2011 University of California Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 06/14/2012

I. Report Overview

1. Executive Summary

The University of California Division of Agriculture and Natural Resources (UC ANR) is the major land grant arm of the University of California, part of the nationwide public university system "built on behalf of the people" (Abraham Lincoln). The Agricultural Experiment Station (AES) was established to develop cutting-edge research information that can be applied to solving real-world problems in agriculture and natural resources. Cooperative Extension (CE) was created as a cadre of academics housed in local communities to translate and test research findings for practical, local solutions. ANR is unique in its three way partnership with federal, state and county governments to provide these local and statewide research and extension programs that address the critical issues of California. Through its partnerships and collaborations, UC ANR is able to leverage its resources to increase its ability to address these issues.

Within UC, ANR's mission is to:

- Maintain and enhance connections that fully engage UC with the people of California
- Achieve innovation in fundamental and applied research and education that supports sustainable, safe, nutritious food production and delivery systems
- Economic success in a global economy
- A sustainable, healthy, productive environment
- Science literacy and youth development programs

AES faculty members conduct research and teach in four colleges/school on the Davis, Berkeley and Riverside campuses. Nine research and extension centers (RECs), located in a variety of ecosystems across the state, provide a core research and extension base. Six statewide programs focus on specific issues that engage ANR academics and UC faculty from all the other campuses, allowing integrated teams to work on complex issues that need multidisciplinary approaches.

The AES has nearly 700 academic researchers, most of whom also have professorial appointments representing dozens of scientific disciplines. Cooperative Extension, the principal outreach arm of the Division, comprises academic appointees attached to campus departments as CE specialists or county offices as CE advisors; there are about 130 specialists and 200 advisors.

FY 2011

The Division continued to tackle the cuts resulting from California's enduring state budget crisis. ANR's budget reduction decisions aimed to reduce administrative overhead while focusing ANR programs and people on the future through our Strategic Vision. The resulting restructured organization is responsive to the needs articulated in the Strategic Vision and represents a strong administrative and programmatic platform for the future. Given more budget cuts are confirmed for FY 2012, ANR continues to seek alternative ways to support our programs.

After significant discussion internally and with clientele, a new CE model was developed to reduce costs while maintaining the strength of programs. This new multicounty partnership model is to be used, where appropriate, instead of the historic individual county-based administrative units. During FY 2011,

ANR launched its first multicounty partnership, with one CE office serving four counties. Through this effort, ANR established guiding principles to provide best practices for subsequent multicounty partnerships.

The Division's priority continued to be hiring new academics, given ANR staffing is well below optimal levels. ANR released eleven CE advisor positions and five CE specialist positions. In addition for FY 2012, two specialist and seven advisors positions were approved for recruitment and hiring.

During FY 2011, the Division continued to make significant progress toward its Strategic Vision 2025. The Vision identifies multidisciplinary, integrated Strategic Initiatives that represent the best opportunities for ANR's considerable infrastructure and talent to seek new resources and new ways of partnering within and outside the University to find solutions to the issues that will be facing California in 2025. Since FY 2009, ANR has been working on the following four initiatives: 1) Healthy Families and Communities; 2) Sustainable Natural Ecosystems; 3) Endemic and Invasive Pests and Diseases; and 4) Sustainable Food Systems. Guided by the four initiatives' plans, which identified focused areas of inquiry and needed areas of outreach, ANR launched a restructured internal grants program to award $4.46 million over the next five years.

ANR continues to work in all initiative areas in addition to the federal priority areas. For FY 2011, California reports on the following eight Federal Planned Programs:

1. Healthy Families and Communities
2. Childhood Obesity
3. Food Safety
4. Global Food Security and Health
5. Endemic and Invasive Pests
6. Sustainable Natural Ecosystems
7. Sustainable Energy
8. Climate Change

The following narratives describe the FY 2011 program highlights for these Federal Planned Programs.

Healthy Families and Communities

Health and economic issues continue to challenge California families and communities. With 61% of California adults overweight or obese, the rate of chronic disease is escalating. California economy problems continued to hinder families across all income levels, although low-income families, non-white workers, and youth were impacted the greatest. Only 74% of students graduated from high school, less than one-third of Californians have college degrees and only half of residents are homeowners. The future of families and community physical and economic fitness is of great concern.

ANR campus and county-based researchers are addressing local, state, national and even global issues to develop and test prevention and intervention strategies in nutrition and human health; family and consumer well-being; youth development and community-economic areas. ANR CE educators extend knowledge and skills for individuals, families, and communities to make positive change in nutrition, youth development, consumerism, and community-economics.

Under the state-defined Federal Planned Program Healthy Families and Communities, there were seventy two Hatch and Multistate research projects conducted by investigators at UC Riverside, Davis, and Berkeley. CE specialists worked on 24 research and extension projects. CE advisors worked on 263

extension projects, and led nine additional research projects. The following discussion illustrates some of the significant work that was conducted by ANR:

Human Nutrition and Health

Nutrition and health research was numerous and varied from post-harvest process influences on nutrient stability to human molecular nutrition. Long-term studies showed promise in the development of chronic disease prevention mechanisms, including: the discovery of key carbon isotopes in human blood cells and their affect by dietary source and habit; identification of the molecular target for Indole-3-Carbinol, a powerful antioxidant in cruciferous vegetables and its derivatives' usefulness in hormone-related cancers; effects of folate fortification on B12 deficiency related to cancer risk; new tools to study milk and human plasma lipids and health consequences of varying dietary fat composition; identification of a target gene in understanding glucose utilization and insulin sensitivity; and identification of genes linked to renal disease.

Other research promoted a better understanding of how the liver's genes respond to environmental toxins, like pesticides. This new knowledge on the liver-enriched transcription factor (HNF4) not only will inform about how the adult liver functions, but also about how embryos develop, and it has been directly linked to several human diseases such as diabetes, hemophilia and atherosclerosis. The ultimate goal is for the data to be used to help personalize medicine, so that individuals can tailor both their diet and drug treatments to be more effective for them.

Nutrient deficiency studies including Vitamin A, B12, and zinc were associated with malnutrition, fetal/child development, cognitive learning capabilities, and the body's immune system. Results from collective work suggest primary and secondary maternal nutrient deficiencies can be common causes of abnormal development. Maternal alcohol consumption significantly impacts zinc, copper and magnesium deficiencies contributing to Fetal Alcohol Syndrome. On the other end of the age spectrum, research in cognitive changes in adults, influencing health literacy and health, showed that prior knowledge of nutrition mitigates age-related decrements in learning new information.

Extension nutrition education through EFNEP and UC CalFresh effectively reached low-income, high risk adults (33,174) and youth (133,623) in 38 of California's 58 counties. Outcomes included increased consumption of fruits, vegetables, whole grains and low-fat dairy products. One statewide study results indicated classroom nutrition education impacted the school environment as more teachers offered healthier food choices to students at parties and as rewards, encouraged breakfast and physical activity and made healthier personal food choices after participating in the UC program.

Family and Consumer Well Being

AES research topics were diverse and included studies in low-income and rural communities as well as understanding consumer behavior in other income levels. Selected examples are featured. Interactions of individuals, family and community have led to a better understanding of the barriers to partnership stability within rural low-income communities. Photographic imagery tools were developed to assist educators promote health in rural and low-income communities. Development of consumer driven methods for product development and consumption related to product choice was conducted to help manufacturers better understand consumer needs, expectations and behavior obstacles in adopting healthy diets and lifestyles. Another study found consumer purchases were affected by information costs and how foods were labeled. Food safety research included edible films as food wraps/pouches to reduce synthetic plastic films. Lastly, several studies focused on textile research in protective technology for hazardous occupations impacting how agencies considered textile criteria for their employees.

Youth Development

AES faculty's research addressed a variety of youth development issues in order to better understand the complexities of issues youth face in becoming competent, caring adults of strong character who contribute to societal well-being. Studies included negative peer interactions, family and sibling interactions, science literacy, and problem solving. Vocational identity development, job and marital satisfaction and fulfillment in adulthood were found to be related to parental, siblings and social networking relationships and support. Agriculture literacy studies revealed a deeper understanding about the science and technology were not well understood by urban students. Studies of children thinking and problem solving was shaped from social environments and cultural settings. An evaluation of toddlers' motor sequences and variation in different physical settings predicted motor skill development to assist in playground facilities design.

Over 260,000 youth were engaged in research-based programming. The 4-H Youth Development's two curricula focused on water conservation and robotics was published by National 4-H. In celebration of a decade of collaboration between campus and county academics in positive youth development and evaluation, Advances in Youth Development Research and Evaluation from the University of California Cooperative Extension 2001-2011 was published. Among the programs highlighted was "Walking on the Wild Side" honored also as a 2011 Program of Distinction.

Community and Economic Development

Research by AES faculty included: assessment of urban design issues in marginalized communities, especially Latino, multi-ethnic communities and youth; transnational civic engagement focusing on new immigrant political organizations; measurement analysis of effects of various programs on actual female sex workers validating the importance of the HIV awareness programs to establish rational allocation of resources in public health promotion programs; utilizing job networks in areas of scarce employment abroad that may be utilized in rural US areas; and impact evaluation development for community driven programs in reducing world poverty.

A rural economy-wide impact of agricultural and trade reforms found micro and economy-wide effect of policy reforms and how international migration affects agriculture production and welfare in both migrant-sending and receiving counties, how political processes evolved to insure a supply of foreign labor to farms in high-income counties, and the tradeoffs between immigration and technology policies. A local study on environmental justice found increasing relationships between scientists, public agencies and activists provided complementary strategies and shaped environmental justice efforts.

Childhood Obesity

U.S. obesity rates over the past 30 years have escalated. The number of obese adults has doubled; obesity prevalence among children has tripled. The 2009 Pediatric Nutrition Surveillance lists California as one of the states where children ages 2-5 have high obesity rates (17%). California's Fitnessgram (2010-2011 school year) data show that 44% of 5th, 7th, and 9thgrade students were classified at high-risk or needed to improve their body composition. These students also needed to improve or were at risk for failing aerobic fitness standards. Children who are overweight and lack cardiovascular physical fitness are starting out at a disadvantage; they are more likely to suffer chronic diseases such as type 2 diabetes, high blood pressure, and exhibit early warning signs of heart disease (increased cholesterol and triglycerides), before they reach adulthood. Childhood dietary habits and physical activity levels are influenced by a variety of environmental factors such as increasing portion sizes; increasing availability of fast foods, sweetened beverages, soft drinks, and unhealthy snack foods; inadequate parks and recreational facilities; limited access to healthy foods; sedentary activities and advertising of low-nutrient-dense foods to children and their families. Such factors influence behavior choices and ultimately body weight.

Throughout the year, ANR faculty worked with undergraduate and graduate students in nutrition, public health, human development, nursing and education through campus and other local colleges and universities. The goal is to educate future professionals in community settings. The battle of childhood obesity is a multifaceted range of activities from all disciplines to achieve effective societal health changes.

Extension Specialists from the UC Berkeley Atkins Center for Weight and Health and the UC Davis Department of Nutrition Center for Nutrition in Schools, along with AES faculty and county-based academics, utilized a variety of approaches including genetics, clinical studies, applied community research, collaborative and environmental to seek potential solutions and promising practices for childhood obesity prevention.

Five Hatch and Multistate Research research projects focused on childhood obesity were conducted by investigators at UC Riverside, Davis, and Berkeley. CE specialists worked on nine research and extension projects. CE advisors worked on 52 extension projects, and led six additional research projects under the required Federal Planned Program Childhood Obesity. The following discussion illustrates some of the significant work that was conducted by ANR:

Genetics/epidemiology approaches

Genetic research focused on identification of obesity-causing genes to amount and type of dietary fat in mice. Impact from this research included identifying a gene that regulates the appetite by a stimulating hormone. Mice lacking this gene were resistant to obesity caused by a high-fat, high-sugar diet suggesting obesity of children can be influenced genetically.

Atkins Center researchers is leading a five-year multi-campus project to revive and extend a ten-year NHLBI National Growth and Health Study longitudinal, epidemiologic study on the development of obesity and the role of disparities in African American and white girls. Clinical and psychosocial indicators will be measured during the first phase of the study. The second phase will examine obesity as it relates to total sleep time to determine if over the course of adolescence and into young adulthood if sleep duration is associated with the development of obesity independent of race/ethnicity.

Beginning of the lifecycle approaches

The beginning of the lifecycle is a critical time for good nutrition. Campus and county-based studies and nutrition education included at-risk clientele during pregnancy, breastfeeding and infants, preschoolers and kindergarteners. Breastfeeding has been shown to protect against obesity. A county-based academic, board certified in lactation, worked with centers to extend education to health professionals to better support young, low-income mothers. A five-year study is being conducted by campus researchers to examine life experiences and compare maternal weight during and after pregnancy to the development of maternal and child obesity. Results will assist in better understanding factors associated with intergenerational obesity.

Feeding practices of Latino mothers with children ages 1-3 were examined in two groups at low or high risk of childhood obesity based on birth weight and the mothers' history of gestational diabetes. The outcomes from this study facilitated a collaboration of multiple campus researchers and ANR county faculty for a new five-year study in a rural Mexican-heritage community. Preschool and kindergarten education projects took place in over one-third of California's 58 counties where teachers, parents and children received nutrition education, food demonstrations, and increased access to fresh produce. Results included improved children's willingness to try foods and increased vegetable consumption.

Environmental approaches

How the environment impacts obesity is being addressed by the Atkins Center. A two-year study in environmental and policy solutions for the prevention of obesity and type 2 diabetes is being conducted to assist new researchers with children who are underserved and vulnerable. Center staff is also conducting evaluations for the Alliance for a Healthier Generation Program framework and the USDA Fresh Fruit and Vegetable Program (FFVP). The Alliance evaluation will help determine which schools that can improve the nutrition and physical activity environments for students. Evaluating the FFVP will help determine the effectiveness of introducing children to fresh fruits/vegetables and provision of healthier snacks.

Family-centered curricula used in schools and communities targeting 9-12 year olds, included Let's Eat Smart & Play Hard Together (LESPHR) and Healthalicious. Both curricula teach the child and adult parent/caretaker at the same time. Research results on LESPHT suggest the dyad approach effective in sweetened beverage reduction, increased physical activity, and eating more fruits/vegetables. Follow-up of participants completing the class showed 95% of program participants continued to integrate skills learned with their family and friends.

Gardening provides access to healthy food and physical activity. Children are more likely to try foods that they have helped to grow or prepare. Community and school gardens involved many diverse partnerships. Campus researchers utilized Farm to School methods in a multi-component, school -based intervention with fifth-graders. After testing materials, methods and tools the research program will be launched. Campus and local ANR researchers' explored a Farm to WIC program connecting small farms to WIC vendors; testing in the second year of this study showed WIC participants learned new information about produce preparation, storage and nutritional value. ANR nutrition academics are working with Master Gardeners in school and community gardens to integrate nutrition and cooking with gardening in urban and rural communities. A county academic assisted a small town to revitalize their failing farmers market to create a meeting place for families and farmers, increasing access to local produce. ANR researchers partnered with their college graduate psyhcology department to study psychological benefits including self-efficacy of school gardening.

Summer programs offered unique research collaboration between parks and recreation centers, campus and county researchers. A six-week structured lifestyle's fitness program of physical activities combined with nutrition education targeting low-income, overweight/obese youth and their parents resulted in a significant decrease in waist circumference, increased family physical activity, menu planning, and increased consumption of lower-fat, healthier foods. A collaborative city-residential summer program for families showed waist loss circumference and decreased cholesterol and glucose levels.

ANR is launching two, four-year studies to study campus-community childhood obesity prevention strategies. The first will be a multi-component, school-based approach to support regional agriculture, and promote healthy behaviors. The second study focuses on a community-wide intervention to surround the child with consistent messaging.

Food Safety

Food safety issues continue to be the primary and most important concern for all of California's agricultural industries that produce commodities for human consumption. Sensitivity to these critical concerns has been heightened by national outbreaks of foodborne pathogens on cantaloupe, sprouts, leafy greens, and other commodities. ANR worked to develop and extend farm production practices to control contamination of foods from microbes, toxins, and chemicals and to understand the biology of food contamination.

Both campus- and county-based academics with ANR continue to focus on research and extension activities in the area of food safety. ANR food safety efforts are notable for covering a wide range of California commodities (processed foods, fresh-cut products, dairy cows, poultry, beef products, seafood, leafy greens and other vegetables, tree nut crops, melons and other cucurbits, strawberries and other fruits) and addressing the need for both basic and applied research.

ANR academics have worked extensively to collect, centralize, and organize the great volume of food safety research and extension information that exists. Databases, websites, guidelines, short courses, workshops, presentations, certification trainings, and other extension and outreach efforts have been created to provide clientele with needed information on understanding and dealing with foodborne pathogens. Such information has increased the knowledge base of clientele and helped clientele, such as beef producers and small-scale strawberry growers, improve quality assurance programs. ANR personnel are providing leadership and expertise to statewide food safety research and outreach programs such as the Western Institute for Food Safety and Security (WIFSS) and Western Center for Food Safety (WCFS). The information generated by these programs is delivered to a diverse audience of ANR clientele, including farmers, processors, regulators, public policy makers, agricultural commodity boards and organizations, consumers, and the public in general. The needs of under-served groups are also addressed; for example, food safety knowledge trainings were completed for Hmong- and Spanish-speaking strawberry growers, with presentations and printed materials translated into their respective languages.

Thirteen Hatch and Multistate Research projects with a food safety focus were conducted by investigators at UC Riverside, Davis, and Berkeley. CE specialists worked on 20 research and extension projects, and CE advisors worked on 41 extension projects under the required Federal Planned Program Food Safety. The following projects illustrate some of the most significant types of work that is being conducted by ANR:

Biology of Pathogens

Basic, foundational research is needed to further our understanding of the biology of these pathogens and the mechanisms by which they cause human diseases. ANR researchers are studying how pathogens respond to and defend themselves from stress factors, how pathogenic bacteria survive in the environment, how E. coli and other pathogens infect animal and human hosts, and how foodborne pathogens attach themselves to the surfaces of fruits and vegetables.

Contamination from Farm to Fork

Other ANR studies are dealing with applied food safety questions that face producers of food commodities. Researchers are evaluating nutritional programs for cattle and the impact of such regimens on carcass quality of the cattle and shedding of fecal pathogens. Extensive post-harvest research of both intact whole and fresh-cut fruits and vegetables seeks to understand the dynamics of product shelf life, contamination by pathogens, and persistence of foodborne agents on such commodities. Findings in this very broad research area will enable clientele to improve handling procedures for intact and fresh-cut fruits and vegetables, nuts, meat, poultry, and seafood. Improved methods of pathogen exclusion, control, and elimination will also be possible.

ANR food safety activities have national impacts. ANR is involved in a number of inter-state research and extension projects in food safety. For example, the University of California collaboration with the Universities of Florida and Georgia is evaluating practices to improve handling and treatment of nuts so as to reduce contamination risks from Salmonella. When Colorado cantaloupes were found to be contaminated with Listeria, ANR academics with experience in melon food safety research were called upon to contribute to the national discussion regarding this outbreak.

Some unique ANR projects involve collaborations between campus-based researchers and county-based CE advisors in which field studies are conducted in real farm situations. These projects evaluate survival and population dynamics of foodborne pathogens under commercial agricultural settings and can potentially provide a more realistic glimpse into how these organisms persist and are moved in the field.

Environmental Concerns

ANR is also participating in food safety studies that involve the environment, ecological issues, and water quality. Researchers are determining how Cryptosporidium, Campylobacter, E. coli O157:H7, Salmonella, and indicator bacteria move from animal or crop agricultural areas into run-off surface and sub-surface waters. Findings obtained here will enable researchers, managers, and policy-makers to better devise measures to protect such water resources.

Global Food Security and Health

Projected population growth, widespread poverty and declining agricultural productivity within the context of climate change create an urgency to increase food production in ways that are more efficient and sustainable. Food security is both a national and global issue. In 2008, the farm gate value of California agricultural products represented 1/8th of total U.S. output; California is a major contributor of nutritious fruits, nuts, vegetables and dairy products to the national and global food supply. California agriculture, therefore, plays a vital role in providing an abundant source of safe, nutritious, and remarkably inexpensive food for its residents, the nation, and the world. Despite California's success as an agricultural producer, however, food insecurity currently affects more than 15% of California households and California agriculture faces unprecedented challenges to its sustainability, including climate change, water, regulation, labor, invasive species, urbanization, and other factors.

Only a multidisciplinary approach can effectively address the severe challenges food insecurity presents to social justice and the California economy, and the dangers that declining agricultural productivity present to national and global food security. Part of the solution lies in increasing the productivity of agriculture, and also in making agricultural products more accessible to consumers, especially those who lack adequate access to healthy fruits and vegetables.

ANR scientists have played a key role in both increasing agricultural productivity and access to healthy food. ANR is helping to introduce new crops and enterprises and developing new uses for existing crops and animals. ANR works with producers to improve the nutritive value of California commodities. California agriculture benefits by the value added to its commodities and its competitive advantage in national and international markets. ANR also works with producers and communities to increase access to California products through new kinds of distribution models and by creating new markets for small and local producers (including programs such as farm-to-institution and Community Supported Agriculture: CSA). Agriculture's enhanced economic viability - through increased productivity and enhanced access - improves the quality of life, human health, education, and other services in both rural and urban California and contributes to the growth of the state's overall economy.

Two hundred and thirty eight Hatch and Multistate research projects with a focus on agriculture were conducted by investigators at UC Riverside, Davis, and Berkeley. CE specialists worked on 87 research and extension projects. CE advsiors worked on 499 extension projects, and led 86 additional research projects under the required Federal Planned Program Global Food Security and Health. The following projects illustrate some of the most significant type of work that is being conducted by academic and non-academic personnel located in county extension offices, the three ANR campuses, several Research and Extension Centers, and USDA facilities in collaborative efforts:

Animals and Their Systems

Research on management systems to improve the economic and environmental sustainability of dairy enterprises is producing data that will be used to develop tools to enable dairy producers to maintain overall sustainability by increasing profits and meeting environmental regulations.

Applied research on animal behavior and welfare developed animal behavior measurement techniques to assess on-farm welfare challenges. Alternative management strategies, with a focus on improving animal welfare and reducing losses in poultry production, were evaluated.

Research on Avian Erythroblastosis Virus in chickens aims to identify possible approaches to suppress this virus-induced disease. The resulting new knowledge will allow improved prevention and treatment of cancer in poultry, in other agriculturally important animals, and in companion animals.

Plant Production and Protection

UC researchers are investigating the post-harvest biology of fruit, determining genetic and biochemical mechanisms governing the loss or retention of fruit quality after harvest. This research will enable UC scientists to help producers develop or adapt post-harvest strategies and technologies to improve quality and market competitiveness of emerging production systems, including organic, local and small-scale. A second project looks at enhancing the post-harvest quality of fruits with reduced dependence on chemical treatments.

Research on chemical and cultural practices as alternatives to methyl bromide fumigation for vegetable crop production has demonstrated to growers the efficacy of key soil fumigants applied under retentive tarps. Thus, they can make informed decisions to enhance crop productivity and reduce fumigant volatilization to the atmosphere (reducing production costs and the use of fumigants, thus contributing to a healthier environment).

Research on wheat germplasm resulted in the development of new varieties with improved disease resistance and end-use qualities adapted to different California environments. These are publicly available and are being used extensively by California growers, and as parental lines in other public and private wheat breeding programs. Other research focuses on making genes present in wild relatives of wheat more accessible for the improvement of wheat varieties. These projects are especially significant to the global food supply, as wheat is one of the two crops that feed the largest number of people worldwide.

High-quality seeds are needed to produce food, fiber and fuel, often for plants bred for improved yield and nutritive or end-use value. Research focused on the following: identify and characterize biophysical, biochemical, genetic and environmental factors regulating or influencing seed development, germination, vigor and dormancy; determine and model the biotic and abiotic factors affecting seed germination, seedling emergence and establishing of sustainable populations in natural and agro-ecological systems; and develop, evaluate and transfer technologies to assess and improve seed and seedling quality, health, performance, utilization and preservation. Among other results, the researchers have characterized a major quantitative trait locus (QTL) associated with the ability of lettuce seeds to germinate at high temperatures. These findings could also be applied to control weeds or to enhance crop emergence and have significance when considered within the context of climate change.

Research on enhancing biodiversity in agro-ecosystems, to improve pest regulation and sustainable production, found that crop diversification is a key strategy to sponsor the internal regulation of important arthropod pests with a minimum of externally derived pest control inputs. Habitat management techniques are proving to be an attractive and effective strategy for organic wine producers to complement their

ecological pest management schemes, resulting in reduced pesticide usage and the enhancement of biodiversity.

To improve the sustainability of pollination services for agriculture, research was conducted to assess and enhance the contributions of native bees to agricultural pollination. This research is still in the early stages, but preliminary lists of plant species that support native pollinators have been developed. The information is being shared with Natural Resources Conservation Services and NGO conservation organizations within California for their habitat restoration efforts. Additional research on pollination by insects is encouraging farmers and gardeners to put bee-friendly habitat into practice, using guidelines developed by UC researchers.

Agricultural Economy

Research was conducted to examine the impacts of immigration on the competitiveness of agriculture in California and the U.S., the economic status of farm workers and their families, and the viability of agricultural communities with large farm worker populations. Among other outcomes, statistical information gathered explains how immigration, trade and other policy changes are likely to affect the U.S. farm labor market.

Alternative agrifood movements have created new models to address problems in the relationship between agriculture, environment and society, including food scares, increased concentration of ownership of the means of food production and distribution, loss of farmland, decreased proportions of the food dollar going to farmers, and financial barriers to entry for young people wanting to farm. These new networks link consumers, producers, and the environment. Community supported agriculture (CSA) stands as an important social and economic model. Data collection on CSA operations in the Central Valley and surrounding foothills has been analyzed and shared to inform discussion between CSA farmers, the Community Alliance with Family Farms (CAFF), and state regulatory agencies that oversee food and agriculture. The findings are helping to inform definitions of CSAs within direct marketing rules and food safety regulations, which will impact growers.

Agriculture and Natural Resource Management

Research on water management for sustainable agricultural development sought to estimate water demand for cropping systems; compare cropping systems based on total water required for irrigation; evaluation climate change impact on water consumption by agriculture; and evaluate production and water resource management risks associated with climate change. As a result, the SIMETAW program was developed to help water planners and researchers improve their long-term estimates of net crop water requirements. The SIMETAW program can simulate many years of weather data from monthly climate data, and estimate reference evapotranspiration and crop evapotranspiration with the simulated data, which allows one to investigate how climate change might affect water demand.

Research was conducted to improve irrigation and nutrient inputs efficiency in vegetable production. As a result irrigation and soil fertility guidelines to improve yield and production efficiency in the processing tomato industry were developed. These identify inputs that either are not needed or that could be replaced by less expensive options. A further impact is that the success of this vegetable cropping system has encouraged the California Strawberry Commission to participate with UC researchers to develop a grower education program for environmental stewardship.

Endemic and Invasive Pests and Diseases

California's pests pose risks to the state's economy, trade, agriculture, natural resources, public

health, and the environment. Pests and pest management activities are very diverse and extensive given California's moderate climate coupled with the state's diverse land resources and land uses. Pests, including arthropods, plant diseases, weeds, nematodes, and vertebrates may cause economic and health impacts to plants, animals, and humans.

Research and demonstration activities related to pest management focused on development of basic and applied knowledge, as well as products to help develop integrated pest management strategies that are effective, economical and environmentally responsible and support public health. Researchers work to understand pest biology and ecology, improve methods of pest detection and monitoring, understand pest genomics and interactions with host plants, breed for pest resistance, develop novel pest management techniques including biological control, improve application technology and delivery, and develop predictive models for pest infestation and damage. Researchers have developed many practical, sustainable IPM programs to manage endemic and invasive pests.

One hundred and seventy four Hatch and Multistate research projects with pest management focus were conducted by investigators at UC Riverside, Davis, and Berkeley. CE specialists conducted 72 research and extension projects. CE advisors worked on 364 extension projects, and led 74 additional research projects under the state-defined Federal Planned Program Endemic and Invasive Pests and Diseases. The following are notable examples from the wide variety of projects conducted during FY 2011 that impact agricultural production, quality of our natural resources, and Californians' quality of life:

Environmentally Safe Management of Endemic Pests

Codling moth has long caused significant damage annually to California pear and walnut crops. Partnerships of UC Cooperative Extension advisors and specialists, AES scientists, and USDA-ARS scientists have developed "puffers" as a practical way to apply pheromones for mating disruption of codling moths and reduce environmental risks of pesticides. To reduce a grower's risk that pheromone disruption would fail, the group developed monitoring protocols to help growers determine when the pheromone confusion technique requires supplemental pesticide sprays. As a result of concentrated outreach and demonstration to Central Valley growers and consultants, use of the practical "puffers" has increased mating disruption in walnuts to more than 15% of orchards. Similarly, more than 95% of pear growers are using the environmentally friendly puffer pheromone dispensers to manage codling moth.

Quick Response to Invasive Pests

Introduction of a new damaging pest into an IPM-managed crop system presents the challenge of eliminating or managing the new pest without disrupting a working IPM system. An excellent example is the response to the recent detection of European grapevine moth, a recently invasive species in Napa County vineyards that has potential to cause great economic loss to the grape industry in California. In response to the detection of the moth, a cross-disciplinary team of UC Cooperative Extension advisors, specialists, and AES faculty researched the pest biology and control strategies that would minimize use of broad-spectrum insecticides; developed outreach materials in several media that included web, print posters and brochures, video, and online training; held workshops for growers and consultants; and collaborated with regulatory agencies to make sure that science guided policy decisions and responses to the pest situation. Efforts were aimed at containing the pest and identifying low-impact control strategies to avoid creating damaging secondary pest outbreaks and disrupt the existing, overall IPM program for grapes. As EGVM was found in 9 counties, outreach programs were put in place, with an overall reduction in subsequent finds.

Detection, Characterization and Management of Pathogens

Early diagnosis of plant disease is critical to limiting damage by plant pathogens since symptoms

often develop long after the plants have become infected and there are few management practices that can cure disease. California scientists researched viruses, bacteria, and fungi on subtropical and temperate fruit crops such as avocado, citrus, stone fruits and tree nut crops; lettuce, tomato, and other vegetable crops; and ornamentals. They developed detection tools that helped to identify new pathogens, conducted tests to assess the threat of these new and endemic species, and studied pathogen biology. To reduce disease, scientists studied the mechanisms of pathogen transmission by insect vectors that included glassy winged sharpshooter, whitefly, Asian citrus psyllid, western flower thrips and others; continued work on genetic strategies affecting pathogen-plant interactions; and developed sustainable management strategies such as biofungicides, suppressive soils, and models that can be used in an integrated pest management program to predict disease development.

An example of these efforts was the response to the appearance of a new celery disease in 2007 in coast California. UC researchers, CE advisors, the California Celery Board, USDA and CDFA collaborated on the problem. They determined the pathogen was the Apium Virus Y. They surveyed for the disease and found it in parsley and cilantro, as well as the poison hemlock weed, which acts as a reservoir for the disease and aphids were determined to transmit it. Growers were advised to remove the poison hemlock, move celery plantings to new areas, plant resistant cultivars and apply sprays to reduce aphids, resulting in the current significant reduction of ApVY incidence.

Nematodes and other Soilborne Pathogens

Nematodes and other soilborne pathogens can stunt plants and cause stand and yield reduction in crops and damage commercial turf. Numerous researchers have been studying plant-parasitic nematode and root pathogen biology and possible management methods that include beneficial microorganisms, pathogen-suppressive soils, soil amendments, and seed coats to develop IPMstrategies. The specific tactics take into account environment and genetic variability, and combinations of control tactics are being assessed as sustainable, safer alternatives to traditional field fumigation. Researchers are determining nematode fitness and adaptability relative to environment, host plant, host plant resistance, and biological control agents, looking in particular at the impact of variations in these factors on effectiveness of control measures. Several UC laboratories are studying nematode suppressive qualities of soils and biomaterials.

Challenges of the Agricultural-Urban Interface

With farms near urban areas, issues related to pests and pesticides can become contentious between growers, residents, and local governments. Through research and extension projects, scientists are solving California agricultural-urban interface issues. House flies and stable flies in commercial dairies directly impact livestock, but theirpresence as a byproduct of confined animal operations is a nuisance to nearby residents. UC researchers aimed to reduce fly populations and the resulting nuisance to residents by developing more information about fly biology and improved IPM tactics for dairies. They developed a new, practical, and efficient method for growers to use in monitoring changes in fly populations to determine whether treatment is warranted, and identified characteristics of fly behavior that can make baits more attractive to the flies while combating fly resistance to the pesticide in the bait product.

For example, scientists with UC Cooperative Extension, UC Riverside, and San Diego County addressed a problem for local residents caused by eye gnats, small flies that are exceptionally bothersome to humans and domesticated animals. They have become a serious issue in areas of the United States where organic farms provide an excellent environment for gnat reproduction. Local residents have been extremely bothered by the gnats, and local governments have passed regulations on farmers to mitigate the problem. The UC team conducted research on possible solutions, developed a nuisance prevention plan, and spent considerable effort on outreach, education, and communication to create a compromise between agricultural and community interests. By integrating four major control methods developed by the scientist team, farmers have reduced the fly populations by 99%. Work continues to reduce populations

even further. Given this nuisance agricultural pest is found worldwide, UC's solutions to California's endemic pest problem could be extended further in the future.

In another study, scientists studied the relationship between mosquito populations and vegetation management of natural and man-made wetlands areas. Through these studies, they have determined the efficacy of existing best management practices, improved management of mosquitoes through release of a native fish species that feeds on the mosquito larvae, and studied the patterns of inheritance of resistance to Bacillus thuringiensis insecticides to improve their efficacy and reduce their use.

Sustainable Natural Ecosystems

The term "Natural Ecosystems" refers collectively to the forests, rangelands, and wetlands. In California, these lands are typically upstream or downstream of intensively managed agricultural and residential lands. They provide valuable goods and services to society but their ecological diversity and mixed ownership increase the complexity in regards to ensuring their sustainability. Population growth, climate change, land use change and fragmentation, and limited science literacy about these ecosystems are adding to the challenges. The goal of the ANR Sustainable Natural Ecosystems Strategic Initiative and Federal Planned Program is to have a large positive impact on California's natural resource ecosystems.

One hundred and fifty six Hatch and Multistate research projects with a natural resources focus were conducted by investigators at UC Riverside, Davis, and Berkeley. CE specialists worked on 76 research and extension projects. CE advisors worked on 283 extension projects, and led an additonal 23 research projects under the state-defined Federal Planned Program Sustainable Natural Ecosystems. Projects are being conducted in several areas that are essential to sustaining California's natural resources. A few illustrative examples of the breadth of projects along with selected examples of high impact programs follow:

Range Resources Management

California's extensive grasslands are composed of mixes of annual grasses, perennial grasses, and well as various invasive or weed species. Streams, other water bodies, shrubs and scattered trees add to the complexity. At the basic ecological process level, ongoing research is exploring the competition and productivity of these systems so that both grazing management and restoration efforts will be more effective. Where cattle and sheep grazing are practiced, new research is suggesting new ways to fine tune livestock control practices such as riparian fencing and herd movements to attract livestock away from environmentally critical areas or into areas targeted for grazing. A recent ANR publicationdocuments the practices that can be applied in California and other western states.

Aquatic and Terrestrial Wildlife Conservation

The viability of fish populations that bisect agricultural and urban areas as freshwater flows to the ocean is a key integrating factor across all natural ecosystems in California. Research was conducted and publications produced to develop a better understanding the factors controlling the resilience and persistence of fish populations in both systems flowing through small streams into the San Francisco Bay as well as into larger rivers flowing into the California Bay-Delta.

Forest Resources Management

In the woodlands and forest areas that are typically upslope of the grasslands, research and publications defined how improving wildlife habitats can be integrated into the land management practices

of private land managers. In addition, new tools are being developed to identify the occurrence and potential spread of two new sources of hardwood tree mortality, Sudden Oak Death (SOD) in Northern California and Golden Spot Oak Borer (GSOB) in Southern California. The crucial role of water use by forests and the remaining runoff into streams and rivers is also a focus since the impacts of droughts and changing precipitation patterns will have on fish populations and the water supplies that are moved around the state to support agriculture and urban areas.

Wildfire Management and Control

Another important issue for natural ecosystems on the residential fringe is addressing the seasonally high level of wildfire risk that can often be the single largest type of resource management expenditure in these areas. Educating homeowners about fire-safe landscaping is one of the most effective ways to increase fire safety, reduce costs associated with property destruction, and reduce the risk of erosion and debris flows after a fire. The UCCE Sustainable and Fire-Safe (SAFE) Landscapes program focuses on helping wildland/urban interface homeowners create and maintain fire-safe landscaping around their homes and neighborhoods. Combined with the statewide efforts to educate homeowners through online tools to ensure that all homes are more resilient to any fire risks, these efforts can significantly reduce the costs and losses that result from the interaction of residences and seasonal wildfires.

Understanding and Valuing Ecosystem Services

Across all of these natural ecosystem-based activities, UC ANR professionals worked with the institutions that combine private and public interests, and have the goal of developing clearer linkages between the provision of ecosystem services and the necessary financial remuneration to continue effective resource management.

Sustainable Energy

Public policies that add the production of biomass feedstocks for power and fuel to the existing objectives of agricultural production systems have affected the work of many ANR scientists and extension advisors. Both purpose grown crops and crops residues are used or will be used for these purposes. Adding new demands on agricultural systems alters demands for agricultural products, and results in new public scrutiny about the efficiency and sustainability of biomass production systems. The greenhouse gas intensity of farming in general is a new concern that originates in part with the need for biomass feedstocks for energy and carbon accounting associated with crop production. California also has large amounts of woody biomass from forests, and some high moisture biomass from its extensive food processing industry. Forestry residues currently are used for biopower production and this use could increase with favorable policies. Interest in biogas production from these residues and from dairy manure is increasing.

At UC Berkeley there is the Energy Biosciences Institute (EBI), which is part of a unique partnership with three other research partners, the Lawrence Berkeley National Laboratory, the University of Illinois at Urbana-Champaign, and British Petroleum (BP). It was created in 2007 by a 10-year $500 million grant from BP. EBI applies knowledge of biological processes, materials and mechanisms to the energy sector. More than 300 researchers, including AES faculty, study the complete bioenergy life cycle, beginning with the feedstocks, continuing through biomass depolymerization, and ending with finding a more effective fermentation process. At UC Davis there is the Bioenergy Research Center, which is a coalition of over one hundred campus research scientists from a wide range of disciplines, seeking to advance the development of bioenergy: heat, power, and biofuels from biomass as part of their work, and the California Biomass Collaborative which is part of the statewide California Renewable Energy Collaborative, and includes more than 500 members from government, industry, academia, and environmental organizations.

Fifteen Hatch and Multistate research projects with a sustainable energy focus were conducted by investigators at UC Davis, and Berkeley, and Riverside. CE specialists and advisors worked on ten research and extension projects under the required Federal Planned Program Sustainable Energy. Projects are being conducted in several areas that are essential to sustaining California's energy resources; a few illustrative examples follow:

Biofuel Crops

Biofuel crops must be produced as efficiently as possible in order to not compete with food crops on prime agricultural lands. They will only be grown if they improve cropping system performance in the state's diverse farming regions. UC research was conducted to evaluate potential biofuel feedstock crops for California, including sorghum, switchgrass, Miscanthus, oilseed crops, sugarbeets, and sugar cane in the Imperial Valley. Many of these crops were discussed at the 2011 Alfalfa, Forages, and Biofuels Field Day at the UC Davis and UC West Side Research and Extension Center (REC). Cellulosic biofuels must meet the criteria of high yield, high efficiency of carbon fixation, and quality of conversion.

One research project focuses on perennial biofuel grasses and forage crops that might be produced in California. The objectives are to discover and report principles of forage and biofuel (phytomass) crop management, directed towards optimizing the yield, forage quality and economic viability of these crops, and to minimize potential deleterious environmental effects under western irrigated conditions. Another research project specifically evaluated the response of potential cellulosic biofuel crops to water. These studies provide the basis for understanding agronomic production techniques as well for economic costs and life-cycle greenhouse gas emissions. This new knowledge improves stakeholders' ability to make science-based decisions on production scenarios for biofuels.

Several CE specialists and advisors are working on new crops, which include new winter annual oilseed crops, sweet sorghum and sugarcane. Other research was conducted on the use of hybrid poplars and other species as biofuel feedstocks across California and the Pacific Northwest. One research project examines the potential for poplar as a key feedstock species for cellulosic biobutanol production in California, and across the Pacific Northwest. In contrast to herbaceous biofuels species, poplar has advantages in harvest and storage.

Woody Biomass

Woody biomass is a broad, generic category that encompasses all woody materials that accumulate to problematic levels. This includes material from forest, agriculture, and urban environments. Biomass from trees, shrubs, and other woody plants is found in timberland, woodland, rangeland, orchard, and urban tree environments. It includes the woody material generated from forest thinning, fuel reduction in wildfire hazard areas, storm damage, catastrophic forest mortality (drought and insect related), as well as the debris from orchard and urban tree maintenance. Woody biomass also includes the woody residue and waste stream of manufacturing, construction, demolition, transportation (pallets and shipping containers), and many other wood use activities. This woody material is recognized to be a potential feedstock to produce bioenergy either directly through thermochemical processes such as combustion or indirectly by producing intermediary fuels such as syngas, alcohol, or wood pellets that can be used to produce electricity in steam driven generators or as transportation fuels. A variety of research and extension projects explored woody biomass as a bioenergy opportunity.

A CE specialist project analyzed the potential linkage between bioenergy, fire risk reduction, and global trade in wood products. This included multistate work with the US Forest Service, as well as private forest land owners and businesses that purchase supplies. The objective is to develop integrated decision support system. The potential impact is to increase the opportunity for private forest land owners to

participate in future markets for bioenergy. Lastly, a CE advisor project is designed to evaluate the evolving woody biomass technologies for producing bioenergy and to develop knowledge and disseminate information to community leaders, entrepreneurs, business developers, investors, and community decision makers. To this end, workshops were held and factsheet were written and extended. There was significant economic success achieved through providing technical assistance that helped small busyness acquire over $4.5 million during the past four years.

Economic Potential and Policy Related Issues

Research was conducted on economic and policy issues associated with bioenergy. For example, UC ANR's BioEnergy Workgroup together with the California Biomass Collaborative has an ongoing cooperative project to model the economic potential for biofuel crop adoption on California farms. UCCE advisors from counties throughout California continue to help gather economic and farm performance data useful for this effort. The model is being used by several potential biofuel businesses to estimate feedstock availability, location and cost. Work also continues on the development of California and national biorefinery siting models. The feasibility for both stand-alone and integrated biorefinery operations as influenced by resource supply distribution and facility scale is part of these analyses. A project using the EPIC and SWAP models is being carried out for the California Air Resources Board to estimate greenhouse gas emissions from agriculture, and the economic effects of potential regulations.

Climate Change

California is characterized by a complex physical geography, tremendous natural biodiversity, and a growing and diverse population. As the climate changes, and our urban footprint continues to grow in the next century, the interplay between climate change and urbanization will increase the challenges faced by California citizens, local and state government officials, and planners. For example, the state's water resources are predicted to be vulnerable through changes in snow pack, timing and amount of precipitation, and increasing urban demand. More weather extremes, such as an increased frequency of heat waves are expected. Climate change is also anticipated to increase the risk of catastrophic wildfire. Invasive species are likely to increase in range and impact on natural resources, as climate change creates new habitats and niches and eliminates existing ones. In addition, the state's coastal and bay areas are at risk of flooding due to a rising sea level. The projected increases in human population density and changes in climate highlight the need to coordinate regional planning efforts to promote conservation while also meeting the needs of all Californians for reliable and clean water, healthy communities, and food.

Fourteen Hatch and two Multistate research projects with a focus on climate change were conducted by investigators at UC Riverside, Davis, and Berkeley. CE specialists and advisors worked on 13 research and extension projects under the required Federal Planned Program Climate Change . These projects are conducted statewide across several research domains, and involve modeling, empirical experimentation, and more narrative approaches to understand climate impacts and adaptations across numerous sectors of California's natural resources, economy and population.

Models of a Changing Climate

Research was conducted to help explain the nature of the complex processes which control global and regional climate and climate change across many domains. Model approaches include Baysien and statistical models; predictive and biogeographic models; process-based meteorological models; and economic models. Model targets include atmospheric dynamics in aerosol concentrations and types; forests and fire; agriculture; and energy. For example, on- study modeling California wildfires shows that seasonal high temperature anomalies are the factor most strongly associated with shrub land fire, while

large-scale climate circulation patterns (e.g. El Nino) is also strongly associated with fire probabilities. They point to preliminary evidence that properly implemented fuels treatments - those which thin smaller-diameter trees and remove activity fuels, and preferably reduce surface fuels using prescribed fire -- reliably reduce fire severity in all but the mildest conditions and the most extreme fire conditions. ANR academics are working closely with such agencies as the California Air Resources Board, National Aeronautics and Space Administration (NASA), California Sea Grant, and the National Oceanic and Atmospheric Administration (NOAA).

Experimental/Empirical Studies

Detailed data on baseline conditions of soils, species and atmospheric constituents are being gathered in studies designed to understand potential impacts and adaptations of systems to changing climate. For example, measurements of climactically important trace gases, such as carbon dioxide and carbonyl sulfide and carbon monoxide are being used in the establishment of a climate sentinel site on the California coast to assess natural and anthropogenic offshore emissions. Additionally, a database of the baseline biogeochemical, mineralogical, physical and morphological properties of California soils that influence carbon storage, nutrient cycling, biodiversity and regulation of quality and quantity of water supply has been created; experimental manipulation of these soils through amendments will increase understanding of potential impacts of a changing climate on rangeland productivity and other ecosystem services. ANR academics are working closely with agencies such as the U.S. Park Service and U.S. Forest Service, as well as the California Energy Commission.

Response of Native and Important Species

Research was conducted to predict the effects of climate change on vegetation types and species in California. These projects focus on plant trait adaptability (e.g. heritable adaptation), possible range shifts that might occur with a changing climate, and novel statistical models that test the role of climactic factors in determining distributions of California plant species currently, and in the future. These plant studies are critical to understanding possible changes in habitats, and also changes to fire regimes. One study highlights the direct influence of a warming climate on plant species: plant response in a field manipulation experiment was driven not by inter-specific interaction, but rather by direct responses to increased temperature. ANR academics are working closely with agencies such as the US Forest Service Region 5, and other non-governmental organizations, such as The Nature Conservancy.

Economic Futures

The potential impact of climate change on agriculture, the sector of the economy most likely to be affected, remains controversial. Research was conducted to predict the effects of climate change on agriculture from an agricultural economics perspective, by estimating the economic value of management actions such as reduction in greenhouse gas emissions. These projects also explicitly examine the uncertainties associated with such modeling frameworks, and explicitly incorporate adaptation in their models. The possibility of widespread biofuel adoption is also examined, and is discussed further under the Sustainable Energy Federally Planned Program.

Social Dynamics

Research was conducted to look at the possible different impacts of a changing climate across social and ethnic groups throughout California. A book has resulted from some of these efforts that examines ethnicity and environmental value and perception: Black Faces, White Space: African Americans and the Great Outdoors, is soon to be published. ANR academics are working closely with groups such as the Bay Area Open Space Council and the National Park Service.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	276.9	0.0	303.2	0.0
Actual	261.0	0.0	389.4	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

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

2. Brief Explanation

Scientific Peer Review

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

Merit Review

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

At the statewide level, the UC ANR Program Council met almost monthly. It was chaired by the Associate Vice President-Academic Programs and Strategic Initiatives, and included the RECs Associate Director/CE Assistant Director, four Associate Deans, five strategic initiative leaders, and two county-based CE representatives. The Associate Vice President - Business Services and the Director of Communication Services serve as ex officio members. This group coordinates Divisionwide planning and delivery of programs and develops recommendations for allocation of Division resources. The Program Council reviewed all ANR budget proposals, program area budget proposals, and position proposals from a statewide perspective to make specific recommendations on budget expenditures and resource allocation principles. These recommendations were then considered by the Vice President and his Executive Working Group for final allocation decisions.

ANR's strategic initiative leaders and advisory panels are key players in helping the Division meet its goals, by organizing division-wide conferences, developing five-year, statewide strategic plans, and coordinating the internal competitive grants program. During FY 2011, three Strategic Initiative conferences were held.

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

During FY 2011, ANR's competitive grant program proposals were review by ad hoc, technical committees recruited by the Strategic Initiative leaders. The membership of these committees depended on the proposals received and included external experts. After the technical committees, the Strategic Initiative leaders engaged in cross-initiative review to recommend a pool of proposals to be considered by Program Council, which then reviewed those and made recommendations for funding. The Vice President and Executive Working Group make the final decisions on allocations, awarded November 2011.

III. Stakeholder Input

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

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

Brief explanation.

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

Strategic Initiatives Process

To implement the Strategic Vision, the strategic initiative leaders and the advisory panels developed 5-year action plans. Through this process, external stakeholders were consulted to identify the areas where ANR has the opportunity to make a significant, visible difference to the people of California.

UC ANR Strategic Initiative and Program Teams Meetings

The Division's Strategic Initiative and Program Team Meetings were the primary mechanism for accomplishing ANR's high priority research and extension goals through grassroots

leadership. These meetings brought together AES and CE personnel and non-ANR partners to work on emerging and continuing priority issues in Division program areas. ANR workgroups involve external stakeholders in their program planning process and workgroup activities and projects. The involvement of external stakeholders in the workgroups ensures that real world needs are brought to the attention of the Division as programs are planned and implemented. External stakeholders on the workgroups include individual producers, representatives from local community groups, state and federal agencies, industry groups, consumer groups, and colleagues from other higher education institutions.

Formal Advisory Groups

The President's Advisory Commission on Agriculture and Natural Resources met two times during FY 2011. This group identifies informational needs for California's agricultural, natural and human resources interests and advises the President on how the University can best meet these needs through its science-based research, classroom instruction and educational outreach. The members represent 28 business, consumer, youth and government leaders from throughout California and meet twice a year to provide input. The Vice President - Agriculture and Natural Resources participates as a member of this Commission and brings the Commission's advice to the ANR Executive Council, the Division's administrative group charged with Divisionwide strategic planning.

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

Several of the Statewide Programs have external Advisory Councils that met during FY 2011 to review progress and offer recommendations for future program direction.

Commodity Organizations/Marketing Order Boards

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

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

1. Method to identify individuals and groups

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

Brief explanation.

Please see previous Actions to Seek discussion.

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

1. Methods for collecting Stakeholder Input

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

Brief explanation.

Please see previous Actions to Seek discussion.

3. A statement of how the input will be considered

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

Brief explanation.

Please see previous Actions to Seek discussion.

Brief Explanation of what you learned from your Stakeholders

ANR's stakeholders helped identify emerging and continuing priority issues in Division program areas. External stakeholder involvement ensures that real world needs are brought to the attention of the Division as programs are planned and implemented.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
7591512	0	6738791	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	7087406	0	5350326	0
Actual Matching	7087406	0	5350326	0
Actual All Other	85960189	0	235942916	0
Total Actual Expended	100135001	0	246643568	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	504106	0	1388465	0

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Healthy Families and Communities

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		3%	
302	Nutrient Utilization in Animals	0%		2%	
305	Animal Physiological Processes	0%		14%	
501	New and Improved Food Processing Technologies	0%		1%	
606	International Trade and Development	0%		2%	
608	Community Resource Planning and Development	1%		1%	
610	Domestic Policy Analysis	0%		2%	
611	Foreign Policy and Programs	0%		2%	
701	Nutrient Composition of Food	1%		3%	
702	Requirements and Function of Nutrients and Other Food Components	1%		37%	
703	Nutrition Education and Behavior	14%		12%	
704	Nutrition and Hunger in the Population	1%		1%	
724	Healthy Lifestyle	10%		2%	
801	Individual and Family Resource Management	6%		0%	
802	Human Development and Family Well-Being	8%		7%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	2%		4%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	0%		2%	
805	Community Institutions, Health, and Social Services	5%		3%	
806	Youth Development	45%		2%	
903	Communication, Education, and Information Delivery	6%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	33.4	0.0	31.1	0.0
Actual Paid Professional	27.8	0.0	51.3	0.0
Actual Volunteer	767.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
603160	0	517452	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
603160	0	517452	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
9172488	0	31080196	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

2. Brief description of the target 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

3. How was eXtension used?

ANR academics used eXtension to participate in and contribute to many Communities of Practices, to answer "Ask an Expert" questions, and for other general networking purposes.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	144669	0	406220	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	27	147	174

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Classes/Short Courses Conducted

Year	Actual
2011	6680

Output #2

Output Measure

- Workshops Conducted

Year	Actual
2011	5157

Output #3

Output Measure

- Demonstrations and Field Days Conducted

Year	Actual
2011	13

Output #4

Output Measure

- Newsletters Produced

Year	Actual
2011	10

Output #5

Output Measure

- Web Sites Created or Updated

Year	Actual
2011	7

Output #6

Output Measure

- Research Projects Conducted

Year	Actual
2011	81

Output #7

Output Measure

- Videos, Slide Sets, and other AV or Digital Media Educational Products Created

Year	Actual
2011	8

Output #8

Output Measure

- Manuals and Other Printed Instructional Materials Produced

Year	Actual
2011	4

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

18	Low-income adults, participating in EFNEP or CalFresh programs, adopted safe food handling and preparation techniques.
19	Youth, participating in 4-H clubs and other youth development programs, assumed leadership roles in organizations or participated in community affairs.
20	Teachers and students in low-income schools adopted healthy eating behaviors as a result of UC Cooperative Extension CalFresh program.
21	GreenNet collaboration builds social capital , helping to change lives and improve community.
22	4-H Scientists Club program improves youth critical thinking and family dynamics.
23	4-H youth bring their communities together on issues that matter, strengthening their involvement in their communities while addressing local issues.
24	California 4-H Technology Leadership Team improves 4-H participants' technology and leadership skills.
25	Canine buddies program helps youth develop reading skills.
26	Central Coast youth gain engineering and technology skills through the TechXcite program.
27	Youth research partners help gain insight on youth workforce challenges.
28	Evaluation finds California workforce programs succeeding and makes recommendations for improvement.
29	Incarcerated youth exhibit more positive behaviors from working on 4-H and Master Gardeners project.
30	Teens participating in the Money Talks Program improve financial literacy and habits.
31	Teachers are more willing to use new program evaluation tool because the time savings provides more classroom learning time for students.
32	Train-the-trainer program enhances employability of teens and young adults.
33	Better civic engagement strategies engage parents.
34	"Hands-on" science improves youth academic performance and self-confidence.
35	Training for educators in after-school delivery of science, engineering and technology increases understanding, skills, and confidence.
36	UCCE Garden-to-Family program empowers people to feed themselves and their community.
37	Los Angeles elementary students learn how agriculture impacts their lives.

38	4-H, Master Gardeners, and EFNEP School Project Collaboration increases fruit and vegetable awareness.

Outcome #1

1. **Outcome Measures**

Percentage of low-income individuals and families, participating in nutrition and consumer education programs, gaining knowledge of food resource management techniques

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

Percentage of youth, participating in 4H clubs, acquiring leadership and civic skills

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Percentage of youth, participating in 4H club, community, in-school and afterschool educational programs, acquiring planning, problem solving, teamwork and other life skills

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

Percentage of low-moderate income individuals and families, participating in nutrition and consumer education programs, adopting recommended food resource management techniques

Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

Percentage of youth, participating in 4-H clubs, assuming leadership roles in organizations or taking part in community affairs

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Percentage of children and youth, participating in 4H club, community, in-school and afterschool educational programs, increasing their level of science, agricultural and environmental literacy

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Percentage of youth educators and child resource specialists, participating in youth development education programs, gaining knowledge of youth development practices

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	731

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #9

1. Outcome Measures

Low-income children and youth, participating in EFNEP or CalFresh programs, gained knowledge of nutrition.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	21819

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
806	Youth Development

Outcome #10

1. Outcome Measures

Parents, participating in parent education programs, gained knowledge of parenting techniques to promote child development and learning.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	109

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #11

1. Outcome Measures

Youth educators and child care resource specialists, participating in youth development education programs, gained knowledge of youth development practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	116

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #12

1. Outcome Measures

Adults and families with children, participating in EFNEP or CalFresh programs, increased readiness to adopt healthier dietary and lifestyle practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	754

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle
802	Human Development and Family Well-Being

Outcome #13

1. Outcome Measures

Youth, participating in 4-H club, community and afterschool education programs, acquired leadership/civic, problem solving, teamwork, or other life skills.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	334

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #14

1. Outcome Measures

Low income children and youth, participating in CalFresh programs, gained skills to identify healthy food choices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	620

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
806	Youth Development

Outcome #15

1. Outcome Measures

Low-income adults, participating in EFNEP or CalFresh programs, adopted healthier dietary practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	7718

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #16

1. Outcome Measures

Low-income children and youth, participating in Youth EFNEP or CalFresh programs, adopted healthier dietary practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	12182

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #17

1. Outcome Measures

Low-income adults, participating in EFNEP or CalFresh and other nutrition and consumer education programs, adopted food resource management techniques.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	7269

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #18

1. Outcome Measures

Low-income adults, participating in EFNEP or CalFresh programs, adopted safe food handling and preparation techniques.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	23821

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being

Outcome #19

1. Outcome Measures

Youth, participating in 4-H clubs and other youth development programs, assumed leadership roles in organizations or participated in community affairs.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	221

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #20

1. Outcome Measures

Teachers and students in low-income schools adopted healthy eating behaviors as a result of UC Cooperative Extension CalFresh program.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
UCCE CalFresh education targets schools with more than 50 percent of students receiving free or reduced price school meals. (CalFresh is the name of the food assistance program formerly called food stamps.) The program aims to increase fruit and vegetable consumption, increase variety in food choices, and promote healthy lifestyles for youth. Teachers, youth program leaders, and other extenders at the participating sites are trained to deliver UCCE CalFresh nutrition curricula such as Reading Across MyPyramid, Happy Healthy Me, and Eating Healthy from Farm to Fork.

What has been done
UCCE CalFresh in Santa Clara County provides nutrition education curricula to 57 qualifying low-income schools and agencies who reach 4,500 children. CalFresh nutrition educators collect teacher evaluations annually to improve delivery and outcomes of the program. UCCE CalFresh developed a retrospective, web-based teacher evaluation tool as a method for evaluating the effectiveness of their youth nutrition education program. The Teacher Observation Tool (TOT) collects information on teachers' perceptions and observations related to changes in knowledge

and behavior of students and themselves after delivering UC developed nutrition curricula. In 2011, 104 teachers and after-school leaders in Santa Clara County completed the TOT.

Results
Results indicate that at least 86 percent of the teachers and after-school leaders in UCCE CalFresh Santa Clara County report a positive change in their students? food behavior as a result of the program. For example, teachers reported that 94 percent of students learned to identify healthier food options and a majority reported choosing fruits and/or vegetables in the cafeteria or during classroom parties more often by the end of the school year. UCCE CalFresh impacted teachers? behaviors as well with 84 percent of the teachers and after-school leaders reporting their own personal behavior had changed by using the program in their classroom. More than 90 percent of the teachers reported making healthier personal food choices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
806	Youth Development

Outcome #21

1. Outcome Measures

GreenNet collaboration builds social capital , helping to change lives and improve community.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
It is generally agreed that the children of low-income families have fewer opportunities to succeed in today's society.

What has been done
The Neighborhood GreenNet Project is a collaborative project engaging low-income families and their children in small horticultural (green) business startups that utilize cutting-edge computer

technology. Teen volunteers mentor younger children, who in turn help teach their parents such things as how to access information technology to enhance their family gardening projects. By working with these families, the program strives to direct youth toward a path of responsible, self-directed and productive membership in society. GreenNet is a collaboration of the Santa Barbara County 4-H/Cooperative Extension program and the Housing Authority of the City of Santa Barbara. Since 1998, GreenNet has involved more than 550 youth and 350 housing resident families from the City of Santa Barbara.

Results

The majority of the teen participants in GreenNet have gone on to college, and several have elected to major in business, technology, science or science-related fields. These teens said their GreenNet experiences helped them develop work skills and self-confidence. A Family Opportunity Learning Center with a computer lab and Arroyo Gardens garden learning center were developed on housing authority property. Various micro-enterprise projects, including a native plant nursery and a cut-flower project, were launched. In the past, vandalism, including graffiti and intentional damage to landscaping and property, have been a serious problem for the housing authority. Prior to GreenNet, property damage repairs cost more than $60,000 a year, not including the cost of policing the property. After just one year of the program, housing property damage costs had dropped to near zero. This change was attributed by the police and the housing property management to GreenNet.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #22

1. Outcome Measures

4-H Scientists Club program improves youth critical thinking and family dynamics.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Science literacy in the United States is alarmingly low. We are falling dangerously behind other nations in developing a future workforce of scientists, engineers, and technology experts. There was a need to improve science literacy, science processing skills, and issues of family.

What has been done
The Scientists Clubs program was conceived and piloted in San Luis Obispo (SLO) County to address the desire and need to involve youth and adults together in hands-on science. The program utilizes a new model of 4-H club structure that involves adults in a one-on-one (one adult/one youth) basis. Each third- to fifth-grade child attends the twice monthly meetings and field trips with an adult partner. Approximately 1,500 individuals have participated in the program since its inception in late 1995.

Results
Random samplings of participants throughout the years have found that more than half of the children spent more time on such things as observing and experimenting after becoming involved in the SLO Scientists Program; 33 percent of the adults reported an increase in this activity. Two-thirds of the children reported that they "always" or "most of the time" talked with other family members about the activities after each meeting and 95 percent of the adults reported doing so. Half the children reported an increase in talking with her/his adult partner "about things other than science" since joining the program and half the adults reported more talking with her/his child partner. Thirty-six percent of the children and 25 percent of the adults reported an increase in "family meetings to talk things over and solve problems" since starting the program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #23

1. Outcome Measures

4-H youth bring their communities together on issues that matter, strengthening their involvement in their communities while addressing local issues.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Young people engaged in their communities and organizations in meaningful ways are more likely to be civically involved and philanthropically inclined throughout their lives. Youth also have considerable knowledge and energy they can give to better their communities if encouraged to do so. However, society often does not value these contributions and it is a challenge to find or create opportunities to involve youth in authentic and meaningful community roles.

What has been done
4-H Youth Development advisors and staff developed and implemented a "community forums" project to encourage community engagement. A community forum is an opportunity for diverse community members to come together to discuss, not debate, an issue important to them. It requires a trained moderator to keep the group on track and to make it a safe place for community members to voice opinions. It also requires a trained recorder to accurately capture the group's ideas. In-depth trainings taught skills to convene, moderate and record community forums, as well as other group process skills, such as meeting facilitation, working as a team, youth-adult partnerships and evaluation methods. The project was offered at the national level and included teams from 16 states, including California. Collectively, the various California teams reached 211 youth and 85 adults from ethnically diverse and rural populations, including migrant farm worker communities, an academy for foster youth, and a military base.

Results
Following the training, the youth returned to their communities and held forums on such topics as youth violence, the environment, out-of-school activities for youth, and how to recruit more youth to a well-established leadership program. Program evaluations showed that participating youth and adults gained confidence and skills, especially in meeting facilitation, which they successfully used in their communities and in a variety of other settings. Adults increased their awareness of youth's capabilities and youth demonstrated that they could successfully connect with their communities. Communities discussed important issues and increased their understanding of the issues that needed to be addressed.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
805	Community Institutions, Health, and Social Services
806	Youth Development

Outcome #24

1. Outcome Measures

California 4-H Technology Leadership Team improves 4-H participants' technology and leadership skills.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Young people today consume a vast amount of media delivered by hi-tech computer technology. Over two-thirds of youth own a cell phone while 84 percent of youth have Internet access at home. However, the mere use of technological devices will not fully prepare our young people for the future. Youth need a basic level of technological literacy to make decisions, engage in civic debates, and be successful in the workplace.

What has been done
Started in 1998, the California 4-H Computer Corps' original objectives were to offer technology workshops, maintain the state 4-H website, and help 4-H clubs develop websites. In 2009, the group was renamed to the California 4-H Technology Leadership Team (TLT), and provided with new objectives: producing 4-H films, integrating technology into 4-H events, and continuing to offer technology workshops. In the last 12 years, 62 4-H volunteers and teens from around California have served on the team in two-year terms. The teams produced a dozen 4-H films, and coordinate a photograph and film festival. The films are used for 4-H marketing (view at http://www.ca4h.org/News/Videos/.) The teams also provide IT support at statewide events, including innovative uses of mobile technologies: mobile-optimized agendas for smartphones and SMS text message polls. Lastly, team members presented workshops at statewide and regional 4-H conferences reaching more than 4,000 4-H youth and adults.

Results
The youth and adults participants consistently report improvements in their own understanding of technology, expanded leadership skills, and enhanced abilities to present technical concepts to beginners.

4. Associated Knowledge Areas

KA Code	Knowledge Area
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #25

1. Outcome Measures

Canine buddies program helps youth develop reading skills.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Strong reading skills are among the essential tools necessary to develop a scientifically literate youth population. Development of these skills is facilitated by reading aloud, a practice that many children find difficult and intimidating. In an effort to lessen children?s anxieties and encourage the development of improved perceptions and practices regarding reading aloud, programs that match youth with trained canine reading partners have been emerging around the country. However, our understanding of how effective these programs actually are is limited by the fact that they have not been systematically researched.

What has been done
Researchers from UC Davis Veterinary Medicine Extension collaborated with Tony LaRussa's Animal Rescue Foundation (ARF) to implement and evaluate ARF's All Ears Reading program with school-aged youth. Two projects were completed. The first project investigated changes in reading skills in third graders from Dixon Unified School District. In the second study, the subjects were 11 home-schooled youth from the Davis-Sacramento region. In both studies, youth participants read aloud to All Ears Reading program dogs once a week for 10 weeks under the supervision of undergraduate interns who were trained as animal handlers. During each session, the children were encouraged to interact with the dogs and then were asked to read aloud to the dogs for 10-15 minutes.

Results
In the study of third-grade students from Dixon, we found that the students who participated in the program improved their reading fluency by 12 percent. By comparison, the third-grade class that acted as the control had no improvements in reading fluency over this period. In the study of home-schooled youth, we found a 30 percent improvement in reading fluency. In this study, we

were also able to collect information from the children regarding their feelings about reading and about dogs, both prior to and following the program. Coming into the study, this group had very positive associations with being around dogs and negative associations with reading aloud. They reported that reading aloud made them feel "self-conscious, clumsy, and uncomfortable." Introducing the presence of a dog to the practice of reading aloud created an environment where they expressed positive feelings of "happiness and safety," and changed their perceptions of reading practice. By the final project interview, the children described reading aloud as "fun" and "cool," and said that they felt "relaxed and more confident" when reading to a dog.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #26

1. Outcome Measures

Central Coast youth gain engineering and technology skills through the TechXcite program.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
America faces a future of intense global competition with a startling shortage of scientists. In fact, only 18 percent of U.S. high school seniors are proficient in science (NAEP 2005) and a mere 5 percent of current U.S. college graduates earn science, engineering or technology degrees compared to 66 percent in Japan and 59 percent in China. To address increased demand for science and technology professionals, 4-H is working to reach a bold goal of engaging one million new young people in science programs by 2013. Currently, 4-H science programs reach more than 5 million youth with hands-on learning experiences to ensure global competitiveness and prepare the next generation of science, engineering, and technology leaders.

What has been done
Partnering with the Pratt School of Engineering at Duke University, youth are working with the UC Cooperative Extension 4-H Youth Development Program in Santa Cruz and Monterey counties to

develop engineering and technology skills. After-school programs have been engaging youth in building bionic arms, solar powered cars, water filtration systems and solar ovens through the TechXcite program and exposing youth to the planning and conceptual design of engineering. They are learning to use technology to apply their learning to real-world situations. During the course of 17 months, over 150 youth have participated in the TechXcite program at seven traditionally undeserved sites in Santa Cruz and Monterey counties.

Results
Impact data, collected via youth surveys, indicate that 80 percent of the participants "definitely feel science, engineering and technology help make our lives healthier, easier and more comfortable." Additionally, 60 percent of youth indicate that they "definitely would rather do experiments to learn about how or why something happens than to read about it," while another 80 percent of youth say they "definitely would like to do more activities like TechXcite." The responses show that the non-formal inquiry-based approach that 4-H uses to deliver science education programs make learning science enjoyable to youth.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #27

1. Outcome Measures

Youth research partners help gain insight on youth workforce challenges.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A statewide team of 4-H Youth Development advisors and UC researchers enlisted youth to interview their peers as part of a study on youth workforce development programs. At issue is how to connect youth to jobs in the emerging economy, especially given evidence of rising numbers of youth who are out of school and out of work. The research sought to incorporate the perspectives of youth participants in local workforce development programs funded by the federal

Workforce Investment Act (WIA). Participants were asked about their experience in WIA-funded programs, their career and educational goals, and on where they get information related to vocational and career planning.

What has been done
The research team brought 10 youth from around California to UC Davis to be trained in focus-group interviewing techniques. Youth practiced active listening skills and learned how to ask neutral, open-ended questions. They then took turns leading mock focus groups to use their new skills. Participating youth also gave the research team feedback on the draft protocol for the focus group. In the months after the training, five of the eight focus groups we conducted were co-facilitated by the trained youth. A total of 53 youth participated in the focus groups, including 19 Latinos, 17 African-Americans, 9 Asian/Pacific Islanders, and 8 Caucasians.

Results
The addition of youth to the research team helped to build rapport with the focus group participants, leading to new insights. Among the common themes that emerged were these:

* Youth indicated that they want to be asked by the community about what types of facilities and services they need instead of having others make those decisions for them.
* They are deeply concerned about the availability of illegal substances and about drug use among their peers.
* Youth fear gang activity in their communities in all parts of California.
* They regard teen pregnancy as unfortunate but as an inevitable consequence of there being "nothing for kids to do."
* They express a disturbing pessimism that any of these problems can be resolved.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #28

1. Outcome Measures

Evaluation finds California workforce programs succeeding and makes recommendations for improvement.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Since 2000, California and its partners in local workforce areas have implemented new provisions contained in the federal Workforce Investment Act (WIA). WIA gives local areas considerable discretion to tailor programs to community needs, but little was known about how this discretion was being used.

What has been done
A UC research team led by a Cooperative Extension specialist partnered with the California Workforce Investment Board to study the implementation and outcomes of WIA in California. The goal was to identify and better understand the most important system-wide opportunities and challenges based on the experience and reflections of public and private stakeholders throughout the California system.

Using common research protocols, a research team prepared detailed case studies of 10 of California's 50 local workforce investment areas. In all, the team interviewed more than 460 people, visited local areas repeatedly, attended local and state Workforce Investment Board meetings, studied local area documents and websites, and kept in touch with key contacts by phone. Five evaluation reports, available from the California Communities Program website, detail the evaluation findings (http://groups.ucanr.org/CCP/index.cfm.).

Results
Despite federal budget cuts of up to 40 percent in some areas, local workforce areas in California are serving more Californians than ever before. To maintain the quality of these services, the study recommends that funding cuts need to be restored, and state officials need to refocus their program efforts. In particular, the evaluation recommends that state officials:

* Increase emphasis on worker skill development and pathways to good jobs, and treating "rapid workforce attachment" and "training" as integrated facets of workforce programs.
* Adopt up-to-date management strategies that de-emphasize top-down controls and instead empower personnel at all levels of the system.
* Institute major changes in the performance measurement and data management systems to reduce unnecessary paperwork and to provide timely data linked to specific strategic policy initiatives.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #29

1. Outcome Measures

Incarcerated youth exhibit more positive behaviors from working on 4-H and Master Gardeners project.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Roughly 1 in 5 U.S. children have mental health problems, and only 20 percent to 25 percent receive treatment (CA Adolescent Health Collaborative, 2010). In the juvenile justice system, some studies report as many as two-thirds of adolescents have mental health disorders. Alameda County Probation's Camp Sweeney is an unlocked 24-hour facility serving boys aged 14 to 18 years. The teens at Camp Sweeney exhibit a range of maladaptive behaviors and have various physical and mental health needs, which should be treated as part of their rehabilitation.

What has been done
After conducting a needs assessment of the Camp Sweeney boys, a 4-H advisor, Master Gardener Coordinator, Behavioral Health Clinician, and Alameda County Probation/Camp Sweeney staff initiated "Project GROW" (Gardening Rejuvenates Our Wellness) in 2010. The 8-week program is a gardening and food program with each Master Gardener volunteer instructing two youths. Probation and Behavioral Health staff are on site to monitor and contribute. Like experiential group therapy, as the boys work on the garden, they are also working on their issues by sharing, acting things out, talking to project leaders, etc. Thus, this "hands on" program begins to address the youths' complex mental/behavioral health and developmental needs.

Results
Preliminary results show that boys who take part in the program exhibit more positive behaviors, more positive support, work cooperatively, share ideas, and are more open to new things (i.e. food, ideas). All Camp Sweeney youth benefit from eating fresh produce from the garden, giving the GROW participants a sense of accomplishment and increased self-esteem. By addressing the various needs of incarcerated boys, Project GROW engages the youth, provides them with another reason to stay at camp, and deters them from committing more crimes and being placed at the Juvenile Justice Center. The youth, agency and community benefit. It costs Alameda

County $3600 per month to house a youth at the Juvenile Justice Center, whereas it costs about $1800 at Camp Sweeney.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #30

1. Outcome Measures

Teens participating in the Money Talks Program improve financial literacy and habits.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Teenagers' financial illiteracy is a current and growing national family economic trend and concern in the United States. Teens have access to and spend a great deal of money each year. A survey conducted by Teenage Research Unlimited indicates that today's teens spend $179 billion annually (2006). In addition to personal spending, many teens purchase food and other items to be used by the entire family. The concern about teen financial illiteracy is supported by a national money management test of high school seniors that revealed an average score of 48.3 percent, a failing grade by standard grading systems (Jump$tart Coalition, 2008). High school seniors have little knowledge of money management, savings, investments, income and spending. The vast majority of students aged 16 to 22 have never taken a class in personal finance, with two-thirds admitting that they could benefit from more lessons on money management. Alarmingly, 9 percent were rolling over credit card debit each month (ASEC, 1999).

What has been done
A team of University of California Cooperative Extension advisors created Money Talks -- a financial literacy curriculum that appeals to teenagers. The purpose of Money Talks is to increase the financial literacy of teens to help them make fiscally sound decisions in today's and future marketplaces. Based on a California needs assessment of 323 teens, this fun and interactive money management curriculum addresses what and how teens said they want to learn about

money. Tapping the diverse ways of teen learning, Money Talks is hands-on, interactive, online and available in English and Spanish. It is composed of 10 colorful teen guides, 10 comprehensive leader's guides, 3 DVDs, and an interactive Web site with games and videos (http://www.moneytalks.ucr.edu). Topics include money personalities, easy ways to save, car buying, credit, banking, food buying and shopping savvy. Teachers have access to a special section containing leader's guides for each teen guide with additional handouts, activities and visuals to help engage students in the topic. The program is currently used throughout California, in 47 other states and in 14 countries. New materials about working and privacy are in development.

Results

Money Talks is helping teens improve financial literacy and behavior. Teens completing the Money Talks curriculum showed a statistically significant knowledge gain and a positive change in money management behavior. After taking part in the Money Talks program, teens were more likely to have identified their values related to money, spent their money based on their values and identified easy ways to save money. The teens learned the safest way to deposit cash, their rights if checks are stolen, the cost of credit, what to ask when loan shopping, and that paying bills on time is the most important issue in establishing credit. Positive behavior change includes a willingness to talk with their families about family finances, save some money before spending, and select a credit card based on annual fee, minimum payment and parent recommendation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
806	Youth Development

Outcome #31

1. Outcome Measures

Teachers are more willing to use new program evaluation tool because the time savings provides more classroom learning time for students.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A valid evaluation tool is important in education programs designed to change behaviors, skills and/or self-efficacy. Most programs use a traditional prospective pre/posttest method of data collection. A pretest is given before the start of the program and a posttest using the same questions is given after the program. This method has limitations in real-world application, especially with adolescents. Establishing rapport with youth at the first educational meeting is important for learning. Test taking at the start of the program may seem intrusive and be an obstacle to establishing trust. Youth may also rate themselves differently on the posttest, after acquiring new information during the lessons that was related to the test question. For example, youth may believe they eat enough fruits and vegetables until they learn the daily recommendations. When the posttest is completed, their responses may appear that they did not change behavior. Such miscalculation may mask actual behavior and skill changes resulting from the nutrition program.

What has been done
Researchers at UC Davis and UC Cooperative Extension (UCCE) tested a retrospective post-then-pre evaluation method on youth and adolescent dietary self-efficacy, skills and behaviors. With this method, participants take only one test at the end of the program. Youth (7th-8th grade) at a school in Calaveras County completed a traditional prospective pre-posttest evaluation at the start and end of the nutrition program. They then completed the retrospective pretest asking them to "think back six weeks, before you had any lessons." Both assessments asked about current behaviors, skills and self-efficacy. Responses were compared to determine if youth responded differently to the two methods. The retrospective method was as valid as the traditional model.

Results
The retrospective evaluation model reduces the burden of testing youth twice, saving educators time and effectively assessing programmatic impact. Teachers are more willing to use program evaluation because the time savings provides more classroom learning time.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
806	Youth Development

Outcome #32

1. Outcome Measures

Train-the-trainer program enhances employability of teens and young adults.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Teens and young adults often find limited job options due to lack of experience, high unemployment rates and age. To be successful in the job market, teens and young adults need to understand what jobs best suit their skills, abilities, and ambitions; how to effectively apply for a job and develop resumes; and how to be successful on the job once they get one. When jobs are not available, understanding options for self-employment can help teens and young adults consider work options that they can create for themselves.

What has been done
Teaming with the Workforce Development Board of Santa Barbara County, Cooperative Extension enhanced the capacity of 31 collaborating agencies in Santa Barbara County to strengthen their workforce development services to 14- to 24-year-olds using UC's "Money Talks, Should I Be Working?" curriculum. By implementing a train-the-trainer approach, 57 staff and volunteers were introduced to a flexible education resource that can be used at little or no cost, when and where they want and using a "learn-by-doing" approach. The curriculum was developed for diverse audiences, including youth organization participants, pregnant and parenting teens, students in traditional and non-traditional educational institutions and youth in the juvenile justice system. The program can be accessed free of charge at http://www.moneytalks4teens.org.

Results
Evaluations showed that youth they trained were better prepared for employment and were able to find jobs using the skills learned through the curriculum.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #33

1. Outcome Measures

Better civic engagement strategies engage parents.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Busy parents often lack the skills or inclination to participate in public decision-making processes. Yet their insights help insure that programs for children and youth are effective. Public officials can use a variety of civic engagement tools to engage parents, including advisory committees, outreach workers, community conversations, mini-grants, or program design workgroups. But the strengths and limits of these strategies, especially in engaging low-income parents or others who are not usually engaged in public deliberation, are not usually engaged in public deliberation, are not clear.

What has been done
A UC Cooperative Extension specialist (CE) and CE colleagues in eight counties examined parent and public participation in California's First 5 program. First 5, funded by taxes on tobacco products, supports health, child care and school readiness programs for children, ages 0 to 5, and their families. Five private foundations teamed with eight county First 5 commissions to promote civic engagement. Using strategies adapted to local conditions, participation in planning processes was promoted from a cross-section of the community, especially low-income parents. The UC researchers found tradeoffs in civic engagement strategies:

* Advisory committees?formal structures have influence over decisions, but are often uninviting to parents; informal structures are more inviting, but have less power.
* Outreach workers?can overcome language and cultural barriers, but comes at the expense of influencing decision makers.
* Community conversations?provide a non-threatening way to share information and build trust, but must focus on serious debate over key issues.
* Mini-grants allow parents and community groups to engage directly in public work, but requires a lot of staff management.
* Program design workgroups?brings parents and community members into settings with power over how dollars are spent; requires heavy staff investment.
* Outreach strategies that mix diverse parents in large conversations don't always work. These parents are better reached by small-group or one-to-one conversations with trusted individuals.

Results
Drawing on the UC evaluation, Harder and Company Community Research documented successful civic engagement during subsequent years of the project. For example, First 5 Contra

Costa held a series of community-friendly meetings that rotated through the county. First 5 San Diego teamed with the Consensus Organizing Institute to provide training and assistance to parent leaders.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #34

1. Outcome Measures

"Hands-on" science improves youth academic performance and self-confidence.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In the National Assessment of Educational Progress report for science in 2009, 77 percent of fourth-graders and 81 percent of eighth-graders in California fell into the below basic or basic levels of science proficiency in the earth and space, physical and life sciences. This data has spurred professionals working in out-of-school time programs to begin addressing the growing concern of science literacy by placing an emphasis on science.

What has been done
The 4-H Youth Development programs in Santa Cruz, Monterey and San Benito counties partner with afterschool programs and other youth serving agencies to provide professional development opportunities for staff, volunteers and teens to deliver out-of-school-time science education programs. The goal of these programs is to increase science literacy among youth, while at the same time building the capacity of adults and teens to deliver non-formal science education. To do this, youth development advisors use specially developed curricula materials designed to provide learners with opportunities to explore and investigate science phenomena in a safe environment, where the focus is on the process of science, and not the end product.

Results
Based on observations and teen feedback, these experiences provide teens with leadership and life skill opportunities, authentic teaching experiences and positive modeling that enables them to develop confidence and skills as educators. As a result of the Youth Experiences in Science Program, site directors indicate an increase in student academic performance, a greater interest in science, and positive learner attitudes among participants. Furthermore, site directors note an increase in self-confidence, improved problem solving techniques and increased positive attitudes among the teen leaders as a result of participating in these programs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #35

1. Outcome Measures

Training for educators in after-school delivery of science, engineering and technology increases understanding, skills, and confidence.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The need for after-school professional development in California is great, with over 4,000 state and federally funded after-school programs and nearly that many other community-based after-school sites. Over 2 million youth, 19 percent of California's total youth population, regularly attend these after-school programs. Even in the highest quality programs, the annual staff turnover rate exceeds 33 percent, severely impacting program quality and pointing to the need for continuous in-service training. Increasingly, after-school programs are being called upon to ramp up their science, engineering, and technology (SET) program offerings to address the decline in youth interest, competency and performance in these fields.

What has been done

The California 4-H Youth Development Program provided five training sessions across the state where after-school trainers receive in-depth instruction on using the University of California and University of Nevada's Tools of the Trade II 4-H After-school Training Guide: Inspiring Young Minds to be SET Ready for Life. Trainers - representing parks and recreations, 21st Century after-school programs, school districts, nonprofits, and other organizations including 4-H - in turn, delivered at least eight hours of the training modules to over 740 other after-school line-staff. Monthly conference calls and webinars provided additional support to the trainers. Hundreds of after-school program staff received consistent in-service training on incorporating effective science, engineering and technology strategies in after-school settings and creating science-rich, learner-centered environments for sparking interest and enthusiasm for SET subjects.

Results
A retrospective survey of the trainees showed significant improvement in their understanding of the elements of high-quality SET programming in after-school programs, as well as how to incorporate inquiry and experiential learning in their SET lessons. Additionally, they reported an enhanced appreciation for the role of after-school staff as a facilitator of youth's acquisition of science, engineering and technology interest and skills. The evaluation also found significant gains in trainers' confidence in training others on high-quality, non-formal SET programming.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #36

1. Outcome Measures

UCCE Garden-to-Family program empowers people to feed themselves and their community.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research shows regular and adequate consumption of fruits and vegetables is associated with improved health, including reduced risk of stroke, some cancers, and type 2 diabetes.

What has been done
Calaveras Garden-to-Family's (CGF) mission is to empower families to produce some of their own food while providing for them in the interim. This project is coordinated by UC Cooperative Extension and involves a local food bank and the Probation and Behavioral Health departments of Calaveras County. Volunteer participants include area gardeners, small farmers, Master Gardeners, students, behavioral health clients, adjudicated youth and families in need. Area gardeners and farmers donate their excess produce to the food bank, exchange produce directly with their needy neighbors and teach them how to grow and prepare fresh produce. UCCE provides horticulture workshops to CGF participants and coordinates information exchange between experienced and beginning gardeners. Calaveras High School students grow thousands of vegetable starts for distribution to CGF participants. Calaveras Behavioral Health clients help with garden tasks. For the 2009 summer growing season, there were 68 participants signed up for the program and by 2010 there were 114.

Results
CGF addresses the need by increasing the amount of local produce available to needy families through produce donation and education on home gardening. In 2009, 9,200 pounds of produce was distributed to families in need and the 2010 growing season brought more than 7,300 pounds of local produce to needy families. As a result of CGF, more than two dozen families started their own gardens, three community gardens were created and thousands of vegetable starts were distributed. Calaveras Garden-to-Family is successful not just in feeding people but also in empowering people to feed themselves and their community.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
802	Human Development and Family Well-Being

Outcome #37

1. Outcome Measures

Los Angeles elementary students learn how agriculture impacts their lives.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Urbanization in Southern California has distorted the relationship between school-aged children and their food sources. Few have the opportunity to see a live farm animal or learn about agricultural productivity and sustainability. Los Angeles County students need experiential opportunities to learn that agriculture has many components - water, plants, bees, fiber, food and dairy - that touch their everyday lives. From the food we eat to the clothes we wear, agriculture affects us all. It is very important to provide future generations an understanding of agriculture's importance.

What has been done
L.A. County's 4-H program participated in the year-long planning of Ag Day LA. UCCE 4-H and nutrition advisors and staff from Los Angeles and San Bernardino counties had the opportunity to collaborate with the Los Angeles County Farm Bureau, Los Angeles County Agricultural Commissioner's office, and other community partners to deliver hands-on learning experiences for third- and fourth-grade students. Ag Day LA provided a fun and exciting way for teachers to address state educational standards and promote agricultural literacy while students learned about water conservation, healthy nutrition and sheep shearing. In the third year of participation, Los Angeles and San Bernardino UCCE interacted with 220 third- and fourth-grade children from six Los Angeles schools.

Results
Students from three classrooms took tests before and after participating in Ag Day LA. Prior to attending Ag Day LA, 58 percent of the students were able to answer the question, "What is agriculture?" Following Ag Day LA, 90 percent of the students tested could define some aspect of agriculture. Before participating in the program, more than 90 percent of the youth could not name any insects that were beneficial or detrimental to agriculture, basic information about the benefits of fiber and where it comes from, what plants need in order to grow, or California's top 10 agriculture products. After the program, more than 80 percent of participants were able to define agriculture and provide correct examples of insects, fiber, agricultural products and plant needs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #38

1. Outcome Measures

4-H, Master Gardeners, and EFNEP School Project Collaboration increases fruit and vegetable awareness.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Utilizing school gardens is one of the most positive hands-on opportunities for youth to experience gardening while learning healthy eating habits. Children who are hungry or poorly nourished do less well in school, both academically and behaviorally. Our current crisis in the rising rates of obesity and related diseases among children is now well known. The proliferation of unhealthy fast foods and the limited intake by children of fresh fruits and vegetables all contribute to this situation. As concern rises, policy makers and teachers in the classroom are searching for ways to improve the health and well being of their students. Moreover, because eating habits and preferences are established early, and although home influences are strong, school is a valuable venue for teaching good nutrition, balanced diets and proper serving amounts. The most effective way to increase children's intake of fruits and vegetables and encourage lifelong healthful eating habits is to teach them about healthy choices and nutrition concepts in the elementary years (Kirby, 1995). Studies show that if established before 6th grade, positive habits are more likely to persist into adulthood.

What has been done
The San Bernardino 4-H Youth Development Program, Expanded Food and Nutrition Education Program (EFNEP), and the Master Gardeners Program, all a part of UCCE joined in collaboration with the Norton Space and Aeronautics Academy (NSAA) in San Bernardino. UCCE began to provide resources and hands-on activities in the area of gardening to children ages kindergarten through 4th grade. Recently, employees and volunteers planted vegetables and fruit plants in the NSAA school garden. In addition, beginning in the fall of 2010, children at the NSAA charter school will begin the 4-H garden project utilizing the curriculum titled Gardening: See them Sprout and Gardening: Let's get Growing. The program will teach youth involved in the 4-H after school program about garden planning, planting, garden care, harvesting, storage and careers.

Results
The children participants have increased awareness about where vegetables and fruits come from and expressed increased interest in trying produce new to them.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

806 Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

ANR's most notable qualitative impacts that were realized, as well as the quantitative outcomes recorded from the evaluation studies, are reported under the State Defined Outcomes section.

Key Items of Evaluation

The Report Overview's federal Planned Program summary of accomplishments highlights ANR's most significant work during FY 2011, especially the research developments. The State Defined Outcomes section captures ANR's clientele behavior change outcomes, which demonstrate important program successes resulting from the research and extension continuum.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Childhood Obesity

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
205	Plant Management Systems	1%		0%	
504	Home and Commercial Food Service	5%		0%	
604	Marketing and Distribution Practices	0%		1%	
703	Nutrition Education and Behavior	63%		45%	
704	Nutrition and Hunger in the Population	3%		0%	
724	Healthy Lifestyle	25%		18%	
802	Human Development and Family Well-Being	0%		18%	
806	Youth Development	3%		18%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	7.0	0.0	0.9	0.0
Actual Paid Professional	6.6	0.0	2.9	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
102192	0	6622	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
102192	0	6622	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
2175124	0	1756970	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

2. Brief description of the target audience

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

3. How was eXtension used?

ANR academics used eXtension to participate in and contribute to many Communities of Practices, to answer "Ask an Expert" questions, and for other general networking purposes.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	136519	0	390	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	9	2	11

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Classes/Short Courses Conducted

Year	Actual
2011	3

Output #2

Output Measure

- Workshops Conducted

Year	Actual
2011	6

Output #3

Output Measure

- Demonstrations and Field Days Conducted

Year	Actual
2011	29

Output #4

Output Measure

- Newsletters Produced

Year	Actual
2011	0

Output #5

Output Measure

- Web Sites Created or Updated

Year	Actual
2011	0

Output #6

Output Measure

- Research Projects Conducted

Year	Actual
2011	11

Output #7

Output Measure

- Videos, Slide Sets, and other AV or Digital Media Educational Products Created

Year	Actual
2011	0

Output #8

Output Measure

- Manuals and Other Instructional Materials Produced

Year	Actual
2011	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage of low-income children and youth, participating in childhood obesity and other nutrition education programs, gaining knowledge of nutrition
2	Percentage of low-income families, participating in childhood obesity and other nutrition education programs, gaining knowledge of nutrition
3	Percentage of individuals and families in the general population, participating in nutrition education programs, gaining knowledge of nutrition
4	Percentage of low-income children, participating in childhood obesity programs, adopting recommended dietary practices
5	Percentage of low-income families, participating in nutrition education programs, adopting recommended dietary practices
6	Percentage of individuals and families in the general population, participating in childhood obesity programs, adopting recommended dietary and healthier lifestyle practices
7	Children, youth, and caregivers in the general population, participating in childhood obesity prevention programs, gained knowledge of nutrition.
8	Children and youth, participating in childhood obesity prevention programs, gained skills to identify healthy food choices.
9	Low-income families with children, participating in nutrition education programs, adopted healthier dietary practices.
10	Children and youth, participating in nutrition and youth development education programs, adopted healthier dietary and lifestyle practices.
11	As a result of UCCE EatFit program, adolescents improved their food and physical activity choices, which have the potential to improve their quality of life and reduce their risk of obesity and chronic diseases.
12	Families adopted healthier lifestyle behaviors as a result of UCCE "Let's Eat Smart & Play Hard Together!" program.
13	WIC shoppers learn to use local produce.

Outcome #1

1. **Outcome Measures**

Percentage of low-income children and youth, participating in childhood obesity and other nutrition education programs, gaining knowledge of nutrition

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

Percentage of low-income families, participating in childhood obesity and other nutrition education programs, gaining knowledge of nutrition

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Percentage of individuals and families in the general population, participating in nutrition education programs, gaining knowledge of nutrition

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

Percentage of low-income children, participating in childhood obesity programs, adopting recommended dietary practices

Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

Percentage of low-income families, participating in nutrition education programs, adopting recommended dietary practices

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Percentage of individuals and families in the general population, participating in childhood obesity programs, adopting recommended dietary and healthier lifestyle practices

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Children, youth, and caregivers in the general population, participating in childhood obesity prevention programs, gained knowledge of nutrition.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	8168

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #8

1. Outcome Measures

Children and youth, participating in childhood obesity prevention programs, gained skills to identify healthy food choices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	318

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #9

1. Outcome Measures

Low-income families with children, participating in nutrition education programs, adopted healthier dietary practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	558

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #10

1. Outcome Measures

Children and youth, participating in nutrition and youth development education programs, adopted healthier dietary and lifestyle practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	502

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #11

1. Outcome Measures

As a result of UCCE EatFit program, adolescents improved their food and physical activity choices, which have the potential to improve their quality of life and reduce their risk of obesity and chronic diseases.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
An entire generation of California youth faces a lifetime of obesity, due, in part, to poor dietary choices and physical inactivity. Obesity reduces an adolescent's quality of life, and can lead to life-shortening chronic health conditions such as hypertension, diabetes, heart disease and some cancers. Middle-school teachers asked Cooperative Extension (CE) educators for educational tools to assist students with healthier eating and becoming more physically active.

What has been done
A team of CE and other UC researchers created EatFit, a fun, interactive, computer-based nutrition and physical activity curriculum that middle-school teachers use to integrate obesity prevention and nutrition education in their classes. In the last eight years, CE staff trained teachers and community leaders in 35 counties to use EatFit, with at least 105,000 California teens completing the program. Teens helped select the activities in the curriculum. The resulting nine-lesson EatFit curriculum includes a web-based eating analysis, teen magazine, and healthful recipes for foods that teens like. EatFit teaches students to develop the skills to reach their own diet and fitness goals.

Results
A study in San Joaquin County showed teens making statistically significant gains in dietary behavior scores and physical activity self-confidence. Seventy-four percent reported making at least one "lasting improvement" in their food choices such as eating more vegetables/fruit, and 69% reported improved physical activity levels, such as adding stretching three times a week before activity.
Participants (87%) reported making an effort to reach their goals. Importantly, 71% indicated they also gained confidence in their ability to maintain these healthful behaviors in the future. In addition, a study in Tulare County found Eatfit graduates increased their overall standardized achievement test scores in English and math.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle
806	Youth Development

Outcome #12

1. Outcome Measures

Families adopted healthier lifestyle behaviors as a result of UCCE "Let's Eat Smart & Play Hard Together!" program.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Overweight is the most common health problem facing U.S. children. One contributing factor is the foods that children are eating or not eating. The USDA reports that "approximately 70 percent of U.S. children still exceed the current dietary recommendations for total and saturated fats." The other major contributing factor is the lack of physical exercise.

What has been done
UC Cooperative Extension staff in Butte, Glenn, San Luis Obispo and Tehama counties implemented "Let's Eat Smart & Play Hard Together!" The program tackles the problem of childhood obesity in a new way: by implementing a curriculum in which 6 to 8 year old children pair up with an adult who is important in the child's life to learn about nutrition and fitness while having fun together. A major goal of this program was to evaluate the use of a train-the-trainer approach to present "Let's Eat Smart & Play Hard Together!" through organizations that impact 6- to 8-year-old children and significant adults in these children's lives. UCCE trained cooperating agency staff in more than 40 community-based organizations, then provided program support through educational materials, program supplies, program evaluations and weekly encouragement. Programs were provided in English, Spanish or bilingually, based on the preference of the clientele.

Results
Data collected before and after implementing the program over a five-year period indicated that 96 percent of participants made a positive nutritional and/or positive physical activity change, such as drinking less soda, sport drinks and fruit drink; eating more fruits and vegetables; and being more physically active. Follow-up surveys three months later show that 95 percent of participants continue to use the program in their daily lives by, for example, making the recipes and doing activities demonstrated in the program, walking more, and sharing information with family and friends.

The results also show that a train-the-trainer approach for implementing "Let's Eat Smart & Play Hard Together!" is effective.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle
806	Youth Development

Outcome #13

1. Outcome Measures

WIC shoppers learn to use local produce.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Despite the documented health benefits of increasing fruit and vegetable consumption, less than 50 percent of California children eat five or more servings of fruit/vegetables daily. Low-income populations in particular face many barriers to consuming fruit and vegetables. To overcome these barriers, the federal Special Supplemental Nutrition Program for Women, Infants and Children (WIC) changed its policy in October 2009 and began distributing cash vouchers to low-income women and children to purchase fruit and vegetables.

What has been done
A team of UCCE educators received a three-year specialty crop block grant from CDFA to research ways to improve WIC participants' access to locally produced specialty crops. During the project's first year, the UCCE nutrition educators surveyed WIC participants in Alameda, Tulare and Riverside counties to determine their interest in purchasing locally produced foods. Farm advisors and specialists explored the feasibility of connecting small farmers to WIC vendors. Also, visits to WIC stores were made to assess improvements needed in produce handling to maintain product quality at the store level. A survey of WIC clientele led to the development of produce handling and nutrition fact sheets for nine fall/winter crops and seven spring/summer crops. Some handling problems at the WIC stores were identified and three training sessions on produce handling for 30 WIC store employees in Alameda, Tulare and Riverside/Coachella Valley were carried out.

Results
Testing showed that WIC participants learned new information about preparation, storage, nutritional value, serving and selection of produce from the fact sheets. A poster designed to promote seasonal produce was also developed. More training and outreach will be conducted during the second project year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Economy
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

ANR's most notable qualitative impacts that were realized, as well as the quantitative outcomes recorded from the evaluation studies, are reported under the State Defined Outcomes section.

Key Items of Evaluation

The Report Overview's federal Planned Program summary of accomplishments highlights ANR's most significant work during FY 2011, especially the research developments. The State Defined Outcomes section captures ANR's clientele behavior change outcomes, which demonstrate important program successes resulting from the research and extension continuum.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Food Safety

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
104	Protect Soil from Harmful Effects of Natural Elements	3%		0%	
212	Pathogens and Nematodes Affecting Plants	0%		8%	
302	Nutrient Utilization in Animals	0%		8%	
303	Genetic Improvement of Animals	0%		8%	
307	Animal Management Systems	1%		0%	
308	Improved Animal Products (Before Harvest)	5%		1%	
311	Animal Diseases	7%		6%	
315	Animal Welfare/Well-Being and Protection	1%		1%	
404	Instrumentation and Control Systems	0%		1%	
501	New and Improved Food Processing Technologies	18%		10%	
502	New and Improved Food Products	6%		1%	
503	Quality Maintenance in Storing and Marketing Food Products	6%		5%	
504	Home and Commercial Food Service	0%		1%	
606	International Trade and Development	0%		8%	
702	Requirements and Function of Nutrients and Other Food Components	0%		2%	
703	Nutrition Education and Behavior	1%		0%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	16%		4%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	35%		32%	
723	Hazards to Human Health and Safety	0%		4%	
903	Communication, Education, and Information Delivery	1%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	4.7	0.0
Actual Paid Professional	9.0	0.0	6.7	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
229738	0	271674	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
229738	0	271674	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2954076	0	4059207	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

2. Brief description of the target audience

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

3. How was eXtension used?

ANR academics used eXtension to participate in and contribute to many Communities of Practices, to answer "Ask an Expert" questions, and for other general networking purposes.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	139844	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	15	31	46

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Classes/Short Courses Conducted

Year	Actual
2011	18

Output #2

Output Measure

- Workshops Conducted

Year	Actual
2011	37

Output #3

Output Measure

- Demonstrations and Field Days Conducted

Year	Actual

2011	18

Output #4

Output Measure

- Newsletters Produced

Year	Actual
2011	0

Output #5

Output Measure

- Web Sites Created or Updated

Year	Actual
2011	0

Output #6

Output Measure

- Research Products Created

Year	Actual
2011	13

Output #7

Output Measure

- Videos, Slide Sets, and other AV or Digital Media Educational Products Created

Year	Actual
2011	0

Output #8

Output Measure

- Manuals and Other Printed Instructional Materials

Year	Actual
2011	2

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

Outcome #1

1. Outcome Measures

Percentage of individuals, participating in food safety education programs, gaining knowledge of safe food handling and preparation techniques

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Percentage of individuals, participating in food safety education programs, adopting safe food handling and preparation techniques

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Adults, participating in food safety education programs, gained knowledge of safe food handling and preparation techniques.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	857

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #4

1. Outcome Measures

Low-income adults, youth and families, participating in food safety education programs, adopted safe food handling and preparation techniques.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1439

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #5

1. Outcome Measures

UC partners with industry in Beef Quality Assurance program making California beef safer.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Identification and control of preharvest critical control points for the safety of beef are necessary. In particular, the beef industry wants to eliminate residues and contamination in market beef and dairy beef products; enhance food safety and microorganism biosecurity at the beef production level, including prevention of zoonotic diseases; and improve medical care, including appropriate drug and antibiotic use, and avoid development of antibiotic resistance.

What has been done
UC and the California Cattlemen's Association (CCA), in response to the growing need for a Quality Assurance Program (QAP) for beef producers, began offering educational programs and certification for beef producers in 1990. The program has proven, by attendance and management-practice improvements, that voluntary, industry-led QAPs can be successful. After nearly 5,000 participants went through the basic program, we developed several new expanded and advanced educational programs. Subsequently the beef industry has required producers to be recertified every three years. The basic program has been modified to provide continuous training and official ongoing certification.

Diseases of significant concern to public health - such as BSE, Brucellosis, E. coli O157:H7, Johne's and Tuberculosis - were emphasized to inform producers of the potential risk to human health. Other diseases result in an increased use of over-the-counter (OTC) drugs, extra-label doses of OTC drugs and prescription drugs, resulting in major residue problems that occur in market beef at slaughter. We have emphasized early detection and programs designed to identify and reduce risk. The potential for disease impacts on end product marketing, quality and public perception were discussed.

Results
Producers who are certified in beef quality assurance know how to develop their own residue and contamination avoidance programs, making beef safer. Industry statistics show injection site problems have disappeared from feedlot beef cattle. Fewer cases of microbial contamination are occurring due to beef. Perhaps most important for beef producers, knowledge of how to use animal health products properly has improved overall health of the beef herd.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
311	Animal Diseases
723	Hazards to Human Health and Safety

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

ANR's most notable qualitative impacts that were realized, as well as the quantitative outcomes recorded from the evaluation studies, are reported under the State Defined Outcomes section.

Key Items of Evaluation

The Report Overview's federal Planned Program summary of accomplishments highlights ANR's most significant work during FY 2011, especially the research developments. The State Defined Outcomes section captures a social/health condition improvement as a result of the Beef Quality Assurance Program.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Global Food Security and Hunger

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	16%		3%	
111	Conservation and Efficient Use of Water	2%		1%	
201	Plant Genome, Genetics, and Genetic Mechanisms	2%		20%	
202	Plant Genetic Resources	4%		7%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	4%		9%	
204	Plant Product Quality and Utility (Preharvest)	8%		4%	
205	Plant Management Systems	31%		6%	
206	Basic Plant Biology	0%		17%	
211	Insects, Mites, and Other Arthropods Affecting Plants	2%		4%	
212	Pathogens and Nematodes Affecting Plants	1%		4%	
301	Reproductive Performance of Animals	0%		3%	
302	Nutrient Utilization in Animals	4%		2%	
303	Genetic Improvement of Animals	1%		2%	
305	Animal Physiological Processes	0%		3%	
307	Animal Management Systems	9%		0%	
501	New and Improved Food Processing Technologies	0%		4%	
502	New and Improved Food Products	2%		5%	
601	Economics of Agricultural Production and Farm Management	9%		2%	
604	Marketing and Distribution Practices	3%		1%	
723	Hazards to Human Health and Safety	2%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	97.6	0.0	103.2	0.0
Actual Paid Professional	94.1	0.0	128.1	0.0
Actual Volunteer	162.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
2074928	0	1907052	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
2074928	0	1907052	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
31042550	0	77609613	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

2. Brief description of the target audience

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

3. How was eXtension used?

ANR academics used eXtension to participate in and contribute to many Communities of Practices, to answer "Ask an Expert" questions, and for other general networking purposes.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	426798	0	390	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	98	434	532

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Classes/Short Courses Conducted

Year	Actual
2011	257

Output #2

Output Measure

- Workshops Conducted

Year	Actual
2011	93

Output #3

Output Measure

- Demonstrations and Field Days Conducted

Year	Actual

2011	74

Output #4

Output Measure

- Newsletters Produced

Year	Actual
2011	45

Output #5

Output Measure

- Web Sites Created or Updated

Year	Actual
2011	29

Output #6

Output Measure

- Research Projects Conducted

Year	Actual
2011	324

Output #7

Output Measure

- Videos, Slide Sets and other A/V or Digital Media Educational Products Created

Year	Actual
2011	0

Output #8

Output Measure

- Manuals and Other Printed Instructional Materials Produced

Year	Actual
2011	16

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage of farm and ranch owner/operators and managers and allied industry professionals, participating in the programs, gaining knowledge of crop and varietal selection factors and research-based performance data
2	Percentage of farm, ranch, and landscaping owner/operators and managers and allied industry professionals, participating in the programs, adopting improvements in cultural practices, pest and disease management, irrigation and drainage or other aspects of comprehensive management systems for plant and animal production
3	Percentage of farm, ranch and landscaping owner/operators and managers and allied industry professionals, participating in the programs, adopting superior varieties of crops
4	Percentage of farm/ranch/landscaping owner/operators and managers and allied industry professionals, participating in the programs, gaining knowledge of cultural practices, pest and disease management, irrigation and drainage or other aspects of comprehensive management systems for plant and animal production
5	Percentage of farm and ranch owner/operator/managers, participating in the programs, gaining knowledge of business management practices and marketing strategies, including the costs and risks associated with producing specialty crops
6	Percentage of members of public, participating in the programs, gaining knowledge of sustainable gardening practices
7	Percentage of tree fruit and nut owner/operators and managers and allied industry professionals, participating in the programs, adopting recommended pruning techniques or other orchard management practices
8	Percentage of farm and ranch owner/operators and managers and allied industry professionals, participating in the programs, will be more likely to try out or adopt recommended cultural practices, pest and disease management, or other aspects of comprehensive management systems for animal and plant production
9	Percentage of farm and ranch owner/operators, participating in the programs, gaining skills in business management practices
10	Farm, ranch, and nursery owner/operators and managers, and allied industry professionals, participating in agriculture education programs, gained knowledge of cultural practices or aspects of comprehensive management systems for plant and animal production.
11	Farm owner/operators and managers, and allied industry professionals, participating in agriculture education programs, gained knowledge of irrigation and water management practices.
12	Farm owner/operators and managers and allied industry professionals, participating in agriculture education programs, gained knowledge of pest and disease management for plant production.
13	Farm owner/operators and allied industry professionals, participating in agriculture education programs, gained knowledge of crop and varietal selection factors for plant production.
14	Farm and ranch owner/operators and managers and allied industry professionals, participating in agriculture education programs, gained knowledge of business management practices, economics, and marketing techniques.
15	Members of the public, participating in Master Gardener Programs, gained knowledge of sustainable home gardening techniques, including varietal selection, composting, water conservation and proper use of pest control, to extend to members of the public.

16	Members of the public, participating in agritourism programs and events, felt more connected to local farms and were more likely to buy local agricultural products.
17	Farm and ranch owners/operators and managers and allied industry professionals, participating in agriculture education programs, were more likely to try out or adopt recommended cultural practices, pest and disease management, or other aspects of comprehensive management systems for plant and animal production.
18	Farm and ranch owner/operators and managers, and allied industry professionals, participating in agriculture education programs, gained irrigation and water management skills.
19	Farm owner/operators and managers, and allied industry professionals, participating in agriculture education programs, adopted recommended cultural practices or other aspects of comprehensive management systems for plant and animal production.
20	Farm, ranch and nursery owner/operator and managers, and allied industry professionals, participating in agriculture education programs, adopted recommended irrigation or other water and soil management practices.
21	Farm owner/operators and managers, and allied industry professionals, participating in agriculture education programs, adopted superior varieties of crops for plant production.
22	Farm and ranch owner/operators, participating in agriculture education programs, realized lower production costs and/or higher return on investment.
23	Members of the public adopt less-toxic pest management principles helping make for a healthier community.
24	Business planning helps small farms build stronger businesses and a stronger agricultural community in a challenging economy.
25	Mexicali Valley weather station and bilingual information conserves water and energy, saves growers money, and increases water availability for urban users.
26	The Citrus Variety Collection is a valuable resource to the global citrus community.
27	Research on citrus virus provides science-based evidence that eradication is not necessary, which saves trees and in turn saves growers money.
28	Merced County blossom trails increase agricultural literacy.
29	Growers adopted a new, practical irrigation management practice, contributing to water conservation and money saved.
30	Vineyard companies adopted smaller picking tubs reducing winegrape pickers back injury.
31	Vineyards adopted recommended practice to solarize winery waste, which prevents the spread of vine mealybug.

Outcome #1

1. **Outcome Measures**

Percentage of farm and ranch owner/operators and managers and allied industry professionals, participating in the programs, gaining knowledge of crop and varietal selection factors and research-based performance data

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Percentage of farm, ranch and landscaping owner/operators and managers and allied industry professionals, participating in the programs, adopting superior varieties of crops

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

Percentage of farm and ranch owner/operator/managers, participating in the programs, gaining knowledge of business management practices and marketing strategies, including the costs and risks associated with producing specialty crops

Not Reporting on this Outcome Measure

Outcome #6

1. **Outcome Measures**

   Percentage of members of public, participating in the programs, gaining knowledge of sustainable gardening practices

   Not Reporting on this Outcome Measure

Outcome #7

1. **Outcome Measures**

   Percentage of tree fruit and nut owner/operators and managers and allied industry professionals, participating in the programs, adopting recommended pruning techniques or other orchard management practices

   Not Reporting on this Outcome Measure

Outcome #8

1. **Outcome Measures**

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

   Not Reporting on this Outcome Measure

Outcome #9

1. **Outcome Measures**

   Percentage of farm and ranch owner/operators, participating in the programs, gaining skills in business management practices

   Not Reporting on this Outcome Measure

Outcome #10

1. **Outcome Measures**

   Farm, ranch, and nursery owner/operators and managers, and allied industry professionals, participating in agriculture education programs, gained knowledge of cultural practices or aspects of comprehensive management systems for plant and animal production.

2. **Associated Institution Types**

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	4467

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

Outcome #11

1. Outcome Measures

Farm owner/operators and managers, and allied industry professionals, participating in agriculture education programs, gained knowledge of irrigation and water management practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual

2011	185

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water

Outcome #12

1. Outcome Measures

Farm owner/operators and managers and allied industry professionals, participating in agriculture education programs, gained knowledge of pest and disease management for plant production.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	304

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants

Outcome #13

1. Outcome Measures

Farm owner/operators and allied industry professionals, participating in agriculture education programs, gained knowledge of crop and varietal selection factors for plant production.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	431

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)

Outcome #14

1. Outcome Measures

Farm and ranch owner/operators and managers and allied industry professionals, participating in agriculture education programs, gained knowledge of business management practices, economics, and marketing techniques.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	589

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices

Outcome #15

1. Outcome Measures

Members of the public, participating in Master Gardener Programs, gained knowledge of sustainable home gardening techniques, including varietal selection, composting, water conservation and proper use of pest control, to extend to members of the public.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	215

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
202	Plant Genetic Resources
205	Plant Management Systems
206	Basic Plant Biology

Outcome #16

1. Outcome Measures

Members of the public, participating in agritourism programs and events, felt more connected to local farms and were more likely to buy local agricultural products.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1800

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area

604 Marketing and Distribution Practices

Outcome #17

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1289

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
307	Animal Management Systems

Outcome #18

1. Outcome Measures

Farm and ranch owner/operators and managers, and allied industry professionals, participating in agriculture education programs, gained irrigation and water management skills.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	170

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water

Outcome #19

1. Outcome Measures

Farm owner/operators and managers, and allied industry professionals, participating in agriculture education programs, adopted recommended cultural practices or other aspects of comprehensive management systems for plant and animal production.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	163

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
307	Animal Management Systems

Outcome #20

1. Outcome Measures

Farm, ranch and nursery owner/operator and managers, and allied industry professionals, participating in agriculture education programs, adopted recommended irrigation or other water and soil management practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	240

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water

Outcome #21

1. Outcome Measures

Farm owner/operators and managers, and allied industry professionals, participating in agriculture education programs, adopted superior varieties of crops for plant production.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	4355

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)

Outcome #22

1. Outcome Measures

Farm and ranch owner/operators, participating in agriculture education programs, realized lower production costs and/or higher return on investment.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	367

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #23

1. Outcome Measures

Members of the public adopt less-toxic pest management principles helping make for a healthier community.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Fresno Metropolitan Flood Control District has a mandate to reduce pesticide applications by home gardeners to keep the San Joaquin River safe and healthy. The District discovered that after city-allowed watering days, the river had increased levels of toxic pest management chemicals. Toxic pest chemicals are broad-spectrum pest control chemicals which do not target one or a few pests but most insects they come into contact with, including beneficial insects.

What has been done
UC Fresno County Master Gardener volunteers, through an ongoing partnership with the Fresno Metropolitan Flood Control District, have developed a community outreach program to reduce the use of toxic pest control products in home gardens and landscapes. The UCCE Master Gardener program built and maintained seven integrated pest management kiosks featuring less-toxic "quick tip" consumer cards at five local nurseries, one retail store and the UCCE Master Gardener demonstration garden. Staffing plant clinics at these locations and making presentations on less-toxic pest control methods has been the primary method used in the education process. Master Gardener volunteers have presented the less-toxic pest control message to school groups, garden clubs, businesses and societies. In addition, the Master Gardener program participated in a statewide IPM outreach campaign with a hardware and garden supply chain, Orchard Supply Hardware (OSH).

Results
Homeowner education about these alternative methods by the UC Master Gardener program volunteers was invaluable in reducing chemical levels in the San Joaquin River. Through this credible community group, the District has been able to leverage its limited resources and create a continuous outreach campaign. As a result of these education efforts, event attendees reported changing their behavior to use more environmentally friendly products. OSH reported a 12

percent increase in the sale of less-toxic products compared to the more-toxic alternatives.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #24

1. Outcome Measures

Business planning helps small farms build stronger businesses and a stronger agricultural community in a challenging economy.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Small-scale foothill farmers and ranchers are known for the quality of their products. However, excellent animal or crop production skills, hard work and dedication may not be sufficient to maintain an economically viable farm business. No matter how good their product, farmers and ranchers who lack the business and marketing skills critical to a viable small business may not be successful.

What has been done
UCCE farm advisors in cooperation with farmers and the Foothill Farmers Market manager developed a six-week farm business planning course with sessions on financial analysis tools, financial statements, weak links, operations planning, evaluating existing and alternative enterprises, analyzing markets and action plans. Limited class size allows participants to develop a support network. Each class continues to meet and offer advice and support to each other. Sixteen farms have participated in the course and have taken steps to put their businesses on a more stable economic footing.

Results
Producers now know how to manage cash flow, analyze the costs, returns and weak links in their farming business and plan for a profitable future. But, the real strength of the class is the peer-to-

peer trust and interaction. Class participants may include fruit, vegetable, livestock, timber or wine producers, and the diversity allows each producer to see that other farmers and ranchers face similar issues. The participants have developed a network of fellow producers who can offer useful advice because of their understanding of each other's operations. The class strengthens the local agricultural economy and the local agricultural community by building more economically viable businesses and farmer-to-farmer support.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

Outcome #25

1. Outcome Measures

Mexicali Valley weather station and bilingual information conserves water and energy, saves growers money, and increases water availability for urban users.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Colorado River is the only source of irrigation and drinking water in the Imperial Valley and the main source in Mexicali, Mexico. As much as 4.5 million acre-feet of Colorado River water is used every year to irrigate more than 500,000 acres in the Imperial Valley and in the Mexicali Valley, Mexico. Growers in Southern California are under continuous pressure to conserve water and transfer some of the agricultural water to urban regions of the state. The current water transfer agreement between the Imperial Irrigation District and the San Diego County Water Authority calls for transfer of up to 200,000 acre-feet annually of Imperial Valley-Colorado River water. Increased irrigation efficiency using CIMIS-based irrigation scheduling techniques and other water conservation practices is needed to supply the water demand in Southern California and northern Baja California.

What has been done
UCCE initiated and coordinated meetings between scientists from California Department of Water Resources, University of Baja California, and the state of Baja California to install and calibrate

two CIMIS weather stations in the Mexicali Valley. UC scientists developed bilingual computer programs and publications that are used to educate growers in the region about how they can improve water use efficiency and increase the availability of Colorado River water to urban areas in Southern California and northern Baja California.

Results
The additional weather stations and irrigation scheduling programs help growers in both Baja California and Southern California conserve water. Growers in California extensively use evapotranspiration information from CIMIS. Parker et al. California Agriculture journal, 2000 estimated that California growers save approximately $64.7 million per year in water and energy savings by using CIMIS. The estimated benefit to growers in our region is $6.5 million in water and energy savings. In addition to water savings, reduction in agricultural water use also reduces fertilizer usage and surface and ground water pollution. In light of this data, our best management practices to conserve water and improve irrigation efficiency were included in Regional Water Quality Control Board - Region 7 Silt/Sedimentation TMDL standards.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
601	Economics of Agricultural Production and Farm Management

Outcome #26

1. Outcome Measures

The Citrus Variety Collection is a valuable resource to the global citrus community.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The citrus industry in California is worth $1.3 billion, making it one of the top 10 California crops. Oranges, lemons, mandarins and grapefruit are each among the top 33% of California export crops. To sustain this level of productivity, citrus breeders, researchers and the citrus industry

need access to collections of citrus genetic resources.

What has been done
The UC Riverside Citrus Variety Collection (CVC), established in 1910, is one of the most extensive collections of citrus diversity in the world. This living collection includes two trees of each of the approximately 1,000 different types of citrus within 29 of the genera of the subfamily Aurantiodeae in the Rutaceae family. Approximately 850 of the CVC varieties are in the subgenus Citrus, which contains the varieties we are familiar with. These include sweet oranges, sour oranges, mandarins or tangerines, lemons, limes, grapefruits, pummelos and citrons. Underlying all tangible diversity (shape, size, color, taste, texture, and aroma) is genetic diversity. Scientists can manipulate these genes, combining and transferring them to improve taste or disease and environmental tolerance, or to develop new food, beverage and horticultural crops.

Results
The range of diversity within the collection provides a priceless resource for research. Currently, the collection serves a wide range of research projects on a diversity of topics, including citrus breeding; biological activities of citrus limonoids as anticancer agents; characterization of the different types for commercially important traits such as disease resistance/susceptibility; and the isolation, mapping and transferring of specific genes.

In addition, the USDA-ARS National Clonal Germplasm Repository for Citrus and Dates in Riverside uses the collection as its field site to fulfill its mission to acquire, preserve, distribute and evaluate genetic diversity. The CVC is the major source of observations documented on the National USDA GRIN database, available to the public (www.ars-grin.gov/npgs/searchgrin.html).

Beyond the research mission, the CVC is used by a wide range of groups, such as research scientists from around the world; the citrus beverage industries; students; and the public.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources

Outcome #27

1. Outcome Measures

Research on citrus virus provides science-based evidence that eradication is not necessary, which saves trees and in turn saves growers money.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Citrus tristeza is among the most serious viral diseases of citrus worldwide. The virus resulted in the loss of 3 million orange trees on sour orange rootstock in Southern California during the 1940s and 1950s. In light of this impact on the California citrus industry, in 1963 a tristeza eradication agency was established in the San Joaquin Valley to survey, detect and remove commercial citrus trees infected with citrus tristeza virus. Five pest control districts were established within the agency. Early survey and laboratory screening by the eradication agency generally detected mild strains of the virus. In 1996, two districts withdrew from the eradication program convinced that the virus was not seriously harming infected trees. The decision was based on the fact that commercial orchards in the districts were generally grown on rootstocks thought to be tolerant of mild strains of the virus.

What has been done
A research trial was established to measure the impact of the virus in commercial citrus orchards grown on rootstocks thought to be tolerant of mild strains of the virus. Ten commercial navel orange orchards were selected within the Tulare County Pest Control District. Using Central California Tristeza Eradication Agency records, orchards with approximately 10 percent infection were selected and approximately 200 data trees selected in each orchard, including trees that were positive and negative for the virus. Trees were harvested individually to determine fruit weight, count, size and grade. Annual canopy measurements were recorded. Relative health scores were developed for each tree and collected seasonally for each orchard. Trees were sampled annually for the presence of tristeza by technicians. The agency conducted bio-characterization studies on isolates from the orchards and found that these strains were mild.

Results
An analysis of the data was conducted in collaboration with a team from the Craig School of Business at California State University, Fresno. No significant difference in tree health was measured between infected and non-infected trees and fruit values from trees with the virus were equal to values from non-infected trees. With the results of this research, growers have scientific evidence that trees on tolerant rootstocks that are infected with a mild strain of citrus tristeza virus will not collapse like the trees in Southern California did half a century ago. However, they must weigh that fact with the knowledge that maintaining infected trees in the orchard increases the risk that citrus tristeza virus will continue to spread from tree to tree in the orchard and in the region.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #28

1. Outcome Measures

Merced County blossom trails increase agricultural literacy.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Merced County is looking for ways to increase visitors and promote the area as a great place to visit, live and do business. Agriculture would benefit from a positive image among the urban population. Many of the most beautiful parts of the county are visible only when you travel far off the main roads.

What has been done
A UC farm advisor developed four "blossom trails" that feature agriculture at its best and show off some of the scenic portions of Merced County. During blossom time, the trails are posted on the front page of the UC Cooperative Extension website and the tourism center website. The rest of the year they are available on a web page featuring tourism development resources that was created to assist locals who are interested in developing visitor-oriented businesses.

Results
Every year, many people download the maps and descriptions. The trails have cast Merced County and its agriculture in a positive light. Visitors and locals have learned that the county has some very scenic areas if they take the time to visit them. In March 2011 alone, the visitor center had 400 downloads of the maps. For spring 2011, the UCCE sites had 448 downloads.

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices

Outcome #29

1. Outcome Measures

Growers adopted a new, practical irrigation management practice, contributing to water conservation and money saved.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The irrigation crop coefficient relates vine water requirements to climatic conditions. Having an accurate crop coefficient allows farmers to estimate irrigation requirements accurately based on local weather data. Past UC research has demonstrated that the crop coefficient itself can be estimated based on measurements of the ground area shaded by the vineyard leaf canopy at midday. However, previous methods for measuring the shaded area were not practical for commercial use, limiting the use of important irrigation information. Many growers base their irrigation decisions on past experiences or guesswork, rather than data, because a practical method for measuring an accurate irrigation crop coefficient hasn't been available.

What has been done
A UC farm advisor developed a novel method for measuring the canopy shaded area, a device (dubbed the "Paso Panel"). The device utilizes a lightweight solar panel as a shade meter, which is read with an inexpensive electronic meter. The method provides accurate measurements of the canopy shaded area with much less effort than previous techniques. The website http://cesanluisobispo.ucdavis.edu/Viticulture/Paso_Panel/ was developed to describe the method and construction. The technology has been extended to Argentina. The device has also been used in local research projects.

Results
The novel 'Paso Panel' effectively fills the information gap. Using the device, growers and irrigation managers can determine accurate vine irrigation crop coefficients based on the particular conditions in their own vineyards. The device has been adopted for use by some of the largest commercial vineyard operations in the state, and has to date characterized the crop coefficient in hundreds of vineyard blocks. They can now use this more accurate information to manage irrigation systems more efficiently, conserving water and saving money, as well as to

further optimize winegrape quality.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water

Outcome #30

1. Outcome Measures

Vineyard companies adopted smaller picking tubs reducing winegrape pickers back injury.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Hand harvest work in winegrape vineyards is physically demanding and exposes workers to ergonomics risks. Back injuries are the most common and most costly. With some 230 back injuries reported annually, the cost to the California vineyard industry is more than $2.3 million per year. In addition to uncalculated worker pain and lost income, these injuries reduce productivity and drive up workers compensation insurance costs.

What has been done
UC Cooperative Extension farm advisors, together with a research team led by a UCCE specialist and professor emeritus, reviewed multiple vineyard jobs for ergonomics risk exposures. They worked with three wineries and one vineyard management company, involving more than 200 workers. They found that hand harvest is the most physically demanding job in winegrape vineyard work. Smaller plastic tubs were evaluated with workers during several winegrape harvests and ergonomics assessment showed large reductions in risk exposures. Workers fill the small tubs in less time, which means they lift more frequently. They also make more carries per hour to deliver the same tonnage. However, due to the smaller tubs' lighter weight, there was actually a slight decrease in energy demand. The smaller tub does result in a 2.5 percent decrease in worker productivity as measured by pounds of grapes per shift. (This was not noted

by either workers or managers, but by the researchers.)

Results
The smaller picking tubs have resulted in a five-fold reduction in harvest workers' reported pain and symptoms for back injury and other musculoskeletal disorders. Workers are less tired and less likely to be injured using the smaller tubs. Equally important, the workers have accepted the use of the smaller tub. All of the vineyard companies cooperating in the project have permanently adopted the smaller picking tub. The tubs are commercially available and indications of worker preference suggest that they will be disseminated throughout vineyards in Napa and Sonoma counties.

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety

Outcome #31

1. Outcome Measures

Vineyards adopted recommended practice to solarize winery waste, which prevents the spread of vine mealybug.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Vine mealybug is an introduced pest in California that causes feeding damage and is capable of transmitting grapevine viral diseases that significantly reduce fruit and wine quality. The insect is very small and often goes unnoticed until populations rise and sticky honeydew accumulates on leaves, trunks and grape clusters. The insect can be spread to uninfested vineyards on farm equipment and workers' clothing. To prevent such spread, growers wash equipment before entering uninfested vineyards and hand crews wear disposable coveralls in infested vineyards. Using unfermented pomace as fertilizer in vineyards was thought to be another route for mealybug movement. (Pomace is berry skins, seeds and cluster stems left over from the wine making process.)

What has been done

In trials at two wineries, UC Cooperative Extension researchers verified the survival of vine mealybug in unfermented pomace. Infested clusters were added to grapes processed in a grape press. Insects survived the press at each winery. This research demonstrated that growers and wineries can prevent vineyard contamination with mealybugs by not spreading pomace in vineyards or stockpiling it near vine rows. Management of this waste was still an issue for the industry. Unfermented winery waste is not commonly composted, and it may remain in static piles for weeks or months. UC advisors compared the fate of vine mealybug in pomace piles covered with clear plastic with their fate in uncovered piles. Results showed that covering pomace for one week reduced the number of live vine mealybugs by nearly 100 percent. The researchers have delivered this message in presentations in winegrape growing regions across the state. They also published the research results.

Results

Spreading fresh pomace in north coast vineyards is no longer a standard practice. Nearly all unfermented pomace piles are covered for at least a short period of time or are in locations that are not adjacent to grapevines. A larger number of wineries are turning the piles to speed the decomposition of skins and stems. One estate winery in Sonoma County now composts pomace from 3,500 tons of grapes it processes each year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

ANR's most notable qualitative impacts that were realized, as well as the quantitative outcomes recorded from the evaluation studies, are reported under the State Defined Outcomes section.

Key Items of Evaluation

The Report Overview's federal Planned Program summary of accomplishments highlights ANR's most significant work during FY 2011, especially the research developments. The State Defined Outcomes section captures clientele economic change outcomes, as well as a couple social/health and environmental condition improvements; these are the types of ultimate impacts that ANR research and education programs strive to realize.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Endemic and Invasive Pests and Diseases

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
135	Aquatic and Terrestrial Wildlife	1%		4%	
136	Conservation of Biological Diversity	1%		1%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		5%	
206	Basic Plant Biology	1%		1%	
211	Insects, Mites, and Other Arthropods Affecting Plants	15%		13%	
212	Pathogens and Nematodes Affecting Plants	22%		37%	
213	Weeds Affecting Plants	14%		2%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	1%		0%	
215	Biological Control of Pests Affecting Plants	4%		11%	
216	Integrated Pest Management Systems	34%		8%	
304	Animal Genome	0%		1%	
305	Animal Physiological Processes	0%		2%	
311	Animal Diseases	1%		2%	
312	External Parasites and Pests of Animals	1%		2%	
601	Economics of Agricultural Production and Farm Management	2%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%		1%	
721	Insects and Other Pests Affecting Humans	2%		6%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%		2%	
723	Hazards to Human Health and Safety	0%		2%	
903	Communication, Education, and Information Delivery	1%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	65.7	0.0	82.2	0.0
Actual Paid Professional	65.4	0.0	101.8	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1816590	0	1053435	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1816590	0	1053435	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
21582906	0	61699945	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

2. Brief description of the target audience

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

3. How was eXtension used?

ANR academics used eXtension to participate in and contribute to many Communities of Practices, to answer "Ask an Expert" questions, and for other general networking purposes.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	99441	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	153	360	513

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Classes/Short Courses Conducted

Year	Actual
2011	72

Output #2

Output Measure

- Workshops Conducted

Year	Actual
2011	25

Output #3

Output Measure

- Demonstrations and Field Days Conducted

Year	Actual

2011	22

Output #4

Output Measure

- Newsletters Produced

Year	Actual
2011	12

Output #5

Output Measure

- Web Sites Created or Updated

Year	Actual
2011	28

Output #6

Output Measure

- Research Projects Conducted

Year	Actual
2011	248

Output #7

Output Measure

- Videos, Slide Sets and Other AV or Digital Media Educational Products Created

Year	Actual
2011	1

Output #8

Output Measure

- Manuals and Other Printed Instructional Materials Produced

Year	Actual
2011	15

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage of farm, ranch, rangeland, and landscaping owner/operators and managers and allied industry professionals, participating in the programs, gaining knowledge of integrated pest management strategies and techniques
2	Percentage of farm, ranch, rangeland, and landscaping owner/operators and managers and allied industry professionals, participating in the programs, gaining knowledge of pesticide and pharmaceutical efficacy and optimal use
3	Percentage of farm, ranch, rangeland, and landscaping owner/operators and managers and allied industry professionals, participating in the programs, adopting recommended prevention, detection and monitoring, and treatment practices for integrated pest management
4	Percentage of farm, ranch, rangeland, and landscaping owner/operators and managers and allied industry professionals, participating in the programs, realizing lower costs for pest prevention and management
5	Percentage of farm, ranch, rangeland, landscaping, and boat owner/operators and managers, allied industry professionals, and members of the public participating in the program gaining knowledge of prevention, detection, and treatment strategies and techniques for management of invasive species
6	Percentage of farm, ranch, rangeland, and landscaping owner/operators and managers, and allied industry professionals, participating in the programs, adopting treatment practices for invasive species
7	Percentage of farm owner/operators and managers, Pest Control Advisors, and other allied industry professionals, participating in the programs, gaining knowledge on how to recognize and identify pests and diseases
8	Farm, ranch, range and landscaping owner/operators and managers, and Pest Control Advisors and other allied industry professionals, participating in pest management education programs, gained knowledge of Integrated Pest Management strategies and techniques.
9	Farm owner/operators and managers, and Pest Control Advisors and other allied industry professionals, participating in pest management education programs, gained knowledge of pesticide and pharmaceutical efficacy and optimal use.
10	Farm, forest, range, and boat owner/operators, and Pest Control Advisors and allied industry professionals, participating in invasive species programs, gained knowledge of prevention, detection and treatment practices for invasive species.
11	Farm owner/operators and managers, and Pest Control Advisors and other allied industry professionals, participating in pest management education programs, gained knowledge on how to recognize and identify pests and diseases.
12	Farm, ranch, and boat owner/operators and managers, and Pest Control Advisors and other allied industry professionals, participating in pest management education programs, were more likely to try out or adopt recommended strategies and techniques for invasive species and pest management.
13	Farm owners/operators and managers, and Pest Control Advisors and other allied industry professionals, participating in pest management education programs, gained skills to detect, monitor, and treat pests.
14	Farm owner/operators and managers, and Pest Control Advisors and other allied industry professionals, participating in pest management education programs, adopted recommended Integrated Pest Management practices.

15	Farm and nursery owner/operators, participating in pest and disease management education programs, used recommended pest and disease management practices, which resulted in reduced crop losses and thus more economic gain.
16	The decreased incidence of tomato spotted wilt virus (TSWV) reduced economic losses due to this pest.
17	A quarantine on the European Grapevine Moth (EGVM) was lifted.
18	Farm and range owner/operators and allied industry professionals, participating in pest management education programs, adopted recommended treatment practices for invasive species.
19	Fewer nursery positives for Light Brown Apple Moth (LBAM) were found in commercial nursery operations in Monterey and Santa Cruz counties.
20	Pesticide application to cherries for Spotted Wing Drosophila (SWD) was reduced, lowering growers' input costs, and thus improving profitability.
21	Acres of peaches showed a continued drop in the use of broad spectrum insecticides.
22	Growers adoption of Integrated Pest Management (IPM) reduces pesticide use.
23	New biological frost control strategies are used and significantly reduce crop damage.
24	UC developed and patented methyl iodide preparation provides growers with a much needed environmentally friendly option to a recently banned chemical.
25	UCCE advice results in 99.9 percent reduction in eye gnats in one plagued local community.
26	Growers adopted new control measures contributing to the significant reduction in the incidence of the viral pathogen Apium Virus Y (ApVY) during 2010.
27	UC biotechnology website helps tens of thousands to understand the science behind GMOs.
28	UCCE helps bromeliad growers comply with regulations.

Outcome #1

1. **Outcome Measures**

   Percentage of farm, ranch, rangeland, and landscaping owner/operators and managers and allied industry professionals, participating in the programs, gaining knowledge of integrated pest management strategies and techniques

   Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

Percentage of farm, ranch, rangeland, and landscaping owner/operators and managers and allied industry professionals, participating in the programs, gaining knowledge of pesticide and pharmaceutical efficacy and optimal use

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Percentage of farm, ranch, rangeland, and landscaping owner/operators and managers and allied industry professionals, participating in the programs, adopting recommended prevention, detection and monitoring, and treatment practices for integrated pest management

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

Percentage of farm, ranch, rangeland, and landscaping owner/operators and managers and allied industry professionals, participating in the programs, realizing lower costs for pest prevention and management

Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

Percentage of farm, ranch, rangeland, landscaping, and boat owner/operators and managers, allied industry professionals, and members of the public participating in the program gaining knowledge of prevention, detection, and treatment strategies and techniques for management of invasive species

Not Reporting on this Outcome Measure

Outcome #6

1. **Outcome Measures**

Percentage of farm, ranch, rangeland, and landscaping owner/operators and managers, and allied industry professionals, participating in the programs, adopting treatment practices for invasive species

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Percentage of farm owner/operators and managers, Pest Control Advisors, and other allied industry professionals, participating in the programs, gaining knowledge on how to recognize and identify pests and diseases

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Farm, ranch, range and landscaping owner/operators and managers, and Pest Control Advisors and other allied industry professionals, participating in pest management education programs, gained knowledge of Integrated Pest Management strategies and techniques.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	3561

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #9

1. Outcome Measures

Farm owner/operators and managers, and Pest Control Advisors and other allied industry professionals, participating in pest management education programs, gained knowledge of pesticide and pharmaceutical efficacy and optimal use.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1644

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants

Outcome #10

1. Outcome Measures

Farm, forest, range, and boat owner/operators, and Pest Control Advisors and allied industry professionals, participating in invasive species programs, gained knowledge of prevention, detection and treatment practices for invasive species.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1246

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #11

1. Outcome Measures

Farm owner/operators and managers, and Pest Control Advisors and other allied industry professionals, participating in pest management education programs, gained knowledge on how to recognize and identify pests and diseases.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	2500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants

Outcome #12

1. Outcome Measures

Farm, ranch, and boat owner/operators and managers, and Pest Control Advisors and other allied industry professionals, participating in pest management education programs, were more likely to try out or adopt recommended strategies and techniques for invasive species and pest management.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	158

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants

Outcome #13

1. Outcome Measures

Farm owners/operators and managers, and Pest Control Advisors and other allied industry professionals, participating in pest management education programs, gained skills to detect, monitor, and treat pests.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	713

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants

213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

Outcome #14

1. Outcome Measures

Farm owner/operators and managers, and Pest Control Advisors and other allied industry professionals, participating in pest management education programs, adopted recommended Integrated Pest Management practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	766

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #15

1. Outcome Measures

Farm and nursery owner/operators, participating in pest and disease management education programs, used recommended pest and disease management practices, which resulted in reduced crop losses and thus more economic gain.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	65

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

Outcome #16

1. Outcome Measures

The decreased incidence of tomato spotted wilt virus (TSWV) reduced economic losses due to this pest.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual

2011 75000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Tomatoes are grown on over 120,000 acres in Fresno County, which had a gross value of over $320 million in 2005, making tomatoes the most valuable vegetable crop in this county. Within the last several years, TSWV has caused substantial economic damage to tomatoes in this production area. This disease can cause 100% crop loss in processing tomatoes. TSWV virus infects at least 168 plant species in 29 families, including many crops and weeds common in this area. Thus, there are many possible reservoir hosts for the virus. In addition, the thrips vectors also have a wide host range. The source of the initial inoculum source is not known and neither is the potential of the infected transplants to contribute to the problem observed. Also, the benefit of IPM strategies for thrips control is not well understood. Short-term goals of this project include (i) identify if the source of the virus is in the production area or if it is re-introduced through transplants, (ii) develop monitoring systems to detect and manage pest outbreaks, and (iii) develop and facilitate efficient management of TSWV in integrated management systems.

What has been done
A newsletter and emails were extended to growers with maps to let them know where the virus has been reported, thrips vector population density information, and management strategies. Workshops, educational presentations, and individual consultations were also conducted. In addition, an article was published on ongoing research.

Results
Fresno County, where the recommendations were followed, experienced little incidence of TSWV, and thus no economic losses were observed.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #17

1. Outcome Measures

A quarantine on the European Grapevine Moth (EGVM) was lifted.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The invasive arthropod pest EGVM was found in California and has impacted farm profitability.

What has been done
Educational presentations about managing, monitoring and the status of this invasive pest were delivered. Also, radio programs and other interviews to extend awareness about EGVM in the quarantine area were conducted.

Results
The extension of management information to the public contributed to improved control of EGVM and the lifting of the 96 square miles of quarantine in the Central Valley.

4. Associated Knowledge Areas

KA Code	Knowledge Area
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #18

1. Outcome Measures

Farm and range owner/operators and allied industry professionals, participating in pest management education programs, adopted recommended treatment practices for invasive species.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1098

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems

Outcome #19

1. Outcome Measures

Fewer nursery positives for Light Brown Apple Moth (LBAM) were found in commercial nursery operations in Monterey and Santa Cruz counties.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	360

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
LBAM is a significant invasive pest in California.

What has been done
An Integrated Pest Management (IPM) program was developed for the nursery industry to help the nursery operators scout their own fields, identify pest problems, and control LBAM. Research and new knowledge was extended through educational presentations, classes, and newsletters.

Results
The LBAM IPM program contributed to the decreased incidence of this invasive pest found in commercial nurseries statewide; thus, reducing economic losses.

4. Associated Knowledge Areas

KA Code	Knowledge Area
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #20

1. Outcome Measures

Pesticide application to cherries for Spotted Wing Drosophila (SWD) was reduced, lowering growers' input costs, and thus improving profitability.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
SWD is a new invasive pest of fruit crops in California. In Kern County, it was first found in February 2010 and has since become a significant pest of cherries. Cherry growers lost tens of millions of dollars in exported fruit that had to be dumped into the ocean due to unacceptable levels of pesticide residues. This occurred because growers were unaware of Maximum Residue Level (MRL) limitations to some countries and due to a lack of information on the degradation rates of the pesticides they were using.

What has been done

Research was conducted to understand the basic biology of the pest, its interactions with cherries and other hosts, and to develop methods for its management using common insecticides that comply with international limitations on pesticide residues for exported cherries.

Results
Prior to this project, cherry growers routinely sprayed three to five pesticide applications close to harvest in order to protect fruit from damage by SWD. After this project, growers now manage SWD with two to three applications due to an increased knowledge of when fruit is, and is not, susceptible to attack. This has resulted in a reduction in the costs of pesticides and their application, thus improving the profitability of producing cherries. Growers adopted the recommended pesticide program that was both effective and that allowed residue levels on fruit to remain below the MRLs for the country to which the fruit was exported. As a result, in 2011 growers were able to avoid the millions of dollars in losses that occurred in 2010; thus, increasing the profitability of producing cherries in California.

4. Associated Knowledge Areas

KA Code	Knowledge Area
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #21

1. Outcome Measures

Acres of peaches showed a continued drop in the use of broad spectrum insecticides.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	78000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Stone fruit farmers have the opportunity to greatly reduce the use of insecticides that can cause harm to the environment, result in excess pesticide residue, and cause farm worker concern due to toxicity.

What has been done
Alternatives to conventional approaches were researched. Reduced risk practices were developed, which are effective, cost equally, and are now registered for use. New technology was utilized to implement these reduced risk practices. Demonstrations, classes, educational presentations, interviews, and a website were delivered to extend this information to stone fruit growers. In addition, two peer-reviewed articles were published.

Results
Peach growers adopted recommended practices, reducing their use of broad spectrum insecticides, and thus providing benefits to the environment and to farm worker health.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #22

1. Outcome Measures

Growers adoption of Integrated Pest Management (IPM) reduces pesticide use.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Farmers are facing increasing regulation of pesticides, in part the result of environmental concerns about pesticides in water supplies and health effects on farmworkers.

What has been done
UC Integrated Pest Management advisors have been leaders in many of the Pest Management Alliance (PMA) projects funded by the
California Department of Pesticide Regulation (DPR) to develop and demonstrate pest management systems that reduce pesticide risks.

* The Almond PMA established long-term demonstration/education sites in Butte, Stanislaus and Kern counties to show growers that reduced pesticide spray programs work. For nine years, no sprays were applied in some of these orchards and reduced-risk (less pesticide) sites showed no increase in damage at harvest.

* In prunes, the PMA focused on developing and demonstrating sampling plans and treatment thresholds that help growers determine whether sprays are needed for each economically damaging pest. A major goal is to reduce dormant sprays.

* The Walnut PMA has worked closely with researchers to develop "puffers" to apply pheromones for mating disruption of codling moths. The PMA developed monitoring protocols to help growers determine when the pheromone confusion technique requires supplemental sprays.

Results

Almond growers have reduced their total pesticide use by 65 percent since 1990. The California Almond Board attributes much of this to the results of the Almond PMA. The Almond PMA won the DPR IPM Innovators Award and a national IPM team award from the Entomology Society of America. The survey of the almond IPM training indicated that almost all of those who attended intended to use the methods they learned during the following season.

Prune growers have mitigated pesticides in surface water runoff by using reduced rates of pesticides necessary for aphid control and changing dormant spray timings.

The results of the Walnut PMA's demonstration of "puffers" increased the use of mating disruption in walnuts to 15,000 acres in 2010.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #23

1. Outcome Measures

New biological frost control strategies are used and significantly reduce crop damage.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Frost damage persistently limits the production of many important crops and costs California agriculture up to $1 billion annually. Flowers of deciduous fruit and nut trees, vegetables and subtropical crops are damaged when temperatures drop even slightly below freezing. Existing methods of frost protection, such as overhead sprinklers, heaters, and wind machines, are expensive to use, limited by water supplies and relatively ineffective. For many crops, no methods of frost control are currently available or practical.

What has been done
Research has shown that frost-sensitive plants are damaged only when ice forms in the plant, not by cold temperatures alone. Further, certain common plant bacteria trigger ice formation by a process called ice nucleation. In the absence of these bacteria, plants do not freeze until faced with relatively cold temperatures. By inoculating crops early in their seasonal development, research has shown that ice-nucleation active bacteria can be prevented from growing. In the field, researchers demonstrated that both the altered bacteria and naturally occurring bacteria successfully competed with the ice-nucleation active bacteria on the potato plant. This represented the first field use of genetically engineered microbes in the world. Both reduced the freezing temperature of crops from 2 to 6 degrees F and reduced plant frost damage during typical frosts of about 28 degrees F by an average of 80%.

Results
A naturally occurring bacterial strain from a pear tree in California was found to improve control of frost damage when sprayed onto crops. This bacterium also controls fire blight, a devastating disease of pear and apple trees. The bacterium has been commercialized as a freeze-dried preparation of live bacteria that can be sprayed onto crops with standard agricultural spray equipment. This product, Blightban A506, can provide considerable control of frost damage and is registered by the U.S. Environmental Protection Agency for use on a wide variety of crop plants, including pear, apple, strawberry, peach and potato. In the western U.S. and other regions, approximately 50 percent of the crop acreage, such as pear and apple, is treated with this antagonistic bacterium for both frost and disease control. The use of this biological control agent provides an environmentally safe and economical means of frost protection, ensuring crop productivity even when cold temperatures strike.

4. Associated Knowledge Areas

KA Code	Knowledge Area
215	Biological Control of Pests Affecting Plants

Outcome #24

1. Outcome Measures

UC developed and patented methyl iodide preparation provides growers with a much needed environmentally friendly option to a recently banned chemical.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
For more than 50 years, U.S. agricultural producers have used methyl bromide as a broad-spectrum soil fumigant to combat nematode pests, soil pathogens, insects, and weeds. An estimated 21 million kilograms of methyl bromide were used annually in the United States by1990. However, in 1993 the Environmental Protection Agency classified methyl bromide as an environmentally harmful, ozone-depleting substance and instituted a gradual phase-out that began in 1999, which culminated in a total ban by 2005 (except for "critical use" exemptions). The U.S. Department of Agriculture has estimated that the loss of methyl bromide costs the agricultural industry and consumers $1.3-1.5 billion annually in crop losses. A more conservative estimate by the National Center for Food and Agricultural Policy put the cost at $484 million annually.

What has been done
A UC professor and colleagues developed two patented methyl iodide uses as alternatives to methyl bromide. Five years of field trials found that methyl iodide is at least as effective as methyl bromide in combating weeds, nematodes, and soil pathogens. Methyl iodide is not an ozone depletor because it has an average lifetime in the atmosphere of about 1.5 days, compared to 1.7 years for methyl bromide. Methyl iodide is also 1.5 times heavier than methyl bromide, so agricultural producers can use about two-thirds less. UC Cooperative Extension research has estimated that about 150 pounds of methyl iodide per acre applied via drip irrigation would provide the same benefits as about 250 to 270 pounds per acre of methyl bromide.

Results
One of the patented uses was licensed to Arvesta Corp. (now Arysta LifeScience) in 1999. In 2008 the EPA approved use of the fumigant on strawberries, tomatoes, tree and vine crops, and

ornamentals and turf. Arysta LifeScience has named its iodomethane product Midas and over the last three years has applied it to 16,000 acres in the Southeastern US, with exceptional results. The California Department of Pesticide Registration approved the use of Midas in December 2010. Midas is expected to replace much of the acreage fumigated by methyl bromide, with strawberries --a $1.7 million crop -- being a major beneficiary. Methyl iodide is now registered in 48 states and 5 countries.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants

Outcome #25

1. Outcome Measures

UCCE advice results in 99.9 percent reduction in eye gnats in one plagued local community.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The community of Jacumba in San Diego County was afflicted with an enormous population of eye gnats -- small flies that hover around eyes, ears and nose. In large numbers, eye gnats can be exceptionally bothersome. Outdoor activity in the mornings and evenings became impossible. Eye gnats are a native inhabitant of the desert southwest and San Joaquin Valley of California, but with the introduction of modern farming practices and irrigation, eye gnat populations have exploded in some areas near farm fields. Control methods have been ongoing since the early 1950s, most notably in Riverside County's Coachella Valley. In 2008, the residents of Jacumba blamed the local 400-acre organic farm for a high population of the troublesome gnats and complained to county officials. There was no avenue for action by the county, and the interaction among the county, the farmer and the community turned acrimonious. This serious urban/agriculture interface issue threatened organic food production in the area and the residents'

quality of life.

What has been done
The County Department of Vector Control asked UC Cooperative Extension in San Diego County to investigate the issue. Advisors conducted research to determine the source of the eye gnats and confirmed that it was the organic farm. Working with the farm owner, UCCE advisors developed management practices to reduce eye gnat propagation on the farm. These practices were modified until the eye gnat population was significantly reduced in the community.

Results
UC Cooperative Extension research helped to solve an urban/agriculture interface problem thought to be insurmountable. It also provided the farmer with methods that will allow him to farm organically in close proximity to an urban center. San Diego County Vector Control used the recommended practices to create an Eye Gnat Nuisance Prevention Plan. Implementation of the management plan resulted in a 99.9 percent reduction in eye gnat numbers in town. Similar eye gnat problems are occurring in several other San Diego County communities. UCCE is now involved in problem solving in those areas as well.

4. Associated Knowledge Areas

KA Code	Knowledge Area
312	External Parasites and Pests of Animals
721	Insects and Other Pests Affecting Humans

Outcome #26

1. Outcome Measures

Growers adopted new control measures contributing to the significant reduction in the incidence of the viral pathogen Apium Virus Y (ApVY) during 2010.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

From 2007 to 2009, celery crops in coastal California were damaged by an apparently new problem. Affected plants showed extensive yellowing and deformity of the leaves, as well as distinct, large brown to tan elongated lesions on the petioles. Such petiole symptoms prevented the celery from being marketable and resulted in crop losses of up to 40 percent. The symptoms were striking in appearance and did not match those caused by any known celery pathogen in California. The disease was first detected in Santa Clara and Monterey counties and later was found in Ventura County.

What has been done
UC Cooperative Extension farm advisors initiated an investigation and assembled a collaborative team that included the California Celery Research Board, USDA-ARS researchers, and the California Department of Food and Agriculture. They determined that the problem was caused by the viral pathogen Apium Virus Y (ApVY). This was first report of ApVy virus on celery in North America. In order to develop control strategies for celery growers, the team conducted research into the biology of ApVY and field surveys.

Researchers found that the virus was present in several central coast and south coast counties. While celery was the most severely affected crop, related plants such as parsley and cilantro were also infected. A key finding was the discovery that poison hemlock, a weed that is also in the Apiaceae plant family, was widely infected and appeared to be a reservoir source of the virus. Inoculation studies using many celery cultivars revealed that some selections were less susceptible and developed only limited symptoms. Importantly, ApVY is not seedborne in celery.

Results
Based on these studies, growers are advised on options for control measures: 1) removal or control of the poison hemlock weed; if such steps are not possible, celery plantings should be moved to different areas; 2) spraying for and managing aphids given they spread the virus from the weeds to celery; 3) Not planting highly susceptible celery cultivars in places having a history of ApVY problems; and 4) planting the tolerant cultivars. The growers? adoption of these measures contributed to the significant reduction of ApVY incidence in 2010.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants

Outcome #27

1. Outcome Measures

UC biotechnology website helps tens of thousands to understand the science behind GMOs.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
It is the responsibility of public sector scientists to provide facts to inform consumers about issues being raised over crops and foods developed through the process of genetic engineering (biotechnology, genetically modified, or GM). This helps individuals make informed decisions about the desirability of the technology and its products.

What has been done
The ANR Statewide Biotechnology Workgroup created the website http://ucbiotech.org in 2001 to provide comprehensive information and resources on biotechnology intended to facilitate scientific evaluation, education and fact-based public discussion on GE foods. The Biotechnology Information section answers popular questions about the safety and environmental impact of organic, conventional and GE agriculture. Responses are linked to peer-reviewed scientific literature. The site also has a large "Resources" section with fact sheets, podcasts, curricula, games and displays available on loan, and an array of downloadable PowerPoint presentations and images.

Results
Scientists and educators worldwide use information on the site to explain the science behind GE crops and foods and to introduce scientific data into the frequently emotional debate. As of 2011, there have been hundreds of downloads worldwide of the two-part series in the Biotechnology Information section, "Genetically Engineered Crops and Foods: A Scientist's View of the Issues" - often as a platform to educate local regulators.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms

Outcome #28

1. Outcome Measures

UCCE helps bromeliad growers comply with regulations.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Ethylene, a gas found in nature and commonly used to ripen bananas and other fruit, can uniformly induce synchronous flowering in bromeliads. Synchronous flowering is key to marketing bromeliads. However, the EPA considers the gas a pesticide when used in this manner, and there are no registered uses of ethylene as a pesticide. Growers were unaware of that fact, but were told by county regulators they would have to stop using ethylene gas until it was registered. This would have caused a severe economic impact on some of the largest bromeliad growers. Synthetic chemicals are registered to induce flowering in bromeliads, but they are toxic, can cause phytotoxicity and cause asynchronous flowering.

What has been done
UCCE San Diego research produced evidence of ethylene's efficacy in comparison to the toxic chemicals presently registered for bromeliad flower induction. UCCE San Diego compiled evidence of the innocuous nature of ethylene gas, relevant research and other relevant data into a full registration packet. In addition, data was collected from local growers on the best method of applying ethylene. Based on the data, UC wrote a formal label for ethylene use that could be included with the tanks of ethylene compressed gas. This information was given to the cooperating specialty gas company that filed the official registration request.

Results
The written label, the full packet presented to the cooperating specialty gas company, and support letters quickened the registration process. California Department of Pesticide Regulation approved the registration and official label for ethylene use in bromeliad flower induction. By interceding, UCCE enabled growers to use ethylene. Ornamental producers across the country, including Florida which has large production, now have a registered label for ethylene.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

ANR's most notable qualitative impacts that were realized, as well as the quantitative outcomes recorded from the evaluation studies, are reported under the State Defined Outcomes section.

Key Items of Evaluation

The Report Overview's federal Planned Program summary of accomplishments highlights ANR's most significant work during FY 2011, especially the research developments. The State Defined Outcomes section captures clientele economic change outcomes, as well as a couple environmental condition improvements; these are the types of ultimate impacts that ANR research and education programs strive to realize.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Sustainable Natural Ecosystems

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	1%		6%	
102	Soil, Plant, Water, Nutrient Relationships	6%		14%	
103	Management of Saline and Sodic Soils and Salinity	3%		2%	
104	Protect Soil from Harmful Effects of Natural Elements	0%		3%	
111	Conservation and Efficient Use of Water	20%		6%	
112	Watershed Protection and Management	15%		4%	
121	Management of Range Resources	10%		4%	
122	Management and Control of Forest and Range Fires	4%		1%	
123	Management and Sustainability of Forest Resources	5%		0%	
131	Alternative Uses of Land	3%		3%	
132	Weather and Climate	1%		4%	
133	Pollution Prevention and Mitigation	15%		10%	
135	Aquatic and Terrestrial Wildlife	9%		6%	
136	Conservation of Biological Diversity	4%		11%	
141	Air Resource Protection and Management	3%		5%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		3%	
206	Basic Plant Biology	0%		3%	
212	Pathogens and Nematodes Affecting Plants	0%		5%	
605	Natural Resource and Environmental Economics	1%		6%	
610	Domestic Policy Analysis	0%		4%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	51.2	0.0	63.1	0.0
Actual Paid Professional	51.1	0.0	82.1	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1377065	0	1161681	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1377065	0	1161681	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
16689588	0	49740431	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

2. 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

3. How was eXtension used?

ANR academics used eXtension to participate in and contribute to many Communities of Practices, to answer "Ask an Expert" questions, and for other general networking purposes.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	66418	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	57	336	393

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Classes/Short Courses Conducted

Year	Actual
2011	86

Output #2

Output Measure

- Workshops Conducted

Year	Actual
2011	50

Output #3

Output Measure

- Demonstrations and Field Days Conducted

Year	Actual

2011	16

Output #4

Output Measure

- Newsletters Produced

Year	Actual
2011	5

Output #5

Output Measure

- Web Sites Created or Updated

Year	Actual
2011	18

Output #6

Output Measure

- Research Projects Conducted

Year	Actual
2011	179

Output #7

Output Measure

- Videos, Slide Sets and Other AV or Digital Media Educational Products Created

Year	Actual
2011	0

Output #8

Output Measure

- Manuals and Other Printed Instructional Materials Produced

Year	Actual
2011	6

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage of farm, ranch, and rangeland owner/operators and managers and allied industry professionals, participating in water quality education programs, gaining knowledge of best management practices for preserving water quality
2	Number of governmental agencies, agricultural and fishing organizations, resource managers and other stakeholders in watershed management issues, participating in the programs, gaining knowledge of strategies and techniques for sustainable use of fishery resources
3	Percentage of owners/managers of private and public rangeland, forest and wildlands, participating in range, forest and wildland education programs, gaining knowledge of strategies and techniques for sustainable use of range, forest and wildland resources
4	Number of governmental agencies, community organizations and other stakeholders in land use policy issues, participating in the programs, gaining increased understanding of land use planning strategies, methodologies and data
5	Percentage of farm, ranch, rangeland and marine industry owner/operators and managers and allied industry professionals, participating in water quality education programs, adopting best management practices for preserving water quality
6	Percentage of owners/managers of private and public rangeland, forest and wildlands, participating in range, forest and wildland education programs, adopting recommended strategies and techniques for sustainable use of range, forest and wildland resources
7	Percentage of fire protection and land management agenices, land and home owners, community orgainzations, and land scape professionals, participating in wildland fire education programs, gaining knowledge on how to increase fire resistance of homes and landscaping
8	Percentage of farm, ranch, and landscape owners/operators and managers and allied industry professionals and governmental agency representatives, participating in air quality education programs, gaining knowledge of the atmospheric system and/or how policies, products, plants, and practices can help improve air quality
9	Percentage of farm owner/operators, allied industry professionals, and members of the public, participating in water conservation education programs, gaining knowledge of water use and conservation practices
10	Farm, ranch, and rangeland owner/operators and managers, allied industry professionals, public agency representatives, and members of the public, participating in water quality education programs, gained knowledge of best management practices for preserving water quality.
11	Owners/managers of private and public rangeland, forest and wildlands, participating in sustainable use of natural resources education programs, gained knowledge of strategies and techniques for sustainable use of range, forest and wildland resources.
12	Farm owner/operators, allied industry and natural resource professionals, and members of the public, participating in water conservation education programs, gained knowledge of water use and conservation practices.
13	Farm, nursery, ranch and rangeland owner/operators and managers, allied industry professionals, public agency representatives, and members of the public, participating in water quality education programs, intended to use best management practices for preserving water quality.
14	Farm, ranch, rangeland, landscape, and nursery owner/operators and managers and allied industry professionals, participating in sustainable use of water education programs, adopted best management practices for water conservation and preserving water quality.

15	Boat owners adopted the use of the recommended nontoxic hull coating, saving them money and improving water quality.
16	Science-based evidence on livestock distribution practices helps insure that taxpayers are getting value from publicly funded conservation measures.
17	Land owners and managers adopted recommended oak woodland management practices helping to conserve California's native oaks.
18	Growers adopted best management techniques for fertilizer use, helping to reduce pollution and improve water quality.

Outcome #1

1. **Outcome Measures**

Percentage of farm, ranch, and rangeland owner/operators and managers and allied industry professionals, participating in water quality education programs, gaining knowledge of best management practices for preserving water quality

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

Number of governmental agencies, agricultural and fishing organizations, resource managers and other stakeholders in watershed management issues, participating in the programs, gaining knowledge of strategies and techniques for sustainable use of fishery resources

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Percentage of owners/managers of private and public rangeland, forest and wildlands, participating in range, forest and wildland education programs, gaining knowledge of strategies and techniques for sustainable use of range, forest and wildland resources

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

Number of governmental agencies, community organizations and other stakeholders in land use policy issues, participating in the programs, gaining increased understanding of land use planning strategies, methodologies and data

Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

Percentage of farm, ranch, rangeland and marine industry owner/operators and managers and allied industry professionals, participating in water quality education programs, adopting best management practices for preserving water quality

Not Reporting on this Outcome Measure

Outcome #6

1. **Outcome Measures**

Percentage of owners/managers of private and public rangeland, forest and wildlands, participating in range, forest and wildland education programs, adopting recommended strategies and techniques for sustainable use of range, forest and wildland resources

Not Reporting on this Outcome Measure

Outcome #7

1. **Outcome Measures**

Percentage of fire protection and land management agenices, land and home owners, community orgainzations, and land scape professionals, participating in wildland fire education programs, gaining knowledge on how to increase fire resistance of homes and landscaping

Not Reporting on this Outcome Measure

Outcome #8

1. **Outcome Measures**

Percentage of farm, ranch, and landscape owners/operators and managers and allied industry professionals and governmental agency representatives, participating in air quality education programs, gaining knowledge of the atmospheric system and/or how policies, products, plants, and practices can help improve air quality

Not Reporting on this Outcome Measure

Outcome #9

1. **Outcome Measures**

Percentage of farm owner/operators, allied industry professionals, and members of the public, participating in water conservation education programs, gaining knowledge of water use and conservation practices

Not Reporting on this Outcome Measure

Outcome #10

1. Outcome Measures

Farm, ranch, and rangeland owner/operators and managers, allied industry professionals, public agency representatives, and members of the public, participating in water quality education programs, gained knowledge of best management practices for preserving water quality.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	209

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #11

1. Outcome Measures

Owners/managers of private and public rangeland, forest and wildlands, participating in sustainable use of natural resources education programs, gained knowledge of strategies and techniques for sustainable use of range, forest and wildland resources.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	784

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity

Outcome #12

1. Outcome Measures

Farm owner/operators, allied industry and natural resource professionals, and members of the public, participating in water conservation education programs, gained knowledge of water use and conservation practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	441

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

Outcome #13

1. Outcome Measures

Farm, nursery, ranch and rangeland owner/operators and managers, allied industry professionals, public agency representatives, and members of the public, participating in water quality education programs, intended to use best management practices for preserving water quality.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	725

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #14

1. Outcome Measures

Farm, ranch, rangeland, landscape, and nursery owner/operators and managers and allied industry professionals, participating in sustainable use of water education programs, adopted best management practices for water conservation and preserving water quality.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	64

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #15

1. Outcome Measures

Boat owners adopted the use of the recommended nontoxic hull coating, saving them money and improving water quality.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
California has experienced millions of dollars in ecological and socio-economic losses from aquatic invasive species (AIS) via structural, fishery and other damages. State water quality and pesticide regulatory agencies have found impaired water quality in boat basins from San Francisco to San Diego. The Congressional bill called the National Aquatic Invasive Species Act of 2005 suggests proper use of antifouling coatings, avoiding in-water hull cleaning, and collecting/disposing fouling growth from boats. The 2006 draft California Aquatic Invasive Species Management Plan cites recreational boats as a vector and calls for collection of fouling growth removed from marinas. Regulatory developments in California and perhaps also the United States over the next 5-10 years may reduce availability of toxic, antifouling paints in order to protect marine life from high levels of copper that accumulate in crowded boat basins with limited flushing. Organizations of boat owners; port/harbor/marina/yacht club managers; boat repair, maintenance and sales businesses; regulatory staff and policy makers; and environmental educators need research- based information on technically feasible and cost-effective ways to reduce AIS risks while protecting water quality.

What has been done
Applied/developmental research was conducted evaluating the costs of different strategies to control hull-borne invasive species on California boats to protect water quality. Educational presentations extended information on the environmental effects of dissolved copper on marine life and the copper tolerance of hull fouling species.

Results
The members of the Convair Sailing Club in San Diego Bay saved $2,940 over 8 years by adopting the recommended nontoxic hull coating, instead of copper antifouling paint, to deal with AIS. Thus, water quality was also improved.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #16

1. Outcome Measures

Science-based evidence on livestock distribution practices helps insure that taxpayers are getting value from publicly funded conservation measures.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Reducing livestock impacts on water quality, aquatic and riparian habitat, and biodiversity are continuing goals for livestock producers, natural resource managers, and conservation groups. These livestock impacts are frequently due to problems with livestock distribution. While fences are usually an effective tool for controlling livestock distribution and reducing impacts on riparian zones or other critical areas, manipulation of grazing patterns can also effectively reduce adverse impacts from livestock. These practices can also facilitate the use of grazing to manipulate vegetation to meet management goals. It is crucial that livestock producers, land managers, community watershed groups, environmental interest groups and policy makers understand the factors that influence where animals graze, rest, and drink, and how livestock can be predictably and effectively redistributed so that they do not produce undesirable effects in grazed watersheds.

What has been done
Researchers from Oregon, Montana, and California recently described pasture and animal management knowledge and practices that can be used to alter livestock distribution and to attract livestock away from environmentally critical areas or into areas targeted for grazing. While basic livestock distribution practices have changed little in the last 50 years, new research suggests ways to fine tune and combine these practices that will improve their efficacy. The

practices are based on basic and applied research in animal behavior and landscape ecology and involve changes in pasture management or changes in livestock management.

Results
UC ANR Publication entitled "Factors and Practices that Influence Livestock Distribution," documents the effectiveness of most of the livestock distribution practices used in the western United States. This publication provides science-based evidence on the efficacy of grazing land and riparian management practices. This informed the USDA Conservation Effects Assessment Project (CEAP), which assesses the efficacy of conservation cost-share practices to insure that taxpayers are getting value from publicly funded conservation measures.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
610	Domestic Policy Analysis

Outcome #17

1. Outcome Measures

Land owners and managers adopted recommended oak woodland management practices helping to conserve California's native oaks.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
For more than 25 years, UC has collaborated with the California Department of Fish and Game, CalFire and other agencies to conduct research and outreach focused on conserving California's native oaks. In order to continue these efforts, UC has organized the Oak Woodland Conservation Workgroup (OWCW), which seeks to maintain, and where possible, increase acreage of California's hardwood range resources to provide wildlife habitat, recreational opportunities, wood and livestock, high quality water supply, and aesthetic value.

What has been done

To make sure that research-based information about oaks and oak woodlands is readily accessible to oak woodland owners and managers, the OWCW established the Oak Woodland Management website, http://ucanr.org/sites/oak_range. This site contains considerable content and links to other oak groups and websites.

Results

To determine the effectiveness of UC's research and outreach efforts, three surveys designed to detect changes in landowner behavior were conducted. The first in 1985 provided baseline data and later surveys in 1992 and 2004 provided an opportunity to document changes in behavior that affected overall woodland conservation. A comparison of survey responses in 1985 and 2004 demonstrated that there was a significant decrease in the number of landowners who cut and sold firewood. In addition, the number of landowners who relied on Cooperative Extension for advice doubled. Survey results also suggested that Cooperative Extension research and outreach on how canopy cover varied with forage production affected landowner decision-making: the percentage of landowners who cut oaks to increase forage production decreased from 39 percent to 24 percent. Finally, there was an overall decline in the percentage of landowners who cut oaks (from 85 percent to 65 percent) and growth in the percentage of landowners who plant oaks (from 6 percent to 32 percent). Landowners' conservation of the state's native oaks will insure that future generations of Californians will continue to have oaks and oak woodlands and the myriad values they provide.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
135	Aquatic and Terrestrial Wildlife

Outcome #18

1. Outcome Measures

Growers adopted best management techniques for fertilizer use, helping to reduce pollution and improve water quality.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Applying nitrogen and phosphorus with irrigation water is a common practice in the Imperial Valley. If the fertilizers are applied incorrectly, the nutrients end up in the drains rather than in the crop. Nitrogen and phosphorus are the two main nutrients that cause eutrophic conditions (high algal biomass and low dissolved oxygen concentrations that cause massive fish kills) in the Salton Sea. Current and proposed federal water quality standards for California require growers to improve the quality of drainage waters. To achieve both federal and state water quality objectives, growers will have to reduce the amount of phosphorus that reaches the drains and the Salton Sea.

What has been done
UCCE Imperial County advisors evaluated various lettuce irrigation and fertilizer application practices on (1) basin irrigation systems (0 percent slope and 0 percent runoff) and (2) free-draining graded furrows (1.5 percent slope and normal runoff). Various water flow rates and the timing of fertilizer applications were compared. A relationship between water application rates and the amount and rate of fertilizer applications was established. Recommendations on the amount and duration of fertilizer applications during irrigation events for each irrigation method were developed.

Results
The UCCE advisors' recommendations (Best Management Techniques or BMTs) are being adopted by growers. This is improving fertilizer use efficiency and reducing the non-point source pollution in the Salton Sea watershed. Also, the educational materials are used to implement plans to meet the TMDL (Total Maximum Daily Load) regulations. Irrigation management is a key factor in controlling the concentration and the load of phosphorus in runoff water. Reducing the rate of surface runoff during and after phosphorus application events could reduce phosphorus load in surface waters by as much as 75 percent compared to standard irrigation practices. The recommended BMTs were included in the Regional Water Quality Control Board (Region 7) silt/sediment TMDL standards.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

V(H). 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.)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

ANR's most notable qualitative impacts that were realized, as well as the quantitative outcomes recorded from the evaluation studies, are reported under the State Defined Outcomes section.

Key Items of Evaluation

The Report Overview's federal Planned Program summary of accomplishments highlights ANR's most significant work during FY 2011, especially the research developments. The State Defined Outcomes section captures clientele behavior and economic change outcomes; these are the types of impacts that ANR research and education programs strive to realize.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Sustainable Energy

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
104	Protect Soil from Harmful Effects of Natural Elements	0%		1%	
111	Conservation and Efficient Use of Water	0%		2%	
123	Management and Sustainability of Forest Resources	50%		1%	
131	Alternative Uses of Land	0%		1%	
133	Pollution Prevention and Mitigation	0%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		39%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		3%	
204	Plant Product Quality and Utility (Preharvest)	1%		3%	
205	Plant Management Systems	0%		2%	
206	Basic Plant Biology	0%		9%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		2%	
212	Pathogens and Nematodes Affecting Plants	0%		2%	
305	Animal Physiological Processes	0%		2%	
402	Engineering Systems and Equipment	4%		4%	
403	Waste Disposal, Recycling, and Reuse	38%		1%	
404	Instrumentation and Control Systems	0%		1%	
503	Quality Maintenance in Storing and Marketing Food Products	0%		1%	
511	New and Improved Non-Food Products and Processes	3%		18%	
605	Natural Resource and Environmental Economics	3%		3%	
608	Community Resource Planning and Development	1%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	7.5	0.0	5.2	0.0
Actual Paid Professional	4.8	0.0	8.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
848890	0	227155	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
848890	0	227155	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1567806	0	4846814	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

2. Brief description of the target audience

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

3. How was eXtension used?

ANR academics used eXtension to participate in and contribute to many Communities of Practices, to answer "Ask an Expert" questions, and for other general networking purposes.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1994	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	2	22	24

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Workshops Conducted

Year	Actual
2011	8

Output #2

Output Measure

- Demonstrations and Field Days Conducted

Year	Actual
2011	1

Output #3

Output Measure

- Web Sites Created or Updated

Year	Actual

2011	1

Output #4

Output Measure

- Research Projects Conducted

Year	Actual
2011	21

Output #5

Output Measure

- Manuals and Other Printed Instructional Materials Produced

Year	Actual
2011	4

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Forestry small businesses received economic benefit, as a result of the program's technical assistance, to explore the opportunities in woody biomass and other alternatives.

Outcome #1

1. Outcome Measures

Forestry small businesses received economic benefit, as a result of the program's technical assistance, to explore the opportunities in woody biomass and other alternatives.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Many communities throughout California are struggling with job losses in the forest industry sector. These same communities are searching for community development alternatives that recognize the value of their local natural resources. Recent interest in the development of small-scale enterprises, the use of non-timber size trees (small trees) and other woody biomass resources, and the national interest in bioenergy are creating new opportunities. However, decision makers at the community level often lack the knowledge and expertise to realistically evaluate these opportunities.

What has been done
This project organized local workshops throughout the state that focus on the opportunities and challenges of working with the non-timber and woody biomass resources, and provided information on how to evaluate technology and to assess the feasibility of options that are appropriate for the location. Specifically, workshops provided information on the Forest Service 2011 Hazardous Fuels Woody Biomass Grants program.

Results
As a result of direct technical assistance proviuded to small business clientele during FY 2011, three companies were awared federal grants totaling about $550,000. Over the past four years, the technical assistance to companies helped them acquire a total of 18 federal grants worth more than $4.5 million.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

511 New and Improved Non-Food Products and Processes

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

ANR's most notable qualitative impacts that were realized, as well as the quantitative outcomes recorded from the evaluation studies, are reported under the State Defined Outcomes section.

Key Items of Evaluation

The Report Overview's federal Planned Program summary of accomplishments highlights ANR's most significant work during FY 2011, especially the research developments. The State Defined Outcomes section captures a clientele economic change outcome.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Climate Change

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	0%		13%	
102	Soil, Plant, Water, Nutrient Relationships	0%		7%	
104	Protect Soil from Harmful Effects of Natural Elements	0%		2%	
122	Management and Control of Forest and Range Fires	0%		2%	
123	Management and Sustainability of Forest Resources	4%		0%	
131	Alternative Uses of Land	0%		1%	
132	Weather and Climate	17%		25%	
133	Pollution Prevention and Mitigation	0%		1%	
135	Aquatic and Terrestrial Wildlife	0%		1%	
136	Conservation of Biological Diversity	0%		6%	
141	Air Resource Protection and Management	0%		1%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		1%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	2%		0%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		1%	
213	Weeds Affecting Plants	0%		1%	
216	Integrated Pest Management Systems	2%		0%	
605	Natural Resource and Environmental Economics	75%		20%	
609	Economic Theory and Methods	0%		5%	
610	Domestic Policy Analysis	0%		2%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		11%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	4.4	0.0	12.9	0.0
Actual Paid Professional	2.4	0.0	8.5	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
34843	0	205255	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
34843	0	205255	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
775651	0	5149740	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

2. Brief description of the target audience

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

3. How was eXtension used?

ANR academics used eXtension to participate in and contribute to many Communities of Practices, to answer "Ask an Expert" questions, and for other general networking purposes.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	9	9

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Research Projects Conducted

Year	Actual
2011	20

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	New knowledge on contributing factors to ozone and particulate matter formation was provided to California's Air Resources Board (ARB).

Outcome #1

1. Outcome Measures

New knowledge on contributing factors to ozone and particulate matter formation was provided to California's Air Resources Board (ARB).

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Central Valley of California is out of compliance with current air quality standards for ozone and particulate matter (PM). Ozone and PM air quality model simulations focused on the Central Valley are critical for State Implementation Plan development for ozone and PM. Biogenic volatile organic compounds (BVOCs) participate in ozone and PM formation, and comprise a substantial fraction of ARB VOC emission inventories. Also, as regulatory controls are extended to agriculture, there is a renewed focus on crop biogenic emissions as well as ozone deposition to crops. While inputs to the Air Resources Board's (ARB) BVOC emission inventory model have been evaluated using field measurements, modeled emissions have not been evaluated using in-situ micrometeorological flux measurements for important valley floor crop environments, nor have emissions from native and naturalized plants frequently found in the Central Valley been characterized with recent measurement methods.

What has been done
A two phase study has been conducted. Based on the species measured, it was concluded that the agricultural crops studied generally have low emission rates of isoprene and other terpenoid compounds compared to many plants found in natural or urban landscapes. Based on these phase I data and crop coverage data, a citrus orchard was selected to conduct landscape-scale, micrometeorological BVOC flux measurements. In-situ measurements were made continuously over a full year of BVOC emissions and micrometeorology to evaluate BVOC emission model performance and improve the representation of emissions and atmospheric processes. This project also provided a one year long observational database of BVOC fluxes in a California orange grove demonstrating the diurnal and seasonal cycles of emissions and atmospheric concentrations that can be used to compare with BVOC emission and air quality models.

Results

Even though emissions were generally low, BVOC emitted from crop species may still play a significant role in the chemistry of the atmosphere in areas like in the San Joaquin Valley of California, where there are large areas planted with agricultural crops. Also, events such as flowering, pruning or harvesting when leaves are present may result in pulses of emissions. Therefore, it is important to model emissions for the agricultural landscape as non-zero, and to evaluate the importance of crop BVOC emissions in regional air quality models. This data will be used by the state's Air Resources Board staff to reduce uncertainty in BVOC emission inventories for the agricultural regions of California.

4. Associated Knowledge Areas

KA Code	Knowledge Area
141	Air Resource Protection and Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

ANR's most notable qualitative impacts that were realized, as well as the quantitative outcomes recorded from the evaluation studies, are reported under the State Defined Outcomes section.

Key Items of Evaluation

The Report Overview's federal Planned Program summary of accomplishments and the State Defined Outcomes section highlight ANR's most significant research developments during FY 2011.