

# College of Agricultural Sciences

*Oregon State University*

*August 2006*

## **Introduction**

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This report to the provost from the College of Agricultural Sciences makes no attempt to provide comprehensive documentation of the many activities and accomplishments of our faculty, staff, and students. Instead, in each of the categories specified by the provost, it offers examples of the kinds of work going on and the consequences for students, stakeholders, Oregon residents, and others. Because so much of the College's work is long-term, any report like this is necessarily a snapshot at a point in time. Some programs we report here were part of last year's report and may well be a part of next year's as well.

## **2005-2006 highlights**

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### ***Programmatic achievements***

#### **Initiatives in support of student engagement and success**

The College embraces multiple approaches to student success inside and outside the classroom and laboratory, and to providing co-curricular activities that engage, inform, and educate its students. Among these are:

##### **Learning and leadership outside the classroom**

More than 30 student organizations provide co-curricular activities and learning for the College's 1,200-plus undergraduate students as well as practical, hands-on leadership experiences. Students take part in the activities of clubs as varied as the Soil Science Club and Young Cattlemen's Association, to the Food and Fermentation Science Club and the Policy and Law Society. An umbrella organization for these student clubs is the well-developed and well-established Agricultural Executive Council—what amounts to a student government and coordinating body that is College-wide. Paid staff work with the student organizations to help assure their effectiveness. In yet another separate but related activity, students in the College publish their own magazine, called *New Fields*, that is distributed to enrolled students as well as prospective students, donors, and friends of the College.

##### **Students immerse themselves in science—for the summer and beyond**

College of Agricultural Sciences students are among those who participate in an 11-week supervised research program in biological sciences that has core funding from the Howard Hughes Medical Institute. (Other funding comes from individual faculty, departments, centers, and endowments.) The program invites students who are interested in biological sciences, but who may not already have research experience.

In 2005, 45 undergraduates from throughout the University participated; Agricultural Sciences faculty supervised 22 of those students. To apply, they first must gain the sponsorship of a faculty member. Each participant receives \$3,600 for 11 weeks of full-time research in the sponsoring laboratory. They then take part in an end-of-summer symposium. After participating, some go on

to continue work in the laboratories of the sponsoring professors. All gain new insights into science, and what it means to carry out scientific research.

### **A dynamic curriculum for a changing world**

Academic departments in the College offer degree programs that educate students for lifelong learning and prepare them for productive careers in fields where there are good opportunities. The departments regularly review and revise curricula, adding or modifying options and areas of emphasis, both to reflect changes in disciplinary focus and to attract student interest. For example, for the Department of **Horticulture**, options now include: horticultural communication, horticultural research, integrated horticultural production, turf and landscape management, and viticulture and enology. The Department of **Crop and Soil Science** has modified its options to include crop management, ecosystem analysis and policy, plant breeding and genetics, seed systems, soil resource management, and soil science. Options for **Food Science and Technology** now include enology and viticulture, fermentation science, and food science. Options for **Animal Sciences** now include animal behavior and bioethics; animal products; beef; communication, leadership, industry, and policy; dairy; equine; poultry; pre-veterinary medicine; and sheep.

### **Scholarships lend a hand**

Students in Agricultural Sciences are eligible for scholarships from the College and its departments. In 2005-2006, enrolled and prospective students received about \$450,000 in scholarship assistance. Several categories of scholarships are offered through the College of Agricultural Sciences, including the Beginning Venture Agricultural Honors Scholarships for incoming students, Continuing Venture Agricultural Honors Scholarships for continuing students, College of Agricultural Sciences Scholarship Awards for incoming or continuing students, and departmental scholarships for incoming or continuing students.

The E. R. Jackman board and the Agricultural Research Foundation partner with the College in an effort to continue to attract talented students. Together, they support Agricultural Honors scholarships that enable students to concentrate on their studies with less worry about personal finances. Through the Agricultural Honors scholarship program, the College awards about \$70,000 to incoming students and \$10,000 to continuing students each year.

Students considered for the College of Agricultural Sciences scholarships are incoming or continuing students enrolling or enrolled in the College not only at the Corvallis campus, but also those in the College's programs at the Eastern Oregon University campus in La Grande, OSU's distance-education program, or OSU's dual-admission programs with select Oregon community colleges. Students with an agricultural science-related interest enrolling or enrolled in the general agriculture, environmental science, or natural resources program at OSU's Cascades campus also are considered.

### **Internships**

Opportunities abound for students to find practical "real world" experiences that complement their formal education but, too often, little or no pay accompanies the internships. A partnership between the College and the E.R. Jackman organization's Internship Support Program provides financial assistance to students in low-paying or volunteer internships. Students use their grants to help offset a variety of expenses including transportation, rent, food, projects, and research. Some 15 internships were awarded in the 2005-2006 academic year. Student work experiences that enrich the collegiate experience have included environmental science studies in Costa Rica, practical horticulture at a country club in Kansas, clinical assistantship in a veterinary hospital,

work at Crater Lake National Park, policy development in a Congressional office in the nation's capitol, and natural resources science at the Temperate Forest Foundation.

## Major research and scholarship initiatives

### Sun Grant program takes shape

Oregon State's designation as a Sun Grant university and as the Western Regional Center for Sun Grant has been propelled this year by receipt of funding and initiation of program activities. Intended as it is to understand and overcome the technical, economic, social policy, and environmental barriers to making biofuels and bioproducts available to consumers, and to do that in a way that benefits local rural economies, the OSU Sun Grant program has become a catalyst for convening stakeholders. These have included established businesses, entrepreneurial start-ups, representatives of state and federal agencies and laboratories, academics, and others with an interest in energy, biofuels, and related subjects. In some cases, those attending Oregon Sun Grant events are meeting for the first time others with whom they share interests.

As designated leader of the Western Region for Sun Grant, OSU is coordinating Sun Grant activities for Alaska, the Pacific Northwest states, Hawaii, the Pacific Territories, and California, Nevada, Utah, and Arizona. In the past year, with leadership from **Jan Auyong** and others in the College of Agricultural Sciences, the region has achieved a strong start in working together.

Founding legislation directs Sun Grant programs toward:

- Developing and improving renewable biobased energy resources to enhance national energy security;
- Diversifying agricultural production in the United States to improve the sustainability of this important industry; and
- Strengthening rural communities through new energy technologies, products, and crops.

Thus, it is a goal to commercialize products and processes, so we are anticipating real world applications and benefits.

### Strong participation in the University's initiatives

Among the six strategic initiatives approved by the University, faculty in the College of Agricultural Sciences are active participants in five of them. The College has committed significant support to four of these initiatives. For example, in addition to recurring faculty support as the initiatives progress, the College has provided more than \$200,000 in non-recurring funds to help initiatives get started and gain momentum.

#### *University strategic initiative: Computational and Genome Biology*

At the outset of this initiative, the College of Agricultural Sciences told leaders of the Computational and Genome Biology initiative that we would pursue all reasonable and productive avenues to find academic homes and to fund long-term FTE commitments for new faculty, if their disciplinary interests were consistent with departments in Agricultural Sciences. During the past year, **three such new faculty have joined the College and are advancing the Computational and Genome Biology Initiative.** They include:

- **Erica Bakker**, assistant professor of horticulture, who studies evolutionary genomics, bioinformatics, population genetics, molecular ecology, and disease resistance.
- **Jeff Chang**, assistant professor of botany and plant pathology, who studies microbial genomics, pathogenesis, symbiosis, Type III effector proteins, *Pseudomonas syringae*, and Rhizobia.

• **Todd Mockler**, assistant professor of botany and plant pathology, who studies bioinformatics, functional genomics, promoter architecture, gene expression *Arabidopsis thaliana*, *Brachypodium distachyon*, and other related areas.

These faculty are among the 95 University-wide now affiliated with the Center for Genome Research and Biocomputing. Of those 95, more than 50 are a part of the College of Agricultural Sciences.

#### ***University strategic initiative: Subsurface Biosphere Education and Research***

The College of Agricultural Sciences has committed to investing **at least 0.75 FTE in long-term support for a new 12-month, tenure-track assistant professor position in the area of rhizosphere biology or soil organic biogeochemistry**. This is one of up to three new faculty positions that will be created and funded initially by funds from the Initiative, and subsequently by academic colleges. A candidate has been selected for the position, and immigration details are being worked out.

#### ***University strategic initiative: Sustainable Rural Communities***

The College of Agricultural Sciences is **contributing to three positions** associated with this initiative. The Extension Agriculture Program and the Department of Agricultural and Resource Economics are jointly funding a 0.75 FTE, 12-month, fixed-term **Extension community economist** position for three years (two years funded by Extension Agriculture Program and one year funded by the department). A decision regarding a recurring commitment beyond the three years of initial funding will be considered in a future round of the College's Priority Staffing process. In addition, beginning in year 6 of the initiative, the College of Agricultural Sciences will assume funding responsibility on a recurring basis for a 0.75 FTE, 12-month, tenure-track, assistant professor position in **economics of rural areas**. More immediately, the College will provide non-recurring funds in the first two years of the initiative to assist with **start-up costs** when the faculty member is hired with University-level funding. **In-kind match** is provided from the College and the Extension Agriculture Program with 0.5 FTE for the **initiative coordinator, Bruce Weber**.

The Initiative has planned and initiated **two projects that explore impacts of land-use and resource management policies in southern Oregon and along the Oregon coast**. One study will engage decision-makers and residents in the Klamath Basin, exploring how Oregon's land-use planning system affects owners of agricultural lands and their ability to manage their land – and water rights and usage – in a sustainable manner. The second project will train local residents in three coastal communities to gather data on the importance of fishing to their community, characteristics of local fishermen and fishing families, economic change, changes in the fishing effort, and effects of recent management decisions. This work will support the comprehensive look at Oregon's state land-use planning system undertaken by the Oregon Task Force on Land Use Planning.

#### ***University strategic initiative: Water and Watersheds***

For information on the College's part in this initiative, please see section on **Key hire advances water and watersheds work**, later in this report.

#### ***University strategic initiative: Mathematics, Computer Science and Ecology***

Agricultural Sciences faculty contribute to this initiative but, unlike those noted above, the College has made no major financial contribution to it.

## Major outreach and engagement initiatives

Of course, the College of Agricultural Sciences has a long history of outreach and engagement, and many ongoing programs and activities. This section highlights three examples of innovative programs, beginning with a richly collaborative case from the Extension Agriculture Program, another that takes science into rural classrooms and that has become enormously popular, and concludes with acknowledgement of what is likely to become an internationally important source of information about fish and fish behavior.

### Collaborative approach reduces pesticides, improves water quality

The Hood River Basin is habitat for threatened winter steelhead and a major tree fruit production region. Organophosphate insecticide detected in Hood River tributaries exceeding water quality standards led to a 4-year monitoring program and the development of pesticide best management practices. Extension and research faculty worked with numerous stakeholders, including fruit packers in Hood River County, growers that apply pesticides to fruit crops, Native Americans, regulators from the Oregon Department of Environmental Quality and Oregon Department of Agriculture, soil and water conservation districts, and the Hood River Watershed Group.

Together, they agreed to establish a monitoring program in the Columbia Basin as a community-based effort. OSU faculty worked closely with the Department of Environmental Quality (DEQ) and the soil and water conservation districts to seek and analyze stakeholder input and to develop a monitoring plan. Monitoring data were then a focal point for a series of stakeholder forums and educational meetings conducted by Extension faculty.

As a consequence of these efforts, producers volunteered to use best management practices. This eliminated the need for heavy-handed regulatory approaches. The Department of Environmental Quality reported **improved water quality associated with reduced chemical inputs resulting from application of best management practices**. Stakeholder communication was also enhanced. This success story has been presented locally, nationally, and internationally. The approach is now employed in other Oregon watersheds and is a model for a United Nations Food and Agriculture Organization (FAO) monitoring/farmer-field-school effort in West Africa.

### Taking science to rural Oregon classrooms

Entomologist **Sujaya Rao** has provided leadership for a popular and highly successful program that is both outreach and enrichment of the student experience for participating OSU students. The Rural Science Education Program sends University students into Oregon K-12 rural schools to teach science. Each year, 12 undergraduate and graduate students received fellowships to create lesson plans, lead experiments, and share their knowledge of cutting-edge science with rural students and teachers. Funded with grants from the National Science Foundation and Toshiba America Foundation, the program focuses on natural sciences, genetic research, and biotechnology studies. Aimed at **getting rural students to see university studies as within their grasp and getting them excited about science**, the program gives rural students a chance to see real people in their classrooms who are scientists. Says Rao: "It opens the door for them to think **'I can be a scientist, too.'**" The program also brings to campus as many as 100 middle school students to present their research on an assigned topic. The success of the program speaks for itself. Rural school teachers make more requests for participation in the program than Rao and her students are able to accommodate.

Over time, the program has involved three colleges and 14 departments, numerous faculty, and has worked with 10 rural schools (elementary, middle, high school) with more than 20 teachers benefiting. Some 38 OSU undergraduate and graduate students have been part of the program, as have more than 1,800 rural K-12 students. In most of the K-12 schools, *every* student in sixth,

seventh, eighth, and tenth grades participated. Many of the OSU students provided a diversity of role models (in particular, women students and Hispanic students were seen engaged in science).

### **Partnership with Oregon Department of Fish and Wildlife**

A new research fish hatchery, the Oregon Hatchery Research Center, opened in October 2005 in a valley of the Coast Range near Alsea. The Center is a joint venture between the Oregon Department of Fish and Wildlife and the College of Agricultural Sciences' Department of Fisheries and Wildlife.

The goal of the **Oregon Hatchery Research Center is to answer scientific questions related to fish recovery and hatchery programs**, including the differences that may exist between wild and hatchery fish, and how to better manage those differences to meet fishery and conservation objectives, and to help Oregonians understand the role and performance of hatcheries in supporting and protecting Oregon's native fish. A key feature of the new state-of-the-art facility is its four simulated stream channels that make it possible to observe wild and hatchery fish in a variety of controlled experiments.

**David L.G. Noakes** joined the center in late 2005 as its senior scientist. He has spent 40 years studying the behavior, ecology, and evolution of fishes with experience in Iceland, Scotland, Great Britain, and Japan, as well as throughout North America. Before joining OSU, he was on the faculty at the University of Guelph in Ontario, Canada, since 1972. Noakes is a professor in the Department of Fisheries and Wildlife.

The Hatchery Research Center will foster and support a wide range of research and education projects to answer such questions as *Do hatchery fish spread disease to their wild counterparts? Do they out compete wild fish for food and habitat? Do they contaminate genetic fitness for surviving conditions in a particular watershed?* It is expected that these and other questions will attract scientists from many nations to carry out studies at the facility.

### **National and international impact of programs and initiatives**

The College's faculty are involved in numerous programs and activities with national and international dimensions. These are three examples of programs with strong international involvement and consequence.

#### **Aquaculture CRSP is a major force internationally**

The Aquaculture Collaborative Research Support Program (CRSP) is a major international research and outreach program of long standing that is part of the College of Agricultural Sciences. Its focus is **sustainable aquaculture development and responsible aquatic resource management** in coastal and inland areas. Project areas include production technology; watershed management; and human welfare, health, and nutrition. Examples of its programs and their consequences include:

- Through a combined research and education program, four-fold increase in aquaculture production in Kenya (when compared to traditional methods);
- In the Philippines, farm management and feed costs were reduced by about \$400 per hectare and net value of the crop was up by nearly 20 percent;
- In Honduras, Nicaragua, and elsewhere, market studies helped gain increased government support for indigenous tilapia farming industries;

- Scientists involved in the program regularly produce about 40 peer-reviewed journal articles each year, adding significantly to the body of knowledge about aquaculture, a key provider of food and an important economic engine, especially in developing countries;
- Over the life of the program, the Aquaculture CRSP has, through employment or assistantships, provided significant financial support to about 130 undergraduate and graduate students at Oregon State University.

### **Agricultural Sciences faculty in the OSU China Working Group**

Four of our faculty members are active participants in the University's China Working Group. They are:

- **David Hannaway**, Crop and Soil Science. He is working with Zhai Guiyu from the Shandong Province Animal Husbandry and Veterinary Station to develop a strong Chinese presence in the international Forage Information System Web site that Hannaway established and now oversees. Their special interest is in forage quality and mineral nutrition.
- **Yanyun Zhao**, Food Science and Technology. Zhao has two international projects underway in China. One is working with the faculty of the University of Shanghai for Science and Technology to develop a curriculum in food engineering. The other is with the Department of Food Science and Engineering at Shanghai Jiao Tong University to develop ways of extending the shelf-life of fresh produce. Zhao is delivering lectures and guiding graduate student research in edible film technology for fresh produce. She expects to apply for and share with Chinese colleagues research grants that will test this novel technology. In addition, Chinese students and scholars will visit Oregon State as part of their education and research.
- **Michael Qian**, Food Science and Technology. He is studying aspects of Chinese liquor, including projects that involve wine flavor chemistry, off-flavor development in wine, flavor chemistry, and flavor precursor development.
- **David Noakes**, Fisheries and Wildlife. Noakes, who is director of the Oregon Hatchery Research Center described earlier in this report, is working with Chinese collaborators on research approaches and results on artificial propagation and other techniques to conserve or restore endangered freshwater fishes. The project also involves studies of behavior and ecology of fishes in natural waters as well as in aquaculture systems.

### **Learning to monitor pesticides in Africa**

With support from the United Nations Food and Agriculture Organization (FAO) and as part of a multi-national Global Environment Foundation-funded project, OSU faculty are developing pesticide monitoring procedures in the West African Senegal and Niger River basins. Using models of pesticide fate and behavior, and human and environmental risk assessments, the OSU team is collaborative and cross-disciplinary. It includes **Paul Jepson** (Integrated Plant Protection Center), **Jeff Jenkins** and **Larry Curtis** (Department of Environmental and Molecular Toxicology), **Dan Sudakin** (National Pesticide Information Center at OSU), **Kim Anderson** (Food Safety and Environmental Stewardship laboratory at OSU), **John Bolte** (Biological and Ecological Engineering), **Anna Harding** (OSU Public Health), and from outside, Bill Settle, FAO Rome, and a Senegalese project on the fate of pesticides used to control locusts.

### **Faculty recognition and awards**

College of Agricultural Sciences faculty and staff have earned **recognition from many sources**: departmental, College, University, professional associations, government agencies, and others. For example, the American Association for the Advancement of Science named **Jim Carrington**

as a fellow. He is a faculty member in Botany and Plant Pathology and director of the Center for Genome Research and Biocomputing. **Greg Perry**, head of the Department of Agricultural and Resource Economics, was named a Fulbright Scholar. The Western Agricultural Economics association named **Bruce Weber** a distinguished scholar. **Jim Males**, head of the Department of Animal Sciences, concluded a term as president of the American Society of Animal Science. **Dan Arp**, head of the Department of Botany and Plant Pathology, was named an OSU distinguished professor. **Lynn Long**, staff chair for the Wasco County office of OSU Extension and a faculty member in Horticulture, was named Outstanding Extension Horticulturist by the International Dwarf Fruit Tree Association, while another horticulturist, **Robin Rosetta** of the North Willamette Research and Extension Center, received the Distinguished Education Award from the Oregon Association of Nurseries. There were many others.

Three College of Agricultural Sciences faculty **published books** in 2005.

**Brewer, Donald Haden** and Oregon State University Seed Certification Service. 2005. *Oregon seed production : Early history and recollections*. Corvallis, Or.: OSU Seed Certification Service.

Hall, Bonnie B. and **James D. Hall**. 2005. *Ever blooming : The art of Bonnie Hall*. Corvallis: Oregon State University Press.

**Jaeger, William K.** 2005. *Environmental economics for tree huggers and other skeptics*. Washington, DC: Island Press.

Nine College of Agricultural Sciences faculty members are **editors or associate editors** of eleven major scientific periodicals. They are:

- **Jerri Bartholomew**, Microbiology, associate editor of the *Journal of Aquatic Animal Health*;
- **Lynda Ciuffetti**, Botany and Plant Pathology, associate editor for *Molecular Plant-Microbe Interactions*;
- **Stephen Giovannoni**, Microbiology, associate editor of *Environmental Microbiology*;
- **Kate Lajtha**, Botany and Plant Pathology, editor-in-chief for *Biogeochemistry*;
- **Michael Morrissey**, head of the OSU Seafood Laboratory, co-editor of the *Journal of Aquatic Food Product Technology*;
- **Patricia Muir**, Botany and Plant Pathology, associate editor of the *Canadian Journal of Forest Research*;
- **Christopher Mundt**, Botany and Plant Pathology, editor-in-chief, *Phytopathology* (term ended December 2005);
- **George Rohrmann**, Microbiology, editor of *Virology*, and associate editor of the *Journal of Virology*, and of *Biomed Central Microbiology*, and of *Virus Genes*;
- **Janine Trempy**, Microbiology, editor of the *Journal of the American Society for Microbiology*.

Many other faculty members serve on **editorial boards** for significant scientific publications. They include:

- **Alan Bakalinsky**, Food Science and Technology, for *Applied and Environmental Microbiology*;
- **Luiz Bermudez**, Microbiology, for *Clinical Immunology Reviews* and *Infection and Immunity*;
- **Peter Bottomley**, Microbiology, for *Applied and Environmental Microbiology*;
- **Theo Dreher**, Microbiology, for *Virology*, and for *Journal of Virology*;

- **Katharine Field**, Microbiology, for *Applied and Environmental Microbiology*;
- **Bruce Geller**, Microbiology, for *Journal of Dairy Science*;
- **Dennis Hruby**, Microbiology, for *Frontiers in Science*;
- **Michael Kent**, Microbiology, for *Journal of Fish Diseases*, and for *Journal of Eukaryotic Microbiology*; and for *Diseases of Aquatic Organisms*;
- **Robert Lackey**, Fisheries and Wildlife, for the *Journal of the American Fisheries Society*, and for *Renewable Resources Journal*;
- **Dave Pyke**, Rangeland Ecology and Management, for *Restoration Ecology*;
- **Carl Schreck**, Fisheries and Wildlife, for *Diseases of Aquatic Organisms*, and for *Comparative Biochemistry and Physiology*, and for *Aquaculture*;
- **Bernadine Strik**, Horticulture, for the *International Society for Horticultural Sciences*;
- **JunJie Wu**, Agricultural and Resource Economics, for the *American Journal of Agricultural Economics*, and the *Journal of Environmental Economics and Management*;

### ***Student recognition and awards***

The College honored four high achieving undergraduates with The Burlingham Student of Excellence, Capital Press Outstanding Senior in Agriculture, Savery Outstanding Master's Student, and Savery Outstanding Doctoral Student awards.

Six students in the College received University-level awards:

- Three recognized with the University's Clara H. Waldo and E.A. Cummings Outstanding Student Award are **Wes Crawford**, a senior in General Agriculture from Oakland, Oregon; **Collin Kayser**, a junior in Agricultural Business Management from Eugene; and **Mary Ann Nash**, a senior in Environmental Economics, Policy, and Management from Bend.
- **Krista Eucken**, a senior in Fisheries and Wildlife from Scio, received the Drucilla Shepard Smith Scholastic Award.
- **Pachida Lo**, a senior in Bioresource Research from Portland, received OSU's Distinguished Student Service Award.
- **Kim Marshall**, a senior in Animal Sciences from Sherwood, received the OSU Student Alumni Association Legacy Merit Scholar Award.

In addition, a national organization for minority students elected a College of Agricultural Sciences student to national office. **Jee Lee**, a senior in Bioresource Research from Beaverton was voted Region VI national undergraduate vice president for Minorities in Agriculture, Natural Resources, and Related Sciences (MANNRS).

## Strategic Plan implementation

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### **University focus areas for 2005-2006**

#### **Enhancing student success**

Many College of Agricultural Sciences faculty go to extra lengths to enrich their students' educational experience inside and outside the classroom. They offer such things as unusual experiential learning by embracing partnerships in research with undergraduate students, and by ensuring that the latest in new knowledge from OSU research makes its way quickly into the classroom. Here are some examples.

#### **Undergraduate success in URISC**

College of Agricultural Sciences undergraduate students have been successful competitors for participation in OSU's Undergraduate Research, Innovation, Scholarship, Creativity (URISC) program. Of the 29 awards made by the University during 2005-2006 school year, six students won stipends to work with faculty members in four departments in the College. The students and their projects are:

**John Castle**, working with **Thomas Shellhammer** in Food Science and Technology: *Hop-Derived Polyphenols as a Clarifying Agent in Hot Wort.*

**Sandy Chan**, working with **Nancy Kerkvliet** in Environmental and Molecular Toxicology: *Influence of Ah Receptor Gene in T Cell Responses.*

**Emily Hamblen**, working with **Selina Heppell** in Fisheries and Wildlife: *Nursing Duration and Frequency in Determining Stellar Sea Lion Pup Weaning.*

**Gautam Mankaney**, working with **Andrew Buermeyer** in Environmental and Molecular Toxicology: *Effect of Cancer-Associated Mutations on MLH1 Interaction with Exonucleases.*

**Caitlin Murphy**, working with **Fred Stormshak** in Animal Sciences: *Estrogen-Induced Membrane Signals Affecting Protein Synthesis and Glucose Oxidation in the Ovine Endometrium.*

**Andrew Nguyen**, working with **Andrew Buermeyer** in Environmental and Molecular Toxicology: *Biochemical Defects Associated with Pathogenic Mutations in Human MLH1.*

#### **Cutting edge research is also on fast-track to the classroom**

Because faculty in the College of Agricultural Sciences are integral to a large-scale research and extension enterprise, students benefit in multiple ways. They have **access to a far broader range of faculty expertise** than would be the case were research and extension not present. Students also are far more likely to have regular **access to cutting edge science** as their professors bring it regularly into the classroom.

For example, **David Hannaway**, professor of crop science, has developed a Forage Information System (FIS) that has attracted major content contributions from his colleagues around the world. The FIS is now used as the framework for teaching Forage Production (CSS310), assuring that students have access to the latest issues in and discoveries about forage systems globally. The same course is now offered as an E-Campus course.

**Michael Banks**, a faculty member in Fisheries and Wildlife who is affiliated with the Coastal Oregon Marine Experiment Station, is refining the way salmon can be precisely identified and

counted using molecular markers—a matter of enormous consequence to salmon recovery efforts in the West. Banks is introducing the results of this research into several courses, a six-credit course called Coastal Population Genetics (FW590X), a two-week concentrated course in Coastal Ecology and Resource Management (FW426/526), and in Salmon Estuarine and Ocean Ecology (FW599).

Students in **Al Menino**'s undergraduate classes in the Department of Animal Sciences are introduced to the latest processes and techniques for genetic modifications in livestock. Menino's research is aimed at learning more about critical processes occurring during early embryo development in livestock. Ultimately, the procedures developed in this work will be integrated with other biotechnology efforts, such as transgenic animal production, to produce animals with improved growth rates and disease resistance that will make livestock production more efficient. Discussions of this work are part of the classroom and laboratory work in Reproduction in Domestic Animals (ANS316 and 317) and Applied Physiology of Reproduction (ANS327). In addition, graduate students working with Menino are part of a national network with other graduate students (about 40 in 11 states) doing similar studies.

### **Preparing students for success: graduates who fit the jobs market in food science**

As consumers develop ever more discerning palates and become more discriminating about the food they buy, companies that process, prepare, distribute, and serve foods seek scientifically educated, job-ready graduates to develop new products and improve those already in the marketplace. This has created **high demand for food scientists** who can tease out necessary information about a food's biochemistry, molecular interactions, and nutritional impact. The College's Department of Food Science and Technology is educating and graduating students who can respond to the need.

Jobs are available for all degree levels, but most are entry-level positions for graduates with bachelors and masters degrees. Recruiters and companies call OSU's Food Science and Technology department looking for students who are ready to graduate and who have the expertise they seek. They project there will be openings for at least the next three to five years as the baby-boomer segment of the industry's workforce approaches retirement age.

The department's **undergraduate program has doubled** (to 80 students) in two years. Two factors loom large in driving the increase. First, students have unique opportunities in beer-brewing and wine-making, both are options to the core program. Few universities have such specialized programs. Second, with public interest in (and purchasing of high-end foods) at an all-time level, there are development opportunities for new foods—something for which the department's graduates are well-prepared.

Department head Bob McGorin and faculty in Food Science have designed their programs to align with what they have learned about industry needs. By offering such courses of study and by staying in close communication with the food industry, they help assure that their students of today meet success in the "real world" tomorrow.

## **Increasing research and outreach**

### **Establishing the Oregon Sustainable Agriculture Resource Center**

The Oregon Sustainable Agriculture Resource Center is a consortium of state and federal agencies, non-governmental organizations, and private business commissioned by the State of Oregon as part of the Oregon Solutions Program. The Resource Center will advance sustainable

agricultural and natural resource practices that have positive environmental, economic, and social consequences for Oregon.

Governor Ted Kulongoski has directed Oregon State University to provide leadership for this consortium in two phases: (1) Organization and development, and (2) ongoing operations. Dean **Thayne Dutson** convened and coordinated early work to form the consortium among the OSU Institute for Natural Resources, food processor NORPAC, Oregon Department of Agriculture, Oregon Department of Energy, Defenders of Wildlife, U.S. Natural Resources Conservation Service, The Food Alliance, Water Resources Department, Oregon OSHA, Oregon Watershed Enhancement Board, Oregon Department of Fish and Wildlife, Eugene Water and Electric Board, SalmonSafe, Oregon Department of Environmental Quality, Tillamook County Creamery Association, Agricultural Cooperative Council of Oregon, Celilo Group Media, and others.

The Oregon Sustainable Agriculture Resource Center (OSARC) will provide one-stop shopping **access to informational, financial, and technical resources related to sustainable agriculture**. In response to rapidly changing market demands, Oregon's farmers and ranchers increasingly are turning to sustainable agriculture practices and certification programs; therefore they need ready access to the complex information and resources that are available.

For Oregon's farmers and ranchers, OSARC will draw together and make access easy to such resources as:

- A one-stop-shopping website for farmers, ranchers, and resource professionals;
- Access to all financial incentive programs in Oregon;
- Access to technical assistance for planning, permits, and on-the-ground work;
- Certification programs, standards, and self-assessment tools;
- Soil, water, pest management, fish and wildlife habitat, and safe and fair working conditions;
- Relevant regulations and assistance with achieving compliance;
- Training and educational opportunities; and
- Staff to answer producer requests for information or other resources.

OSARC represents a marginal additional investment that will greatly increase the use and effectiveness of the resources already available from public and private partners. It provides a coordinated one-stop shop where producers and those working with them have ready access to the information, agencies, and programs they need.

### **Key hire advances water and watersheds work**

Several College faculty members collaborated in developing the University's **strategic initiative on water and watersheds**, and are designated participants in the Institute for Water and Watersheds and in new graduate degrees in water sciences. The College has committed matching funds for this initiative. **Agricultural Sciences Dean Thayne Dutson chaired the search committee for the Institute's new director, Michael Campana**, a hydrogeologist and international expert on a range of complex water management issues. Campana became director of the Institute this year. He brings extensive knowledge and experience on water resources in developing countries, cross-boundary water resource issues, water allocation and availability, and other areas.

A major thrust of the Institute is connecting those at OSU with expertise in water and watersheds with stakeholders across the state. This engagement with stakeholders is one in which the College expects to play a large part, given its long-established relationships, both through the Extension Agriculture Program and the research enterprise, with many of those stakeholders who are engaged in agriculture, food processing, and natural resource management. Additional dialog with these water users, conservators, and managers holds great promise for identifying additional

research opportunities. Those, in turn, will engage students in the new masters and doctoral programs in Water Resources Engineering, Water Resources Science, and Water Resources Policy and Management.

### Welcoming a new faculty cohort

After a major reduction in faculty (approximately 80 FTE) made necessary by budget reductions beginning in 2001, many valued research and outreach activities were curtailed. In the past 18 months, however, the College has been able to approve filling a number of high-priority positions. As may be expected, the process for attracting highly qualified candidates can be lengthy but, during the past year, many of these positions have been filled. To welcome these new members of the University community, **the College is treating the new hires as a cohort**, sponsoring events and making opportunities available for these faculty to get acquainted with (and support) one another, to meet colleagues in other academic units, to understand and appreciate the College's culture, and to tour facilities in and outside Corvallis. Among the activities, for example, have been a Dean's Reception, encouragement for participation in Conversational Skills Workshop sponsored by the Provost's Fund for Excellence, and an upcoming bus tour of off-campus research facilities. It is the College's intent that treating our new faculty as a cohort is an additional investment in research and outreach that will help them "ramp up" their work efficiently and effectively. Several of new faculty in core disciplinary areas will *participate* in interdisciplinary teams relating to the College's Goals 1-4<sup>1</sup>, while nine positions will *focus primarily* on them.

### Outreach that works: modest effort with wide-reaching results

Oregon's cattle ranchers strive to produce and deliver high quality beef to enter the nation's food supply. It takes a wealth of knowledge to achieve that goal consistently and, at slaughter, carcasses can be condemned if they show signs of improper administration of injections or otherwise faulty animal husbandry practices. Central Oregon Extension agent and staff chair **Cory Parsons** wrote and received a grant from the OSU Extension Agriculture Program to carry out Beef Quality Assurance (BQA) programs around the state. In an effort that concluded last year, Parsons conducted eight training programs and certified 135 livestock producers. These certified producers say they feel better prepared to continue producing a healthy, wholesome product. Recent USDA audits of beef produced in the state show a decrease in the number of injection site lesions and a decrease in the number of bruised carcasses at slaughter. Thus, even a modest but well-designed and -delivered program yielded both **food safety benefits and economic gains** for Oregon producers.

### Department of Horticulture lauded for integration of extension and research

*The Agenda for the College of Agricultural Sciences*, a strategic foundational document that lays out long-term goals and practices, stresses the importance of striving for functional integration within the College; that is, for **blurring the lines among the three functional areas of education, research, and outreach**. The rationale is one of increased effectiveness. A recent

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<sup>1</sup> The College's four strategic emphases are: (1) Emphasize research, technology development, and technology transfer that will establish and support a **biobased Oregon industry** that produces energy and other products. (2) Apply scholarship and technology to enhance the capacity of managed landscapes and their biota to optimize the production of **ecosystem services**, such as: carbon sequestration, wastewater treatment, bioremediation, maintenance of biodiversity, and others. (3) Advance basic bioscience research and apply knowledge to create enhanced **foods and food products, nutrition, and health**. (4) Advance understanding and effective management of **water, watersheds, and other water-related resources**.

program review of the Department of Horticulture by a team fielded by the U.S. Department of Agriculture recognized such integration in Horticulture. Its report said:

*“The extension programs in the Department of Horticulture are difficult to distinguish from the applied research programs. Extension faculty carry out applied research on developing production systems to assist growers and many research faculty are integrally involved in the extension activities to disseminate these programs. Extension faculty and research faculty function and report accomplishments based on position description rather than academic appointment. The review team appreciates that this has been a conscious effort on the part of the department and agrees that **this is the model of the future**. Overall, the impacts of departmental extension programs have been impressive.”* [Note: Emphasis added.]

To greater or lesser extent, such integration may be found in the College’s other academic departments that have extension programs.

### **Intensive review and collaboration yield new research plan**

During this past fiscal year, the U.S. Department of Agriculture’s Cooperative State Research, Education, and Extension Service (CSREES) required future state 5-year Plans of Work (POW) to embody planned programs rather than the collections of individual projects (which had been the past norm). Each such program is expected to produce measurable outcomes that address “Knowledge Areas” established by CSREES. This method of planning applies to both the state Agricultural Experiment Station and Extension Service.

In Oregon, the Agricultural Experiment Station (OAES) **consolidated its suite of 269 projects into 32 interdisciplinary and integrated programs**. Over a period of several weeks, OAES faculty and leadership worked to restructure the OAES projects into more thematic clusters, develop cluster leadership, and begin to address multiple reporting issues. In some cases, **programs crossed departmental and mission lines**. In other cases, **programs were developed to address thematic issues through interdisciplinary teams**, such as dryland cropping systems or sustainable animal production in mixed conifer habitats.

Each state Planned Program was formatted around the “Logic Model,” a nationally recognized method and used extensively by planning and evaluation specialists to display the sequence of actions that describe what the program is, what it will do, and how investments link to results. Components in the model include situation and priorities, inputted resources, proposed activities, resultant products and services, and outcomes. The new system also required development of state output and outcome measures. OAES’s primary **output measures** focused on scholarly excellence in **animal and plant production systems, genetics and mechanisms of microorganisms, human health, environmental health and ecology, food technology, bioproduct production, economics and marketing, and distance and volunteer education**. Outcome measures dealt with short-term measures (e.g., informed decision-makers and citizenry, knowledge and awareness, products, services, model development), medium-term measures related to application and adoption of practices, and long-term outcomes that focused on changes in businesses, organizations, society and the environment.

Examples of OAES programs include **themes such as land use economics, integrated pest management, plant and animal genomics, animal health and disease, production efficiencies, plant cropping systems, alternative energy systems, a healthy world, human nutrition, and food processing systems**.

Although this effort required a great investment of time and attention by department heads, research leaders, Jan Auyong, and others, it **enables us to frame our research enterprise in more succinct and understandable language and to continue the College’s commitment to**

**accountability and transparency in our programming.** In addition, OAES has begun discussions with OSU Extension Service to further integrate activities at OSU. Proposed outcomes include a shared reporting process, and greater participation on integrated (research and extension) and multistate projects.

## **Enhancing diversity and community**

### **Partnerships address dynamic demographics of potential students**

With the rise in the number of Hispanic students and the decline in the number of Caucasian students within the K-12 pipeline in the state of Oregon, recruiting underrepresented students is becoming an imperative. The College has been developing a **minority student recruitment program by visiting organizations that serve underrepresented students**, developing Spanish-language recruitment materials, and forming partnerships with pre-college programs that serve underrepresented students. The College has been noted within the University for its level of engagement in minority recruitment.

Among the organizations that serve underrepresented students—and with which the College has established relationships—are these: Confederated Tribes of Grand Ronde; Native American Youth Association; Oregon Migrant Education Service Center; Oregon Department of Education Title VII (Indian education); Upward Bound at Chemeketa Community College and Portland State University; Urban League; the SMILE program; MESA; and others.

In addition, the College of Agricultural Sciences has completed the second year of **Community Leadership in Agricultural Sciences (CLAS)**. These students assist the College in recruiting underrepresented students. Three students served on this team. CLAS students' responsibilities include visiting selected Oregon middle and high schools, community and cultural centers, leadership conferences; attending diversity-related college events and training; setting up and leading college tours and workshops for prospective individuals and high school and middle school student groups.

Representatives of the College also attended state and national conferences and college fairs for Native American and migrant students in Astoria, Grand Ronde, Lincoln City, Portland, and Yakima.

As a result of these efforts, **more underrepresented students learn of the importance of agricultural sciences to their communities and the professional career opportunities available within the field.** Organizations who serve underrepresented students now bring their students to campus for tours provided by the College of Agricultural Sciences. From these efforts, the College expects increases in the number of underrepresented students choosing to pursue degrees in agriculture and natural resources.

### **Donors enable new opportunities for undergraduates**

Ernest and Pauline Jaworski have established the **Ernest and Pauline Jaworski Fund for Summer Research Experiences for Underserved Undergraduates in Plant Science**. It will bring talented and promising students to OSU for ten weeks. The program will be directed so that students participate in an ongoing research project under the supervision of a faculty mentor and other activities that will help to prepare them for graduate school.

The goal of this program is to **increase the level of diversity among students who enter doctoral programs to pursue careers in university teaching and research by providing research opportunities to undergraduates that have been underserved.** Program objectives include: providing students with the preparation to become research scholars; stimulating serious

consideration of graduate study; and increasing the number of successful underserved applicants and subsequent enrollment of these students in graduate school.

This program affords students an opportunity to conduct selected research under the direction and guidance of an OSU faculty member. Special consideration will be given to applicants that have shown potential for success, but may have had limited access to graduate research or other preparatory opportunities. The program particularly encourages applications from: Alaskan natives, American Indians, African Americans, Mexican Americans (Chicanos), Puerto Ricans, Latinos, and Filipino Americans.

### Observations

In the pursuit of goals related to student recruiting and the enrichment of the student experience, it is important to consider not only “What works?” but also “What doesn’t?” The College’s experiences lead to two observations that have been reinforced over time and, in the first case, confirmed with a modest study:

- The pervasive and intractable image of agriculture as an area of study *only* for those who want to be farmers and ranchers continues to be a detriment to recruitment of students across all sectors, including those who come from farms and ranches. The College’s messages will continue to address the considerably great scope of academic study, and significantly more varied career opportunities. From time to time there is discussion of alternatives for the name of the College.
- Generating interest in international study among undergraduate international and domestic students continues to be a challenge—one worthy of long-term attention.

## **Summary: Promoting the thematic areas**

### **Focus on the Natural Resources initiative**

Although the College contributes significantly to four of the five theme areas, for the purpose of this report we provide examples of the variety of research projects and education programs being carried out by faculty and staff in Agricultural Sciences that advance the Natural Resources initiative. Detailed information about each of these is available in our accountability database, *Oregon Invests!*, on the Web at: <http://oregoninvests.oregonstate.edu/> Taken together, even these relatively few sample programs provide insight into the multiple avenues faculty in the College are pursuing that advance the Natural Resources initiative, which is about **managing natural resources and growing and sustaining natural resources-based industries in the 21st century**.

Every Oregonian has a stake in the state’s natural resources, their wise management, their sustainability, and the viability of the economic engine that derives from them. These examples **illustrate the breadth of faculty expertise that forwards the interests of Oregon’s natural resources**, through policy choices, improved management, exploration of new potentials, control of insects, weeds, and diseases that challenge desirable plant materials, understanding and controlling pollution, and developing and applying new tools to understand and provide wise stewardship for this complex natural resources system.

It is striking to explore any of these or other programs or projects in *Oregon Invests!* to note that almost every one is collaborative: across departments, across colleges, across agency boundaries, and, often, across state lines. **Our faculty are practiced at coordination and collaboration**. Indeed, these and many, many other educational programs and research projects in the College significantly advance the University’s natural resources initiative.

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**Agricultural and Resource  
Economics**

Andrew Plantinga	Measuring compensation under Measure 37
JunJie Wu	How do location decisions of firms and households affect economic development in rural America?

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**Animal Sciences**

Mike Gamroth (and others)	Business management for Oregon dairies
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**Biological and Ecological  
Engineering**

Gail Andrews	OSU Extension well water program
Roger Ely	Systems for biological production of hydrogen gas
Derek Godwin (and many others)	Understanding watershed ecosystems and how to maintain their health

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**Botany and Plant Pathology**

Lynda Ciuffetti	An investigation into the fungus that causes tan spot of wheat
Phil Hamm (and others)	Diversification into value-added agriculture in the Columbia Basin

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**Crop and Soil Science**

Marvin Butler	Seed production of native rangeland plants
Neil Christensen	Managing nitrogen to protect groundwater quality

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**Environmental and Molecular  
Toxicology**

Staci Simonich	Atmospheric transport of organic pollutants from Asia to the U.S. Northwest coast
Tim Root	Protecting farm workers from pesticides

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**Fisheries and Wildlife**

Samuel Chan	Aquatic invasive species educational program
Stan Gregory	Landscape processes and restoration ecology of streams and rivers

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**Food Science and Technology**

Mike Penner	Value-added processing of plant biomass
James Kennedy	Improving quality of Oregon wines

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**Horticulture**

James Altland	Solving problems in perennial container nursery stock
Rebecca McCluskey	Hazelnut advanced selection, cultivar, and rootstock evaluation

Xinhua Yin Alternative nutrient, water, and ground management strategies for pears and sweet cherries

#### Microbiology

Janine Trempy Developing natural and safe food thickeners for dairy and other food industries

#### Rangeland Ecology and Management

Jeff Miller (and others) Biological control of exotic rangeland weeds using herbivorous insects

Doug Johnson Electronic technologies for inventorying and monitoring rangelands and pastures

### **Summary: Accomplishments in support of the OSU Capital Campaign**

The College opened the 2005-2006 fiscal year with a fund-raising goal of \$3 million and concluded it having achieved **a total of about \$5.2 million, or more than 170 percent of our goal**. This is the product of work on the College's and the University's behalf by a number of individuals and groups. Working closely with Todd Bastian who is the OSU Foundation director of development for the College of Agricultural Sciences, the dean, associate deans, and department heads made almost 200 personal, face-to-face donor visits during the period. Other noteworthy steps include:

- Developed a "Dean's Campaign Advisors" volunteer structure to help focus the College's development efforts and encourage leadership gifts. We have now identified 4 prospective individuals to serve on the committee.
- We have raised roughly \$1.25 million towards our \$2 million goal for the Emery Castle Endowed Chair in Resource and Rural Economics.
- We have raised roughly \$750,000 in cash, pledges and bequests for the Animal Sciences Education and Research Pavilion, and have also opened \$1.75 million in proposals with prospective donors.
- We have implemented a new College-wide stewardship letter to thank donors for each gift benefiting the College of Agricultural Sciences.
- We are working with leaders in Oregon's and California's wine industry to develop a volunteer structure, white paper, and brochure for a proposed \$10 million "Vine and Wine Institute".

### **Other initiatives: *Art About Agriculture* program**

#### **Bridging rural and urban cultural interests in the Northwest**

*Art About Agriculture*, the College's annual fine arts competition and awards program portraying professional artists' interpretation of agriculture, food systems, natural resources, and related subjects opened in May 2006 the **first show ever of its permanent collection**. It continues through mid-September at the **Oregon Historical Society** in Portland. The collection comprises

more than 200 outstanding paintings, prints, sculptures, fabric pieces, and photographs selected in annual juried competitions of entries from professional artists throughout the Pacific Northwest.

Established by the College in 1983 as a program to help create awareness and appreciation among urban dwellers with little connection of agriculture and natural resources, *Art About Agriculture* is the nation's first and premier such program. A gift from a private donor enabled publication, in cooperation with the Oregon Historical Society, of a high quality 242-page, full-color book, entitled *This Bountiful Place*, that catalogs and illustrates each piece in the permanent collection. In conjunction with the opening of the show, the Oregon Historical Society published a major article in its Oregon Historical Quarterly about *Art About Agriculture*. Book stores, galleries, and museums throughout the Northwest are carrying *This Bountiful Place*, and libraries are adding it to their collections.

## **Scorecard**

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### ***Performance on metrics***

Please see Appendix A for information provided by the Institutional Research office.

### ***Leveraging resources***

#### **Initiatives to leverage state resources**

The single most important factor for this College in leveraging state resources comes down to clearly defining state needs, hiring highly competent faculty, and supporting their pursuit of outside research funding. Despite a serious loss of faculty FTE a few years ago (referred to earlier in this report), our success in securing grant funding continues. The most recent data (for 2004-2005) show that the ratio of external funds (in the Oregon Agricultural Experiment Station) to funds appropriated by the legislature is 1.51. Every state dollar Oregon invests generates \$1.51 in external funding.

#### **Initiatives to improve administrative efficiencies**

The College is continuing a gradual remodeling of administrative office space in contiguous space in Strand Agriculture Hall. Progress already made in the dean's office, associate deans' offices, the business office, the office of assistant director of the Oregon Agricultural Experiment Station and leader of the Extension Agriculture Program has generated significant improvements in operating efficiencies, coordination, and communication.

## **Assessment of 2005-2006 priorities**

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The College has continued to work on its previously identified goals, including those in the OSU Strategic Plan and those in the College's own plan. These include the goals of enhancing student success, increasing research, scholarship, and outreach, and enhancing diversity and community. All involve cultural change and persistence, arguing for "staying the course" as articulated in current plans, and adjusting our strategies as we continue to learn. This report is intended to characterize the progress made this year.

Major diversity enhancement efforts have focused on the completion of a diversity appraisal to assess work place and learning environments within the College (now being tabulated).

## **Proposed priorities for 2006-2007**

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### **Advance the programmatic priorities of the College of Agricultural Sciences and Oregon State University.**

Both through personal leadership and through active support of others, the dean will advance the College's strategic goals 1 through 4 in education, research and outreach:

1. To build strength in biobased products (a goal related to the OSU Sun Grant Center);
2. To build excellence in ecosystem services;
3. To build excellence in food, nutrition, and health;
4. To build excellence in water and watersheds.

In the course of advancing these priorities, the dean will sustain the College's support for the University's six initiatives, especially the four in which the College already is making significant investment:

- Computational and Genome Biology
- Subsurface biosphere: Education and Research
- Sustainable Rural Communities
- Water and Watersheds.

### **Sustain and further build active engagement in the University's capital campaign**

The dean will allocate approximately 20 percent of his schedule to personal involvement with the College's development officers and its numerous constituencies to identify and cultivate donors consistent with the College's development priorities.

### **Partner with the OSU Extension Service and OSU Forest Research Laboratory in relating to the 2007 Oregon Legislative Assembly**

Because of the importance of the Statewide Public Services (SWPS) to the state's economic, social, and environmental welfare, the dean will allocate a substantial proportion of his time in late 2006 and early 2007 to building and sustaining relationships with Oregon legislators and their staffs, working in collaboration with the University's legislative relations director and directors of the other two SWPS. A goal will be to achieve some level of additional funding to address high priority needs identified by Oregon residents who look to the SWPS for research and outreach.

# Appendix A

## Scorecard information

This information is provided by the Institutional Research office.

<b>Goal 1: Provide Outstanding Academic Programs</b>					
<b>2004-05 Themes: Increase research and outreach</b>					
<b>Increase diversity</b>					
1.1	Expenditures from Grants and Contracts, and Other Sources <sup>1</sup>	\$66,072,334	\$65,716,755	\$64,965,137	Aug-06
1.2	Invention Disclosures	13	6	12	Jan-07
1.3	% of Faculty, Staff, and Students Comfortable with Climate for Diversity	N/A	82.7	N/A	N/A
1.4	% of U.S. Minority Students of Total College Enrollment	5.4	5.8	6.2	6.5
1.x.1	External Funds Generated per State Dollar Invested in Statewide Public Services	1.29	1.41	1.51	Oct-06
<b>Goal 2: Improve the Teaching and Learning Environment</b>					
<b>2004-05 Themes: Improve student success and retention</b>					
<b>Increase diversity</b>					
2.1	First Year Retention Rate (% Within College / % Within University)	73.0 / 85.3	71.4 / 84.4	74.1 / 84.4	76.3 / 82.7
2.2	6-Year Graduation Rate (% Within College / % Within University)	43.1 / 61.8	51.3 / 70.7	58.2 / 69.7	46.2 / 62.6
2.3	Undergraduate Degrees Awarded	284	293	290	TBA
2.4	Graduate Degrees Awarded	105	89	110	TBA
2.5	% of Seniors Participating in Student Engagement Activities / Number of Respondents	N/A	93.3 / 15	84.8 / 46	N/A
2.6	Student Primary Major to Faculty FTE Ratio / Student Course to Faculty FTE Ratio	23.5 / 15.7	24.9 / 17.9	24.7 / 17.5	TBA
<b>Goal 3: Increase Revenues</b>					
3.1	Awards from Grants and Contracts (# / \$) <sup>1</sup>	555 / \$29,368,256	668 / \$35,834,483	614 / \$35,891,976	669 / \$37,982,268
3.2	Private Giving Revenue	\$1,168,796	\$1,827,412	\$1,495,528	TBA

<sup>1</sup> College of Agricultural Sciences award metrics include Agriculture Experiment Station (AES).

"N/A" -- Not Applicable

"TBA" -- Awaiting data requested from OSU unit.