The Department of Animal Science Academic Mission:
The mission of the Department of Animal Science is to create and disseminate knowledge about animals for the betterment of animals, society, and the environment in California and beyond.

The Departmental Vision is to contribute to the long term animal agricultural production in California and the nation. Strategies to achieve this goal will integrate diverse aspects of the animal and the environment ranging from reduced detrimental emissions and effluent while preserving animal welfare and enhancing productivity and emphasizing healthful and safe aspects of the products, wildlife habitat preservation, and economic stability. A full understanding of the life cycle of agricultural animal species and the species potentially impacted by animal agriculture is essential to solve societal problems related to animals and animal production. Key to this vision is engaging a full spectrum of stakeholders, particularly students.

Overview of the Departmental Disciplinary Leadership, Undergraduate and Graduate Teaching, and Role in AES.
The department engages in high-quality experimental research and scientific scholarship essential to developing innovative strategies that solve agricultural, environmental, and societal problems related to animals. The department maintains its connection to traditional animal agriculture while also addressing current issues that face modern agriculture. The Department of Animal Science undertakes important integrative and problem-based research that is sought after by state constituents and public decision-makers as a credible source of scientific information. The animal facilities are integral to all these endeavors. In this way, research from the department informs public policy to minimize environmental impacts and improve the resource allocation/sustainability of animal agriculture. Communication, collaboration, and mentoring among faculty, students, and staff form essential components in the scientific creativity, generation of knowledge, and the quality of learning. The department provides a high quality, innovative and rewarding educational experience for each undergraduate and graduate student having interests in animal agriculture, animal biology, and the holistic interaction of the animal and its environment.

The unique and competitive advantage of our department is the collaboration existing among faculty. The Department has a shared vision of integrated, interdisciplinary approach to its research, teaching, extension, and outreach programs. All IR faculty hold AES appointments, several of our CE faculty also hold AES appointments with an additional CE holding an IR appointment. These title combinations contribute to the vitality of the research, teaching, and outreach undertaken by the Department of Animal Science. Further, the faculty structure allows the accomplishment of the overall departmental objectives of diverse, experimentation-oriented, discovery-driven research program, inclusive of basic and applied research, recognized worldwide for its excellence. The program of study includes animals in domestic and/or natural environments, with a comparative species approach in the arenas of the mechanistic biology behind animal productivity, resource utilization, and the interaction of animals in their environment. Animal facilities maintained by the department position faculty to be successful in garnering stakeholder and extramural funding. An overriding goal is to develop well-funded and coordinated research to address the challenges of societal problems related to animals.
Teaching efforts emphasize a foundation in the biology of animals as well as advanced studies in animal productivity, management, health and ecology. Students graduating from majors based within the Department of Animal Science are equipped to undertake a variety of science based and/or management careers or a pursue advanced degrees. Graduate students receive advanced training in the core scientific disciplines related to animal biology. Graduates enter diverse careers reflecting the varied emphases/interests of the Department of Animal Science faculty: academia, governmental regulatory agencies, private industry, and non-profit entities as well as others.

Core Competencies and Clusters of Excellence in Animal Science:

The Department of Animal Science has an integrated, interdisciplinary approach to its research, teaching, extension, and outreach programs. Our core competency is the whole organismal study of domestic and/or wild animals in their respective environments. Underlying that core are the Animal Science animal facilities. The department has key disciplinary themes of genetics/genomics, physiology, nutrient metabolism, and behavior/welfare. To address societal concerns related to resource utilization we apply classical disciplinary-based science with diverse approaches including biotechnology, molecular technologies, modeling, in vitro systems, and cell biology to name a few. Combined, these create interdisciplinary research themes within the department of agroecosystems, animal management and sustainable animal agriculture systems, animal welfare and well-being, reproduction, growth and development, preventive animal health, food safety, translational animal agriculture, and conservation biology. These themes pervade the research and the instruction of the department. It is this very diversity that underpins the unique excellence of the department; our faculty have the integrative skills to address the pressing agricultural, environmental, and societal problems related to animals.

Departmental History and Scope:

The division of Animal Husbandry was established at the UC Davis campus in 1908 and remains the sole department dedicated to animal science within the University of California system.

The Department of Animal Science is the largest animal science department in the western region and is ranked as # 3 nationally (by the Chronicle of Higher Education for the most recent survey in 2007). As of January 1, 2011 there are currently 12.8 I&R FTE, 13.40 AES FTE, and 8.3 CE FTE for a total of 34.50 FTE. This represents more than a 34% reduction in AES FTE, a 15% reduction in CE, and an overall reduction in faculty of over 18% in ~13 years (from 1999 to 1/1/2011). Departmental faculty also include one Adjunct Professor and one faculty in the Professional Research series. Faculty have received national and international recognition for their research, extension, and teaching programs. Extramural funds expensed in the 2009-2010 fiscal year were in excess of $3.85 million supported the diverse research with competitive awards from federal agencies (such as USDA, NSF, EPA, Sea Grant, BARD, NIH) state agencies, commodity groups, and private foundations.
The department manages four undergraduate majors: Animal Science, Animal Science and Management, Agricultural and Environmental Education, and Avian Sciences. The last has been discontinued due to low student interest and the availability of the curriculum within the Animal Science major. The Animal Science major is one of the top 10 majors on the UCD campus (with 729 students as of Fall 2010) and the total number of students declared in the four majors is 855 (as of Fall 2010).

As noted above, the Department of Animal Science’s unique and substantial strength lies in the disciplinary and interdisciplinary research and teaching themes. A poll of existing faculty projected 12 IR/AES/CE retirements by 2015 and an additional 9 retirements by 2020 (for a total of 21 faculty in ten years equating to a LOSS of 55% of faculty). An additional highly productive Adjunct Professor is also slated to retire by 2015. The projected loss due to anticipated retirements for research and key instructional areas include faculty expertise in animal welfare, nutrition and energetics, population genetics/genomics, and preventive animal health (e.g., disease, toxicology, and immunology aspects for populations vs. single individuals) along with a loss of species expertise (equine, aquatic, and avian species). That is on top of existing gaps related to microbiology and the broadly defined area of the agroecology. In sum, the areas that will be impacted converge on many of the ten emerging academic themes identified as having college wide significance in the 2007 CA&ES college plan and the strategic initiatives defined by ANR. These include Agriculture Sustainability; Biodiversity and Ecosystem Services; Complex Microbial Ecosystems; Food Safety; Global Change; Water, and Watersheds; and Science, Policy, and Public Perception.

With reduced expertise in some areas and the opportunities to hire faculty to the defined 2010 target (27.2 IR/AES total) the Department of Animal Science will focus on ensuring long term animal agricultural production in California and the nation in the context of sustainability at all levels: environment, profit, people’s health, and the community writ large. Hiring strategies to achieve this goal must include faculty with the capacity to investigate, teach and define the biological and physiological processes of the complete life cycle of agricultural animal species and those species potentially impacted by animal agriculture as well as to engage stakeholders, including students.

Educational Programs & Departmental Educational Goals:

Departmental Undergraduate Teaching Mission: There are two majors within the Department: Animal Science and Animal Science and Management. The Animal Science major offers an innovative curriculum that provides a solid foundation in the biology of animals while establishing an appreciation for the advanced academic disciplines underlying animal productivity, management, health and ecology. The curriculum of the Animal Science and Management includes traditional areas of production of animal products as well as enterprise management, business and economics. The vast majority of undergraduates entering the majors administered by the department are of urban background with little exposure to animal agriculture and the knowledge of where their food comes from. The underlying instructional mission of the Department of Animal Science is to create a strong underpinning of scientific knowledge related to biology in general and animals in particular while educating students in the role of animal agriculture.
The undergraduate curriculum must be scientifically rigorous, experiential, and multi-disciplinary to achieve the aforementioned goals, while simultaneously exposing the students to the breadth of career opportunities in the animal sciences. The Department is well known for its teaching excellence and dedication to undergraduate and graduate education. That culture is one that must be maintained to achieve a cutting edge teaching department in a world class research university.

As with any major, the curriculum must strike a balance among student interest, societal need, and core competencies. Urban students must be retained to enhance the scientific literacy related to animal agriculture, animal well-being, and animal biology within the California populace. We have an obligation to instruct undergraduates to contribute to society and prepare them for a successful future including those interested in pursuing advanced degrees in professional and graduate schools. Fundamental to this instructional goal is the availability of the unique animal facilities within the department.

Anticipated retirements will result in a significant loss of student credit hours (SCH) to the department with loss of an equine authority, an animal welfarist, two population geneticists/genomicists, and three nutritionists/biochemists. Many other areas will suffer though existing/remaining faculty have the expertise to cover the topics. With faculty retirements, the curriculum will be adapted to increase efficiency of course delivery. Low enrollment courses will be combined when appropriate or offered on an every other year basis to increase SCH. Specializations will be reviewed to either improve the student interest or be shifted to a discipline focus specialization with broader implications. Experiential learning, although costly, is viewed as an essential component to the Department of Animal Science teaching mission. When possible, those experiential courses will be offered by departmental faculty which will also increase SCH. Because of the anticipated retirements it will be absolutely necessary to hire a number faculty to cover key disciplinary areas essentiality for the education of students in the Animal Science majors. Courses specifically designed to meet the unique needs of animal science students will be taught by departmental faculty and thereby maintain SCH and SFR.

The Department of Animal Science AES Priorities.

Returning to the vision of the Department of Animal Science of ensuring long term animal agricultural production in California and the nation, the AES priorities for the Department are to remain nimble to rapidly address emerging issues that are as of yet unpredicted. Hiring the best scientists with skill sets of sound scientific inquiry dedicated to understanding the needs of the AES mission will permit the integration of the diverse aspects of the animal and the environment all the while preserving animal welfare and enhancing productivity, healthful and safe aspects of the products, and economic stability. The direct and regular interaction with departmental CE and participating in outreach activities will coordinate the AES needs with the basic scientific inquiry. The goal, as always, is to create a continuum of basic and applied work. The department promotes the integration of outreach with the diverse basic and applied research undertaken by faculty members. The department is also creating a set of expectations related to outreach and
will include measurable goals. Success can be measured in outcomes, informing policy, and deliverables measured by stakeholder interest.

Animal Facilities
The Department of Animal Science has 14 special animal facilities that directly support the multidisciplinary research and outreach of the department. Our species coverage include dairy and beef cattle, aquatic species, poultry and avian, small ruminants (sheep, goats), swine, equine, and laboratory animal models. Their visibility is a draw for students, the public, and stakeholders alike: the animal facilities serve as an integral component to the education of the ~850 undergraduate majors and ~100 graduate students, the hosting of the many and varied annual departmental, CA&ES, and campus outreach programs for the state’s stakeholders. The AES image of the campus is enhanced by the presence of agricultural animals.

The animal facilities play a pivotal role in the academic planning of the Department of Animal Science. The facilities enable the fundamental and applied research undertaken by departmental faculty to address the AES mission oriented questions. In addition, in our curriculum we instruct numerous laboratories and classes involving the use of animals. Many of the students play an important part in data collection for the research studies that result in strategies to solve the societal concerns facing animal agriculture. Based on these facilities departmental faculty have successfully obtained extramural funding and have published in prestigious journals including *Science*, *Nature*, *PNAS*, *Biotechnology*, *Journal of Animal Science*, *Journal of Dairy Science*, and *Poultry Science*, representing the top ranking journal for scientists in general and animal scientists in particular. The animal facilities are key to animal agriculture research, teaching, and outreach programs at UC Davis.

Faculty Position Priorities:

**Academic Senate Faculty (IR/AES positions):** The faculty position recruitments listed below while directly relating to the ten emerging themes detailed in the 2007 CA&ES College Academic plan, address the 2010 ANR vision and strategic initiatives and also strengthen and build departmental core competencies in both research and teaching and remediate existing and future gaps, especially given that in the next ten years 17 IR/AES faculty are projected to retire.

These positions reflect the need for basic animal biology discipline expertise in order to maintain skills necessary for the interdisciplinary and technologically advanced mechanistic approaches to societal problems. The recruited individuals will have classical training in one of the disciplinary themes of genetics/genomics, physiology (comprehensively including microbiology, endocrinology, immunology, etc.), nutrient metabolism, and behavior/welfare but with flexibility and creativity. As mentioned previously in this academic plan, these disciplines combine to form interdisciplinary research themes within the department that address sustainable animal agriculture systems. Such themes include agroecosystem studies including conservation biology; animal welfare and well-being; animal management for sustained production including reproduction, growth and development, and preventive animal health; and translational animal agriculture.
Globally they create two areas of scholarship for investment of research and outreach efforts that address the mission and vision of the Department of Animal Science: Animal Environment Interactions (including efficient resource use, knowledge of the genetic underpinnings, and use/management of natural resources) and Animal Welfare and Health. Notably, these recruitments are truly interdisciplinary and will coordinate with faculty within the department as well as faculty in other CA&ES departments and campus units while maintaining existing excellence filling gaps in both research and teaching. Individuals will be capable of teaching in several areas and these positions grow the department’s commitment to truly sustainable animal agriculture while permitting the delivery of the core curriculum. These positions create a portfolio that represents a progressive Animal Science that combines skill sets to address key and emerging areas related to our mission and vision. New hires must be positioned to secure extramural and commodity funds to ensure a successful career at UCD. These positions will maintain and grow departmental excellence.

The Department of Animal Science will hire future faculty to build programmatic research strength in support of two areas of scholarship related to sustainable animal agriculture:

1) Animal Environment Interactions
2) Animal Welfare and Health.

We seek positions in terms of disciplinary focus in order of importance for delivery of the core biological disciplines required to support our curriculum, although the research focus of the sub-disciplines within each area will reflect the two strategic areas listed above. Projected hires will cycle through the disciplines as FTE become available. The order is subject to reorienting based upon actual retirement patterns of the projected 17 retirements.

Genetics: examples of targeted areas
- Population genomics/ geneticist
- Genomicist
- Quantitative/Biostatistician—applying high throughput approaches for domestic animal evaluation
- Epigeneticist

Nutrition: examples of targeted areas
- Metabolomics
- Nutritional microbiologist
- Alternative/Sustainable feed sources
- Nutrigenomicist

Physiologist: examples of targeted areas
- Stress Endocrinologist—environmental stresses (e.g., temperature, psychological) adversely impact the immune system, growth and reproduction
- Translational Developmental Physiologist—muscle emphasis
- Immunologist/Microbiologist (depending on the outcome of the current hire)
- Physiological Genomics—systems biology approach to study the regulation of animal growth

Welfare/Behavior: examples of targeted areas
- Animal Welfarist specializing in domestic animal behavior
- Herd Health at the population level
- Stress/Pain Physiologist—neurosensory applications for assessing welfare concerns
- Behavioral biologist
Lectureships:
We will seek an endowment to establish lectureships to meet the specific teaching needs of the equine curriculum; it is important to note that ~20% of the undergraduates within the Animal Science major seek an emphasis on the equine. Further Equine lecturers would also serve CSU students by distance learning courses.

These positions would maintain the strength of the key disciplinary themes of genetics, physiology, nutrient metabolism, and behavior/welfare as they concern animals. It is important to recognize that an FTE hired in this department often provides collaborative colleagues to faculty in other departments creating a natural team. For example, a faculty member focused on preharvest food safety issues for both human and environmental health (critical to sustaining of animal agriculture) are also needed by Food Science and Technology. Faculty with some of the disciplinary skill sets may have aquatic emphases and therefore also important to Wildlife Fisheries and Conservation Biology. The nutritional disciplinary hires would be pertinent to the Nutrition Department, Environmental Science and Policy, or to Plant Science.

The department will focus on identifying the best scientist with the proper skill set that will complement existing strengths rather than targeting species specific research areas. As a department we are choosing to align new hires with the tripartite needs of teaching, education, and extension related to animals and animal agriculture, rather than refilling species-specific positions.

Cooperative Extension Faculty Position Priorities: The current Cooperative Extension (CE) profile of the department has been and continues to be decimated by retirements without replacement. California is the nation’s top dairy-producing state and it ranks in the top ten for beef, turkeys, eggs and aquaculture. The department has major CE programs in beef, dairy, poultry, and aquaculture although with the impending retirements of CE Specialist Bradley and Zeidler there will be no poultry extension person affiliated with UCD to serve the ~$1 billion industry. Award winning Quality Assurance programs in beef, dairy, poultry, and aquaculture have been vital to helping these industries deliver high-quality food products in the face of increasing regulations. Environmental resource management, animal welfare concerns, and agricultural literacy continue to be a driving force in forming the concerns of animal agriculture. Four of the 8.3 CE within the department project retirement in the next 10 years (three in the next 5 years). Retirements will cripple the extension efforts in poultry and aquaculture as there will be no specialists in those areas. It is especially important to note that two of the four with planned retirements include animal welfare issues in their applied research activities.

The CE priorities proposed below meet the pressing State needs for stakeholders, do in fact foster the CE/Farm Advisor continuum, and most clearly align with departmental priorities noted above:

- Small to Industry Scale Poultry Management Systems & Poultry/Livestock Immunobiology
- Agroecosystems (range, restoration grazing, fire suppression, complements the existing IR/AES position in Plant Science)
- The Alternative and Urban Farming Systems
• Preharvest Food Safety Microbiologist (could also develop a HACCP training program that is needed within the State).

While an urban livestock CE position is much needed within the state (for equine, llama, and alpacas and backyard farming congruent with the locavore movement) to address welfare, environmental impact in an urban setting, waste, nutrition, nuisance, etc. this type of position has never gained traction within the DANR system.

The combined prioritized IR, AES, and CE recruitments will ensure that animal agriculture in the state of California and the nation will be attended to by the finest scientific minds possible. The profile of the department with the proposed hires encourages teaching and research interactions with other biological, chemical and engineering programs at UC Davis, creating a unique academic environment for biological research. These cooperative teams of expertise can continue to build upon past success and develop the world class status of the Department of Animal Science at UC Davis.
Introduction

This academic plan for the Department of Agricultural and Resource Economics (ARE), builds on previous academic plans, the College priorities, and campus plans. The ARE department has 24 senate faculty, and four full time and one half time extension specialists. The faculty services one of the largest undergraduate programs on campus, and provides training to students in a widely recognized top graduate program. In addition, the Department supplies the state, nation and the world agricultural community with rigorous and high quality applied research that provides a framework for technical and policy decisions related to agricultural production, marketing, its resource base, and the resulting environmental impacts.

Overview

The fundamental short-run academic planning problem facing the department of agricultural and resource economics is that we are currently attempting to maintain a superior academic performance with inadequate resources.

Academic Performance

Academic performance can be measured in the success of the undergraduate students, graduate students, and research productivity and impact. Using impartial national metrics specified later in this document we show that our undergraduate program is rigorous, successful, and growing. Our Ph.D. and M.S. programs are highly ranked nationally and internationally. The Chronicle of Higher Education’s faculty scholarly product and index ranks the ARE department as second in the nation. ARE also has 850 undergraduate majors and our undergraduate enrollment is among the largest (in terms of student FTE) undergraduate majors in the college.

Academic Resources

Academic planning is about the rational allocation of academic resources, including faculty FTE and lecturer support. The ARE department is currently below its target allocation of faculty I&R. The CA&ES FTE allocation statement dated 10-1-07 shows that ARE is the furthest below its FTE target (-2.00) of any department in the College. Two other departments (Animal Science and Environmental Toxicology) are also significantly below their target. Most departments are slightly over target. While ARE receives substantial support for lecturers, it is not commensurate with current expenditures. In the 2006-2007 academic year the department spent $68,700 more on lecturers than we were reimbursed, and in the 2007-2008 academic year the unreimbursed expenditure from department resources on lecturers was $95,722. To correct this problem we will be forced to reduce the number of course offerings and increase the size of many of our core classes from 120 students to 150 students in the 2008-2009 academic year.
Over the next decade the ARE department will adjust to changing research, outreach and teaching priorities and a substantial anticipated change in the faculty due to retirements.

The overall objective is to maintain top-ranked research and graduate programs while also supporting a high quality, large and popular undergraduate program, contributing to the Agricultural Experiment Station (AES) through stakeholder outreach and mission-oriented research, and contributing to high quality extension education for stakeholders throughout the state. This academic plan details ARE’s strengths, while focusing on our priorities and targets for the planning period. As part of the process of developing this academic plan, Senate faculty and CE specialists were surveyed regarding key questions facing the department, and reviewed and commented on a draft of the plan prior to its final revision and submission to CAES.

Research

Disciplinary leadership
ARE is widely viewed as one of the top departments in agricultural and resource economics. As noted earlier, the Chronicle of Higher Education’s Faculty Scholarly Productivity Index ranked ARE second in 2007 with an index value of 1.58, closely behind top-ranked Iowa State University with an index value of 1.61.1 (Third-ranked UC Berkeley had an index value of 1.51.) The components of the index indicate that work conducted by ARE faculty has been very influential in the profession. Using the Chronicle of Higher Education’s measure, ARE had the highest number of citations per faculty member, 16, considerably above the 13.04 for Texas A&M (fourth-ranked overall), the 7.8 for Iowa State University and the 10 for UC Berkeley. In another ranking based on publications in 63 top-ranked economics journals, UC Davis ranked second in agricultural economics and fourth in resource and environmental economics.2

Departmental specializations, core competencies and clusters of excellence
ARE’s fundamental research objective is to engage in work that expands the frontiers of knowledge and to apply this work to issues of importance to stakeholders, especially those in California. ARE focuses on four core competencies: agricultural economics and policy, development economics, environmental and resource economics, and quantitative economics and methods. The department’s efforts to address statewide AES priorities and needs, and to maintain its position as a top-ranked agricultural economics department we need to utilize all of our core competencies. Table 1 summarizes some of the technical subfields and specific topics associated with each core competency that are addressed by ARE faculty and specialists. Many of the clusters of excellence span more than one core competency.

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Table 1. Core Competencies, Sub-fields and Clusters of Excellence

<table>
<thead>
<tr>
<th>Core Competencies</th>
<th>Sub-fields and clusters of excellence</th>
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</thead>
<tbody>
<tr>
<td><strong>Agricultural Economics</strong></td>
<td>Agricultural finance; Agricultural labor; Agricultural policy and regulation; Water markets and agriculture; Invasive species; Agricultural sustainability; Agri-environmental interface; Bioeconomic modeling; Commodity markets (incl. supply and demand for agricultural products, futures markets); Competitiveness of California farms; Contracting; Food safety; Innovation, Technology adoption and productivity growth; International trade; Market structure and performance (incl. marketing power, marketing margins); Biofuels; Implications of climate change; Marketing orders and other market institutions; Nutrition; Risk management</td>
</tr>
<tr>
<td><strong>Environmental and Natural Resource Economics</strong></td>
<td>Agri-environmental interface; Biofuels; Climate change; Ecosystem services; Energy economics (incl. renewable and non-renewable energy sources); Environmental policy and regulation; Invasive species; Natural resource management (in particular watershed, forest, fishery and non-renewables); Natural resource modeling (incl. bioeconomic modeling); Non-market valuation; Recreation</td>
</tr>
<tr>
<td><strong>Economic Development</strong></td>
<td>Development and environmental linkages; Ecotourism; Innovation, technology adoption and productivity growth; Labor and migration; Microeconomics of Rural Poverty; Nutrition; Risk and Insurance; Rural financial markets; Sustainability and green accounting; Trade and regional development</td>
</tr>
<tr>
<td><strong>Quantitative Analysis and Methods</strong></td>
<td>Demand and cost function estimation; Linear, non-linear and dynamic programming; Survey design and analysis; Time series and cross-sectional econometrics</td>
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</tbody>
</table>

**Anticipated gaps and new opportunities.**

A strong consensus has emerged for the appropriate research emphasis for two new positions in the department. First we need to shore up our work in economic development. Given two relatively junior core faculty in that area, it is important to hire at the senior level in this development economics. Agriculture and rural issues continue to be vitally important in economic development, where the rural poor continue to be a major social issue and food remains a major share of the consumer budget. Economic development is a major interest area of our graduate students and, although many faculty members work on topics in economic development, we must have more faculty who consider development their core field.

The second area of emphasis need for additional faculty is at the interface between agricultural economics and environmental economics. There is no question that environmental and resource issues are among the most important facing California agriculture and global agriculture. And, while a number of faculty members devote some attention to these issues, only one member of the faculty has a research program devoted to this interface, and that member is currently nearing retirement age.

Additional emphasis for new faculty appointments will depend on the pattern of retirements or other vacancies created. Demand for our research from stakeholders far
exceeds the time and resources of the current faculty in all our areas of emphasis. Thus we envision hiring in agricultural economics, resource and environmental economics, development and quantitative methods in the coming years.

**Agricultural Experiment Station**

*AES role within California.*

All Academic Senate members in ARE have partial appointments in the Agricultural Experiment Station (AES). Agricultural and Resource Economists in the AES are involved in mission-oriented research and mission-oriented outreach tied to research activity. Research is conducted as part of one or more AES projects. Currently, the department has 16 AES projects ranging from general subject matter areas to short term research. Many of these projects include more than one faculty member. Current AES projects cover a number of important general subject matter areas, ranging from sustainability and green accounting to commodity and futures markets. Table A-1 in the appendix lists current AES projects within ARE.

ARE’s AES activities are strongly relevant to the core issue topics identified by ANR’s Program Council and address the key components of a successful program. Maintaining and developing further expertise in economics and policy analysis within ANR is essential for successfully addressing critical issues. ARE’s core competencies are in precisely these areas.

*Outreach*

Communicating research results to stakeholders and interacting with outreach sources is important for ARE members, who have a diverse clientele for the results of applied economic research. Our off-campus clientele is defined at state, national and international levels and includes decision makers at all levels of government and industry, including agribusiness, farmers, bankers, educators, consumers, and consultants. Communication methods are diverse and include informal meetings, expert testimony, interviews with media, formal presentations and publications of all types. Consequently, outreach activities range from providing expertise in a general subject area to disseminating the results of a specific research project. A few examples of recent high-profile communications to stakeholders and the public by ARE AES faculty have addressed whether or not California and the U.S. are actually facing a farm labor shortage, the effect of illegal immigration on agriculture, impacts of a new Farm Bill, obesity and the federal food stamp program, and alternative policy approaches for managing the Bay-Delta system.

One particularly important outreach tool for ARE is *ARE Update*, published by the Giannini Foundation of Agricultural Economics six times a year. *ARE Update* provides

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an outlet for agricultural economists at Davis and Berkeley to communicate research results with a variety of stakeholders. Over 2,400 policymakers and stakeholders receive print copies of ARE Update. In 2006, there were approximately 75,000 downloads of ARE Update articles and issues.

The Department has strong linkages with the Agricultural Issues Center (AIC) located in Davis, and directed by one of our faculty members. While AIC is a university-wide center, many faculty in ARE work on a wide range of cooperative projects in the AIC. Two ARE professors and one CE specialist serve as AIC associate directors. Working with AIC, often on multi-disciplinary projects, the ARE faculty gain substantial outreach exposure for their applied and policy related research.

Cooperative Extension

CE role within California.
The five ARE CE specialists serve as conduits connecting the campus to a broad range of industry and public groups. Simultaneously, CE specialists provide disciplinary resources to county CE staff while collaborating with them in providing off-campus education. The content of these educational activities is derived from the mission-oriented research component of CE specialist appointments and other members of the faculty. Like the rest of ARE, the CE component has shrunk over recent decades, with two CE specialists retiring since 1990.

The existing ARE CE faculty have successful programs that are valued by constituency groups, and provide visibility to ARE, UC Davis, and UCCE. For example, the cost studies series, distributed by ARE online through the departmental webpage, and through hard copies, is valued by a number of constituencies in addition to agricultural producers. Farmland appraisers and lenders use the cost studies as a tool when making valuation and lending decisions. The cost studies also benefit producers and other constituencies indirectly through their use by other CE Specialists and AES faculty. In 2007, there were 209,733 hits and 63,638 visits for the cost studies website. Another very visible and successful component of the CE program is the California Agribusiness Executive Seminar. This biannual seminar brings together leading executives in California agribusiness to discuss ways of addressing business challenges, and provides an opportunity for them to interact with faculty and specialists from ARE and elsewhere in CAES. With a CE program that is so under-staffed it is hard to isolate the few highest priority needs, however, one area where the department is lacking in CE expertise is at the interface between agriculture and resource issues. We are also lacking expertise related to field crops and the cattle industries, and finally we have no CE specialist with specific expertise in agricultural policy generally or international trade.

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7 These statistics exclude hits and visits from known and likely robots. Including robots, there were 750,056 hits and 385,349 visits.
Educational programs and goals

ARE’s fundamental education challenge is to sustain an very popular undergraduate major and two top-ranked graduate degree programs. Meeting this challenge will require additional faculty positions and lecturer resources. The contributions of proposed faculty positions to the undergraduate and graduate curricula will be discussed in the later sections on hiring priorities.

Graduate Education.
ARE offers programs of graduate study leading to the M.S. and Ph.D. degrees. About 30 students enter the program each year. On average, Ph.D. students take about five years to graduate. Currently, there are 69 students in the Ph.D. program. Most M.S. students choose to take a comprehensive exam and finish the program in one year. Both programs offer quantitatively rigorous programs of study organized around three fields (i) agricultural economics, (ii) international development, and (iii) environmental and resource economics. ARE integrates students into an active departmental research program that includes collaboration with faculty members that frequently culminates in joint-authored papers, student-run weekly seminars on students’ research, participation in national and international professional meetings, and active informal critiques of fellow students’ work.

Consistent with its top-ranked research program, two recent rankings placed ARE’s Ph.D. program at number two in the world. First, in 2004 Gregory Perry of Oregon State University compiled a ranking from a survey of referees for the American Journal of Agricultural Economics, the top journal in the field. Second, the website http://econphd.net ranked programs based on research output of the faculty, also in 2004. The American Agricultural Economics Association awards an annual prize for the best Ph.D. dissertation. Since 1967, ARE graduates have won eighteen of these awards, more than any other program. Since 2000, ARE graduates have won three “Best dissertation” awards, also more than any other program. The Perry survey also ranked Master’s programs, and it placed ARE’s M.S. program at number one.

Our programs are based on a strong disciplinary training in economics. We provide this training by collaborating with the Department of Economics to teach the core subjects of microeconomic theory and econometrics. Many of our students supplement these core offerings by taking other courses in the Department of Economics or the Department of Statistics. Our students sometimes seek to complement their applied economic courses with an understanding of the physical or biological environment that relates to their economic problem. For example, some students interested in environmental economics also study ecology or transportation, some water resource economists also study hydrology, and some development economists also study nutrition. Of the 33 current Ph.D. students who have advanced to candidacy, 12 have dissertation committee members from outside ARE.
Additional course work fits naturally in the third year of the Ph.D. program, after students have completed their basic microeconomics and econometrics training and their required field courses in ARE’s core areas and other fields offered by the Economics Department. ARE is currently compiling materials for the self-review component of a regularly scheduled graduate program review. We plan to use the review as an opportunity to examine our curriculum further.

Undergraduate Education.
The Department of Agricultural Economics offers a BS degree in Managerial Economics, Agricultural Economics, and Resource and Environmental economics. Overwhelmingly, the students select the managerial economics option. Managerial economics is based on the understanding of core concepts in economics and quantitative methods through their application to management problems. Additional courses include finance, marketing, production, policy analysis, and labor economics among others. The objectives of the undergraduate program are closely related to the Department's research and graduate program goals, namely, competence in applied economic analysis as it pertains to management. Additional areas in which undergraduates acquire skills are quantitative and statistical modeling, business law, organizational behavior investment evaluation, and accounting. The hallmark of our undergraduate program is the integration of formal quantitative analysis with applied economic theory.

This combination of management skills and quantitative ability is well received by the undergraduate job market. The demand for our graduates is strong, and the numbers of majors is increasing. The majority of graduates find employment in occupations that capitalize on the training from this degree. For example, a significant number join financial institutions, economic consultant firms, government agencies, and agribusiness firms. Many of our students go on to graduate school in agricultural economics, economics, and professional schools. Recent alumni surveys indicate substantial satisfaction with the basic structure of the program and with the success of graduates in finding meaningful applications of their education.

Cross-department teaching
Several undergraduate courses are taught jointly with other departments. Professor Daniel Sumner is currently co-teaching a course on the economics of the wine industry with the Viticulture and Enology Department. Professor Cynthia Lin, has a joint appointment in ARE and ESP and teaches a course in resource economics taken by students from both majors. Professor Pierre Mérel, is in the process of developing a new course. This undergraduate upper-division course called “Economics of Sustainability” will be a required course for students enrolled in the new Sustainability major, but will be open to other students as well.
Future Challenges for educational program goals.

Challenges to the Graduate Program
A primary barrier to achieving ARE’s graduate program goals is the continued increase in graduate student fees and non-resident tuition (NRT) and recent policy changes regarding the requirements for funding NRT. One of the factors that has aided ARE in attracting outstanding graduate students has been its ability to offer multiple years of guaranteed financial support for Ph.D. students. Increased fees and NRT and restrictions regarding the funding of NRT for graduate student researchers will impact ARE’s ability to continue to offer competitive financial packages.

A second challenge to the graduate program that can gradually be overcome with changes in the faculty composition is the mismatch between faculty core interests and the fields of interest of the graduate students. Strict categorizations by core area are an inaccurate reflection of the workload of PhD supervision, since an examination of the supervision load reflects many instances of crossover between core areas. For example, faculty member with primary interests in the agricultural economics area often supervise dissertations about resource and environmental impacts of agriculture, and dissertations that focus on agriculture in less developed countries. In general, faculty with their main interests in quantitative methods help supervise dissertations that use advanced econometric tools in the applied areas.

The current breakdown of faculty by primary core area is Agricultural economics and policy 52%, Resources and environmental economics 22%, Development economics 13%, Econometrics 13%. Topics for Ph.D. dissertations over the last 10 years have the following breakdown Agricultural economics 37%, Resource and environmental economics 35%, Development economics 25%. Recently, interest amongst Ph.D. students has shifted towards development, with current enrollment at approximately one third of the students in each main area. We have considered this issue when selecting areas for new faculty hiring.

Challenges to the Undergraduate Program
The lack of teaching resources is the major problem currently facing the managerial economics major.

Student credit hours.
In 2006-2007, ARE accounted for 21,264 undergraduate student credit hours (SCH) and 2,150 graduate SCH, as reported in Table A-3. These credit hours are driven by a combination of a large number of departmental majors, the enrollment of economics majors in managerial economics courses, and the use of some ARE courses as “service courses” by other majors. ARE’s majors and pre-majors account for slightly fewer than

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8 Based on 403 query in https://sisds.ucdavis.edu. These numbers include only courses taught by ARE instructors. Cross-listed courses taught by Department of Economics instructors are excluded.
60% of ARE’s undergraduate SCH.\(^9\) Around 12% are students in other CAES majors, and another 12% are Economics majors. The remaining students in ARE courses are enrolled in other majors outside CAES or are undeclared.

In total, twelve other majors either require ARE courses or allow them as an option for a specialization within the major. Nine of these majors are in CAES: Agricultural Management and Rangeland Resources, Animal Science and Management, Community and Regional Development, Crop Science and Management, Environmental Biology and Management, Environmental Policy Analysis and Planning, Food Science, International Agricultural Development, and Textiles and Clothing. The remaining three are in L&S: Economics, International Relations, and Sociology.

ARE does not need to take any steps to sustain student credit hours. In fact, we have the opposite problem of equitably restricting entry to the major so that student numbers do not overwhelm our academic resources. As discussed earlier, ARE currently does not have sufficient resources to serve its current majors and other enrolled students. In order to provide the quality of instruction UCD students expect and deserve, ARE requires additional teaching resources.

If ARE desired to increase SCH, as would be the case under a moderate growth scenario, there are a number of options for doing so. Given that ARE is an impacted major, an obvious approach would involve reducing the minimum GPA requirement for entry into the major from the current level of 2.8, or offering additional sections of courses\(^{10}\). Additional faculty positions and resources to hire teaching assistants and graders would be required for the implementation of this option.

The current level of student contact hours for ARE senate faculty as measured by the student to faculty FTE ratio is 14.4 for the 2007-2008 academic year. This ratio is influenced by the large number of small enrollment graduate courses that support the Ph.D. and MS programs, and also by a deliberate policy to improve the quality of student contact with faculty by reducing class sizes. We are responding to pressure to increase the student to faculty ratio by increasing some core class sizes, although ARE faculty members have significant concerns that this may degrade the quality of students’ learning experience. As a result, the student to faculty ratio for the next academic year 2008 - 2009 is projected to increase to 17.7. Additional resources to hire teaching assistants and graders would be required for the implementation of this option.

**Teaching roles potentially filled by CE Specialists.**

As documented elsewhere, ARE’s CE program is currently understaffed. In addition, the current incentive structure for CE faculty discourages them from teaching courses on

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\(^9\) Based on first majors, 411 query in [https://sisds.ucdavis.edu](https://sisds.ucdavis.edu). Courses taught by ARE instructors only. Crosslisted SCH only include students enrolled in ARE listing of the crosslisted course.

\(^{10}\) Courses that would serve both ARE’s managerial economics majors and students in other majors are: ARE 100A-B, the microeconomic theory sequence; ARE 115A, the economic development course; ARE 130 and 136, two marketing courses; ARE 138, a course in international commodity marketing; ARE 171A, the first course in the finance sequence; and ARE 175, a natural resources course.
campus. In fact, two specialized courses in our undergraduate curriculum that two of our CE faculty are uniquely qualified to teach have been starred to enable them to fully pursue their extension obligations. We would like to be able to offer these courses, but with the CE so understaffed and demands from stakeholders overwhelming this does not seem likely.

**Future Senate Faculty Positions**

Presently ARE has 22.7 I&R/AES faculty, accounting for 14.32 I&R positions and 8.38 AES positions. An additional two positions (1.14 I&R and 0.86 AES) are targetted for ARE but are currently unfilled.

A number of retirements are projected over the 2009 to 2014 planning period. Twelve of ARE’s I&R/AES faculty members will be eligible for retirement at age 60 during the planning period: slightly over half of the current faculty. Six were 60 or older as of August 31, 2007. Another six will turn 60 prior to August 31, 2014. All four of ARE’s CE specialists will turn 60 prior to August 31, 2014. The consequences for ARE’s CE program are discussed in the section on CE priorities.

**Target size.**

In addition to the two positions that are allocated in the target but currently unfilled, ARE would like to add an additional two I&R/AES faculty members, for a total of 26.7 FTE, and would like to add two CE specialist positions, for a total of 6.0 FTE. The role of these additional hires in ARE’s AES program, graduate and undergraduate curricula, and CE program are discussed below.

**Positions to maintain steady state.**

ARE is currently two positions below its current CAES target FTE allocation. Based on faculty survey responses, the two core areas that clearly have the strongest weighted priority are development economics and the economics of the environmental aspects of agriculture.

**Highest priority positions for investment above current FTE allocation.**

Under a moderate growth scenario, an investment in two additional FTE would enable ARE to hire in two additional priority areas. There is a strong demand in each of our focus areas for additional positions. Specific suggestions for hiring priorities from faculty respondents are shown in table A-5. This modest increase in FTE represents a 8% (2 FTE ) expansion over the current target FTE. We argue that given the demand of our research and teaching programs the current target for ARE is simply too low.

**Rationale for college investment.**

There are a number of reasons for CAES to invest additional FTE above the current target allocation in ARE. Investing in ARE is investing in the college’s long-term goals. Every applied topic area of interest in the college requires economic analysis to reach its potential usefulness for stakeholders. Second, ANR has identified the functional role of economics in addressing core issues, regardless of the precise issue in question.
Investment in ARE is an investment in the continued success of California’s AES. Third, the expertise offered by ARE faculty is essential for the successful completion of many multidisciplinary projects, especially applied projects that address the consequences of specific policies or evaluate the viability of a technology or practice for use by growers or members of another stakeholder group. Many ARE faculty are engaged in multidisciplinary research.\footnote{Limiting attention to the UC Davis campus, a partial list of the home departments and schools of faculty with whom ARE faculty collaborate includes Animal Science, Food Science, Entomology, Environmental Science and Policy, Graduate School of Management, Human and Community Development, Economics, Land, Air and Water Resources, Nematology, Nutrition, Plant Pathology, Plant Sciences, School of Medicine School of Veterinary Medicine, Soil Science, and Viticulture and Enology.} Investing in additional faculty will result in additional resources for multidisciplinary efforts.

**Contribution to curriculum.**

ARE sustains a top-ranked graduate program offering Ph.D. and M.S. degrees as well as a rigorous, high-quality undergraduate major that consistently ranks as one of the largest on campus. The challenges facing both of these programs were discussed earlier. All four of the positions discussed above will make substantial contributions to the ARE undergraduate and graduate curricula.

The gap in ARE’s core competency of development economics is linked to a gap in the graduate curriculum and has negative consequences for the undergraduate curriculum. ARE offers four graduate courses in development economics (three Ph.D., one M.S.), and has only three specialists in development economics. In 2007-2008 a visiting professor was invited to teach one of the Ph.D. courses, and in 2006-2007 one of the Ph.D. courses was not offered at all. Neither option is a satisfactory long-term situation. At the undergraduate level, the shortage of development economics faculty has had two consequences: first, ARE has used lecturers to teach some sections of ARE 115A, Economic Development, which is a very popular course. For example, in the 2008-2009 course offerings, a section of ARE 115A with a projected enrollment of 140 students had to be cancelled due to the lack of faculty and lecturer funding. Second, ARE has not had the teaching resources to offer additional upper division courses covering economic development, such as a course focusing on development issues in Latin America or a course focusing on economic development, natural resources and the environment.

ARE currently has 5 faculty whose primary research, teaching, and dissertation supervision focus is environmental/resource economics. In addition to supervising a substantial fraction of ARE’s large graduate program and teaching core courses, these faculty teach 3 undergraduate field courses (ARE 147, 175, and 176) and 5 graduate field courses (ARE 215D, 275, 254, 276 and 277).

The specific contributions of the additional two proposed positions to the offerings of elective upper division undergraduate courses for ARE’s majors and other students, and to the graduate curriculum will depend on the specializations of the hires within the three broad areas identified as priorities. At the graduate program level, hires in agricultural economics and in environmental and natural resource economics would most likely...
participate by contributing to instruction in their major field at the M.S. level, Ph.D. level or both. A hire in agri-environmental economics may instruct in the M.S. program, in the Ph.D. agricultural economics field or in the Ph.D. environment and natural resources field. At the undergraduate level, new hires could contribute by addressing gaps in the existing curriculum, by developing new courses, or both.

Regardless of the specific contributions of each hire to ARE’s offerings of upper division electives and the graduate program, the two positions will contribute to the undergraduate program by increasing ARE’s capacity to offer both upper division electives and the large enrollment “core” courses required for the major. As noted earlier, at the present time, instruction by I&R/AES faculty is disproportionately focused on upper division electives, due to the specialized expertise required for these courses. Lecturers are hired to cover several sections of core courses.

Potential synergies.
All four proposed positions have natural synergies with other departments within and outside CAES. Footnote 10 provides a partial list of the wide range of departmental affiliations of researchers with whom ARE faculty currently collaborate. The potential for synergies is not fully described by departmental affiliations. For example, ARE’s development economics specialists belong to the International Agricultural Development (IAD) group, and a new hire in development economics would mostly contribute to IAD as well. A hire in environmental and resource economics might collaborate with researchers affiliated with the Institute of Transportation Studies, Civil and Environmental Engineering, and Environmental Studies and Policy. Hires for all four proposed positions might be affiliated with the Agricultural Sustainability Institute.

Another source of synergies is the undergraduate program. As discussed earlier, many other majors require ARE undergraduate courses, or include them as part of a specialization within the major. The proposed positions will enhance ARE’s ability to serve these students as well as its own majors.

CE position priorities

Current CE Programs and Staffing.
At present, ARE has four full-time CE specialists (4.0 FTE) and one affiliated Center director with a half-time, soft-money appointment in the department. The disciplinary areas include farm management, financial and risk management, and marketing. Table A-4 summarizes program areas and specific topics addressed by CE faculty in ARE and the affiliated Center director.

Positions Needed to Fill Critical Statewide Needs.
The last time a CE position was recruited and filled in ARE was in 1990. The demand for economic extension, and the composition of the ARE faculty has changed since then. As a result, there is a poor match between our CE and Senate faculty in terms of
disciplinary assignments. Given the expansion of disciplinary responsibilities of our department and the unfilled retirements of two Specialists in CE, several “holes in coverage” currently exist in our department’s CE programs.

Within the broad area of natural resource economics, more specific priorities include: water economics, energy economics, and environmental sustainability. After resource economics, three additional areas emerged with similar levels of priority: Agricultural Policy, Production Economics oriented to livestock, and Production and Processing Economics oriented to specialty crops.

**How Might These Needs be Filled?** A possible solution is to trade CE FTE between current specialists and Senate faculty within ARE. However, 10 years ago, a college-wide committee considered issues involved in CE-I&R-AES split appointments and found that a CE appointment of less than 0.3 FTE would not likely be effective. Therefore, the only viable solution to filling critical statewide needs for CE programs in agricultural economics is to seek the replacement of the two specialists who have retired.

**Startup funds and diversity targets.**

Recent hires have been allocated $25,000 in startup funds (half from ARE and half from CAES), one month of summary salary for two years (funded by CAES), and six quarters of support for a graduate research assistant (funded by ARE). In order to remain competitive in the market for new economics Ph.D.s, we are requesting $20,000 in startup funds and one month of summer salary for three years from CAES. ARE will supplement these funds with $20,000 in startup funds and support for a graduate research assistant for six academic quarters and two summers.

Adjusting our diversity targets from the October 31, 2003 Academic Utilization Analysis to reflect recent hires, our diversity goals are 1 African American, 2 Asian Americans, 1 Hispanic and three females.

**Summary**

The ARE Department has a strong record in research, outreach, and graduate and undergraduate teaching. However, we are facing both short run and long-run challenges. In the short run, we urgently need to recruit two additional FTE to bring us up to the minimum target. In addition, we have the ongoing problem of obtaining sufficient funding to maintain the range of lecturers and courses there have been a characteristic of our undergraduate major. In addition to the target FTE, we require an additional two FTE to expand our faculty core areas into new and evolving areas. Two additional CE FTE would enable us to address a growing clientele for economic extension in the area of natural resources and water. In the longer run, but within the purview of this academic plan, we will have to replace at least six faculty and several CE specialists who are likely to retire in the next six years.
## Appendix

### Table A-1. Current AES Projects

<table>
<thead>
<tr>
<th>Project Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immigration and the Changing Face of Rural America</td>
</tr>
<tr>
<td>Comparative Advantage and the Management of Exotic Animal Disease in</td>
</tr>
<tr>
<td>International Meat Markets</td>
</tr>
<tr>
<td>Economic Performance in the Food System: Costs, Productivity, Efficiency and</td>
</tr>
<tr>
<td>Competitiveness</td>
</tr>
<tr>
<td>Sustainability, Green Accounting, and Natural Resource Management: With</td>
</tr>
<tr>
<td>Application to California Agricultural Land</td>
</tr>
<tr>
<td>Environmental Regulation, Market Structure, and Consumer Preferences: Policy</td>
</tr>
<tr>
<td>Implications for Agriculture, Industry, and Trade</td>
</tr>
<tr>
<td>Forward Premiums and Price Volatility in Commodity Markets</td>
</tr>
<tr>
<td>Economic Analysis of the World Wine and Grape Industry</td>
</tr>
<tr>
<td>A Time Series Approach to Analyzing Market and Food Demand Systems</td>
</tr>
<tr>
<td>Improving Resource Management with Bioeconomic Modeling</td>
</tr>
<tr>
<td>The Structure and Performance of Rural Financial Markets and the Welfare of</td>
</tr>
<tr>
<td>the Rural Poor: A Comparative Study in Peru and Mexico</td>
</tr>
<tr>
<td>Economic and Environmental Impacts of the Adoption of Genetically Modified</td>
</tr>
<tr>
<td>Foods</td>
</tr>
<tr>
<td>The Spatial and Seasonal Pricing Effects of Energy Transmission</td>
</tr>
<tr>
<td>The Benefits and Costs of Natural Resources Policies Affecting Public and</td>
</tr>
<tr>
<td>Private Lands</td>
</tr>
<tr>
<td>Market Power, Information and Contracting in Agriculture: Impacts on</td>
</tr>
<tr>
<td>Performance and Distribution</td>
</tr>
<tr>
<td>Increasing Value-Added Profits for Small- and Medium-Scale Growers: The</td>
</tr>
<tr>
<td>Institutional Market</td>
</tr>
<tr>
<td>Marketing and Management for a Changing Agrifood Chain: Educating Tomorrow's</td>
</tr>
<tr>
<td>Leaders Today</td>
</tr>
</tbody>
</table>
Table A-2. Examples of ARE Research Regarding ANR Core Issues

<table>
<thead>
<tr>
<th>ANR Core Issue</th>
<th>ARE Research and Outreach Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Priority</strong></td>
<td></td>
</tr>
</tbody>
</table>
| **Invasive species**           | Management strategies for starthistle in California  
Management institutions for the olive fruit fly in California  
Effect of invasive species management and eradication policies in the presence of commodity programs  |
| **Pest management**            | Net benefits of public sector investments in integrated pest management in California  
Determinants of dormant season organophosphate use in California almonds  
Economic viability of methyl bromide alternatives for pest control in California strawberries  |
| **Food safety**                | Traceability, legal liability and incentives for food safety                                                                                                                                                                |
| **Sustainability and viability of agriculture** | Farm management styles and the adoption of biologically integrated farming practices  
International agricultural trade  
Effects of dairy policies on returns to producers  
Increased pollination costs and changes in honeybee disease and pollination regulations  
Economic and environmental implications of biofuels |
| **Water quality**              | Economic viability of best management practices for reducing dormant season pesticide runoff in California  
Estimation of agricultural pollution abatement costs  
Citizens’ willingness to pay for water quality improvements in California |
| **Medium Priority**            |                                                                                                                                                                                                                            |
| **Biosecurity**                | Foot and mouth disease and trade policy  
Trade policies and institutions for addressing invasive species                                                                                                                                                             |
| **Organic production**         | Organic produce handlers’ relationships with federal marketing orders  
Consumer preferences and willingness to pay price premia for organic produce                                                                                                                                                |
| **Air quality**                | Effectiveness of California smog check program design  
Economic impact of state regulations to reduce volatile organic compound emissions from pesticides                                                                                                                         |
| **Land use**                   | Residential development patterns and the recreational and amenity benefits provided by open space                                                                                                                               |
| **Sustainable use of natural resources** | Fisheries management: spatial-dynamic approaches  
Economic growth and natural resource extraction  
Economic development and environmental quality |
| **Water supply and allocation** | New policy approaches for the Bay-Delta  
Design of stakeholder negotiations regarding water allocation |

### Table A-3. Summary of ARE Student Credit Hours: 2006-2007

<table>
<thead>
<tr>
<th>Course Type</th>
<th>SCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>All undergraduate courses</td>
<td>21,264</td>
</tr>
<tr>
<td>Lower division courses</td>
<td>1,976</td>
</tr>
<tr>
<td>Upper division courses</td>
<td>19,288</td>
</tr>
<tr>
<td>All graduate courses</td>
<td>2,510</td>
</tr>
<tr>
<td>Scheduled graduate courses</td>
<td>1,172</td>
</tr>
<tr>
<td>299 and 299D</td>
<td>1,338</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23,774</strong></td>
</tr>
</tbody>
</table>

### Table A-4. Current CE Program Areas

<table>
<thead>
<tr>
<th>CE Program Area</th>
<th>Specific Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable and organic agriculture</td>
<td>feasibility and performance of alternative farming systems, including economic feasibility of alternative farming practices, size and growth of organic production in California, factors influencing the adoption of alternative farming systems</td>
</tr>
<tr>
<td>Economic performance and resource use for California commodities</td>
<td>Profitability and associated resource use for major commodities and niche market commodities across farming system, geographic region, and time; cost studies series</td>
</tr>
<tr>
<td>Financial and Risk Management</td>
<td>Financial management; decision-making under risk, risk management methods and tools (e.g. futures markets, crop insurance); effects of technology, globalization of commodity markets, and rising input costs on producers' cropping decisions</td>
</tr>
<tr>
<td>Marketing – dairy</td>
<td>economics of dairy production, marketing, consumption, and policy (domestic and international)</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>adoption and diffusion of new biotechnologies; intellectual property rights issues in plant genetic resources (incl. with WTO mechanisms)</td>
</tr>
<tr>
<td>Marketing – Fresh Produce</td>
<td>fresh produce marketing, food distribution, and international trade in fruits and vegetables</td>
</tr>
<tr>
<td>Marketing – Collaborative Structures</td>
<td>use of cooperatives and other business structures to enhance returns to producers; economic implications of vertical linkages between growers and processors, grocers, food service operations and other downstream entities</td>
</tr>
<tr>
<td>Priority 1</td>
<td>Priority 2</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>Development economist (preferably senior)</td>
<td>Environmental valuation economist- junior level</td>
</tr>
<tr>
<td>Agricultural economics, broadly defined</td>
<td>Agricultural economics, use of natural resources (water)</td>
</tr>
<tr>
<td>Senior development economist to replace Rozelle</td>
<td>Environmental economics</td>
</tr>
<tr>
<td>Development economics</td>
<td>Water economics</td>
</tr>
<tr>
<td>Agribusiness</td>
<td>Managerial economics</td>
</tr>
<tr>
<td>International Development Economics</td>
<td>Environmental Economics</td>
</tr>
<tr>
<td>Development</td>
<td>Ag marketing</td>
</tr>
<tr>
<td>Michael Carter</td>
<td>Finance Person</td>
</tr>
<tr>
<td>Environmental/Natural Resource Economics</td>
<td>Economic Development/Environment</td>
</tr>
<tr>
<td>Development</td>
<td>Environmental economics</td>
</tr>
<tr>
<td>Development - marketing institutions and trade</td>
<td>agricultural finance</td>
</tr>
<tr>
<td>Interface of agriculture and the environment</td>
<td>Development economics (with sub-emphasis on agriculture or environment -- not labor or finance)</td>
</tr>
<tr>
<td>Resource and environmental economics</td>
<td>Regulation (including environmental, agricultural, and development and industrial organization)</td>
</tr>
<tr>
<td>Agriculture in economic development</td>
<td>Agricultural environmental economics</td>
</tr>
<tr>
<td>Econometrics</td>
<td>Environmental Economics</td>
</tr>
<tr>
<td>Development economics</td>
<td>Environmental valuation economics</td>
</tr>
</tbody>
</table>
Figure A-1. Links between Departmental Priority Areas (Gaps and Opportunities) and CAES Ideas for the Future: Survey Results*

*Figure based on top three priorities of respondents. Top priority assigned a weighting of 3, second priority assigned a weighting of 2, third priority assigned a weighting of 1.
This addendum to the department of Biological and Agricultural Engineering's (BAE) academic plan is meant to reflect changes brought about by the recent I&R and AES FTE targets set by the College of Agricultural and Environmental Sciences (CAES), by projected new targets in the College of Engineering (CoE), and by possible retirements over the next five years.

Proposed reductions in the department FTE and the demographics of its faculty are expected to present challenges in maintaining the breadth of teaching and research activities the department currently covers. The department foresees the elimination of narrow areas of specialty both in research and in teaching, to be replaced by broader areas for which the department can maintain a core number of faculty.

The department of Biological and Agricultural Engineering is one of the top-ranked programs in the nation. The department's historical association with the CoE and the CAES reflects the disciplinary expertise of its faculty and the strength of its programs and mission-oriented research activities. The department's existence in two colleges creates particular challenges at this time of lowered FTE targets. The three-way splits that are typical for departmental faculty appointments (approximately 20% I&R in the CoE, 20% I&R in the CAES, and 60% OR in the Agriculture Experiment Station, AES) will have to shift in the future for the department to retain its excellence and vitality. This shift will be driven primarily by the significantly reduced I&R FTE target in the CAES.

Academic Programs

The department offers a major in the CoE (Biological Systems Engineering, BSE) for which department faculty teach 12 required courses (37 units out of a total 184 units required for the major). In addition, BAE faculty teach a course on Engineering Economics (ENG106) which is required by BSE students and students in other CoE majors. Department faculty teach other engineering courses which BSE students take to satisfy elective course requirements for the major. BAE faculty also teach courses in the CAES through the Applied Biological Systems Technology series (ABT). The department offers two minors in the CAES.

College of Engineering

The BSE major has a number of areas of specialty. These areas of specialty are useful advising and outreach tools as they help students in the selection of electives and in identifying with the profession and their future careers. Current areas of specialty mirror the research activity of department faculty, and are:
Projected reductions in FTE and expected retirements within the next five years will result in significant or complete loss of departmental expertise in several of these areas. Examples are Aquacultural Engineering, Ecological Systems Engineering, and Forest Engineering. The coalescence of areas of specialty was forecast in BAE's 2009-2014 Academic Plan and becomes even more urgent given the current economic climate. Programmatic areas of strength identified in 2009 were:

- **Agricultural Engineering** - precision agriculture, equipment and system development, instrumentation, ergonomics, waste management
- **Biological Engineering** - biotechnology, bioprocessing, bioenergy, biosensing
- **Food Engineering** - processing, packaging, human health
- **Natural Resources Engineering** - water, land, air, forests

Possible retirements in these areas are:

- Agricultural Engineering (SKU, MJD, RHP)
- Food Engineering (RPS, JMK)
- Natural Resources Engineering (WWW, BRH)

These seven retirements represent more than one third of our Academic Senate faculty. Agricultural Engineering will sustain the greatest loss at a time of increasing industry demand. In Food Engineering we will lose two of our highest visibility faculty, including a member of the National Academy of Engineers. However, the most vulnerable area to departmental downsizing and retirements is Natural Resources Engineering, which could disappear altogether. Given its importance to the State, the department considers Natural Resources Engineering an essential area that should be retained in a more focused way to ensure excellence and impact. Therefore, the department would focus this area on issues related to water quality and use in agriculture and related industries.

As retirements occur, the department will need to ensure that it maintains expertise in:

- Food Processing Engineering
- Precision Agriculture
- Water Quality and Use in Agriculture and Related Industries
- Biosensors for Agriculture and Related Industries

The exact order in which new faculty would be hired will depend on the expertise of retiring faculty.

**College of Agricultural and Environmental Sciences**

Applied Biological Systems Technology courses are taught by a lecturer supported through endowment funds specifically targeted for such purpose and by Academic Senate Faculty. A number of courses in areas associated with the specialties listed above will disappear as retirements occur over the next few years. The department will endeavor to continue offering courses that are required for other majors (e.g. ABT 110L, ABT142). The department will also work with other CAES departments, as it has started to do, to share in the teaching of courses of mutual interest. Examples are courses related to geographic information systems and global positioning systems (GIS and GPS), which are required for a minor offered by the department and for the Landscape Architecture program.

**Faculty**

As of December 31, 2010, the instructional FTE of the department was split between the CoE (4.13) and the CAES (3.13). Both values include a position currently being recruited (Mechanization Engineering) and two faculty members serving as associate deans in the CoE. Therefore, the total I&R FTE in the department is 7.26. The OR FTE in the department is 7.74 in the AES, also as of December 31, 2010.

The new FTE targets released by the CAES for the department are: 1.98 I&R and 7.09 AES. No specific departmental targets have been allocated by the CoE, but an overall reduction of 10% has been assigned to the College and that number is used here. Therefore, the assumed CoE I&R target becomes 3.72 and the resulting overall I&R target for the department would be 5.70, a 22% reduction from December 2010 values.

Typical appointments for BAE faculty are three-way splits with approximately 20% I&R in the CoE, 20% I&R in the CAES, and 60% OR in the AES. The three way split creates special challenges in meeting the CAES reduction targets and will likely result in significant changes in the average appointment make up of department faculty, with two possible alternatives: 1. a proportionally higher CoE I&R appointment for new and remaining faculty made possible by increased total I&R in the CoE, or 2. a proportionally higher AES appointment for new and remaining faculty. The department sees the first option as the only viable alternative for maintaining the vitality and excellence of its programs. The second option would result in I&R appointments that are too low to sustain the department's academic programs.
March, 2011

Memorandum of Understanding
Consolidation of the Department of Biological and Agricultural Engineering and the Division of Textiles and Clothing

This Memorandum of Understanding (MOU) identifies major academic and programmatic issues, including faculty FTEs, academic programs and curricula, budget, and space and facilities, and serves as a working document to facilitate the immediate integration of the two groups of faculty and transition into one academic program. This document provides general principles guiding the consolidation and may be revisited as needed.

Faculty FTEs

1. Consolidation of the Division of Textiles and Clothing (TXC) in the College of Agricultural and Environmental Sciences (CAES) and the Department of Biological and Agricultural Engineering (BAE) in both the College of Engineering (CoE) (~20% I&R) and CAES (~20% I&R, 60% AES) involves the transfer of three TXC faculty FTEs (60% I&R, 40% AES) into the BAE department. These three faculty have expertise and research activities in physical sciences and engineering related to materials including fibers, polymers and biomaterials and teach courses in these areas.

2. Current BAE faculty have appointments in the CAES and the CoE, whereas current TXC faculty's appointments are in the CAES only. The goal is for all faculty in the new BAE department to have comparable appointments as the new faculty start teaching in the CoE and as new engineering FTE becomes available.

Academic Programs

3. The consolidated academic department retains the name of Biological and Agricultural Engineering with the same mission stated in the department's 2009-2014 Strategic Plan:

   "The department mission is to discover, develop, apply, and disseminate knowledge for the sustainable production, management, and use of biological materials, and to educate students for this work."

4. While the primary undergraduate educational focus of the department is the Biological Systems Engineering major in the CoE, the faculty will develop a new academic plan by June 2012. The new academic plan will address academic priorities including new curricular developments and course offerings taking into account new strengths gained and potential synergism built.

5. The department will work to expand its educational offerings and student enrollment in the CAES by means of minor(s) and new and updated course offerings.

6. The CAES Executive Committee has voted, 6-2, to close admissions to the TXC major for Fall 2012 and Fall 2013 and forward the decision to the Undergraduate Council. The CAES Dean's Office has indicated that it will not fund the required teaching resources to support the major in the long term. As a result, the TXC faculty see the discontinuation of the major as
inevitable. Given these circumstances, the TXC faculty will accept the discontinuation of the TXC major. During the time necessary to graduate all TXC majors, support for lecturers and TAs will be provided by CA&ES and decreased in a step-wise fashion as existing students in the major complete their requirements. When the last student graduates there will no longer be support from CA&ES for the Textiles and Clothing major. The current TXC physical science faculty will continue to deliver existing TXC textile science courses.

Budget

7. The current BAE and TXC are in the same administrative cluster. Contributions to the administrative cluster will be re-negotiated with the cluster partners as needed. It is expected that contributions will continue to be proportional to departmental FTE.

8. BAE and TXC faculty acknowledge that the two departments have used certain funds (Hatch, multi-state, and indirect cost returns (ICR)) differently. The departments further recognize the need to have a uniform policy by which all faculty are treated equally with respect to departmental funds and allocations to faculty. As a transition measure and depending on budgetary constraints and availability of funds, current TXC faculty may receive allocations proportional to what they receive under current TXC practices for a period of two years. Management of the BAE budget will be the responsibility of the Department Chair, who will make the requisite decisions in consultation with department faculty and in accordance with University guidelines and policies.

9. All TXC carry forward funds, including all 19900, ICR and intramural and extramural grants, on June 30, 2011 belong to the current TXC faculty. The I&R carry forward funds will be used for the undergraduate programs in TXC and FPS and the Textiles graduate group, including funds set aside for the hiring of lecturers to cover for current TXC faculty's sabbatical leaves for a period of up to four years. The OR carry forward funds are set aside to maintain and upkeep research equipment and capabilities in Everson Hall for Hatch and multi-state projects. Current TXC I&R carry forward funds for TXC major not used by June 30, 2015 will be used for curricular development for CAES courses offered by BAE.

10. Support for lecturers and TAs to deliver TXC courses to graduate all TXC majors will be provided by the CAES Dean's office and decreased in a step-wise fashion as existing students in the major complete their requirements. Undergraduate student advising and course materials will be supported with RAC formula funds, namely, RAC cells B1, B3, B4a, C1a and C2 for undergraduate student advising and course support.

Space and Facilities

11. The current BAE and TXC programs are located in two different buildings, Bainer and Everson Hall, respectively. There is insufficient space in Bainer Hall to accommodate the consolidated BAE and TXC faculty and their laboratories. Faculty office space in Bainer Hall will be made available to incoming TXC faculty to foster full integration and collegiality.

12. TXC faculty have their offices and teaching and research labs in Everson Hall. There are overdue safety and long standing quality and quantity space issues with respect to the chemical and analytical laboratories in Everson Hall. Costs associated with improving the space to meet safety guidelines, especially as they relate to the chemical fume hoods, will not be borne by BAE.
but by the CAES Dean's Office.

13. While the current BAE faculty office and laboratories will remain in Bainer, assessment is being made on the necessary upgrading and remodeling of the old FST building to meet the research and teaching needs of the consolidated department. All costs of renovation and upgrading of the old FST building, including chemical and analytical laboratories, clean room for nanomaterials and constant temperature and humidity facility, as well as moving of equipment and instruments to meet the needs of the consolidated BAE will be borne by the CAES Dean's Office.
TO: Dean Neal Van Alfen, College of Agricultural and Environmental Sciences  
Dean Enrique Lavernia, College of Engineering

FROM: Raul Piedrahita, Chair  
Department of Biological and Agricultural Engineering

You-Lo Hsieh, Chair  
Division of Textiles and Clothing

RE: Consolidation Memorandum of Understanding

As you know, the BAE and TXC faculty have worked diligently to develop an MOU to guide the consolidation of the two departments. The faculty were asked to vote on the consolidation as described in the MOU. Support of the consolidation was unanimous by the TXC faculty and 16 in favor with one opposed by the BAE faculty. In voting as they did, faculty and we as chairs, expect that all terms in the MOU will be honored.

The faculty see opportunities for collaboration and growth in the area of bio materials, but there were also expressions of concern with potential difficulties in certain areas. Ultimately, success will depend in large part on the support provided by your offices.

The next step for us in the consolidation process is the preparation of a formal proposal in accordance with PPM200-20.
Proposal for the Consolidation of the Departments of Entomology and Nematology

Prepared in accordance with PPM 200-20D
Department of Entomology
Department of Nematology
January 2011
Introduction

A consolidation of two departments, 1) Entomology and 2) Nematology, into a single department in the College of Agricultural and Environmental Science is proposed. This consolidation stems from the College Planning Committee report (CPC, March 31, 2010) and the Academic Prioritization Committee report (APC, August 26, 2009); the latter proposed that the Department of Nematology faculty be redistributed "into other units where their expertise can be well utilized." The CPC report listed six possible strategic options and considered the implications of four different departmental combinations, including Plant Pathology plus Nematology, Entomology plus Nematology, and Animal Science plus Nematology. The six professors in the nematology department have carefully considered the strengths and weaknesses of these potential mergers with respect to maintaining the identity of our discipline and delivering research and outreach in our areas of emphasis, and unanimously support consolidation with Entomology. Similarly, the Entomology faculty has carefully considered the formation of this broader organismal department, and strongly supports this action. The benefits of this proposed merger for the College and the campus stem from the fact that there is substantial commonality and potential synergism in shared areas of research excellence between the two departments (e.g., behavioral ecology, systematics, sustainable agriculture, and functional biology); it is this foundation of basic research that supports one of the main applied research foci of the departments: mitigating damage to agricultural production due to insects and nematodes. This merger also has the potential to enhance teaching because several nematology professors teach courses within Entomology and have administered and taught courses in Animal Biology, a major that is now overseen by Entomology. Goals of this consolidation, if approved, will be reflected by joint development of a new department name and a combined strategic/academic plan that builds upon resulting research synergies, enhances common teaching interests and ensures delivery of our outreach missions.

A. Justification

1. Objectives

The APC report recommends that the Department of Nematology faculty be redistributed into other units where their expertise can be well utilized. The rationale was not based on lack of faculty excellence, but on the small size of the department (currently six FTE); with budget reductions precluding investment of additional FTE, a critical mass cannot be maintained. However, the CPC report clearly recognized the importance of maintaining disciplinary expertise on nematodes, given their importance not only as pests of plants and animals, but due to their value as biological control agents (of insect pests), and as major components of biodiversity and ecosystem services in soils. This CPC finding is not surprising. For example, of the eight Neglected Tropical Diseases of greatest prevalence, five are caused by nematodes: these worms infect 2.1 billion people, mainly in developing countries. Nematodes also adversely affect humans through crop losses and yield reductions; global losses due to plant parasites are estimated to exceed $100 billion per year. These impacts illustrate the need to maintain some disciplinary expertise in nematology and to find the optimal department for existing faculty. These considerations led to this proposal.
for consolidation with Entomology. This consolidation has potential advantages beyond providing the best environment for facilitation of current nematology expertise. Some of the objectives of a combined department of entomologists and nematologists include:

- Fostering a collaborative environment that benefits basic research activities for both entomologists and nematologists
- Enhancing research breadth, benefiting the development of outreach and applied science activities for faculty
- Preserving, to the degree possible, the breadth of research and teaching activities characteristic of the broad discipline of nematology
- Strengthening core competencies and areas of excellence shared by the individual departments, including biodiversity, behavioral ecology, sustainable agriculture, functional biology, and vector biology

The CPC report recommended that the Department of Nematology consider merging with the Department of Plant Pathology. In part, this recommendation stemmed from the idea that (p. 50) "Thus, disciplinarily, this group fits well with plant pathology. The department appears to accept this as a possible solution to the current situation." However, our faculty rejects this view of Nematology, and emphasize that our discipline is much broader than the nematodes impacting plants, and recognize that our science has much more in common with the discipline of Entomology than Plant Pathology. This is reflected in the research of our current faculty and the history of the department at UC Davis. In fact, the former name of the department (Plant Nematology) was changed in 1962 to Nematology in order to better reflect the breadth and nature of the science. In addition, there are both institutional and key biological linkages between the disciplines of entomology and nematology.

Institutionally, the first nematologists in the UC system were hired in the Department of Entomology and Parasitology at UC Berkeley (the first in 1944). Founding members of the UCD department were students in the Entomology and Parasitology department at UCB. These historical and research linkages were recognized by the UCD administration in previous proposed mergers and other programmatic structures. For example, in 1976 CAES Dean Hess proposed (unsuccessfully) merging Nematology with Entomology. In more recent years, the departments of Nematology, Entomology, Animal Science, and Wildlife Fish and Conservation Biology were organized as the Division of Animal Biology in the CAES; it was from this Divisional group that the Animal Biology major emerged.

Biological linkages between nematodes and insects provide a stronger rationale for nematologists and entomologists to be housed in a single department. For example, recent molecular phylogenetic studies demonstrate that nematodes and arthropods are closely related, belonging to an exclusive group or clade (Ecdysozoa) that excludes most other animals. Due to their common ancestry, ecdysozoans share many fundamental biological properties, such as hormone-mediated molting. Thus applied and basic research on insects has relevance to nematodes, and vice-versa. This, together with broad linkages across many research, teaching and outreach areas connecting the faculty in both departments makes for a compelling argument for consolidation. Given this strong common foundation, the continued excellence and broad contributions in fundamental and applied nematology,
including plant-parasitism, is to be expected in proportion to the allocation of FTE resources for nematologists. Importantly, faculty members in the Department of Nematology believe that development and advancement of their individual research, teaching and outreach goals (and the process of peer merit review) is best served by consolidation with the Department of Entomology.

Research in the Department of Entomology spans most of the areas of emphasis designated within the college and ANR including Agriculture Productions Systems (Sustainable Agriculture); Food (systems); Human Health and Welfare; Natural Resource Science and Management; and Ecosystem Function and Management. As emphasized in the Entomology Academic Plan, there are five clusters of excellence in the department: biodiversity, behavioral ecology, functional biology, sustainable agriculture, and vector biology. Research by faculty in nematology enhances these clusters of excellence. For example, nematologist Ed Lewis (who already holds a 25% appointment in Entomology) engages in studies of nematode behavior, population ecology, community ecology and evolutionary biology with several groups of nematodes, insects, and bacteria. His work includes practical pursuits such as biological control of crop pests, and predicting the impact of crop management on pest and beneficial organisms. Similarly, in the area of functional biology, nematologist Valerie Williamson fuses molecular and genetic tools to study the interactions between host and parasite. One area of her research has examined commercial tomato lines containing a gene, Mi-1, that confers resistance against root-knot nematodes. Mi-1 has been isolated by her lab and research done in collaboration with Diane Ullman in Entomology showed that this same gene confers resistance against the potato aphid. There is a group of faculty in Entomology with interest in plant-insect interactions, especially in the area of ‘induced resistance’, and Valerie’s research would reinforce these programs. These two examples are illustrative of the potential integration among faculty in the departments. Other nematology faculty also emphasizes these cluster areas including biodiversity (Steve Nadler), sustainable agriculture (Howard Ferris, Becky Westerdahl) and behavioral ecology (Ed Caswell-Chen).

In the area of Cooperative Extension, the Entomology Department has a 100% Cooperative Extension (CE) position (Eric Mussen, Apiiculture) and 3 faculty with partial CE appointments (Larry Godfrey, Frank Zalom, and Mary Louise Flint). Entomology CE personnel have a general focus on sustainable agricultural systems and IPM. Nematology has one partial (0.85) CE FTE, Becky Westerdahl, who would be adding to this emphasis on IPM with her research on nematology management practices.

2. Changes in Instructional Programs

Overall, few changes are anticipated to occur in instructional programs. No changes are expected in the overall graduate and postdoctoral training programs. Nematology does not have its own graduate group. Interest in graduate training in Nematology will continue as before, with students enrolling through graduate groups appropriate for their area of specialization (e.g., Ecology, Entomology, Plant Pathology, Genetics) with graduate group membership by Nematology faculty reflecting their research interest. Nematology does not have an undergraduate major, but it does have a (low-enrollment) minor. This minor would
be retained as long as the remaining faculty is able to offer the courses with sufficient frequency. Entomology has its own undergraduate major, but enrollment is not expected to change as a result of the consolidation with Nematology. The strong existing connection between nematology and entomology is also evident in their history of shared teaching. Specifically, nematologist S. Nadler co-teaches ENT 156 (Biology of Parasitism), and nematologist Ed Lewis teaches ENT 104 (Insect Behavioral Ecology) and co-teaches ENT 135 (Introduction to Biological Control). Likewise, nematology professor Becky Westerdahl previously taught ENT 156 for several years. Entomology is also the administrative home for the Animal Biology (ABI) major (an inter-departmental major), and provides the ABI Master Advisor, staff advisor, and faculty for instructing many of the courses. Entomology took over this ABI role from Nematology, which served as its home for the previous three years. Several Nematology faculty (H. Ferris, E. Caswell-Chen, E. Lewis, and S. Nadler) have either taught or team-taught ABI courses (Ed Lewis served as Master Advisor). It is likely that some Nematology faculty will contribute to ABI courses in the future. These teaching synergies between combined faculties are likely to help accommodate enrollment growth (the ABI major has grown substantially during the last 3 years).

3. Expected Budgetary Impact

The proposed action is a consolidation of two existing departments, and therefore normally the budgetary impacts would be predicted to be minimal, and any impact would not be unique to this particular consolidation of departments. One potential negative impact involves the FTE target for the consolidated departments that will be set by the CAES. Recently, CAES has begun funding departments based on FTE targets (with transition funding to mitigate rapid changes) rather than "head-count" FTE. Thus, FTE targets are central to RAC funding that provides for core budgets such as department administration. The College has not provided a separate FTE target for Nematology, so it is not yet possible to determine the exact fiscal impact for the consolidation of Entomology and Nematology. However, if there is much less Nematology target FTE than existing Nematology faculty, the budgetary impact on any combined unit could be substantial.

4. Administrative Staffing Impact

This consolidation follows administrative clustering within the College. The resulting administrative cluster for our faculty includes the departments of Entomology, Plant Pathology, and Nematology. The Chief Administrative Officer of this unit (Janet Brown-Simmons) previously served all three of these departments (and the current Chairs of these departments). The reorganization of the administrative staff supporting the members of these three departments is nearly complete, and it is anticipated that consolidation of Entomology and Nematology will have no additional impact on this administrative reorganization or services provided.

5. Impact on Enrollment

The consolidation is not expected to have any impact on undergraduate or graduate enrollments. See section A.2.
6. Changes in Staffing and Space Requirements

Requirements for space in the consolidated department, including office, research and administrative space will be met by retaining current allocations to the departments. No staffing changes are anticipated beyond those that have already taken place as part of the formation of the shared administrative cluster for the departments. No layoffs are foreseen as a result of the consolidation.

7. Costs and benefits to campus

The Davis Nematology department is one of only two such departments in the UC system, and these are the only distinct departments of their kind in the United States. To quote from the CPC report (p. 49) "There is a clear benefit to an organismal focus in nematology. Retaining an identifiable program in nematodes, and being one of a very few universities that does so, makes CAES a leader in this field." However, because CAES does not currently intend to invest FTE in nematology given current budgetary constraints, maintaining an "identifiable program" requires consolidation with another department. The Nematology faculty believes that the discipline and their individual research programs are best served by consolidation with Entomology, a department with significantly greater overlap, breadth and potential synergies than any other within CAES. Importantly, the Nematology faculty believes that consolidation with Entomology offers the greatest potential for retention of a separate identity for the discipline at UC Davis. The combined department will promote collaboration among faculty with similar research interests, benefiting basic research in both departments. This shared administrative and academic home will permit the remaining nematologists to continue their outreach mission, including biological control of insect pests, identification of known and novel nematode pests, mitigation of nematode damage to crops, and increasing our understanding of the role of nematodes in ecosystem services. Given that only one of our current professors is expected to retire in the near future, decisions regarding how to best maintain an identifiable program in nematology over the long-term, including changes in research emphases, will have to await decisions on FTE replacements that will not occur for quite some time. If budgetary constraints continue, or future CAES administrators do not commit replacement FTE for nematologists as they retire, then reconsideration of any joint department name that results (e.g., Entomology and Nematology) will be required.

B. Phase-out Plan

We are not instituting a phase-out, so this item is not relevant to our proposed consolidation.

C. Implementation of Consolidation

Proposed Time Table:
1. January 2011: Proposal to consolidate Entomology and Nematology submitted to the dean of the College of Agricultural and Environmental Sciences.
2. February 2011: Receive consultation from the College Executive Committee on proposed consolidation.
4. May 2011: Receive consultation from the Academic Senate on proposed consolidation.
5. June 2011: Proposal to consolidate the departments submitted by the Provost to the Chancellor for final approval.

D. Explanation of Consultation Process

For the Nematology faculty, discussion of potential mergers is longstanding, preceding the release of the CPC report. During the APC process our faculty continued to discuss options, particularly mergers with Plant Pathology or Entomology. The Chairs of these departments met formally and informally to discuss potential consolidations, and in 2010, there have been several Nematology faculty meetings (including one with emeriti) focused on considerations of potential mergers. There have also been meetings involving department Chairs and Associate Dean Mary Delany. The Nematology faculty met jointly with the Plant Pathology faculty (August 23, 2010) to discuss concerns relative to a potential merger between our departments. The outcomes of that meeting were not favorable as assessed by the Nematology faculty, who then uniformly expressed their interest in further exploring a merger with Entomology. As a small department, Nematology faculty also used many informal opportunities to discuss the pros and cons of mergers, and our decision has not been made in haste.

For the Entomology faculty, discussion of the potential merger with Nematology took place during several faculty meetings, including special faculty meetings called specifically for this purpose.

The faculty of both departments held anonymous votes on the issue of departmental consolidation. Vote tallies were recorded separately for Federation versus Senate faculty (note: some faculty have split appointments with both Senate and Federation components; their votes were tabulated under Senate results only). The ballot contained the following question, and offered the opportunity to provide comments (duplicated in Appendix A).

——— I support the consolidation of the department of Entomology with the department of Nematology.

——— I do not support the consolidation of the department of Entomology with the department of Nematology.

——— I abstain.

If you wish, please provide comments below.
The outcome of this vote was as follows:

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<th>Academic Senate Faculty Results</th>
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<th>Academic Federation Faculty Results (Entomology)*</th>
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<td>Entomology</td>
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*Nematology has no members with an exclusive Academic Federation appointment*

Total Results (Combined Departments, Federation plus Senate faculty)
  In favor: 19
  Opposed: 0
  Abstain: 5

E. Comments of Faculty and Academic non-Senate Appointees
   As part of the consolidation vote, the faculty was invited to provide comments, which are reproduced in Appendix A.

Appendix A. (comments that were provide with the vote)

Comments from Nematology Faculty and Emeriti

Comment 1
The proposed consolidation of Entomology and Nematology is the best outcome possible of a situation that has been imposed by budgetary (and other) sources. Entomology has a history of a broad outlook, and now houses several faculty that do not work exclusively on insects. As nematologists, we as a group, also work on a broad array of taxa and specific areas. So, from a research standpoint and a teaching standpoint, this merger will be of mutual benefit.

Comment 2
First, I have to voice my humble protest - I do not agree that the Department of Nematology should “go away.” If California agriculture and the environment remain as significant parts of the AES mission, then I argue that the mission for the Department of Nematology remains. The recent approval of methyl iodide by DPR, and the controversy surrounding that decision are indicators that nematology remains significant in the State. Our Dean has informed us however, that absent a consolidation the CAES will no longer provide support to the faculty members of our department, in essence mandating a consolidation. Accordingly, I support
the proposed consolidation of the Departments of Entomology and Nematology as the best possibility for realizing the suggestions put forward in the APC and CPC reports (as another aside, I consider it disconcerting that the CPC process did not include any explicit consideration of either the undergraduate or graduate teaching needs of campus instructional programs). I conclude that this consolidation is, given the scenario that some sort of a consolidation must occur, positive is for many reasons. This particular consolidation (as opposed to, for example, Nematology consolidating with Plant Pathology) is justifiable for a number of important reasons; and, it is consistent with shared historical legacies, current research and teaching interests, and aspirations for significant contributions to the coming directions in research, teaching, and outreach necessary to the AES and the University of California. It is very reasonable to state that the visibility and reputations of both departments are considerable. Important to the vitality of the consolidation is the fact that the faculty of both departments are creative and excited to work together. The consolidation presents an opportunity to leverage our current expertise to foster creative strategies and initiatives to meet emerging needs in the applied and basic invertebrate biosciences, and to plan for possible future model of substantially decreased resources. There are a number of historical connections between the two departments, and some of these have been mentioned in both the narrative and in other comments. The Department of Nematology has previously been a Division in the Department of Entomology. The two departments have a shared history of contributing to integrated pest management and applied ecology, with faculty members from both departments participating in the Graduate Group in Ecology and the Graduate Group in Integrated Pest Management. In the early to mid-90s, the CAES supported an internal divisional structure that included Entomology, Nematology, WFCB and Animal Science as administered within a "Division of Animal Biology." It was under that Divisional structure that both departments were heavily involved in creating the CAES interdepartmental major in Animal Biology ("ABI"), a major that was recently housed in the Department of Nematology but moved to the Department of Entomology in 2010 in anticipation of a consolidation. In recent years, the ABI major has grown, and is now among the larger undergraduate majors in the CAES. Due to student demand indicates that this will be a well-subscribed major for years to come, and the ABI major, which might equally well be named "Experimental Biology," is poised for significant future growth because of that demand. The faculty members of both departments have been committed to and instrumental in the growth of the major, and it represents a significant current, shared teaching interest for the two departments. Both past and current shared research interests in integrated pest management and ecology also provide tremendous common ground for the two departments. There are common research interests that have already resulted in a number of successful collaborations, and common interests range over a broad array of topics including evolution, systematics, disease ecology, signaling, the genetics of organismal interactions, life history ecology, demography, aging, biological control of pest species, the ecology of vector and phoretic relationships, food webs, trophic dynamics, and exotic species. As we look to the future, it is clear that creative and forward-thinking research and teaching will be more necessary than ever and current faculty involved in this consolidation recognize that. The consolidation will be supportive of continued excellence of current faculty, but will also foster creative and novel developments in the previously mentioned areas as necessary under a climate of significantly reduced resources. In equal measure, it is likely that constant and rapid advances in molecular
biology and technology will present opportunities for novel research foci in applied and basic questions in the invertebrate biosciences. For example, a number of insects and nematodes serve as important model systems in biology, and the rapid pace of discovery and technological development in genetics and bioengineering present intriguing and ever-expanding opportunities for the consolidated unit. For example, global gene expression research reveals, not surprisingly, that environmental conditions may be highly significant with respect to gene expression. It follows that organismal ecology (the array of environmental influences on an organism) will be more important and reciprocally requisite in applied and basic studies of genomics, epigenetics, metabolomics, and proteomics. In short, model systems present exciting new opportunities for developing explicit research linkages between current model systems and applied research on invertebrate species of interest (e.g., species in conservation efforts, beneficial species, pest species, and indicator species). Although dismal economic conditions, and shrinking AES budgets in particular, have contributed significantly to the original recommendations for consolidation, this consolidation is arguably sufficiently creative, exciting, and desirable that could be considered justifiable under any budgetary scenario.

**Comment 3**

Given that consolidation must occur, this is a wonderful opportunity to combine and promote synergies among faculty of two units. Both have the mission of research, teaching and extension in applied and fundamental invertebrate biology. The commonalities are clear: Animalia: Metazoa: invertebrata; pests of plants, animals, humans; parasitology, pest management, biological regulation, vectoring, phoretic relationships; ecosystem services and ecosystem disservices, etc. Also, faculty with programmatic expertise at organizational levels from molecular to ecosystem. Also, a history of shared faculty and functional historical success of a previous amalgamation. Given the diversity of the current Nematology department, it makes much more sense than an awkward programmatic consolidation with Plant Pathology. A similar very successful union exists at the University of Florida.

**Comment 4**

I believe this will be a very productive and collegial consolidation of faculty. Despite arguments from the Dean’s office promoting a very narrow conception of Nematology and a Nematology/Plant Pathology consolidation, there is no reason that plant nematology research cannot flourish in the proposed ENT plus NEM department. In fact, plant-piercing insects and stylet feeding nematodes induce similar defense responses in plants, and there is evidence that some plant genes that mediate resistance mechanisms recognize similar effectors in insects and nematodes. Although the Dean’s office emphasizes a distinct and narrow programmatic vision for the future of nematology research in CAES (nematodes as plant pathogens), any consolidation must consider what is best for current nematology faculty (most of whom are not plant nematologists) who were hired under a much more inclusive view of the science of Nematology. Clearly, the broader base of research in ENT and the potential for more productive interactions between ENT and NEM faculty (than for NEM and Plant Pathology faculty, on average) will benefit basic and applied research in both disciplines. The proposed consolidated structure certainly will not be deleterious to those pursuing research involving plant parasitism, and offers the best opportunities for those
nematologists with other research interests. No doubt, this is why the proposal generated such strong faculty support.

Comment 5
Approximately 10 years ago, faculty in Nematology became aware that elimination of the Department was a goal of the Dean’s office. Thus, over time, we have been coerced into the position of joining with another department, and even threatened with retribution, such as denial of basic departmental operating funds. The proposal before us for consolidation with Entomology is the best solution for the current situation and I commend Steve Nadler and Michael Parrella for their leadership in its preparation. I also commend faculty in Entomology for their consideration of the proposal and look forward to joining with them in a joint venture. Consolidation with Entomology would best serve my personal interests at this time, and would be preferable to consolidation with another department. However, coercion with fear of retribution is not a proper model for governing faculty at the University of California. Nematology is a strong department with a long and distinguished history of excellence, and of service to California agriculture. Consolidation with another department is not in the best interests of either the discipline of nematology, or of California agriculture. For these reasons, I have voted to abstain from voting on the proposal.

Comment 6
I have read the draft report on the “Proposal for the Consolidation of the Departments of Entomology and Nematology” and wholeheartedly support the consolidation of these two departments. The consolidation of these two departments is logical from a programmatic standpoint and will be beneficial to the nematologists and entomologists.

Although I retired on July 1, 2010, I maintain a keen interest in the welfare of both departments. As a background, I joined UC Davis in 1976 with a 75% OR appointment in the Department of Nematology and a 25% IR appointment in the Department of Entomology. During the past 34 years, I had been deeply involved in both departments in research, teaching and committee assignments (i.e., university service). My research program was focused on the use of insect-parasitic nematodes for biological control of insect pests and all 11 of my Ph.D. students came through the Entomology Graduate Group. Moreover, I co-chaired a Ph.D. student with Dr. Michael Parrella, Professor and current chair of the Department of Entomology. In Nematology, I taught NEM 205 (Insect Nematology) and NEM290 (Seminar), but my major teaching activities were in Entomology. In Entomology, I taught ENT10 (Natural History of Insects) which enrolled over 100 undergraduates (primarily freshman and sophomores) and ENT135 (Biological Control) which averaged 12 upper division and graduate students. In terms of committee work, I was heavily involved in both departments on various committees.

From my viewpoint of research, teaching and university service, the consolidation of the Department of Nematology and Department of Entomology makes programmatic sense. But it also is a logical approach for the current faculty of the Department of Nematology. Nematodes and insects are animals that share many fundamental biological properties, and conducting research with nematodes and insects uses similar approaches. Moreover, the Department of Nematology oversaw the Animal Biology undergraduate major until this year.
(July, 2010) when the Department of Entomology took over this responsibility. Several Nematology faculty taught the core courses in this undergraduate major and are willing to participate again in the future.

Comments from Entomology Faculty (both Senate and Federation)

Comment 1

I agree with others that we need to make sure the level of support/RAC formula is consistent with AES policy regarding budgeting issues.

I believe that we can turn this numerical and disciplinary expansion as an opportunity for all involved including the College. So far the discussion has only been about the former (numerical) but not really about disciplinary in any substantive way other than the concept of faculty and name addition.

Thus I would like to see written into whatever documentation is created for this merger that, aside from budgetary issues, one of the first items of business is a retreat to both reconceptualize and modernize OUR (meaning entomologists and nematologist's) department. This does not mean we necessarily change our name but this must be on the table. What it does mean is that it is more than adding 4-6 faculty specialists who complement entomology. Rather we can this as a window of opportunity to re-think ourselves in a big way.

Comment 2

I strongly support the merger, but I'm not comfortable voting until two issues are resolved with the Dean’s Office: (i) the RAC formula, and (ii) how our future 'head count' will be calculated, relative to our 'target FTE', for purposes of granting the department new faculty positions."

Comment 3

The merger between Entomology and Nematology will be a positive outcome for both of the groups. Our Entomology department is already a home for scientists of varied interests, with respect to both disciplinary and taxonomic areas. The Nematology department is also broad in scope, with only 2 of the members focusing on biology of plant-parasitic nematodes; other members focus on nematodes as animal parasites, indicators of soil health, and models for the study of behavior and ecology. These areas of expertise will contribute greatly to our high standing on the campus and nationally.

With Entomology's new adoption of the Animal Biology undergraduate major, this merger makes sense with respect to curriculum development as well. Though the College Planning Committee, formed last year, was forbidden from taking undergraduate teaching into consideration when suggesting merger plans for various departments, teaching classes remains a primary function of departmental units. Teaching in the Animal Biology major can serve as common ground for all new departmental members.
Hopefully, the Entomology Department in its new form will not be penalized for this merger by the Dean removing financial support from the 6 nematology faculty who will join us to form the new department. It seems counterproductive to thwart the organization of logical and productive new departments with threats of financial repercussions.

**Comment 4**
My reasons for supporting the merger with Nematology are as follows.

Entomology has had a history of close and collegial interactions with Nematology including two joint hires (Harry Kaya and Ed Lewis).

I value the contributions that our colleagues in Nematology have made to our teaching program, including co-teaching in the Animal Biology Major and in several courses: Biology of Parasitism, Introduction to Biological Control, and Natural History of Insects. Some of these contributions might be jeopardized if faculty were moved to a department with a different disciplinary focus.

I see strong disciplinary linkages between our groups in the areas of animal ecology, plant-animal interactions, and animal systematics. Carey and Caswell-Chen publish together. I foresee that such interactions would be further strengthened by the proposed merger. Conversely, only a fraction of Nematology’s faculty would be a good fit for Plant Pathology, and it’s arguable that any of them would be a better fit for Plant Pathology than Entomology.

**Comment 5**
I am enthusiastic about the proposed merger between the departments of Entomology and Nematology. There is already considerable interaction between members of both departments in both teaching and research, and this merger will enhance and diversify those interactions.

**Comment 6**
The merger of the nematology department with the entomology department is a positive move because it links two departments that are studying invertebrates of economic importance, including pests of plants and animals and beneficials. There are lots of opportunities (some already being exploited) for collaborative projects and joint teaching of classes.

**Comment 7**
I think for the future of departments and survival of administrative clusters this merger is a good idea. We have had close ties with the faculty from Nematology in the past anyway so I see this merger as a smooth integration. We have several disciplines in common particularly as we have faculty from both Entomology and Nematology working in agricultural systems, genomics and population genetics. I look forward to the merger and I am sure as we put our heads together as a larger group we will derive more ideas and research collaborations.
ACADEMIC PLAN ADDENDUM FOR ENVIRONMENTAL SCIENCE AND POLICY – 2011-2016

ANTICIPATED RETIREMENTS WITHIN ENVIRONMENTAL SCIENCE AND POLICY

Environmental Science & Policy has had three retirements in the last two years and anticipates four additional retirements by July 1, 2016. The main research and curricular voids that have been/will be created by these retirements are in culture and human behavior, environmental policy, and water and watersheds. We have recently lost two faculty members who were the core of our culture and human behavior program. We will be losing one of our key policy scientists, at the end of this year. We have already lost one faculty in the area of water and watersheds and anticipate losing our other aquatic biologist within two years. Without any more hires in ESP, under this scenario, we would be 0.6 over target in 2016. However, the reason that we are so far over target is that four new positions from the global change initiative opted to join ESP. We have deferred curricular and research needs, particularly in policy, that go beyond these hires and we believe that we should not be held strictly to our target, at least in the near term, because four of the new Initiative hires chose our department as a home.

Gaps to be eliminated and filled: Because of losses of our two culture and human behavior faculty, we do not plan to continue this program given that these two individuals were the key faculty and that it is unlikely that we can replace them in the near future. All courses taught by these individuals will not be continued. The environmental policy position is included in the present plan and water and watersheds position will be recruited via a TOE.

PROPOSED NEW POSITION IN POLITICS, POLICY, AND COUPLED HUMAN–NATURAL SYSTEMS FOR 2011-2012

Intended disciplinary focus The position will focus on environmental politics and policy in the context of coupled-human natural systems. Integrated scientific research focused on key environmental problems requires an integrated analysis of both social and natural systems. The position will focus on a political or policy scientist with a strong theoretical and quantitative empirical research record. Research approaches could include mathematical/computational models, experiments, network analysis, decision-making under uncertainty, evolutionary models, theories of cooperation, and institutional analysis. These approaches will be used to analyze policy effectiveness in the context of coupled human–natural systems, including the integration of scientific information in to policy decisions and dynamic feedbacks between social decisions and environmental change. Specific system focuses may include water management, climate change, energy, and conservation management although other substantive domains would be considered.

Intended applied focus: We envision this position being housed in ESP, but linkages to other departments are apparent. The idea of coupled-human natural systems is at the heart of the all of the topics being considered under environmental sustainability. For example, water management will be ineffective unless we understand how individual and policy decisions feedback into climate and hydrological models, and how the resulting changes in hydrology and climate influence individual and policy decisions. Urban ecology must directly integrate social decision-making because the nature of urban environments is largely determined by humans.
Human are the direct or indirect source of many aquatic toxics, and policy decisions influence their clean-up and distribution while at the same time toxics exposure can have directly consequences for human health and welfare. Many grants emphasize demand integration of natural and social science, and there are few scholars at UCD who specialize in these integrated approaches, particularly in the area of political and policy decisions. The current UCD scholars who bring social science into these integrated approaches are already involved in many projects, and the new position would provide more opportunities to current and new hires in other departments. Knowledge about how science is effectively translated into policy can also help relieve the oft-expressed frustration among environmental scientists that their conclusions are not surviving in the political environment.

**Role in department instruction:** The person would also help fill key curricular needs in environmental policy, which currently is not teaching classes due to the retirement or impending retirement of three social scientists in DESP.

**IR-AES-CE continuum:** Regarding the IR-AES-CE continuum, this position should provide social science research expertise that is demanded at the county-level as well as in various public agencies at the state and regional scales.

**Relevance to the CA&ES Strategic Plan:** Both environmental policy and water and watersheds are critical to our mission and to important areas of emphasis in the CA&ES Strategic Plan (*Science, Policy, and Public Perception*, and *Global Change*).

This position is envisioned to be part of our cluster hire for the environmental science departments in CA&ES. As a cluster, we propose recruitment of 10.36 FTE as outlined in the following table. We prioritized these position based on critical curriculum needs within departments and within the environmental cluster as a whole, and also upon strengthening the demographic structure of the four departments.

<table>
<thead>
<tr>
<th>Recruitment Year</th>
<th>Position (Identified Dept.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-11</td>
<td>Molecular Ecotoxicologist (ETX)</td>
</tr>
<tr>
<td></td>
<td>Regional Climate Modeler (LAWR)</td>
</tr>
<tr>
<td></td>
<td>Urban Conservation Ecologist (WFCB)</td>
</tr>
<tr>
<td>2011-12</td>
<td>Integrated Hydrologic Modeler (LAWR)</td>
</tr>
<tr>
<td></td>
<td>Politics, Policy, &amp; Coupled Human-Natural Systems (ESP)</td>
</tr>
<tr>
<td>2012-13</td>
<td>- Aquatic Environmental Chemist (ETX)</td>
</tr>
<tr>
<td>2013-14</td>
<td>Remote Sensing &amp; Ecosystem Change (LAWR)</td>
</tr>
<tr>
<td>2014-15</td>
<td>LAWR I position “to be determined”†</td>
</tr>
<tr>
<td></td>
<td>LAWR (0.36 FTE) possibly distributed to CE specialist for partial I&amp;R appointment</td>
</tr>
</tbody>
</table>
2015-16 | LAWR II position “to be determined”
|----------------------|
| LAWRIII position “to be determined”

† These positions will be determined based on the disciplinary focus of the 7 environmental groups hiring in the 2010-14 period and based on the actual retirements experienced within LAWRI during the planning period.

The following table outlines FTE in the four environmental departments relative to June 2010 FTE targets, with and without the proposed recruitments.

<table>
<thead>
<tr>
<th>FTE</th>
<th>ESP</th>
<th>ETX</th>
<th>LAWR</th>
<th>WFCB</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2010 Target (average)</td>
<td>5.10</td>
<td>0.80</td>
<td>0.80</td>
<td>2.00</td>
</tr>
<tr>
<td>June 2016 difference from target without new hires</td>
<td>0.60</td>
<td>-2.00</td>
<td>-6.36</td>
<td>-1.00</td>
</tr>
<tr>
<td>Proposed new FTE</td>
<td>1.00</td>
<td>2.00</td>
<td>6.36</td>
<td>1.00</td>
</tr>
<tr>
<td>June 2016 difference from target with proposed new hires</td>
<td>1.60</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Departmental Academic Plan

Addendum

Department of Environmental Toxicology

2010 – 2016

Introduction

In 2011 the CA&ES, in response to the College Planning Committee’s (CPC’s) recommendations of the previous year, assigned new FTE targets. In addition, it was recommended that the environmental science departments develop a coordinated academic plan to take advantage of what is likely to be fewer available faculty appointments. In response, the new Program in Environmental Sustainability was developed. It provides a strategic vision for the future of environmental sciences in the College, and is reflected in the modified plans below.

Faculty

ETX currently consists of 12 Senate faculty members (9.2 FTE), including four joint appointments and one WOS courtesy appointment. There are also five emeriti, 10 adjuncts (all who significantly contribute to research and teaching), seven professional researchers and six other affiliated faculty members. In 2000, when the College was significantly larger, ETX consisted of a slightly smaller Senate faculty (7.8 FTE), as well as two CE specialists (2.0 FTE).

In 2004, the CA&ES set a new target for the department of 8.80 FTE. However, in 2010 the target was re-set to 8.40 FTE, and by 2011 three Senate faculty members (2.80 FTE), the WOS courtesy member and one adjunct member will be age 65 or beyond.

Current Programmatic Specializations

The current specializations (molecular and cellular toxicology, analytical and environmental chemistry, systems toxicology and ecotoxicology) are broad considering the relatively small number of faculty. However, ETX has developed an international reputation for being a leader in all four areas. Because of the minimal scheduled decline in FTE (0.8), and the strategic use of new recruits and adjuncts, specializations are not anticipated to decline. For instance, the 2.0 FTE identified in the new program (molecular ecotoxicology and aquatic environmental chemistry) will serve to replace the next two likely retirements (1.8 FTE), and the other anticipated loss (1.0 FTE) will be filled by adjustments to individual faculty and/or adjunct teaching assignments.

Teaching Programs

During the past decade our student-to-faculty ratio has nearly doubled – from 15.5 in 1999-2000 to 26.7 in 2009-10. Also, enrollments in most of our courses have nearly tripled. For instance, in 2010 enrollment in ETX 10 was 283 students – up from 99 in 2005. We expect that the number of students in our undergraduate major, as well as total student credit hours, will continue to increase with rising interest in the environmental sciences and the “Green Revolution.” There is more than adequate teaching capacity within our Senate faculty to cover our core courses, and many of our electives, well into the future. In fact, some of our members are currently responsible for
courses in a number of other departments, including BIS and LAWR. In recent years our strategic use of highly dedicated adjuncts has provided the opportunity to offer an increased variety of high-quality electives (the most in our history; see below). It should be noted that many of the courses taught by adjuncts are in areas for which they are often the most qualified, such as legal aspects, risk assessment and forensics.

- ETX 130, Industrial Toxicology (Wong; 3)
- ETX 131, Air Pollutants and Inhalation Toxicology (Kado; 3)
- ETX 135, Health Risk Assessment of Toxicants (Marty; 3)
- ETX 138, Legal Aspects of Environmental Toxicology (Alexeeff; 3)
- ETX 146, Exposure and Dose Assessment (Bennett; 3)
- ETX 228, GC-MS of Toxic Chemicals (Holstege; 3)
- ETX 234, Neurophysiological Basis of Neurotoxicology (Lein; 3)
- ETX 240, Ecotoxicology (current new recruitment; 3)
- ETX 260, Immunotoxicology (Golub; 3)
- ETX 280, Forensic DNA Analysis (Von Beroldingen; 3)
- ETX 281, Principles and Practice of Forensic Serology and DNA Analysis (Ballard; 3)
- ETX 284, Non-human Forensic DNA – Theory and Casework Application (Kanthaswamy; 2)
- ETX 190/290, CalEPA: Translating Toxicology into Public Health (Alexeeff; 1)

If Senate faculty numbers decrease further, we would focus their efforts on our core courses and continue to rely on adjuncts for our most important electives. Other electives could be discontinued without serious impact on program quality (see below).

**Role of Cooperative Extension**

Within the past decade both of our specialists retired and, due to budgetary constraints, their positions have not been returned to our department. ETX has recently submitted a proposal to ANR for a new CE specialist (80% CE/20% AES FTE) focused on agrochemicals and their risk to both farm workers and the general public. However, an opportunity may arise to allow ETX to share a current specialist in the Department of Entomology, focused on directing the USDA Western Region IR-4 Laboratory.

**Future Priorities and Activities**

With declining resources, the future focus would be to maintain the excellence of our undergraduate and graduate programs and contribute to the success of the new Program in Environmental Sustainability. There may also be limited opportunities to contribute to the new and emerging areas outlined in the ETX Academic Plan.

**Future Resource Needs**

**Steady-State Conditions**

By 2011, at least four Senate faculty members (2.8 FTE plus the WOS member), and one adjunct will be age 65 or beyond. However, we have also recently recruited new members in environmental chemistry and metabolomics. Thus, even with the potential retirement of one or more of the above FTE, the department possesses the capacity to
Academic Plan – Addendum

Environmental Toxicology

maintain its core strengths – and contribute to the other environmental science departments. In this scenario it is assumed that resources made available over the next six years are only for maintaining programs at near current levels. This would be represented by the plans put forth for the new Program in Environmental Sustainability.

1. Molecular Ecotoxicologist (0.58 I&R/0.42 AES FTE) – to use modern molecular techniques to better understand mechanisms of adverse effects and risks posed by toxicants to ecosystems (WFCB, ESP).

2. Aquatic Environmental Chemist (0.58 I&R/0.42 AES FTE) – to use modern analytical approaches to better understand the transport and fate of potentially toxic chemicals in aquatic systems, including surface waters and subsurface aquifers (LAWR, ESP).

3. CE Specialist in Risk and Regulatory Issues (0.80 CE/0.20 AES FTE) – a critical need for outreach to stakeholders and public communication – this function may be in part covered by sharing a current specialist with the Department of Entomology.

Conditions of Declining Faculty Resources

If resources to be made available over the next six years are reduced, reflected by lower FTE targets, then ETX would be able to maintain its excellence by realigning its Senate faculty to focus on the continued offering of its core coursework (ETX 10, 101, 102AB, 103AB, 138). With the continued reliance on dedicated adjuncts and a reduction in some non-essential elective offerings, our curriculum could be more than adequately maintained with as few as 5-6 FTE. Electives currently taught by Senate faculty are below (not including courses taught for other departments).

- ETX 20, Introduction to Forensic Science (Wood; 4)
- ETX 30, Chemical and Drug Use and Abuse (Miller; 3)
- ETX 110, Toxic Tragedies and their Impact on Society (Rice; 2)
- ETX 120, Perspectives in Aquatic Toxicology (Cherr, Tjeerdema; 4)
- ETX 127, Environmental Stress and Development in Marine Organisms (Cherr; 10)
- ETX 128, Food Toxicology (Shibamoto, Mitchell; 3)
- ETX 203, Environmental Toxicants (Matsumura; 4)
- ETX 214, Mechanisms of Toxic Action (Denison, Hammock; 3)
- ETX 230, Experimental Approaches in Coastal Toxicology (Cherr; 3)
- ETX 250, Reproductive Toxicology (Miller, Golub; 3)
- ETX 270, Toxicology of Pesticides (Matsumura; 3)
- ETX 278, Molecular Techniques (Denison, Rice; 3)

Conclusions

With the emerging consequences of toxic chemicals and pollution on a global scale, demand for advanced research information and new professionals will only increase. Whether future resources are stable or reduced, careful strategic planning over the past decade has positioned the Department of Environmental Toxicology to remain at the forefront of the field – and in a position to continue providing both vital leadership and new professionals capable of addressing future challenges.
Addendum to Academic Plan
Food Science and Technology

This addendum is prepared to update the Food Science and Technology (FST) Academic Plan, prepared in March 2008 and updated in March 2009. This Addendum was prepared in response to the request by Dean Neal Van Alfen of November 16, 2010, to submit an Addendum that reflects alignment of Department plan with recent College planning and Department I&R/AES FTE targets.

FST recently completed move of its Pilot Plant Staff and Equipment in Cruess Hall to the new August A. Busch III Brewing and Food Science laboratory—a LEED Platinum building with a theme, matched by its construction features, of sustainability. FST will participate with VEN in a companion building with a sustainability theme to be planned and constructed 2011-2013. Also, FST and VEN participate in a new Analytical Measurements lab, housing mass spectrometers and related instruments loaned by Agilent, recently established at RMI.

These new capabilities underpin a vigorous research, teaching and extension program which is attracting increasing numbers of students and interest by industrial and agency partners. FST has also significantly increased its extramural fund expenditures as a result of new grant and contract funding to the department.

FST, VEN, BAE, and T/C have agreed, and are well along toward clustering of administrative/business functions. FST had previously completed an agreement with BAE to join its shop, and move much of the shop equipment, to the BAE shop in Bainer Hall. These moves promise savings and improved efficiency in department operations.

Summary of Current FST I&R/AES FTE

<table>
<thead>
<tr>
<th>Description</th>
<th>FTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FST Reduced Budget Targets set by CAES in 2010</td>
<td>13.25</td>
</tr>
<tr>
<td>FST Current I&amp;R/AES FTE (February 2011)</td>
<td>14.25</td>
</tr>
<tr>
<td>FST I&amp;R/AES FTE under Recruitment Food Chemistry/Biochemistry (Feb 2011)</td>
<td>1.00</td>
</tr>
<tr>
<td>Total net FTE</td>
<td>15.25</td>
</tr>
<tr>
<td>FST Faculty with Systemwide Appointment (Guinard, 2010-2013, renewable)</td>
<td>1.00</td>
</tr>
<tr>
<td>FST Faculty I&amp;R/AES Retirements</td>
<td></td>
</tr>
<tr>
<td>2011 Krochta (also serves as Shields Chair)</td>
<td>0.90</td>
</tr>
<tr>
<td>2012-2015 (Per survey taken in February, 2011)</td>
<td>2.90</td>
</tr>
<tr>
<td>FST CE FTE (February 2011)</td>
<td>5.00</td>
</tr>
<tr>
<td>FST CE FTE Requested (February 2011)—Dairy Food Extension</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Address Programmatic Research Areas in Which you will Invest

I&R/AES Positions


2. Food Processing Energy Efficiency. 0.5 FTE offered by Energy Institute, will require match from CAES/FST. Position to be written broadly to reflect that chemistry, engineering, and microbiology can contribute to reduce energy and water use. Could use new (2011) August A. Busch III LEED Platinum Brewing and Food Processing Lab. Under Discussion, February 2011.

3. Dairy Food Science, Shields Chair, to be recruited nationally if FTE available, in 2011. CE FTE request, see note 1 below, potential source of FTE. If FTE not available, position will be filled by internal search, 2011. Under Discussion, February 2011.

4. Food Microbiology, including Food Safety and Pathogen Dynamics in Food Systems

CE Positions/Areas

1. Dairy Foods Extension. See Note 3 above. Could use Milk Processing Lab in new August A. Busch III Brewing and Food Processing Laboratory. Request for 1.00 FTE. Submitted (2011) FST to CAES/DANR

Programmatic Areas to be Deemphasized

See CPC Questionnaire Response, Food Science and Technology, January 2010. “Recent or proposed Changes in Your Undergraduate Curriculum as a result of Priority Setting”

- Food Plant Sanitation
- Meat Science
- Heat Processing
- Food Freezing
- Industrial Microbiology
- Proteins: Functional Activities and Interactions

Note: These areas will be deemphasized or courses dropped because of faculty retirements in recent years.
Indicate how you will Deliver Your Curriculum within your Targets

Addressed by the CPC Questionnaire Response, Food Science and Technology, 1/19/10. In summary, department will:

Consider reducing frequency of offering high enrollment lower division undergraduate courses

Change FST 47 (Food Product Development Field Study) from field trips/tours to on-campus seminar or lecture series provided by industry colleagues, to save cost of transportation and reduce faculty time.

FST 108 (Food Plant Sanitation)—Collaborate with VEN to offer this course to both FST and VEN students and/or provide some instruction through industry colleagues

FST 131 (Food Packaging)—Drop Course from Restricted Elective List and Add coverage of this topic to other course(s)

Explore partnering in course instruction with other departments as is being done with Environmental Toxicology (FST and ETX 128, Food Toxicology) and Animal Sciences (FST and ANS 120, Principles of Meat Science). Explore additional opportunities more broadly with BAE, VEN, NUTR, other departments.

Note in this Addendum, FST Department’s current effort to recruit (in part with Energy Institute FTE) in the area of Food Processing Energy Efficiency, extending previous success in joint recruitments through the Foods for Health Initiative in which three joint faculty appointments were recruited, and with BAE where FST-BAE share five FTE.

Also noted in this Addendum, FST is presently conducting a search for a Food Chemist/Biochemist to contribute to teaching needs in Department.

Explore additional Adjunct Faculty positions. FST has one new Adjunct in 2010 (Grimm) but lost one (Frankel) to retirement.

In case of FST faculty member with 100% administrative appointment, use release salary to recruit Lecturers (3) to continue offering FST 127 (Sensory Evaluation of Foods), and contribute to FST 1 (Principles of Food Science), FST 160 (Food Product Development), and other high priority teaching needs in the department.

(See CPC Questionnaire Response, Food Science and Technology, 1/19/10, for additional details that respond to this section. Department will assemble and analyze data on all FST courses and teaching loads in order to clarify future needs for new faculty).
Proposal for the Consolidation of the Departments of

Human & Community Development,

and Environmental Design

into

the Department of Human & Community Development and Design

(provisional name)

Department of Human & Community Development,
Department of Environmental Design.

August 2010
Introduction

A consolidation of three academic programs based in two departments – Community Studies and Development Program and Human Development and Family Studies Program in Human & Community Development (HCD) and Landscape Architecture in Environmental Design (ED), in the College of Agricultural and Environmental Science (CAES) is proposed. Following the College Planning Committee report (March 31, 2010) and the College’s Academic Prioritization Committee report (July 31, 2009), which addressed the “resource-limited environment” within CAES and recommended the elimination and consolidation of departments within the College, the Dean’s office has advocated the consolidation of HCD and ED into one department. This proposed consolidation has been under discussion by the faculty in the two departments and the CAES administration for the past year. Key goals of this consolidation will be to maintain academic excellence, facilitate the execution of a joint academic plan of the faculties, improve teaching commitments, enhance research synergies, enhance our fulfillment of the outreach mission of the University and increase efficiencies in the departmental administration and operations. The new department is provisionally named Department of Human and Community Development and Design (HCDD). The definitive name will be determined at the end of the 2010-2011 academic year when the strategic plan for this new department is completed.

A. Justification

1. Objectives

The overarching objective of the consolidation of these two departments is to promote and enhance the ability of the faculty to engage in interdisciplinary collaborative research, teaching and outreach, while maintaining, strengthening and supporting individual disciplines within the new department. We believe that the breadth of what the combined faculty can cover is greater than what the current, smaller groups of faculty can cover; in other words "the whole will be greater than the sum of its parts." In anticipation of continued budget constraints, reduced FTE faculty allocation, and the desire to increase efficiencies within the departments, this consolidation will enable us to develop shared faculty positions in order to have continued success with our research programs, undergraduate and graduate curricula, and outreach activities. The academic domain of this new department is similar to departments (or schools/colleges) of human ecology in other land-grant universities (e.g., Cornell University; University of Texas, Austin; University of Wisconsin, Madison). While these colleges include design study related to human factors, our department will include a more holistic study of design including a professional, accredited design program (i.e. landscape architecture). Thus, the new department will be united around the interdisciplinary study of the relationship between humans and their social, natural and built environments.

Teaching

The three academic programs house and support four undergraduate majors, three master’s, and two Ph.D. programs. While diverse in their specific areas of emphasis and focus, the
undergraduate programs share significant areas of common concern and have many disciplinary
synergies. This is due to the applied research orientation of the three programs and their
distinctive focus on, respectively, individual, family, and community well-being in relation to the
social, natural, and built environment at different geographical scales. The Community Studies
and Development (CSD) program houses the Community and Regional Development (CRD) and
the International Agricultural Development (IAD) majors and the community development MS
graduate group; the Human Development and Family Studies (HDFS) program houses the
Human Development (HDE) major, child development MS program and human development
Ph.D. graduate group, while Environmental Design houses the Landscape Architecture (LDA)
major, geography MS program, and (jointly with CSD) the geography Ph.D. graduate group.

For largely historical reasons, there has been little explicit, but much implicit, cooperation and
coordination between the faculty in the three majors. Despite this lack of explicit coordination,
students in CRD, HDE, and LDA often take classes in the other majors as part of their elective
courses or to partly fulfill areas of specialization requirements. The consolidation of the three
programs into a single department will enhance the existing academic synergies between the
majors, including formal cross-listing of courses and exploring the likely possibility of offering
common courses in areas such as research methods and general social theory. This approach
seeks to both strengthen existing synergies, maximizing the efficient use of scarcer resources,
while maintaining the distinctiveness and high quality of each major. An exception to this trend,
however, is the IAD major, which, due to its unique focus and recent faculty reductions, is
planned to be suspended for admissions and eventually disbanded. Preparing for this
eventuality, the CRD major is planning to create a new track (area of specialization) in
international development.

Research
The research objective of the consolidation is to enhance the overall success of the research
enterprise that our faculty members (as well as their graduate students and postdoc trainees) are
engaged in. More specifically, we anticipate that increased synergy among faculty in CSD,
HDFS, and LDA will result in: (a) additional, interdisciplinary, extramurally-funding research
projects; (b) an increased number of publications co-authored by faculty (and trainees) from
across two or three of the current academic programs; and (c) increased cross-program
involvement in, and support of, the following existing research centers: Center for Child and
Family Studies, 4-H Center for Youth Development, Center for Regional Change, and
Agricultural Sustainability Institute. An example of extant research synergy between HDFS and
CSD, that could very easily expand to include LDA, is the research on youth development in the
community context. One of the important community contexts for youth is public spaces,
including parks and gardens; research on how the design and accessibility of these public,
landscaped areas affects youth development (e.g., positive versus negative trajectories) could
easily involve faculty from all three programs.

Outreach
The academic senate faculty and CE Specialists from these departments/programs share many
research interests and areas of specialization, and the consolidation thus allows for better
collaboration and more vigorous outreach activities. In particular, the proposed consolidated
department is well-poised to significantly contribute to the Healthy Families and Communities
strategic initiative of UC ANR. These departments and their faculty members share a focus on youth, families and communities and have complementary programs that can strengthen future departmental efforts to conduct research and extension activities aimed at the healthy and sustainable development of individuals, families, communities and environments. The combined strengths of the three programs make them well suited to provide faculty leadership in applied research and for extension projects associated with the new initiative. In addition, we see opportunities for collaborations on outreach efforts focused more fully on natural environment issues and those possibly related to the Sustainable Natural Ecosystems strategic initiative.

2. Budgetary Impact and Space

As the proposed action is a consolidation of two existing departments, the possible impact on cost and benefits to the campus at large or on the budget is expected to be neutral. Requirement for space, research and administrative, will be met by the current space allocation to the two departments. The new programs will retain control and assignment of their current space allotments as indicated in the space inventory in effect at the time of this proposal. In addition, in the collaborative spirit of this department consolidation and in keeping with current practice, the programs will make space available to one another as warranted.

3. Administrative Staffing in the New Consolidated Department

This proposed departmental consolidation follows a recently instituted administrative clustering within the College. This administrative clustering addresses many of the staffing issues associated with the proposed consolidation. Specifically, a Chief Administrative Officer will oversee the administration of this new department along with two other departments, i.e., the Department of Environmental Sciences and Policy and the Department of Agricultural and Resource Economics. Personnel, contracts and grants, and business functions will be served by shared staff. The reorganization of administrative staff will also provide a better separation of duties than was achieved in the departments as separate programs.

Staff functions that will remain within the department are advising and information technology. The staff advisors will be assigned to majors (i.e., LDA, HDE, CRD, IAD) and graduate groups and will remain under the discretion of individual programs or graduate groups. The programs will determine if combining or sharing these positions will lead to better overall service. Likewise, the IT functions will be examined for opportunities for consolidation in order to provide better overall service within the new department. Other existing staff positions currently held by the two departments such as classroom support, research center staff, etc. will remain under the control of the individual programs within the new department.

4. Instructional Programs

The intent of this merger is to maximize the multiple synergies and common areas of instruction shared by the different undergraduate majors. The CRD, HDE, and LDA majors will be housed
in the new department. As stated earlier, it is expected that the IAD major would be suspended and eventually disbanded. The faculty will explore establishing a major focused on sustainable environmental design that would have the potential for further integrating the expertise and interests of the three programs.

No immediate changes are foreseen in the overall graduate program. However, the faculty will explore the development of a Master’s and/or Ph.D. program in Landscape Architecture. Members of the new department will play a significant role in developing and supporting such programs.

Responsibility for these programs will be consolidated under the leadership of the HCDD Executive Council in coordination with the Department Chair and the Program Chairs as described in the Memorandum of Understanding approved by the faculty of the three programs. The Department Chair and the Program Chairs will work with the faculty to develop teaching opportunities.

A joint committee of undergraduate instruction formed by faculty from the three programs is already working on a common plan to coordinate the formalization of curricular coordination, course cross-listing, common course offerings, and further improvements to create efficiencies and new opportunities for all the majors in CRD, HDE, and LDA, respectively. While curricular revisions will be vigorously pursued, the requirements for professional accreditation in the LDA major will also be maintained. Initial steps have already being taken in establishing shared courses, including allowing students in the three majors to be included in Pass I for all upper division courses with high enrollments and to include among acceptable courses those often taken by our students from the other majors.

Our intent is to maintain competitive, highly visible, and appealing programs that meet the current needs of their potential client bases and professions. One way in which all three programs strive to meet this goal is the inclusion of internships. All CRD and HDE majors are required to become actively engaged in the community through internships and must complete at least one internship before graduation. LDA students are encouraged to engage in internships and can receive up to 12 units for their work. HDE has specific "practicum" course requirements such as HDE 141 or 143 that have a fieldwork component in community sites, and one additional internship (HDE 192) that can be used toward the restricted electives. Thus each year approximately 350 CRD and HDE undergraduate students complete an internship for units towards their major. Many landscape architecture studio courses include a community outreach component. Students often have real-world clients and produce designs to address current issues and demands.

More than forty percent of CRD and HDE students complete internships in the same organizations. Most of the HDE majors and a significant number of the CRD majors perform internships involving working with youth either in schools (as tutors, mentors, or teacher’s assistants, or school counselors), in sports and recreation programs, and in housing, city, and regional planning agencies. Landscape architecture students typically find internships in professional settings including private offices, public agencies and nonprofit organizations.
B. Phase-out plan

The issue of providing a phasing-out plan is not of relevance here as no-phase out is requested.

C. Implementation of the consolidation (see Timetable attached Appendix A)

The faculties of the three programs have taken several steps in order to allow for the consolidation process to move smoothly and efficiently. In addition to the process of consultation described below, four faculty committees to address substantive issues regarding common areas of interest and priorities in research, undergraduate teaching, graduate instruction, and extension and outreach have been created. The recommendations of these committees, along with further faculty deliberations, will provide the basis for the construction of a singular departmental academic plan. These committees include representatives of each of the three programs. The final committee reports will be completed by the end of winter quarter 2011 and the new academic plan will be finalized by the end of spring 2011.

During this first academic year (2010-2011), we plan on finalizing a full revision of the undergraduate curricula and advising structure seeking to take advantage of existing synergies and complementary functions. We also expect to be able to implement fully a curricular overhaul of the Geography Graduate Group (GGG) as recently proposed by HCD and LDA faculty (along with other GGG group members) and approved by the Graduate Council of the Faculty Senate. In addition, we will start the process of exploring and proposing the new programs described earlier.

Guided by the general principles of governance established by the faculty-approved MOU, a transition system of governance will operate during the 2010-2011 academic year. It is expected that at the end of this academic year, the CAES dean will be able to appoint a single department chair, as well as the program chairs.

Time Table:

1. June 2010: MOU for the consolidation of the three academic programs into a single department is voted on by the three faculties.
2. July 2010: The dean of the College of Agricultural and Environmental Sciences submitted the MOU to the college’s Executive Committee for consideration and approval.
3. August 2010: Proposal to consolidate the three programs voted on by the faculties and submitted to the dean of the College of Agricultural and Environmental Sciences.
4. Summer 2010: Receive consultation from the College Executive Committee on proposed departmental consolidation.
5. Fall 2010: Proposal to consolidate the three programs submitted to the Provost with comments from the Executive Committee.
7. Winter 2010/11/Spring 2011: Proposal to consolidate the three programs submitted by the Provost to the Chancellor for final approval.
D. Method of Consultation

Methods of consultation varied widely in type and in timing, but throughout the entire process, between October 2009 and early August 2010, there has been regular communication and planning between the three programs. During this period, the chairs of the respective programs met formally 16 times, including two meetings at which the MSOs of the two departments were also invited. The chairs also met several times with the CAES Dean and Associate Deans. Direct faculty input and planning was achieved through monthly departmental faculty meetings of all three programs and through several joint faculty meetings and a full-day, off-campus retreat. In total, there have been four joint CD-HD faculty meetings, two CD-HD-LDA faculty meetings, and one meeting between the CD and HD chairs with the LDA faculty. In addition, there were meetings of joint faculty committees on research, teaching and outreach/extension that identified synergies, potential opportunities, and constraints to a proposed department consolidation. The faculties from the three programs had social gatherings on three occasions.

The Environmental Design Department, as an accredited program, also discussed the potential consolidation with the landscape architecture program’s Advisory Board at two meetings and received helpful feedback from this group representing the profession. This local board is made up of leaders in government, finance, planning, development and design and their guidance was essential. In addition, LDA sought outside consultation with LAAB, the national accreditation authority for Landscape Architecture.

There were several faculty polls asking for input and feedback to preliminary ideas about governance, budget and promotion, in addition to the research, teaching and outreach discussions of the committees. There was a final faculty vote on the MOU by the faculties on June 25, 2010. Results supported the continuation of efforts to consolidate the three academic programs into one department. Faculty comments were also assembled and forwarded with the results of this official voting to the Dean’s Office.

Accompanying all of this communication and planning were innumerable e-mails, phone conversations and discussions among colleagues and personal meetings between the chairs and individual faculty members. In addition, many alumni and student comments have been received by the departments and individual faculty and staff and these have been taken into account where relevant.

Following the faculty vote on the MOU and discussion and support of the College’s Executive Committee, this proposal for consolidation was developed. The faculty of the three programs involved in the consolidation, Community Studies and Development, Human Development and Family Studies in the Department of Human and Community Development and the Department of Environmental Design, held an anonymous vote addressing the issue of the departmental consolidation. The ballot contained the following question, adjusted for each program:

_____ I support the consolidation of the department of Environmental Design and the department of Human & Community Development into a single department provisionally named Department of Human and Community Development and Design.
I do not support the consolidation of the department of Environmental Design and the department of Human & Community Development into a single department provisionally named Department of Human and Community Development and Design.

I abstain.

If you wish, please provide comments here below.

The outcome of the vote was as follows:

**Academic Senate Faculty and Academic Federation Faculty voting results:**

<table>
<thead>
<tr>
<th>Department/Program</th>
<th>In favor</th>
<th>Opposed</th>
<th>Abstain</th>
<th>Subtotal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Studies &amp; Development</td>
<td>6 (1)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>6 (1)</td>
<td>7</td>
</tr>
<tr>
<td>Human Development &amp; Family Studies</td>
<td>8 (1)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>8 (1)</td>
<td>9</td>
</tr>
<tr>
<td>Environmental Design</td>
<td>5 (1)</td>
<td>1 (0)</td>
<td>1 (0)</td>
<td>7 (1)</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>22</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>24</strong></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>

- Academic Federation Faculty votes in parentheses
- Total eligible votes, CD: 9(1), HD: 10(1), ED: 7(1).
## Appendix A. CSD/HDFS/LDA Consolidation Time Table:

<table>
<thead>
<tr>
<th>Activity</th>
<th>2009-2010</th>
<th>2010-2011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SP</td>
<td>FALL</td>
</tr>
<tr>
<td><strong>STRATEGIC PLANNING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESEARCH, TEACHING, EXTENSION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMMITTEES</td>
<td></td>
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<tr>
<td>MOU</td>
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<td></td>
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<tr>
<td>STRATEGIC PLAN</td>
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<td></td>
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<tr>
<td><strong>UNDERGRAD PROGRAM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CURRICULA RECONFIGURATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUSPENDING IAD**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CREATING UNDERGRAD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLUSTER***</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GRADUATE PROGRAM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLANNING NEW MLA*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECONFIGURATION GGG****</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRADUATE CLUSTERING</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXTENSION &amp; OUTREACH</strong></td>
<td></td>
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<tr>
<td>PLANNING</td>
<td></td>
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<tr>
<td>IMPLEMENTATION</td>
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<tr>
<td><strong>GOVERNANCE</strong></td>
<td></td>
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<tr>
<td>INTERIM CHAIRS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEFINING FTE TARGETS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEFINING BYLAWS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELECTING CHAIRS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* MLA: Master in Landscape Architecture
** IAD Major: International Agricultural Development. CD had planned to rename this major as International Development (IDE). This initiative was approved at the college level but not by the Senate Undergraduate Council. In the face of reduced FTE allocation and substantive programmatic priorities we cannot sustain IAD anymore. Admissions to the major will be suspended. Alternatively, a new track on International Development could be created as part of the CRD major.
*** The Undergraduate Cluster in Sustainability, Development, and Globalization will be formed by the three programs’ majors (HDE, CRD, LDA [CDP]) and possibly by the new Sustainable Agriculture and Food Systems major (SAFS). In addition to the substantive common focus, the cluster will be distinguished by the promotion and support of undergraduate research.
**** GGG: Geography Graduate Group. This graduate group, currently housed by Environmental Design, is being substantially restructured under the leadership of several HCD and ED faculty.
Appendix B. Comments made by the faculty during the voting process are reported *ad verbatim*.

1) The success of this effort will depend on the ability of the faculty and students to see the essential “ecological” relationships between the three different programmatic approaches and build a network of expertise and a research capacity effective enough to solve the incredible real world problems facing humans on this planet.

   This is a good blueprint for the future of the departments and it provides for a process to follow to further refine curriculum, research, outreach and departmental management.

2) While I believe the consolidation of these departments has great potential for teaching and research synergies, I also have deep concerns regarding the long-term implications for maintaining the high quality of the teaching program in landscape architecture. Continued recognition and support of the professional design focus of this department, particularly from the Dean’s office, is essential to make this new alignment of departments successful.

3) I support this merger and thank the chairs and others for their work thus far.

   This process will be a big challenge for all of us to put aside our disciplinary blinders and develop new, more interdisciplinary ways of conceptualizing individual, social, and ecological welfare. Some of what we do currently will need to be maintained for the foreseeable future, for example our existing accredited degree programs, although I suspect that there are ways of making even these more interdisciplinary and cutting-edge. But in other areas I think there’s a great deal of room for creative rethinking of our offerings, at the undergraduate level especially. I hope my colleagues will engage in this process with a spirit of openness and cooperation.

   I do think we need a better name than “Department of Human and Community Development and Design.” The fact that we have such an awkward moniker speaks to people’s unwillingness to step out of existing silos. I support “Human Ecology,” which is a short title that I think we can define ourselves in a way that includes our current disciplines and concerns. The current names could continue to exist at the program level.

4) Although the initial consolidation recommendations came following evaluation by the College Planning Committee and the College’s Academic Prioritization Committee report, I believe the recognition of this consolidated department’s efforts to achieve academic excellence through research synergies and revised curricula should be noted. Aside from creatively addressing FTE and administration setbacks, this proposed consolidation strives to also to meet the CAES goals “towards environmentally sustainable agricultural food systems, natural resources, and communities in a changing world.” These efforts have been approached with optimism by faculty members, and great efforts at coordination have been undertaken towards research and teaching opportunities collaboration.
5) The new department offers many possibilities for expanding our current research horizons through interdisciplinary, collaborative research, innovative grad and undergrad instruction, and integrated outreach and extension programs.

6) I do have some concerns about this consolidation. If it were not for the CAES Dean requiring this consolidation as a condition for keeping the three units (HD, CD, LDA) and their associated undergraduate and graduate programs intact (while merging the faculty FTE allotment, across three units), then this consolidation would not be taking place. There are some synergies between LDA and CD; moreover, there are a limited number of synergies between CD and HD. However, it’s going to be difficult to create synergies among all three units. In my view, this is a “shotgun” (based on the budget crisis) marriage of the three academic units; however, the faculty seem willing to do their best to make it all work.

7) Combining these departments is fine, but the name of the department must be seen as tentative. Every colleague I have talked to has simply laughed at this department title, and I cringe every time I use it. We must come up with something that is shorter and yet inclusive of all areas. The content of the various areas will be clear in the department websites and each area will attract students in that fashion.

8) There is no teaching, research, or disciplinary basis for a merger between landscape architecture and human development. If consolidation between these two distinct disciplines is approved, this will pose significant on-going challenges regarding joint faculty hires and curricular integration. In addition, the prospects for joint research are minimal at best. Of the 67 landscape architecture programs in the United States, none are aligned with any human behavioral science. In the few instances when landscape architecture is part of a larger department, planning is the primary discipline aligned with landscape architecture. Therefore, the only consolidation worth considering is between landscape architecture and community development, with a core focus on community and regional planning, geography, and the design of sustainable places.

9) I support the consolidation. I am not sure there will be economic savings due to the consolidation, but I think that there will be other advantages. I think that the combination of the departments will lead to greater opportunities for teaching a research. I already see them for my research program. There also may be better service to faculty provided by the support staff because of a more diverse body of experience due to the larger number of individuals providing services.

10) I will be as supportive as possible during this one-year trial merger of these three units. I understand the budgetary impetus for such a move. However, it is not a comfortable fit and the three units do not easily co-exist, no matter how much people would like that to be true. I do hope that some of the proposed synergies around Healthy Families and Communities can bring a lot of people together. Also, I hope we can survive this first year without losing anymore of our well trained, effective staff than we already have in the past 2 months. The name needs to be jettisoned as soon as possible; anytime you have
to spend 5 minutes explaining the name (after people stop laughing) then you know it is not an effective representation of the department.
Appendix C. The Memorandum of Understanding voted on by faculty in June 2010.

MEMORANDUM OF UNDERSTANDING
Between
Human Development, Community, Development, and Environmental Design/Landscape Architecture

The faculty of the Department of Human and Community Development and the Department of Environmental Design - Landscape Architecture, both in the College of Agricultural and Environmental Sciences, agree on disbanding these two individual departments and establishing a three-program (Community Development, Human Development and Family Studies, and Landscape Architecture) department. The newly established department will develop an integrated academic plan in this coming year of transition.

This Memorandum of Understanding is entered into by and among the three units/departments: the Community Development Unit, Human Development and Family Studies Unit (of the Department of Human and Community Development) and the Department of Environmental Design - Landscape Architecture.

A. Department Name:

Human & Community Development & Design (HCDD)

B. Departmental Organization:

The department’s governance will be formed by a Department Executive Council (DEC), which will be formed by three program chairs, one of whom will serve as Department Chair.

The Department Chair also serves as chair of his/her own program.

The Department Chair and the program chairs each serve three-year terms. The position of Department Chair shall be rotated every three years.

Department Executive Council:

The DEC is charged with developing a strategic vision, determining programmatic priorities, and formulating departmental policies regarding the management and equitable and efficient allocation of resources. The DEC will consult with and advise the Department Chair on the implementation of all policy decisions. The DEC will be chaired by the Department Chair. The Department Chair will convene the DEC
regularly, typically once every other week, but it could meet more frequently as required. The DEC is specifically charged with:

1) Developing and revising the department’s academic plan in consultation with the department’s faculty;
2) Coordinating with Graduate Group Chairs;
3) Formulating department policy on teaching, budget, space and resource allocations, and academic and staff personnel;
4) Consulting with and advising the Department Chair on implementation of all policy decisions.
5) Establishing, in coordination with the Department Chair, research, outreach, and teaching planning; and
6) Establishing and coordinating committees as required by the strategic vision, plans, and needs of the department.

**Department Chair:**

The primary responsibilities, in consultation with the Executive Council, are:

1) To administer the department budget;
2) To assign space;
3) To assign teaching;
4) To implement programmatic initiatives to further the teaching, research and outreach missions of the department;
5) To provide guidance to and seek consultation from Program Chairs on merit and promotion procedures and policy;
6) To support, oversee, and administer, in consultation with the DEC, special facilities and assigned spaces associated with the department;
7) To work directly with the Administrative Cluster’s CAO to ensure staff support is provided equitably across the cluster;
8) To chair the DEC and follow its recommendations;
9) To represent the department in the college and campus administration.

**Program Chairs:**

Their primary responsibilities are:

1) To coordinate research and outreach initiatives within their Program;
2) To initiate faculty personnel actions and write the letters for merit and promotion actions for academic senate and academic federation personnel in their Program;
3) To set priorities and recommend to the DC the space, equipment (both inventoriable and non-inventorial), facilities and faculty development needs of their Program;
4) To recommend faculty teaching assignments and TA and Reader assignments for their Program to the Department Chair;
5) To serve on the department Executive Council.

C. Peer/Voting Groups:

Each Program (Community Development, Human Development, and Landscape Architecture) shall form a peer/voting group for faculty personnel actions. In general, all program members will vote on all merit, promotion and high-level merit (CAP-level actions) packages within the program and in accordance with Senate and Federation eligibility and voting rules. However, based on disciplinary affinities and specializations, each program is free to invite faculty from the other programs to be part of its own voting group. The department will work toward expanding the peer groups beyond the individual academic programs, encouraging membership across all three programs.

The department will hold regular departmental faculty meetings as well as program faculty meetings.

D. Target FTE:

The Dean’s office sets target FTE for the department. The department assigns new faculty positions to programs.

*Process:* Faculty consultation and Executive Council approval.
*Principles:* During the transition period, the allocation of new faculty positions will be based on 1) the joint strategic plan, 2) the 2004 target FTE for each program, and 3) critical substantive academic and teaching needs.

E. Budget:

The Dean’s office assigns a single budget for the department. Unit 18 and TA positions are assigned by the Dean’s Office, outside the RAC formula, based on specific program needs.

The DEC will formulate department policy on teaching, budget, space, resource allocations, and academic and staff personnel.

Each program shall maintain a program account for the program’s specific indirect costs returns, gifts, endowments, and other funds specifically donated or assigned to the program by external donors. Each program shall carry-forward any unexpended funds still remaining in their own program account.
F. Timeline and milestones:

September 1, 2010:
The new department structure will start operating while awaiting official approval of the new department by campus and university administration and Faculty Senate. To facilitate the transition process, the current, or newly designated, program chairs will serve as interim chairs and members of the DEC, for the 2010-2011 academic year.

Peer voting groups will be formed and start operating.

The Dean’s Office will allocate a single budget to the department.

New, separate program accounts will be created.

July 1, 2011:
The college Dean will appoint the Department Chair in consultation with the faculty of the department. Faculty from each Program will select their own Program Chair for a three-year period (2011-2014).

The first Departmental Strategic Plan for 2011-2014, including setting program target FTE, substantive priority areas, undergraduate and graduate instruction planning, and common programmatic objectives, will be completed.

September 1, 2011:
This MOU will be reconsidered and revised in consultation with the entire faculty and approved by the DEC.

Note 1: As of August 20, 2010, the above timeline has been adjusted. The constitution of the three peer voting groups and the allocation of a single budget by the Dean's Office will take effect on July 1, 2011 instead of September 1, 2010.

Note 2: Clarification for MOU Section C: Peer/Voting Groups. It is not the intent of the faculty to deny any member of the academic senate faculty the right to vote on any personnel action in any of the other departmental programs.
Introduction

The Department of Land, Air and Water Resources strategic plan focuses on four integrated themes – climate change, environmental quality, agricultural sustainability, and landscape interfaces and processes – that capture the core elements of LAWR while at the same time representing strong disciplinary emphases on hydrology, soils, and atmospheric sciences. The College Planning Committee recommended that the environmental science departments develop a coordinated academic plan to optimize the environmental sciences programs across the college. In response, the new program in Environmental Sustainability was developed to provide a strategic vision for the future of environmental sciences in the College. Within this environmental sustainability theme, LAWR is well prepared to contribute to the major areas of emphasis: (i) climate change, (ii) conservation and ecosystem services, (iii) energy development, production, and use, (iv) the urban-agriculture-wildlands interface, and (v) water quality, quantity, and security.

Faculty

LAWR currently consists of 27 Senate faculty members (24.71 FTE; including two joint appointments), 6 CE Specialist (6.3 FTE), 2 adjuncts, and 2 professional researchers. Senate faculty are nearly equally distributed among three disciplinary programs in atmospheric sciences, hydrology, and soils and biogeochemistry. In 2011 the CA&ES assigned LAWR a new OR/I&R FTE target of 23.91, which presently puts LAWR 0.80 FTE over our assigned target. The CPC report considered LAWR as “stable” and commented that the department aligns well with the College’s mission and has pending but not immediate demographic risk. LAWR expects the retirement of seven faculty members by June 2016 with three possible retirements in the next three years (two with expertise in climate change and one in remote sensing-global change). LAWR recently lost three CE specialists to retirement with one currently under recruitment (water resource policy). Three additional CE specialists may retire by 2016.

Programmatic Research Specializations

LAWR faculty have disciplinary emphasis in the areas of hydrology, soils, and atmospheric sciences. Collaborations among faculty contribute strong synergisms to address four integrated research themes: climate change, environmental quality, agricultural sustainability, and landscape interfaces and processes. These integrated research themes capture the core elements of LAWR while at the same time promoting LAWR’s strategic vision to enhance expertise in systems-level research to complement our existing strengths in process-level research. This move will allow us to compete for large interdisciplinary research projects with an Earth System Sciences focus, while maintaining our core disciplinary strengths and curricula in land, air and water resources. The current and emerging agricultural and environmental issues and research funding trends require this integrative approach. We see three new positions (listed below) as interdisciplinary, helping integrate faculty expertise within the department, as well as providing substantive linkages to other environmental departments. We anticipate that several traditional LAWR research areas will be deemphasized in the future (e.g., soil-plant interactions and plant
nutrition at the individual plant scale, selected biological aspects of hydrology, and global-scale atmospheric modeling) due to the decreasing number of faculty FTE.

LAWR has prioritized the following three positions that integrate the areas of climate change, water resources, and ecosystem landscape analysis:

**Regional Climate Change Modeler:** This position will focus on climate change impacts upon California with an emphasis on coupling atmospheric models with hydrological and oceanic models. Other areas of potential work include hydrometeorological processes, atmosphere-surface interaction (including greenhouse gas fluxes), greenhouse gas effects, and/or aerosol-cloud-radiation interaction.

**Integrated Hydrologic Modeler:** This position will focus on accurate predictions of precipitation, snowpack size, runoff, evapotranspiration, and groundwater levels to manage flood and drought risks. Research will evaluate the impacts of limited water resources on agriculture and focus on a progression towards a system of sustainable irrigated agriculture using a holistic approach that considers water resources, delivery, application, and cycling at the basin scale.

**Remote Sensing and Ecosystem Change:** This position will focus on developing new tools for remote sensing of environmental properties and landscape analysis. These technologies will have application to several hydrological and ecological problems, such as climate change and land-use impacts, ecosystem services, and environmental sustainability using geospatial technologies.

LAWR expects the retirement of seven faculty members by June 2016. In addition to the three high priority positions listed above, the following positions have been short-listed for future consideration: cloud physics, snow hydrology, soil biogeophysics, microbial ecologist, bioremediation, groundwater resources management, and watershed management.

**Teaching Programs**

LAWR is the home or co-home department for the following undergraduate majors (Fall 2010 enrollments): Atmospheric science (20), Hydrology (24), Environmental Science and Management (ESM, 236; interdepartmental with ESP), Environmental Resource Science (ERS, 31) and Soil and Water Sciences (SWS, 3). The ERS and SWS majors have been incorporated into the ESM major and will be discontinued once all currently enrolled students have completed their degrees. LAWR is fully committed to maintaining the training of more specialized professionals in the Atmospheric Science and Hydrology majors, for which there are several job opportunities critical to the needs of California. LAWR faculty have played a key role in developing the Sustainable Agricultural Food Systems major and would be important contributors to the delivery of the major requirements. LAWR is also exploring the efficacy of developing an Earth System Sciences undergraduate major with the Geology Department that would specifically address global change and larger-scale environmental processes.

LAWR is the home department for three graduate programs (Atmospheric Science, 21; Hydrologic Sciences, 36; and Soils and Biogeochemistry, 38), with department faculty also supporting students in several other graduate groups (e.g., Ecology, Agricultural and Environmental Chemistry, Plant Biology, Applied Mathematic). Graduate student numbers in our programs remain very strong, in spite of the recent loss of several faculty to retirement. The development of an IGERT entitled “Climate Change, Water and Society” was led by LAWR.
faculty (G. Fogg) and if successful will greatly enhance graduate training in the water resources area.

The net loss of senate faculty has resulted in several significant changes to our teaching programs. Our course offerings have been streamlined and refreshed, and reflect current content students are seeking. Enrollments in nearly all of our courses have experienced large increases, in part resulting from demand of the increasing number of ESM majors. We are also focused on enhancing the efficiency of curriculum delivery within and across majors. We are consolidating courses within individual majors, teaching some courses on an alternative year basis, consolidating laboratory sections for chemistry courses, initiating a distance learning course (ATM 280A/B) with UC Merced (and developing an additional course with CSU campuses), and utilizing adjunct faculty and CE specialists to assist with some courses. We would welcome the possibility of providing CE specialist with a partial I&R appointment to formalize their teaching role in our programs. Collaboration with other environmental departments has also helped us meet teaching needs, such as ETOX faculty teaching ESM 131 (Air as a Resource). While our current ATM undergraduate major is National Weather Service accredited, we are exploring the possibility of a multi-track major, with only one track maintaining accreditation, in order to reduce teaching needs. We have significantly increased our student-to-faculty teaching ratio (~18) by developing new large enrollment courses (e.g., SAS courses).

The three new hires proposed will also allow us to maintain the training of more specialized professionals in the Atmospheric Science and Hydrology majors, for which there are several job opportunities critical to the needs of California. The new hires will also fill critical roles in our jointly administered ESM major which is benefiting greatly from the format of the new integrated major. Given that LAWR is nearly at its FTE target and considering the strategic changes initiated and planned, we feel that we can maintain our existing undergraduate and graduate programs in their current formats.

Cooperative Extension

Cooperative extension activities associated with LAWR have a long tradition of excellence and remain a critical asset for the state in agricultural, urban and natural landscapes. Three CE specialists with expertise in irrigation retired in the past year, and three of the remaining 6 CE specialist could retire in the next few years. We are currently recruiting for a Water Resources CE specialist in the area of water policy. Proposals for an Irrigation Science specialist and Waste and Nutrient Management specialist are currently under consideration by ANR. The irrigation science specialist was part of a proposed irrigation cluster hire along with irrigation technology (BAE) and water economics positions (ARE). CE specialist positions in reclamation of disturbed/damaged soils and air quality are also high priorities for future positions.

Future CE specialist hires in LAWR will likely include a request for split CE/IR appointments. These split appointments are necessary for a variety of reasons. First, the applied perspective of CE specialists is highly desirable in the classroom where topics on the environment, natural resource management, policy, and land use are taught. Secondly, if done correctly these appointments can strengthen the AES continuum by promoting CE in classrooms, fostering an understanding of CE beyond its traditional focus areas among the future leaders of CA, and as example of how academics can provide leadership in society. Finally, split appointments are the only way to partition diminishing CE FTE across the wide range of problems in the state, an
opportunity to maintain impact with fewer resources. The alternative (hiring a handful of specialists every 5 to 10 years), will eventually result in the demise of CE.

**Conclusions**

With declining resources, the future focus will be to maintain the excellence of our undergraduate and graduate teaching programs, rebuild our CE program in the areas of irrigation and nutrient and waste management, build a strong nucleus in the area of Earth System Sciences research while maintaining our disciplinary strengths, and contribute to the success of the new program in Environmental Sustainability. The integration of our expertise in land, air and water resources has us well prepared to address current and emerging agricultural and environmental issues in California and beyond.
DEPARTMENT OF NUTRITION ACADEMIC PLAN UPDATE - 2011

MISSION: Advancing Nutritional Biology and Translation to Human Health through Research, Education and Outreach

GOALS:

1) Demonstrate continually increasing excellence and serve as a leader in the field of nutritional biology
2) Generate new knowledge using cutting edge science
3) Train future nutrition scientists with high levels of expertise
4) Transfer and translate nutrition knowledge in a broad context and with high societal impact

AREAS OF PROGRAMMATIC FOCUS AND PRIORITIES IN RESEARCH:

Nutritional Biology – studying mechanisms and effects of foods and food components on health and disease risk

- Cellular and whole body/integrative metabolism
- Developmental and life-span nutrition
- Models of obesity and age-related diseases

Translation – implementation and evaluation of food-based interventions, education and their impact on individuals, society and policy

- Nutrition of diverse populations in international and domestic community settings
- Clinical nutrition and biomarkers of health and disease
- Education in schools, communities and food assistance programs

AREAS OF FOCUS IN TEACHING:

The department curriculum includes courses designed to meet the core competencies within the discipline and reflects the expertise of existing faculty. This includes core undergraduate courses required for all nutrition majors, specialized courses required for each track or major including the accredited dietetics program, elective courses, service courses and graduate education. The department curriculum committee and faculty recently undertook a review of the majors and requirements that resulted in a revision of the Nutritional Science major tracks to better meet the educational needs and career preparation of today’s’ students. This proposal is under
consideration by the college curriculum committee. Similarly, the graduate group has recently reorganized the core curriculum courses. Current faculty teaching assignments are designed to fully utilize expertise of the I&R and AES faculty to deliver the curriculum.

- **Majors:** (Enrollment as of Fall 2010: 588 students total; 284 in Nutritional Science, 304 in Clinical Nutrition)
  - Nutritional Science (Tracks: Nutritional Biology; Nutrition in Public Health
  - Clinical Nutrition (*A program accredited by the Commission on Accreditation for Dietetic Education which includes specific specialized courses)
- **Minors:** Nutrition science, community nutrition, food service management
- **Service courses:** Nutrition 10 & 11 (serves general campus population with ~600 students every quarter, 4 x/yr), 111AV (serves majors and other science majors within CAES & CBS with ~400 students yearly)
- **Graduate level:** Graduate Group in Nutritional Biology; Masters of Advanced Study in Maternal and Child Nutrition

**Demographic Factors:**
The nutrition department houses a total of 13.75 I&R+AES FTE, which includes 14 Academic senate faculty, 4 of whom have shared appointments with either Environmental Toxicology or Food Science and Technology, 2 CE specialists with AES appointments and a specialist with the EFNEP, and one SOE Lecturer. Additionally there are 6 Professional Researchers and 5 Project Scientists who are fully supported on extramural grants), 1 Lecturer/Academic Coordinator, 2 Academic Administrators and 13 Adjunct Professor faculty members who are Scientists at the USDA Western Human Nutrition Research Center (WHNRC).

The current I&R+AES FTE is above the newest 2010 departmental target FTE of 10.75. However, the age demographics of the I&R+AES ladder rank faculty are skewed toward the more senior members, with relatively few in the younger and mid ages. (See table 1 below) The anticipated departmental attrition through retirements (based on individual responses to a faculty poll) indicates that although no retirements are expected in the immediate 3 years, by 4-6 years 4 I&R+AES and 1 CE retirement are anticipated. The predicted 31% reduction in faculty would leave the department at 9.5 FTE, a number below the current set target of 10.75 FTE. Furthermore, within 6-10 years another 2 I&R+AES and 1 CE retirement are anticipated; which would leave the department at 7.25 FTE, a number which is roughly half of the current faculty and with no CE specialists at all. If there were no faculty replacements, this would severely adversely impact the ability of the department to carry out its research, teaching, and outreach mission.
Conclusion: The nutrition department is highly vulnerable due to the age demographics and the associated productivity levels of the younger versus older faculty cohorts. There is an immediate and critical need for early and mid-level senate faculty and CE specialist positions in the department of nutrition just to keep up with the anticipated large number of retirements within 4-6 years and beyond. Faculty recruitment will enable the department to meet the current target of 10.75 FTE in light of the projected retirements. The department is committed to a strong and creative program in research, teaching and outreach. The academic plan will allow the department to maintain excellence and accelerate its impact and reputation.

FUTURE VISION, PRIORITIES AND STRATEGIES TO ACHIEVE OUR GOALS

The Nutrition Department addresses the most pressing human nutrition issues, from under-nutrition to childhood obesity and developmental and nutrition-related chronic diseases, utilizing basic cell biology approaches to applied interventions and modeling, with evaluation and implications for individual health and broad policies. These issues are central to the mission of the College and University and their ability to grow and achieve even greater successes. We envision that as a department we will continue to lead the field of nutritional biology nationally and internationally, as demonstrated by the recent top NRC ranking of the graduate program in nutrition. We will accelerate our impact and reputation through attaining greater extramural grant funds, increasing our already high research productivity and impact. We will be the epicenter on campus and in the UC system for nutrition and health expertise and as such aim to partner with others to achieve these goals.

Areas of pending departmental weakness in research and teaching as a result of the projected faculty retirements and demographic shift, and an assessment of immediate needs:

- International and community nutrition. The Program in International and Community Nutrition (PICN) is housed in the nutrition department and has had an extremely successful track record of accomplishments since it was officially established in 1995. During the last reporting period (AY 2007-2009), PICN faculty brought in more than $26 million in new research funding, and several new projects will bring in another $8 million or more within the next two years. PICN has an excellent reputation both internationally and nationally because of the high research productivity of the faculty and their extensive involvement in providing technical assistance to domestic and international agencies, non-government organizations and national governments.
  - There are 4 Academic Senate non-emeritus faculty members in PICN who are in the Department of Nutrition; the rest of the core and affiliated PICN members are adjunct faculty or outside of the department. Of the 4 Academic Senate PICN members in the department, 2 are over 60 years of age, one is a newly-hired Assistant Professor and the other is the current Director of PICN who is slated to retire within 6-7 years. That will leave only 1 junior Senate departmental faculty member in PICN by 6-7 years from now. Therefore, there is an urgent need to ensure that we maintain critical mass in the program and recruit a mid-level
faculty member now who has the potential to assume the position of Director of PICN within 6-7 years.

- Conclusion: Sustaining the department’s excellence in the area of nutrition for diverse populations is critical to the departmental mission. Therefore, a high priority for the department is to recruit a mid-level faculty member in the area of international/community nutrition. The research, outreach and policy work of PICN is highly visible and valued by stakeholders. Such a position is also of key importance in meeting the teaching needs of the department, particularly for courses that cover nutritional assessment, community nutrition, nutritional epidemiology, public health and nutrition interventions and education. Given the university’s interest in building on strengths, fostering partnerships across departments and disciplines, and communicating UC’s successes to the public, maintaining PICN’s excellence in research, teaching and outreach is critical.

- Nutrition and prevention of disease. This is a central core theme that underlies much of the research focus and mission of the department faculty, encompassing both nutritional biology and translational approaches. Regardless of approach, understanding biochemical mechanisms and integrative metabolism contributes to solutions for prevention of disease, a pressing societal problem. The Department is internationally recognized for its leadership in the area of developmental nutrition, and elucidating features of nutrient metabolism which influence susceptibility to and progression of disease.
  - The demographic shift in the department and anticipated 4 retirements in the next 4-6 years will severely impact both our research productivity and teaching. Each of the retiring faculty (and CE specialist) has this applied human focus, using a variety of sophisticated methodologies and approaches for basic and applied research. Their retirement will leave a critical gap in research. It will also leave a critical gap in teaching core courses required by our nearly 600 majors (including courses required as part of our accredited Clinical Nutrition/Dietetics program – see below). Experimental nutrition is a laboratory course required by all Nutrition Science students and Clinical Nutrition courses are required by both majors, the latter with an average enrollment of 180 students. Therefore, there is an urgent need to ensure that we maintain critical mass within the department and recruit an early-level faculty member to contribute to the sustainability of our research and teaching program.
  - Conclusion: It is crucial to sustain the department’s excellence in this core aspect of our mission and goals. Therefore, a high priority for the Department of Nutrition is to recruit an early-level faculty member in the area of nutrition and prevention of disease. The research and outreach derived from this core faculty expertise is highly visible and contributes significantly to the departmental productivity. Such a position is also of absolute key importance in meeting the teaching needs of the department, particularly for required courses that cover clinical nutrition, nutrition assessment, experimental nutrition and nutrition recommendations and policy.
• Lecturer for the Clinical Nutrition major. The Clinical Nutrition major is an accredited program in Dietetics (through the Commission on Accreditation for Dietetic Education) and is one of the most highly respected in the country because of the rigor of the strong science base that the students receive at UC Davis. For accreditation, the program must maintain a curriculum that includes specific specialized courses and faculty with appropriate professional and educational credentials. Students may progress in their post-baccalaureate training in dietetics only with graduation from an accredited program.
  o Teaching in the Clinical Nutrition major/dietetics program covers several core areas, one of which is food service management, a specialized area requiring professional work expertise in addition to academic training. This curriculum area is required for accreditation. This teaching has been carried out by a lecturer position since the program began at UC Davis (45 years) and it is the intent of the department to continue that practice. This specific academic and professional expertise is not available through any of the Academic Senate faculty and is not supported by the academic research mission of the department. Therefore it is appropriate and crucial that a lecturer is employed for food service management teaching needs within the department to maintain program accreditation. The current Lecturer/Academic Coordinator will be retiring at the end of 2011, therefore, there is an urgent need to find a replacement lecturer.
  o Conclusion: The department is committed to sustaining a program of excellence in dietetics. Therefore, a high priority for the Department of Nutrition is to recruit a Lecturer faculty member in the area of food service management and clinical nutrition management. The Clinical Nutrition/Dietetics program at UC Davis has a strong reputation among stakeholders, and makes a significant contribution toward preparing students for post-baccalaureate training in the health care field and graduate study. Students in the clinical nutrition major make up 50% of all the undergraduate students in our department, thus sustainability of the teaching and accreditation for this major is crucial.

• CE specialists. This critical issue was addressed in the department’s proposal for CE specialist positions submitted to ANR in November 2010.

SUMMARY:
Our vision is to continue to grow our high level of excellence and leadership on campus and in the discipline, and continue to contribute to the health and well-being of society. Our research and teaching priorities are broad in scope with a strong scientific base, yet integrated due to the multidisciplinary nature of the field. This is a distinguishing characteristic of the department that sets us apart from other nutrition programs across the country. The department extends its expertise through linkages with the campus School of Medicine, School of Nursing, and School of Veterinary Medicine. A complementary partnership exists between the department and the USDA Western Human Nutrition Research Center to help achieve research and graduate training goals, but Academic Senate faculty in the department are the only means
to achieve undergraduate teaching needs. It is imperative that our faculty expertise be maintained and replenished to avoid adverse impacts on our research, teaching and outreach due to projected retirements (6 I&R+AES and 2 CE). To continue to accomplish the expected level of productivity we will need to recruit 2 new faculty members and a lecturer (as detailed above) in the short term (next 1-3 years) and additional faculty in the intermediate future (5-10 years) to allow for sustainability of our research and teaching programs and to enable the department to fill the current target of 10.5 FTE within this time frame. This academic plan outlines actions that will enable the faculty to fully achieve the vision and goals of continued excellence.

(Table 1) Nutrition Department Faculty (IR & AES) Data Summarized by Age Cohorts

<table>
<thead>
<tr>
<th>Faculty Age Groups</th>
<th>Age grps as % Dept Total</th>
<th>Average 2010 &quot;H&quot; Factor</th>
<th>Cumulative Average # Indexed Pubs as of 2010</th>
<th>2007-10 3 Yr Average Extramural $ (Thousands)</th>
<th>2007-10 3 Yr Average Graduate Student Head Count</th>
<th>2009-10 Average Student to Faculty Ratio</th>
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<tr>
<td>31-35</td>
<td>7.14%</td>
<td>2</td>
<td>8</td>
<td>$0.00</td>
<td>0</td>
<td>9.34</td>
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<tr>
<td>36-40</td>
<td>7.14%</td>
<td>3</td>
<td>6</td>
<td>$202.00</td>
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<tr>
<td>41-45</td>
<td>14.29%</td>
<td>11</td>
<td>22</td>
<td>$90.30</td>
<td>0.5</td>
<td>0.56</td>
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<tr>
<td>46-50</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>51-55</td>
<td>21.43%</td>
<td>14</td>
<td>49</td>
<td>$273.00</td>
<td>2.39</td>
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<tr>
<td>56-60</td>
<td>21.43%</td>
<td>36</td>
<td>375</td>
<td>$799.90</td>
<td>4.44</td>
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<tr>
<td>61-65</td>
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<td>540</td>
<td>$364.90</td>
<td>3.17</td>
<td>4.43</td>
</tr>
<tr>
<td>&gt; 65</td>
<td>14.29%</td>
<td>35</td>
<td>315</td>
<td>$206.80</td>
<td>2.58</td>
<td>24.54</td>
</tr>
<tr>
<td>TOTAL &amp; Averages</td>
<td>100%</td>
<td>25</td>
<td>217</td>
<td>$338.90</td>
<td>2.43</td>
<td>17.77</td>
</tr>
</tbody>
</table>

Nutrition Department -- IR & AES Ladder Rank Faculty
Current FTE = 13.75
Target FTE = 10.75

<table>
<thead>
<tr>
<th>Anticipated Retirements</th>
<th>Resulting FTE</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within 3yr</td>
<td>13.75</td>
<td>0</td>
</tr>
<tr>
<td>4-6 yr</td>
<td>9.5 (1&lt;target)</td>
<td>31%</td>
</tr>
<tr>
<td>6-10 yr</td>
<td>7.25 (3&lt;target)</td>
<td>16% (47% overall)</td>
</tr>
</tbody>
</table>
I. Introduction

The last academic plan for the Department of Plant Pathology was completed in January of 2008. At that time, the department’s faculty was comprised of 16 Academic Senate members, four Cooperative Extension (CE) Specialists (three being split appointments) and two AES Plant Pathologists (totaling 6.68 I&R, 9.77 AES and 2.85 CE FTE). Since that time, one member of the faculty (Bruening) retired and one was hired (McRoberts). Thus, the I&R/AES contingent of the department faculty is essentially the same as it was in 2008. At a combined I&R/AES total of 16.45 FTE, this equals the target set for the department in 2004. However, to accommodate budget reductions, the department’s target FTE was reduced to 14.45 in 2010. In addition, with the elimination of the Department of Nematology, two FTE dedicated to the study of plant-parasitic nematodes were re-allocated to Plant Pathology, pending the retirement of current faculty members associated with the former department. This document serves to outline how the academic plan under which we currently operate will be modified to accommodate the changes described above.

II. Vision

Plant pathology is an integrative discipline that brings together scientists with a range of expertise, including bacteriologists, mycologists, virologists, plant biologists, epidemiologists and molecular biologists, with a common focus on plant-microbe interactions. Research in plant pathology ranges from fundamental studies that advance science in a general way to more mission-oriented research intended to generate the knowledge needed to manage diseases affecting the health and productivity of plants in agricultural and native ecosystems. The problems confronted by plant pathologists are dynamic owing to the continual emergence of new diseases and increasingly restrictive environmental and food safety regulations. In the face of these constraints, agriculture must produce more on less land, using less water and less energy in order to remain competitive in the global economy. The Plant Pathology Department strives to meet these challenges through the discovery and application of knowledge that will facilitate development of innovative and durable solutions to problems posed by plant diseases.

III. Missions

Our responsibilities to the University, the Agricultural Experiment Station and the citizens of the state of California define three core missions: 1) to conduct research that advances our science, and provides a base of knowledge that will help to sustain and enhance the productivity of agriculture in California and promote effective stewardship of natural resources; 2) to contribute to instructional programs at undergraduate and graduate levels and to mentor graduate students and post-doctoral scholars; and 3) to
extend knowledge to our clientele in both the public and private sectors, and facilitate implementation of novel approaches to the control of plant diseases and management of natural resources. How we plan to effectively address each of these three missions within the constraints of our current FTE target is described below.

IV. Research

National rankings of plant pathology programs have consistently placed our department at or near the top. This is due, in large measure, to the productivity and visibility of our research programs. Sustaining this level of excellence requires that we retain expertise in the major groups of plant pathogens and the capacity to apply the latest technological approaches to the study of plant-microbe interaction at all organizational levels, from sub-cellular to populations and ecosystems. These core competencies form the foundation for the Graduate Program in Plant Pathology, and enable us to train future generations of scientists, educators and practitioners. Our research programs also support other important campus, state, and national programs, such as Foundation Plant Services, the Foundation Seed Service, the California Department of Food and Agriculture, the National Plant Diagnostic Network, the Contained Research Facility, the Plant Genomics Program, and CAES Genomics Facility and the campus Genome Center, to name a few.

Our current academic plan identifies four research foci: 1) Microbial Biology of the Phytosphere, 2) Genetic Structure and Function of Microbe and Plant Populations, 3) Cellular and Molecular Mechanisms of Plant-Microbe Interactions and 4) Integrated Approaches to Disease Management. The rationale for each of these foci is provided below.

- **Microbial Biology of the Phytosphere** Fundamental to the productivity and sustainability of both managed and natural ecosystems is an understanding of the biology of plant-associated microbes. During their interaction with host plants, pathogens must operate within a community of microorganisms. The composition and activity of this community will have an important and potentially determinative influence on the ability of a pathogen to cause disease in a susceptible host plant. In addition, many microbes that are not themselves pathogenic will interact directly with plants and may thereby affect their susceptibility to disease. Current and next-generation technologies present great opportunities to gain a better understanding of the dynamics of microbial populations and pathways for communication and signaling among the members of the community. Presently, the following departmental faculty members contribute to our activities in this area of research: Bostock, Coaker, Cook, Davis, Epstein, Gordon, Gubler, Leveau, MacDonald, McRoberts, Michailides, Rizzo and Subbarao. Relevant expertise is also provided by our USDA colleagues: Baumgartner, Browne, Kasuga and Kluepfel.

- **Genetic Structure and Function of Microbe and Plant Populations** Studies of host and pathogen populations at the genetic and phenotypic levels are critical components of both applied and basic research in plant pathology. Such studies
have the potential to enhance our understanding of the nature of selection and rate of evolution in host and pathogen populations, and to identify genes and alleles that contribute to host and pathogen fitness through their impacts on host resistance and pathogen virulence. Such understanding can provide a foundation for applied plant pathology, through avenues such as improved pathogen diagnosis, more accurate disease prediction indices, and breeding for disease resistance. Faculty members contributing to this area of research include: Coaker, Cook, Davis, Falk, Gilbertson, Gilchrist, Gordon, Gubler, Kirkpatrick, Leveau, McRoberts, Rizzo, Rowhani, Subbarao, and Van Alfen. USDA scientists Baumgartner, Kasuga, and Kluepfel also contribute to this effort.

- **Cellular and Molecular Mechanisms of Plant-Microbe Interactions** It has been a long-standing goal in plant pathology to gain a comprehensive understanding of the mechanisms by which plants can prevent invasion by parasitic microbes and the means employed by pathogens to disable plant defense responses or manipulate host mechanisms for self destruction and thus create the diseased condition. This knowledge will contribute to our capacity to develop novel synthetic approaches to disease resistance that may ultimately prove far more durable than resistance conferred by major genes. Complementary strategies may include genetic modification to improve biological control agents and exploit endophytic microbes that can influence susceptibility to disease. The following departmental faculty are involved in this area of research: Bostock, Cook, Coaker, Epstein, Falk, Gilbertson, Gilchrist, Kirkpatrick, Ronald, and Van Alfen.

- **Integrated Approaches to Disease Management** Central to the mission of plant pathology is the discovery, study, and control of emerging disease problems. Emerging diseases can result from the physical introduction of pathogenic agents to new locations, the emergence of new more virulent pathogen forms, or the re-emergence of endemic pathogen genotypes due to altered cultural practices and/or the loss of effective chemical treatments. Changes to the natural environment can also dramatically impact disease severity and as a consequence climate change, abiotic stress, and resource management (e.g., water quality and availability) will become increasingly relevant to the study of plant diseases. Taken together, these factors will require the development of new, effective and environmentally-sound strategies for disease management, which will in turn require better fundamental knowledge of disease biology, especially the interaction between host, pathogen and environmental variables. Within this research thrust diverse efforts on many plant pathogens contribute to the common goal: gaining knowledge that can be used to develop integrated, environmentally responsible approaches to manage plant diseases. Faculty contributing to this effort include: Bostock, Coaker, Davis, Epstein, Falk, Gilbertson, Golino, Gordon, Gubler, Kirkpatrick, Leveau, MacDonald, McRoberts, Michailides, Rizzo, Rowhani, and Subbarao. Relevant expertise is also provided by our USDA colleagues, Baumgartner, Browne, Kluepfel, and Sudarshana.

The foci described above are central to our research mission and thus eliminating any one of them is not an option for us. Nor are we prepared to differentially diminish our
commitment to one of the four areas. Consequently, we foresee that a reduction in faculty FTE will impact the intensity of our activity in all research foci to some degree. To manage this reduction in a way that does not compromise the quality of our program requires that we retain expertise in a number of core areas: the biology of the major pathogen groups: bacteria, fungi, nematodes, oomycetes and viruses; the conceptual areas of molecular genetics, biochemistry and ecology of host-parasite interaction; and the epidemiology of plant diseases. Provided we remain strong in these areas we can continue to advance the science of plant pathology and train the next generation of scientists and educators.

Previously, research on plant parasitic nematodes was covered by faculty within the Department of Nematology. As this department is slated for elimination, responsibility for the study of nematodes causing plant diseases will be transferred to the Department of Plant Pathology, along with 2.0 FTE previously allocated to the Nematology. Thus, the reduction of FTE for the Department of Plant Pathology (from 16.45 to 14.45) will specifically affect research activities exclusive of those involving nematodes.

Within a five-year planning window, we can anticipate a minimum of five retirements: one CE, one federation (100% AES) and three senate faculty members. This will subtract significantly from our expertise in virology, mycology and host-microbe interaction, and will eliminate faculty expertise in the biology of phytoplasmas. Meeting the proposed reduction in our I&R/AES target means that two of our retiring senate faculty will not be replaced. We will thus scale back the level of research activity on fungal pathogens and will no longer invest specifically in the study of phytoplasma-induced diseases.

V. Teaching

The Department of Plant Pathology is the administrative home of the Graduate Program in Plant Pathology, which offers programs of study leading to M.S. and Ph.D. degrees, and of the Science and Society Program, which offers a wide range of general education courses and an undergraduate minor. Members of our faculty also serve as instructors in courses in other undergraduate and graduate programs, including the Biological Sciences undergraduate major and Biotechnology undergraduate major and graduate programs in Genetics, Plant Biology, Microbiology, and Viticulture and Enology. Plant Pathology has become the center for research and teaching of mycology on the UC Davis campus. Department faculty members also contribute significantly to undergraduate instruction in virology (MIC162, General Virology, and PLP123, Plant-Virus-Vector Interactions). In total, Department of Plant Pathology faculty members have sole responsibility for, or make significant contributions to, eight upper division courses and thereby help to enhance the breadth and quality of the curriculum available to undergraduates in a diversity of majors.

The loss of 2.0 FTE will result in an increased teaching load for our faculty, which is presently one of the highest in the college. Thus it may be necessary to eliminate some course offerings as current faculty members retire and are not replaced. Our priority will
be to retain all the courses that are required for our graduate program. At the undergraduate level, we will continue our important participation in the SAS program, which includes several well-regarded and high enrollment GE courses (>100 students per year) that impact a significant fraction of UC Davis students and alumni. Most at risk will be upper division courses that fill requirements for a number of majors but which have low priority in university’s narrowly-conceived incentive system because they account for relatively few student credit hours. Among the courses that we may cease to support for this reason include: PLP 140 (Agricultural Biotechnology and Public Policy), PLP 150 (Fungal Ecology) and MIC162 (General Virology).

VI. Outreach

All our faculty members have an outreach component to their programs and our CE specialists devote a large proportion of their efforts to this activity. Fewer I&R/AES faculty will reduce outreach activities in parallel with the reduction in research relevant to our clientele. CE specialists remain a critical part of our program and we hope to maintain current FTE levels. No other changes relative to our existing academic plan are anticipated at this time.

VII. Recruitment priorities

Our 2008 academic plan identified the following four faculty recruitment priorities: 1) epidemiology and disease ecology 2) functional genomics and proteomics in plant-fungal interactions, 3) plant virology and 4) integrated strategies for development and implementation of disease resistance. Owing to a hire in 2010 (McRoberts) and what we anticipate will be a successful recruitment in 2011, positions corresponding to priorities one and two will have been filled. It is our intent to retain the other two on our list of priorities and to add a plant nematologist. The ranking of these priorities will be evaluated at such time as we have the opportunity to anticipate recruitment of a new faculty member.
ADDENDUM ACADEMIC PLAN

Department of Plant Sciences
University of California Davis

Since its establishment in 2004, the Department of Plant Sciences is, and intends to remain, a leader in agricultural and environmental sciences, with demonstrated academic excellence in fundamental plant science, agronomic and horticultural crop production and handling, and the management of ecosystems along the wild-land-urban gradient. The Academic Plan written in 2004 at the time of the establishment of the department of Plant Sciences elaborated on the areas in research, teaching, and outreach our members would dedicate themselves to. A revised Academic Plan was submitted in 2008.

Teaching and Curriculum

Briefly, on teaching and curriculum, the department expressed a strong commitment to the following Majors: Ecological Management & Restoration, Plant Sciences, Environmental Horticulture & Urban Forestry and Biotechnology. The first two majors are new ones and resulted from the merger of the 4 departments. In addition, in 2011, the department agreed to manage the undergraduate major in International Agricultural Development (IAD). Changes in the IAD curriculum will be proposed in due course.

The department will continue to house these Majors and increase its efforts to promote enrollment in them, in particular the two new majors. The department expects that the IAD major will grow significantly in the future with the increased interest in food production and security across the globe.

Plant Sciences department faculty members will continue to teach courses at all levels in plant science, ecology, plant biology, international agriculture, and related areas. With the planned and announced reduction in the number of I&R faculty members, there is a distinct possibility that some courses offered now will not be offered in the future. However, it remains speculative which specific graduate courses will no longer be offered until we know which of our faculty colleagues will be retiring and not be replaced, thus resulting in a loss of expertise.

The department is strongly committed to the requesting of partial I&R appointments to a select number of CE faculty. Once these appointments are approved, several undergraduate and graduate courses that the department has not been able to offer will be offered. As it remains unknown when and how many CE faculty members will be offered an I&R appointment, the Teaching and Curriculum part of our Academic Plan must remain incompletely defined.

Research competencies

Departmental research encompasses the full spectrum of scholarship in the land-grant university tradition, solving agricultural and environmental problems through a continuum from fundamental discovery to application of research findings. Currently, the departmental strengths can be divided into seven core competencies

1. Genetics, genomics, breeding, and evolutionary biology
2. Plant physiology: development, nutrition and reproduction
3. Weed science
4. Cropping systems
5. Postharvest biology and technology
6. Ecosystem management and restoration
7. Urban forestry and urban horticulture

The seven core areas of competence outlined in the first Academic Plan and its revision reflected, up to a certain level, the core areas of research of the four departments that were consolidated. Memories of the former four departments now have faded away and new faculty members have joined the department. Moreover, the number of I&R/AES FTEs will decrease from 60 FTEs (2004) to 47.7 FTEs once the new target has been met. Based on these two factors (integration of the four departments and reduction in I&R/AES FTEs), the department has decided to undertake a complete revision of its Academic Plan. Core areas of competence in the department will be reevaluated and restructured. However, as this process of revising the Academic Plan started only recently, it is too early to conclude that research activities conducted in the currently defined 7 core areas will be reduced or ceased in the future.

One possible approach the departmental committee in charge of developing the new Academic Plan may take is to design a Plant Sciences department de novo, setting aside our historical perspectives and creating a new plan that is based on the present and anticipated future needs for research and instruction in the Plant Sciences. Such an Academic Plan will identify critical areas in research, teaching and delivery of knowledge to the stakeholders of a modern and forward-looking department of Plant Sciences. Once such an Academic Plan is defined, current shortcomings in core areas, in teaching as well as applied and fundamental research, will become apparent and guide departmental decisions about future FTE hires.
Faculty: The Department of Viticulture and Enology currently has assigned 4.7 I&R, 7.05 OR(AES) and 3.00 CE. Our new target level is to drop by 1.00 OR, the equivalent of one faculty member. According to a pro-bono study provided by Bain and Co, the Department of Viticulture and Enology is a global leader in our teaching and research programs. We attract resident, non-resident and international students to our undergraduate and graduate programs despite the fact that we have not undertaken any marketing efforts to attract students. This status and visibility of our program was recently enhanced by campus, state and private investment in state-of-the-art research and teaching facilities for the Department. Based on this reputation, other units on campus have approached us to partner in creating new programs.

- We have developed an on-line winemaking certificate program offered in collaboration with UC Davis Extension that provides significant support for that unit. This program has been so successful that other international institutions now wish to offer it as a franchise in their own regions.

- We have partnered with the Graduate School of Management to offer a 4-day Wine Executive Program tailored to the wine industry, and it has been beneficial for both partners. For the past 10 years, it has attracted a solid number (generally 50-70) of the top managers in, production, finance and ownership.

- Recently, we developed a Professional Science Master’s Degree program that has been submitted for approval. Such programs are strongly encouraged on this campus and within university system. Based on our standing, we anticipate that this program will be popular, increasing student enrollments and campus revenue, but also increasing faculty teaching loads.

Reducing faculty numbers in the Department will have a collateral impact on all of these currently successful and planned programs in addition to existing departmental teaching and research programs.

As the Department has a mission to address the academic needs of a large, well established industry, faculty in Viticulture and Enology are each heavily engaged in research that has application to current needs in a specific industry. And, to ensure the new knowledge is accessible to that industry, they participate in extension and outreach activities.

Spurred on by diminished extension support, faculty have created new mechanisms to deliver knowledge to the commercial sector, dubbed “VENsource” (Viticulture and Enology System for Outreach, Research Communication and Extension). We are using the term system as this extension effort is envisioned quite differently than existing centers and institutes on campus, and it recruits significant cooperation from other viticulture and enology experts across the US, as well as community college instructors as a new delivery pathway, using the website
EnologyAccess.org as a centerpiece of the system. This effort is being largely self-funded by revenues from programs, such as the highly successful Wine Flavor 101, and grant support. Increased teaching demand will certainly constrain such efforts, in order to maintain the quality of the teaching programs to the best of our ability.

1) to deal with the reduced FTE allocation, address the programmatic research areas in which you will invest and those areas that by necessity will be deemphasized.

The Department of Viticulture and Enology is multidisciplinary. As expected there are no good choices with respect to further cuts in faculty levels in the Department. The loss of an additional faculty member will have a visible impact on teaching, research or extension. There are six main areas of research emphasis as shown in Table 1. These many disciplines are needed to address just the scientific issues that face the wine and grape sectors of the economy. Moreover, our ability to conduct multidisciplinary research is a clear and necessary strength of the department. Thus, the loss of faculty FTE will obviously impact multiple research teams. The least impact to our multi-disciplinarity would come from a loss of one faculty member in the Grapevine Environmental Biology area. However both breadth and depth in sustainability would be visibly diminished by the loss of a faculty member in this area.

Table 1. Research areas of emphasis in the Department of Viticulture and Enology

<table>
<thead>
<tr>
<th>Research Area</th>
<th>New Knowledge/Technology</th>
<th>Translation to the Grape/Wine Industry</th>
<th>Primary Faculty</th>
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</thead>
<tbody>
<tr>
<td>Grape Genetics</td>
<td>Use of genetic technologies to study genetic relationships among <em>Vitis</em> cultivars and species; identification of genes controlling important grapevine traits; define mechanisms of disease and stress tolerance</td>
<td>Generate new cultivars with higher tolerance to abiotic and biotic stress; manipulate mechanisms of genetic control to obtain important vine and grape traits in the field</td>
<td>Walker New Systems Biologist</td>
</tr>
<tr>
<td>Grapevine Environmental Biology</td>
<td>Analysis of impact of soil and climate and cultural practices on genetic expression, grape biochemistry and physiological changes that affect grape and raisin quality and yield</td>
<td>Development of sustainable practices tailored to specific cultivation sites that minimize the economic and environmental costs of grape production and that enhance quality and value at the same time</td>
<td>Adams Fidelibus Matthews Smart Williams Wolpert</td>
</tr>
<tr>
<td>Fermentation Biology and Wine Microbiology</td>
<td>Investigation of the basic biology of microbes important in wine production and spoilage; modeling of microbial practices</td>
<td>Development of better fermentation management practices and prevention of spoilage</td>
<td>Block Bisson Mills</td>
</tr>
<tr>
<td>Winemaking Technology</td>
<td>Analysis, development and engineering of production techniques and equipment</td>
<td>Integration of processes and systems to optimize product goals and not only reduce</td>
<td>Block Boulton</td>
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<tr>
<td>Field</td>
<td>Objective</td>
<td>Tools/Methodologies</td>
<td>Faculty</td>
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<tr>
<td>Chemistry</td>
<td>Development of innovative analytical methods for study of the chemical composition of food products; identification of flavor and aroma impact compounds; analysis of health effects of plant biomolecules</td>
<td>Development of analytical tools that can be used in production conditions; understanding the impact of processing decisions on wine chemistry and flavor and aroma loss and evolution</td>
<td>Adams Ebeler Waterhouse</td>
</tr>
<tr>
<td>Sensory Science</td>
<td>Development of methods to measure sensory properties of foods and beverages; understand mechanisms of sensory perception and consumer preference behavior</td>
<td>Integration of sensory and consumer information with chemical composition and treatment variables to understand effects of fermentation technology, grapevine biology and genetics on grape and wine flavor</td>
<td>Heymann</td>
</tr>
</tbody>
</table>

2) indicate how you will deliver your curricula within your reduced targets. If gaps are unavoidable with respect to your current curriculum, describe modifications to the curriculum that will account for the faculty reductions. Keep in mind, we do not envision growing our lecturer ranks, so plans need to indicate how you will maximize ladder-rank faculty resources. I appreciate all the effort that has gone into our planning to date. Rest assured we will continue the discussion of academic and curriculum planning throughout this academic year with the primary goal being the continued success and increased excellence of the College of Agricultural & Environmental Sciences.

According to the statistics of the CAES Dean’s office the Department of Viticulture and Enology has the second highest student to faculty ratio, 31.35, with the college average being 22.08. Faculty are therefore heavily engaged in teaching and additional departmental teaching duties will necessarily result in cuts to activities in other areas. The academic program of Viticulture and Enology is integrated and multi-disciplinary, and, in order to sustain a viable program, must retain at least one faculty member with expertise in each area of essential disciplines. However, given that there are multiple courses in the same discipline, when one FTE is lost in within one discipline, the remaining faculty member would not be able to sustain the depth of instruction at the graduate level, and will certainly have to cut back on research and extension activities to maintain teaching at the level necessary to sustain our academic programs. Maintaining the quality of the undergraduate and graduate programs has been the highest priority of the department.

- All courses are taught by ladder rank faculty. The department does not employ lecturers to cover the curriculum.
- To provide appropriate laboratory and field courses that are shared by our undergraduate and graduate programs, faculty are present in the classroom or field during laboratory
sessions—a highly unusual and time consuming commitment to instructional excellence.

- The Department teaches ~1000 students per year in GE courses.
- Two faculty have joint appointments in the College of Engineering and fulfill significant teaching duties in that college.
- Some of our courses are the foundation of the microbial biotechnology track of the Biotechnology undergraduate program.
- Faculty are engaged in teaching courses for graduate groups not housed in the department: Agricultural and Environmental Chemistry, Food Science, Genetics, Horticulture, Microbiology, and Plant Biology.

Ultimately loss of one FTE in the plant sciences would have the least impact on the teaching responsibilities of the department. In order to cover the required courses a minimum number of 10 FTE is necessary. Note that for sensory science, which relies on one current FTE, a vacancy could not be allowed if we plan to sustain the major, particularly with the current loss of sensory capacity in Food Science and Technology. In cases where we currently have two faculty members in a discipline, if both left, a replacement would be essential.

We anticipate that cuts to faculty numbers will have to be mitigated as much as possible by reducing efforts in outreach and extension. In one case, with the loss of a specific faculty member, we would ask CE specialist Fidelibus to assume responsibility for some of the courses in the curriculum. We are loathe to make this decision but the other alternatives, loss of effort in translational research or loss of quality of our educational programs would ultimately have a stronger negative impact on the excellence of the department and college.

The following table lists the disciplinary expertise needed to offer each required undergraduate course for the major, as well as the current graduate offerings in the same discipline. Required courses for the Viticulture and Enology B.S. are indicated with an asterisk. Other courses serve as restricted electives. The current faculty teaching responsibilities are shown. Some faculty could cover courses outside of their indicated area particularly in the plant sciences.

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Faculty</th>
<th>Undergrad Courses</th>
<th>Graduate Courses</th>
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<tbody>
<tr>
<td>Chemistry</td>
<td>Ebeler</td>
<td>Analysis of Must and Wines*</td>
<td>Natural Products of Wine</td>
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<td></td>
<td>Waterhouse</td>
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<td>Flavor Chemistry</td>
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<tr>
<td>Microbiology</td>
<td>Bisson</td>
<td>Wine Microbiology*</td>
<td>Instrumental Analysis</td>
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<td></td>
<td>Mills</td>
<td></td>
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<tr>
<td>Engineering</td>
<td>Block</td>
<td>Wine Stability*</td>
<td>Winery Design</td>
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<td></td>
<td>Boulton</td>
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<td></td>
<td></td>
<td></td>
<td>Wine Technology*</td>
</tr>
<tr>
<td>Discipline</td>
<td>Faculty</td>
<td>Undergrad Courses</td>
<td>Graduate Courses</td>
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<td></td>
<td></td>
<td>Distillation</td>
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<tr>
<td>Sensory</td>
<td>Heymann</td>
<td>Wine Sensory*</td>
<td>Sensometrics</td>
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<tr>
<td></td>
<td></td>
<td>Advanced Sensory</td>
<td></td>
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<tr>
<td>Plant Physiology</td>
<td>Matthews</td>
<td>Introduction to Viticulture*</td>
<td>Advanced Viticulture</td>
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<tr>
<td></td>
<td>Williams</td>
<td>Grapevine Growth and Physiology*</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horticulture</td>
<td>Smart</td>
<td>Viticultural Practices*</td>
<td>Vineyard Establishment</td>
</tr>
<tr>
<td></td>
<td>Walker</td>
<td>(3 qtrs)</td>
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<tr>
<td></td>
<td>Williams</td>
<td>Raisin and Table Grape Production</td>
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<tr>
<td>Plant Pathology and Entomology</td>
<td>Williams</td>
<td>Grapevine Pest, Diseases and Disorders*</td>
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<tr>
<td>Grape Biochemistry</td>
<td>Adams</td>
<td></td>
<td>Grape Development and Composition</td>
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<tr>
<td>Vineyard Ecology</td>
<td>Matthews</td>
<td></td>
<td>Precision Farming</td>
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<td></td>
<td>Smart</td>
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<tr>
<td>General (discipline-flexible courses)</td>
<td></td>
<td>Introduction to Winemaking* (3 qtrs, GE offering to campus, ~1000 students/year) (Adams, Heymann, Waterhouse)</td>
<td>Introduction to Scientific Methods (Ebeler)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wine Production* (Bisson)</td>
<td>Advances in the Science of Winemaking (All faculty)</td>
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<tr>
<td></td>
<td></td>
<td>Readings in Enology (Matthews)</td>
<td>Critical Evaluation of Scientific Literature (Bisson, Matthews)</td>
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<td></td>
<td>World Viticulture (Heymann)</td>
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INTRODUCTION.

In response to unprecedented budgetary constraints in recent years, CA&ES recently undertook a comprehensive planning effort to consider alternative College structures. All four “environmental science” departments\(^1\) were strongly supported through this process, but recommendations were made that these strengthen by association and collaboration. Release of FTE to these departments in Fall 2010 was made contingent on development of a coordinated Strategic Plan that would facilitate further development of the environmental sciences within CA&ES. The resulting coordinated plan was approved in December 2010, and establishes programmatic and recruitment priorities for these departments. The present document supplements the coordinated plan for the environmental sciences, emphasizing the current status and objectives of WFCB.

CONTEXT – THE NEED FOR RESEARCH AND TRAINING IN ECOLOGY AND CONSERVATION OF WILDLIFE AND FISH.

California is the third largest state, exceeded in area only by Alaska and Texas, yet has more species than any other state (nearly 500 more than Texas, nearly 5000 more than Alaska), as well as more endemic species (i.e., those found only in California). California ranks first in number of endemic mammals, reptiles, amphibians, and freshwater fishes, and 2\(^{nd}\) for birds. There are over 450 species of marine fish as well, supporting economically important (if declining) fisheries. California also has the largest human population of any state, which may explain why California is exceeded in risk to native species only by Hawaii (which has 1/5 as many species), and in number of species extinct by only two states (Hawaii and Alabama).

These points underscore the magnitude of threats to California’s natural diversity, and explain why California is recognized as both a national and global “hotspot” of species at risk. More than ever, the state requires a public that is enlightened in the natural history of its remarkable fauna, and employees that are trained in the ecology and requirements of these species. In spite of this, only two academic programs in the state emphasize the requisite training to prepare students in the conservation and management of fish and wildlife species, and within UC this responsibilities falls within CA&ES.

UPDATED TARGET FTE.

In the face of mandatory FTE reductions across the College, the target FTE for WFCB was reduced from 8.9 (5.57 I&R + 3.33 AES) to 6.9 (4.57 I&R + 2.33 AES). We note that this was the greatest proportional reduction in the College (15.3%) with the exception of a single program targeted for termination (e.g., Textiles & Clothing merged into Biological & Agricultural Engineering, 22.8% FTE reduction), and was in fact greater than that allocated to other programs targeted for absorption (e.g., Nematology merged with Plant Pathology, 11.7%)

\(^1\) The four Environmental Science Departments include: Environmental Science & Policy; Environmental Toxicology; Land, Air, & Water Resources; Wildlife, Fish, & Conservation Biology.
reduction; Environmental Design & Landscape Architecture merged with Human & Community Development – Human Development and Human & Community Development – Community Development, 13.9% reduction). The new target FTEs pose challenges across CA&ES, and ongoing budget concerns in California threaten to exacerbate these challenges. WFCB will continue to respond proactively and vigorously to minimize the impacts of these extrinsic forces on our undergraduate curriculum and to graduate training, to continue promoting novel and integrative research of relevance to the College mission and that of the AES, and to provide both Service to our colleagues and Outreach to our AES clientele.

In this addendum we outline how we anticipate responding programmatically to the change in FTE targets, how we propose to deliver our curriculum, and how we are considering adjusting our curriculum to pending limitations.

Programmatic strengths of WFCB are reflected in our name. Our faculty are recognized experts in the biology, ecology, and conservation of wildlife and fish, with expertise in physiological and behavioral ecology, population and community ecology, biogeography and macroecology. All of our faculty apply foundational biological and ecological understanding to address questions of immediate relevance to our AES stakeholders, the citizens of California. Our mission remains unchanged: to promote research and understanding of the biology of wild vertebrates, including native, non-native, and pest species, with the goal of improving management of these species for the people of California and elsewhere.

**FACULTY.**

WFCB currently includes 9 Senate faculty (8.9 FTE), including 1 Sr. Lecturer SOE and 8 faculty in the professorial series (2 Assistant, 6 Full). Two of our faculty are of “retirement age” and within the time frame of this document one more faculty member will achieve this status. We have 4 Professor Emeriti, 3 adjunct faculty, and 1 professional scientist. Additionally, we currently support 1 Specialist in Cooperative Extension, and we have 5 Specialist Emeriti.

**PROGRAMMATIC AREAS OF EMPHASIS.**

Recent retirements have forced us to refocus our programmatic strengths. Most notably, we no longer have expertise in ecotoxicology or disease ecology, and we do not anticipate rebuilding in these areas. However, we are optimistic that we will be able to maintain programmatic excellence in the core areas of emphasis – the ecology and conservation of fish and wildlife species and their habitats. Traditional boundaries are largely taxonomic and somewhat artificial, but within WFCB we are particularly strong in the ecology and conservation of terrestrial vertebrates, most notably mammals (3 FTE) but also a well-known program in waterfowl (1 FTE), and a recent recruitment for a conservation biologist allowed us to cover a taxonomic gap involving reptiles and amphibians (1 FTE). We also boast a highly visible and productive faculty in aquatic biology, with well-known expertise in the applied ecology and conservation of California fishes (2 Senate FTE + 1 CE FTE), and in applied physiology of fish (1 FTE). In thematic terms we have expertise in behavioral ecology (3 FTE), population and community ecology (7 FTE), geographical ecology (5 FTE), conservation ecology (10 FTE), population biology and demographic modeling (1 FTE), the ecology of human-wildlife interactions (4 FTE), physiological ecology (1 FTE), and the effects of climate change (8 FTE).
Cooperative Extension within WFCB has suffered severe losses in recent years, with retirements not being replaced, and subsequent reductions in our ability to service our stakeholders. A single FTE in the biology of inland and anadromous fishes has been highly successful, and we remain hopeful of recruiting CE FTE in the areas of human-wildlife interactions, waterfowl biology, and wildlife habitat / conservation management.

Given recent losses in FTE and programmatic emphases (ecotoxicology, disease ecology), we anticipate maintaining core needs with targeted recruitments in the future that cover multiple needs per faculty member, in much the same way as our recent recruitment of a conservation biologist simultaneously provided reptile and amphibian expertise to our ranks.

**Undergraduate Curriculum.**

Reflecting both realized and projected changes to our faculty, we recently reviewed and fully revised our undergraduate curriculum, with the objective of streamlining requirements while maintaining intellectual rigor, and simplifying the overall program to reduce the number of decisions to be made by students. Simultaneously, we added a new option to our curriculum that we expect to attract a new body of students but without additional teaching needs.

As with most UCD programs, our BS in Wildlife, Fish, & Conservation Biology includes both Preparatory and Depth subject matter, followed by a series of elective courses, presented in “Areas of Specialization” (AOS). We distilled our earlier curriculum of 9 such areas to only 5, reflecting changes in faculty expertise and in our pedagogical capacity. Five AOSs were excised from our program; these were Behavioral Ecology, Ecotoxicology & Disease Ecology, Physiological Ecology, Wildlife Damage Management, and Population Biology. We retained 4 core areas – Conservation Biology, Fish Biology, Wildlife Biology, and an Individualized AOS. To this we added an AOS in Wildlife Health, aimed at students considering veterinary school or otherwise interested in the broad area of wildlife diseases and health. Our objective in this revision was to focus our pedagogical investment in the core areas that our students need to know to be successful in this field.

We also have proposed an AB degree in Wildlife Conservation. This was designed to be a more general program of study for students interested in the conservation of our natural heritage, yet not necessarily heading to graduate school or either public or private agencies. We envision this as an alternative for the many undergraduate students that study psychology, English, history, political science, and even nature and culture, but who have no strong career plans in that area. As indicated above in the context of threats to our biological resources, the greatest pedagogical investment we can make in the future is in an educated public, not necessarily focusing only on those students who plan to work as biologists. One of our pedagogical objectives is that home-makers, small-business owners, and entrepreneurs understand the ecology and natural history of wildlife and fish species in the hopes that they will be enlightened voters and insightful consumers.

As a final step in this direction, we recently developed a Minor in Wildlife, Fish, & Conservation Biology. Requiring 20-32 units of targeted coursework, this has already proven popular with students in a variety of majors.
Finally, in terms of the delivery of our program, our curriculum includes several courses that are either team-taught (e.g., WFC 100, 101) or coordinated by one faculty member with guest lectures by most or all department faculty (e.g., WFC 10, 50). This structure allows us additional flexibility in the face of declining FTE.

We have effectively terminated offering WFC 121 (Physiology of Fishes), 153 (Wildlife Ecotoxicology), and 158 (Infectious Disease in Ecology and Conservation), and when our faculty approaches Target, we may be forced to consider eliminating some field courses (WFC 101, 102) or coursework that does not target on vertebrate biology per se, such as WFC 156 (Plant Geography) and 157 (Coastal Ecosystems). We have faculty expertise to maintain all remaining coursework.

In recruiting new faculty WFCB has always targeted academic excellence with the caveat that successful applicants must also fit our pedagogical needs. As such, we have maintained excellence and diversity in undergraduate teaching while building an outstanding research program that addresses AES needs. Likely reflecting this emphasis on both teaching and research, enrollment in WFCB has continued to increase in recent years, currently standing in excess of 200 students. Additionally, most of our courses have been reaching enrollment capacity and in many cases we have had to seek larger lecture rooms. We feel strongly that our teaching is second to none, and we pride ourselves in our ability to challenge and motivate our students towards greater achievements.

**The Museum of Wildlife and Fish Biology.**

The Museum of Wildlife and Fish Biology (MWFB) plays a fundamental role in WFCB courses and approximately 30 additional courses from all colleges at UCD. Within WFCB, museum staff play important roles in lecturing and lab support to courses on the biology of diverse vertebrate groups (WFC 10, 50, 100, 101, 110, 111, 120, 155L, 157) as well as a specialized course on Museum Science (WFC 192). The Museum runs a highly successful and popular internship program (about 20 students annually) and provides tours and educational opportunities for numerous K-12 schools. In addition to this core pedagogic role, MWFB staff have actively pursued AES-relevant research and played a very important role in outreach to local and regional stakeholders. The Museum receives approximately 1000 visitors annually and assists researchers at other institutions with about 25 loans of scientific specimens yearly. Currently managing its second Facilities Improvement Grant by the National Science Foundation, the MWFB was recently awarded with formal accreditation by the American Society of Mammalogists in recognition of the caliber of its collections as well as the standards of curation. Support for this facility is minimal (effectively limited to the salary of the Principal Museum Scientist who manages the Museum and coordinates associated outreach activities) but we strongly believe that the returns on these funds (teaching, outreach, research support) more than justifies this allocation.

**Future Priorities and Resource Needs.**

Recognizing that the UC of the future is likely to be smaller, it is our objective to maintain excellence in the areas for which we are best positioned. We anticipate maintaining dynamic and challenging undergraduate and graduate curricula, to further developing our contributions
in the latter, and to continued success in mentoring both MS and PhD students so that they will assume leadership roles in private as well as State and Federal organizations. We look forward to maintaining programmatic strength in ecology and conservation of fish and wildlife species, although we recognize that further trimming of the UC budget may limit our abilities in some areas.

**Condition of Stable Resources.** Given the schedule of presumed retirements in WFCB we anticipate being able to maintain our pedagogic and programmatic excellence into the foreseeable future. However, this likely will require additional allocation of FTE in anticipation of later retirements to ensure that we retain faculty with specific expertise. Because our faculty expertise (teaching and research) generally is not duplicated in other departments it will be difficult to “farm” any teaching needs to colleagues elsewhere. Specifically, we anticipate critical needs in the ecology and conservation of freshwater fishes and in population dynamics and demography. Recognizing ongoing budgetary constraints we hope that we will be able to combine these pedagogical and programmatic needs in a single position within 3-5 years.

**Condition of Declining Resources.** If resources decline it will become increasingly challenging for WFCB to maintain its current teaching obligations, since WFCB does not rely on temporary lecturers for any of our coursework. We will strive to meet these needs by redirecting faculty to core course needs. However, very few courses in WFCB are not required by students in our major, so if we are faced with permanent reductions in FTE and are unable to obtain “proactive” allocation to cover immediate teaching needs, we may be forced to further refine our curriculum, most likely by selectively removing Areas of Specialization and seeking alternate courses to meet the spirit of current requirements.