



Extension Service

2005 Annual Report of Accomplishments and Results

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Overview

Oregon State University Extension programs are conducted in all 36 counties of the state. Faculty are housed in county Extension offices, at Experiment Stations, on campus, and with partner agencies such as the Oregon Food Bank and the Multnomah County Education Service District. Programming is in five areas: Agriculture, 4-H Youth Development, Forestry, Family and Community Development, and Sea Grant. In addition, faculty perform multidisciplinary activities such as the statewide watershed program.

This report documents the rationale for programming, activities conducted and impacts of programming during 2005.

Summary of Program Activities and Impacts

Each program described in the following pages was deemed to be representative of the broader programming conducted by the Oregon State University Extension Service and to have significant and documented impacts on target audiences.

Goal 1: An agricultural system that is highly competitive in a global economy.

A. Key Theme: Agricultural Production Efficiency

1. Title: Improving Economic Efficiency by Optimizing Beef Cattle Winter Feeding

Issue: Supplemental feed is the largest expense for most livestock producers, accounting for up to 50% of variable production costs. A producer with inadequate knowledge of nutrition tends to overfeed (incurring unnecessary cost) or underfeed (jeopardizing reproductive performance and animal health). Most beef producers in Oregon have not fully utilized modern nutritional techniques and technologies to improve their feeding efficiency.

Target audience: Oregon beef cattle producers

What was done: Extension livestock specialists taught producers to feed their animals more scientifically by using: (1) ration formulation software; (2) a library of Oregon feeds and forages, developed for use with the formulation software; and (3) other resources such as the new “Winter Feeding Workbook.”

Impact: Participating producers report saving an average of \$21/head by using these technologies. Examples include a producer who reduced feed cost by \$45/cow by substituting low-quality grass seed straw for 25% of his feed; another sold 90 tons of high-quality hay he determined he would not need; a third reduced the cost per pound gain on weaned calves by adding barley to a forage-based program.

Optimizing inputs in relation to outputs has an even greater impact on profitability than reducing costs. For example, a Klamath Falls producer sold his higher quality hay to buy feed that better met his animals’ requirements at a lower cost. Another producer on the south coast sold his farm-raised, low-quality hay, bought higher quality hay, and thereby increased his cows’ body-condition scores, which potentially increases profitability. In Lake County, a producer weighed his feeders monthly and adjusted feed rations accordingly, using some 50 tons less of alfalfa than in the previous year. In Malheur County, a producer balanced his mineral program and lowered retained-placenta incidence from 10% to zero, reducing next year’s calving interval.

So far, 105 ranches across Oregon are participating in the program with an estimated net profit gain of \$7,000/ranch/year. Therefore the total savings for ranches in the pilot phase of the program is approximately \$735,000. As other ranches join the program, benefits statewide will increase. Most recent data available show 645,900 head of beef cattle in the

state. If \$21/head were saved on only 10% of Oregon cattle ranches, producers would save almost \$1.35 million/year.

Scope of impact: Oregon Statewide

Funding: Smith Lever 3(b)(c)
State Extension funds
County Extension funds

2. Title: Stewardship Certification for Vegetable Crops in the Pacific Northwest

Issue: In the early 1990s, there was growing public concern about the safety of food produced on farms and concern about the possible negative impacts of farming on the environment. There also seemed to emerge price incentives and/or increased market-share opportunities for a food production and processing system that could be certified as “environmentally friendly.”

Target audience: Vegetable producers
Food processors
Food buyers and distributors
Food consumers

What was done: In 1994, the multistate Marketing and Production Alliance for Sustainable Agriculture (MAPASA) began with support from a \$1,006,000 grant from the W.K. Kellogg Foundation. This has since evolved into the Food Alliance. The Alliance has actively supported development and certification of stewardship-based farming programs that may lead to soil, water and wildlife conservation. From 2003-2004, Extension faculty collaborated with the Food Alliance and a group of ten processed-vegetable growers to craft a Food-Alliance-certified environmental stewardship program for NORPAC Foods, the largest farmer-owned vegetable processing cooperative in the Northwest.

Impacts: In 2005, the NORPAC Foods Stewardship Program was recognized by SYSCO Foods, one of the nation’s largest institutional food buyers, as one of the best stewardship programs in the processed vegetable industry. Other food processors are looking at this program for use with their producers. As participation in this program is growing, producers see improved prices and marketability while the public has assurance of food safety and preservation of environmental quality.

B. Key Theme: Plant Health

1. Title: Center to Expedite Registration of Pest Management Substances for Minor Crops

Issue: Oregon produces more than 50 horticultural food crops with combined annual sales exceeding \$500 million, yet each is a “minor” crop in terms of total U.S. production. Growers of minor crops have limited pest-management options due to (1) the 1996 federal Food Quality Protection Act (FQPA), and (2) the economics of manufacturing and registering pest controls for very small numbers of growers. Limited availability of approved chemicals for safe and effective control of agricultural pests increases potential for crop damage and/or failure, directly impacting this important segment of Oregon agriculture.

Target audience: Oregon producers of “minor” crops

What was done: Oregon grower groups and commodity commissions work with manufacturers, state agencies, IR-4 (USDA’s Interregional Research Project No. 4) and the U.S. Environmental Protection Agency to maintain pesticide registrations and obtain new ones. The Center to Expedite Registration of Pest Management Substances for Minor Crops was established in 1995 to expedite registration of minor crop pest management substances. The Center develops performance data to support grower requests to the IR-4 Project, and it monitors the progress of requests. It also conducts field studies of pesticide residue to determine whether a substance meets EPA standards for food products. It also prepares Section 18 and Special Local Need Requests to submit to the Oregon Department of Agriculture.

Impacts: Impacts are in three areas—environmental, economic, and social.

Environmental: Given the FQPA, more emphasis is on new pesticides that are more environmentally friendly. Many are target specific, rather than broad spectrum, and are suitable for Integrated Pest Management (IPM) programs. Unlike older products, new compounds have short residual lives and thus do not persist in the environment or pollute water sources. Most also are not toxic to beneficial insects and use significantly less, or no, organophosphates or carbamates, thereby meeting an important EPA goal. Therefore, employment of new materials using IPM methodologies greatly reduces potential impact to the environment.

Economic: Without some of these newly registered substances, crops yields would fall or be lost entirely. Section 18 and SLN 24c (Special Local Need Requests) registrations alone document potential losses of \$22 million annually if minor crop pesticides and herbicides are not available. Re-registered herbicides avoid costly hand weeding and crop losses from weed competition. Other products avoid losses from insects and diseases while generating gains in higher quality produce. Examples of annual savings include:

- Re-registration of 2,4-D for sucker control on 28,770 acres of hazelnuts: saves growers nearly \$1.8 million each year.

- Lorox for 100 acres of celery: saves \$68,000 annually over the cost of hand weeding.
- Command in cucurbit crops: saves growers \$149,500 annually.
- Goal for transplanted cauliflower, broccoli, Brussels sprouts and cabbage: If weed competition were to reduce yields by 25%, loss to growers would be \$4 million.
- Poast for grass control in 1,000 acres of rhubarb: saves growers \$428,000 annually.
- Malathion for aphid control in rutabaga and turnips: saves growers \$450,000 annually.
- MCPA re-registered for weed control on 1,000 acres of pea seed and 2,500 acres of processing peas: without this, these crops would not be grown.
- Emergency use of fenbuconazole (Indar) fungicide to control mummyberry disease in blueberries: potential loss without fenbuconazole is \$12.6 million (50% yield loss on 3,500 acres).
- Oxyfluorfen (Goal) on 6,400 acres of blackberries for primocane suppression: without Goal, an 18% yield reduction would mean a loss of \$530/acre, or about \$3.4 million each year.
- Emergency use of sulfentrazone (Spartan) herbicide for weed control in strawberries: potential loss without sulfentrazone is \$3.5 million annually.
- 24c SLN use of Dual Magnum for weed control in rhubarb in 2005 on 90% of approximately 750 acres:, saves growers \$500/acre.
- Outlook herbicide Section 3 registration in bulb onions in 2005 on 25,000 acres in eastern and western Oregon: reduced weeding cost.
- Outlook section 18 for weed control in Golden Delicious squash in 2005 was used on 2230 acres to control nightshade.
- Sandea 24c sln 2003 for weed control in all cucurbits used on 1530 acres of cucumbers squashes and pumpkins.
- Strategy 24c SLN for broadleaf weed control in cucurbits used on 940 acres of cucurbits.
- Select herbicide approved for grass weed control in clover grown for seed.
- Raptor herbicide approved for weed control in clover grown for seed.
- Endura fungicide approved for white and gray mold control in snap beans, section 3.

Conservatively, at least half the almost \$20 million/year saved can be attributed directly to the Center's work. And this estimate does not consider the additional value of better quality produce.

Social: Public benefits, beyond those to growers, are easy to see in the variety and quality of food available to consumers in Oregon and other states as well as abroad. Also, rural communities in the state benefit from profitable production of these many minor crops. New pest control materials being registered are more environmentally friendly than older products, and the food supply is safer because of this work on Oregon's minor crops.

Scope of impact: Oregon Statewide

Funding: Smith-Lever 3(b)(c) funds
State Extension funds
County Extension funds

Goal 2: A safe and secure food and fiber system.

A. Key Theme: Food Safety

1. Title: 2004–2005 Queso Fresco Programming

Issue: Queso fresco, a soft cheese, traditionally is made in Mexico with raw milk. This technique has been brought to the U.S. by Mexican migrants. A foodborne illness outbreak in the late 1990s among Hispanics in Washington’s Yakima Valley was linked to queso fresco. The OSU Extension Service initiated programming for Hispanics in response to that incident.

Target audience: Low-income Hispanic adults

Goals: To teach how to make queso fresco safely at home (by pasteurizing raw milk to kill pathogenic bacteria that cause listeriosis and salmonellosis). Attendees were informed about the dangers of purchasing cheese from nonlicensed facilities.

What was done: The Oregon Dairy Products Commission funded cheese-making supplies (thermometer; Rennett, cheesecloth) for participants in classes conducted by OSU Extension’s Nutrition Education Program for low-income Hispanics. From October 1, 2004 to September 30, 2005, there were 301 class participants in six counties (Clackamas, Washington, Marion, Yamhill, Linn, and Lane). A sample of 45 Portland metro area participants was interviewed later by phone to evaluate the impact. (Respondents ranged in age from 16 to 44 with a mean of 27.5 +/- 6.3 years.)

Impacts:

- Eighteen percent reported making queso fresco before the class. Of these, 75% used milk from a dairy rather than from a grocery store, an unsafe behavior unless the milk is pasteurized. (Note: This activity may have occurred while they were living outside the U.S.)
- After the class, 73% reported making queso fresco using the new OSU Extension recipe instruction. All reported using milk from the grocery store.
- After the class, 100% of respondents believed that you can get sick if milk from the dairy isn’t heated first.
- Eighty-four percent reported using the thermometer (received in class) for their cheese-making.
- Eighty-seven percent had used the thermometer to determine the temperature of other foods (a food safety benefit).
- Seventy-three percent had given the queso fresco recipe and instructions to 2.5 +/- 1.3 persons (a range of 1 to 6).

Scope of impact: Six Oregon counties

Funding: Smith-Lever 3(b)(c)
USDA/Food and Nutrition Service
State and local OSU Extension funds
Community partner matching funds
Oregon Dairy Products Commission

Goal 3: A healthy, well-nourished population.

A. Key Theme: Human Nutrition

1. Title: Nutrition Education Program (NEP)

Issue: Poor nutrition and physical inactivity are linked to chronic illnesses such as cancer, heart disease, diabetes and obesity. In 2003, 58% of adult Oregonians were obese or overweight. Only 1 in 4 Oregonians eat the recommended daily servings of fruits and vegetables. In Oregon, disadvantaged populations have a greater chance of not meeting physical activity recommendations. Additionally, hunger rates are higher in Oregon than the national average. Lower income women with children are significantly less likely to use the “nutrition facts” label when buying food. Households with strict budgets were found to be significantly less likely to: make a complete list before going shopping; shop around for bargains; use coupons; or stock up on sale items. Pregnant women, young children, older adults and people with compromised immune systems are at risk for foodborne illness.

Target audience: Low-income adults and youth, most of whom receive some type of public assistance (e.g., Food Stamps, TANF, WIC, Head Start, Free/Reduced Price Meals, emergency foods).

Goals: 1) Improve health and reduce risk of chronic diseases through healthy eating combined with daily physical activity; 2) improve food safety practices.

What was done: Adults learned practical skills in food budgeting and feeding young children on a limited budget. Adults and youth learned about food safety, food preparation and other topics. NEP staff and trained volunteers reach adults and youth through series of classes, single events, public events, exhibits and newsletters. They used a variety of community settings, such as state agency offices, community centers, churches, schools, low-income apartment complexes, food pantries, migrant camps, family shelters, teen-parent programs, and USDA Summer Food Service sites. Extension and NEP community partners pledged \$2,066,212 in match funding in FFY2005 to support programming efforts. This resulted in equivalent support from the federal Food Stamp program, representing \$4,158,639 in total effort.

Impacts: NEP directly reached 21,577 participants with 105,433 contacts in FFY2005. Another 90,595 contacts with individuals were made indirectly through public events – food or activity demonstrations, displays, newsletters and a kiosk.

Results from adults completing a series of classes:

- 514 (73% of 704) improved food resource management, such as meal planning/budgeting
- 158 (84% of 187) improved nutrition practices, such as choosing healthy food and reading labels

- 392 (57% of 689) improved food safety practices, such as storing and thawing foods properly
- Of those who completed 24-hour diet recalls, 346 (91% of 380) showed a positive change in any food group at exit

Results from adults in a single-event class:

247 (46% of 537) adult participants more often eat more than one kind of vegetable each day. One participant named John shared, “Through the nutrition class series, I learned to like vegetables and began eating more each day. This is the first time in my life I have started thinking about what I eat. I’ve never liked vegetables, but I have liked all the recipes we have made in class.”

Results from youth completing a series of classes:

- 233 (74% of 300) youth now eat a variety of foods
- 174 (31% of 554) youth increased their nutrition knowledge
- 1003 (42% of 2374) youth increased their ability to select low-cost, nutritious foods
- 407 (80% of 507) youth improved their practices in food preparation and safety

Scope of impact: 31 Oregon counties

Funding: Smith-Lever 3(b)(c)
 State Extension funds
 County Extension funds
 Food & Nutrition Service
 State and local Extension funds
 Community partner matching funds

2. Title: Start Smart Eating and Reading Curriculum

Issue: American youth consume 50% of their daily calories in the form of added fat and sugar, leading to obesity and a host of diet-related diseases. Current costs of obesity-related disease are estimated at \$781 million statewide. But because obesity is spreading to an increasingly younger population, costs are expected to increase dramatically in the not-so-distant future (Oregon currently ranks seventh among the states for percentage of overweight low-income children ages 2–5.)

Target audience: Kindergarten through second-grade classes, particularly in neighborhoods near schools where 50% or more students qualify for free or reduced price lunches; 4-H club meetings

Goals: To emphasize the importance of including fruits and vegetables, whole grains, and low-fat dairy products at breakfast, and the importance of being physically active each day.

What was done: Start Smart Eating and Reading (SSER), a five-module curriculum that links nutrition messages (about the importance of a healthy breakfast) with children’s

literature, was offered by NEP and 4-H faculty and staff. In FFY2005, the SSER program was pilot tested in 15 Oregon counties. More than 1,900 elementary-school-age children participated; 980 evaluations were analyzed.

Impacts:

Results from student pre- and post-test evaluations

- Improvement in participants' knowledge of the importance of eating breakfast every day (72.9% vs. 85.4%)
- Improvement in participants' knowledge of the benefits of selecting foods from at least three food groups for breakfast (50.9% vs. 66.7%)
- Improvement in participants' ability to identify fruits and vegetables (85.1% vs. 90.2%)
- Improvement in participants' ability to identify foods made with grains (30.7% vs. 47%).

Results from teacher surveys

- Teachers said the curriculum activities were age appropriate and that students enjoyed the activities.
- Teachers said the series increased student knowledge about both the importance of breakfast and the components of a healthy breakfast.
- Students had reported sharing information learned in the curriculum and/or from parent newsletters with their families.

Additional evidence of program effectiveness

- The SSER curriculum site received 928 hits
- Approximately a third of these hits were repeat visitors.

Scope of impact: 15 Oregon counties

Funding: Smith-Lever 3(b)(c)
State Extension funds
County Extension funds
USDA Food Stamp funds
Oregon Dairy Council
Oregon Department of Education

3. Title: Food Security Programming

Issue: A community is “food insecure” when residents do not have access to safe, nutritious, affordable, adequate and culturally appropriate food from non-emergency sources at all times. Oregon rates of both hunger and food insecurity are higher than the national average. In response, emergency and other food assistance programs for low-income families are critical. Additionally, steps must be taken to assure that these foods are utilized properly to provide adequate nutrition for target audiences.

Target audience: Food pantry clientele; Nutrition Education Program clientele; Emergency Food Network staff and volunteers; students; Family Food Education (FFE) volunteers; Family and Community Education (FCE) groups.

Goals:

- Increase public awareness about hunger issues
- Train volunteers to help food pantry clientele improve diet quality, food security, food safety and food resource management
- Increase skills of food-insecure clientele in utilizing low-cost, nutritious foods

What was done: A lesson on “Oregon: A State of Hunger” was conducted in four counties by Family and Community Education (FCE) groups. Nutrition Education Program staff in four counties made 220 direct contacts at food pantry sites; more than 12,000 indirect contacts were made through displays, exhibits or newsletters in 11 counties (approximately 8,000 of these contacts were made by 32 trained Lane County Family Food Education volunteers). A bilingual recipe online database developed in 2004 received more than 5,000 hits a month during 2005. A lesson on “Health Consequences of Food Insecurity through the Lifecycle” was conducted with 85 students, 35 faculty, 32 volunteers, and 150 agency partners. “Are You Hungry Tonight?” a simulation of food insecurity in a small community, was produced as an OSU Extension Service publication.

Impacts: “Oregon: A State of Hunger” lesson evaluations were completed by 100 FCE members in four counties. Pre- and post-test results are summarized below.

- Significantly more participants planned to:
 - Regularly stay abreast of hunger/food insecurity issues in Oregon (19% vs. 67%)
 - Regularly support local soup kitchen or food pantries (36% vs. 56%)
 - Advocate for community members in need of food/housing assistance (16% vs. 51%).

Scope of impact: Oregon Statewide

Funding: Smith-Lever 3(b)(c)
State Extension funds
County Extension funds
USDA Food Stamp funds

4. Title: Using the Hunger Simulation to Complement 4-H Service Learning Projects

Issue: One of the goals of youth development programs is to involve youth in community service and service-learning projects. Specifically, this program is designed to help young people better understand poverty and take actions to help alleviate hunger. Simulations are effective in catalyzing action. Service-learning projects provide students with opportunities to use newly acquired skills and knowledge in real-life situations.

Target audience: Youth ages 13–19

What was done: The Hunger Simulation has been used with teen audiences as an introduction to hunger-related service-learning projects. The simulation sets the stage for youth to participate fully in hunger-related projects because they develop an understanding of hunger issues and empathy for those experiencing food insecurity. Following participation in the simulation, participants have volunteered time at the local food bank, participated in food drives, and repackaged large quantities of food into family-size portions for regional food banks. 4-H members from Tillamook County were first exposed to the Hunger Simulation project at the state 4-H Ambassador Training. Upon returning home, these youth helped lead other teens and the 4-H Leader’s Association to focus on hunger and assistance to low-income families as their countywide community service focus. They decided to conduct the Hunger Simulation at a regional teen leadership retreat. They also assisted in leading the simulation at the 2005 Oregon 4-H Leader’s Forum and held a silent auction, with the proceeds benefiting the local food banks.

Impacts: Participants in the hunger simulations were asked to evaluate their level of understanding about hunger issues. Thirty participants completed the evaluations. Participants were asked to evaluate their level of understanding before and after the training on the scale of none (1) to very good (5) on the following questions:

- Financial pressures faced by the unemployed—before 2.97, after 3.93
- Difficulties that financially stressed people often have in improving their situation—before 2.97, after 3.97
- Difficult choices people need to make each month when stretching limited income—before 3.0, after 4.07
- Emotional stresses and frustrations that stem from having limited resources— before 3.07, after 3.73
- The positive and negative impacts of community organizations in the success or failure of someone on a limited income— before 2.72, after 3.67

After the simulation activity at the teen leadership retreat, youth participated in a food drive and repackaged large quantities of food into family-sized portions for the regional food bank. The silent auction at the Oregon 4-H Leader’s Forum netted more than \$1,000 for the Tillamook Regional Food Bank.

Scope of impact: Oregon

Funding: Smith-Lever 3(b)(c)
State Extension funds
County Extension funds

5. Title: Television Watching and Childhood Obesity

Issue: Childhood obesity is a growing concern. Research suggests that children who watch more television also tend to weigh more. Along with inactivity associated with television watching, youth are exposed to messages promoting high-fat and high-sugar foods. In 2001, 57% of Oregon's eighth graders and 37% of eleventh graders watched TV more than 2 hours per day (the limit recommended by the American Academy of Pediatrics).

Target audience: Parents and grandparents of young children

Goal: To decrease television watching and similar sedentary behaviors of children and their families (a strategy included in Oregon's Statewide Public Health Nutrition Plan).

What was done: The lesson "Why Weight? Reducing the Impact of Television on Children's Weight" was developed by Extension Family and Community Development faculty. Evaluation questionnaires were completed by 139 Family and Community Education group members in eight counties. Resource materials were provided to Extension faculty for promotion of TV Turn-off Week (April 25–May 1, 2005). Ten counties conducted TV Turn-off programming.

Impact: On a scale of 1 (not at all) to 5 (a lot), program managers reported mean increases in knowledge/awareness about:

- Influence of TV commercials on children's food choices (3.8-point increase)
- Link between TV viewing and childhood obesity (3.7-point increase)
- Ways to reduce the impact of TV on children's health (3.7-point increase)
- Opportunities to get involved in regulating TV advertising directed at children (3.6-point increase)

Family and Community Education members reported plans to change the following behaviors as a result of the lesson:

- Sixty-one percent planned to regularly discuss the effect of TV on children's health with others (compared to 21% who did so regularly before the lesson)
- Sixty-eight percent planned to regularly control or limit personal TV viewing (compared to 42% who did so regularly before the lesson)
- Forty-nine percent planned to take action regularly to promote responsible viewing; e.g., participation in TV Turn-off Week or by contacting TV networks, legislators or school boards (compared to 17% who did so regularly before the lesson)

Scope of impact: 10 counties in Oregon

Funding: Smith-Lever 3(b)(c)
State Extension funds
USDA/Food and Nutrition Service
State and local OSU Extension funds
Kaiser Permanente (donation of educational materials)

Goal 4: An agricultural system that protects natural resources and the environment.

A. Key Theme: Water Quality

1. Title: Reusing Water from Food Processing to Extract Nutrients

Issue: Food processing plants in Oregon produce nutrient-laden waste water that contains chemicals such as nitrates that can damage surface and groundwater resources. For example, a single potato-processing plant in Umatilla County produces 800,000 pounds of elemental nitrogen annually. Similarly, onion, vegetable, milk and cheese processors produce waste water with high nitrogen contents.

Reused water can be a valuable resource for growing crops because growing plants can readily extract and utilize nitrogen and other processing byproducts. The challenge is to apply those nutrients to the crops at rates that match plants' ability to take up the nutrients, leaving no excess to leach to ground water or run off to surface water.

Target audience: Food processors in
Growers that irrigate
Power generators that use land application of waste water
Regulators from the Oregon Department of Environmental Quality

What was done: This program is part of a statewide effort to appropriately use processing waste waters while avoiding environmental damage. The main goal is to find the optimum agronomic rates at which to apply the waste water to various crops, and then inform growers. Extension has played a key role in developing the Water Reuse Consortium, a group that meets regularly to determine precise amounts of nutrients and water needed by particular crops and to discuss various regulatory issues. Extension specialists have helped develop science-based plans designed to optimize use of waste water while minimizing environmental impacts. In addition, this program encourages better communication among participants and provides education about, for example, the value of the resource. It also establishes a framework for current and future research needs.

Impacts: Waste water from food processing plants now is applied at agronomic and environmentally sustainable rates. This has turned nutrient-rich waste water, formerly an environmental liability, into plant-nutrient assets valued at \$500,000 a year. If regulation had forced processors to invest in alternative technology to treat waste water, additional annual operating costs likely would have been \$4.5 to \$6 million. Meanwhile, growers receiving the effluent enjoy a triple benefit: it benefits their crops, it saves fertilizer costs, and it helps keep growers' markets viable, i.e., it helps the processors who contract with them. Also, there are considerable environmental benefits which have not been estimated in dollar terms.

Scope of impact: Oregon Statewide

Funding: Smith-Lever 3(b)(c)
State Extension funds
County Extension funds

2. Title: Fruit Production and Water Quality in the Columbia Basin

Issue: 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.

Target audience: Fruit packers in Hood River County
Growers that apply pesticides to fruit crops
Native Americans
Regulators from the Oregon Department of Environmental Quality
Oregon Department of Agriculture
Soil and Water Conservation Districts
Hood River Watershed Group

What was done: A monitoring program was established in the Columbia Basin as a community-based effort and included the target audience listed above. OSU worked closely with the Department of Environmental Quality (DEQ) and the Soil and Water Conservation Districts (SWCDs) to seek and analyze stakeholder input and to develop the monitoring plan. Monitoring data were a focal point for a series of stakeholder forums and educational meetings conducted by Extension faculty.

Impact: 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.

Scope of impact: Pacific Northwest
Africa

Funding: Smith-Lever 3(b)(c)
State Extension funds
County Extension funds

B. Key Theme: Weather and Climate

1. Title: Tsunami Warning Signs Go Global

Issue: The danger tsunamis pose for humans living near the world's oceans was made brutally clear, again, in December 2004 when an undersea earthquake in the Indian Ocean triggered massive tidal waves that lashed the coasts of numerous Asian countries, killing an estimated 283,100 people. History shows that significant numbers of humans in coastal danger zones do not move quickly toward higher ground, even after coastal waters turn angry and tsunami warnings are issued.

Target audience: Humans worldwide living in coastal areas, but particularly on the earthquake-prone Pacific Rim.

Goals: Prevent deaths and injuries from tsunamis.

What was done: In the early 1990s, an Oregon State University Extension Service communications outreach specialist, working with Oregon Sea Grant faculty and the Oregon Department of Transportation, produced a series of simple, but powerful, graphic illustrations that warn humans in coastal areas how to move quickly to safety in the event of an earthquake or tsunami.

Impacts: Signs featuring these warning illustrations have been placed along the full length of the Oregon Coast and have been adopted in other Pacific coastal states – Washington, California, Alaska and Hawaii – as part of the National Tsunami Hazard Mitigation Program, a collaborative state-federal program to improve tsunami warning systems and public awareness.

In 2005, following the disastrous Indian Ocean tsunami, the illustrations were posted on warning signs along the beaches of Thailand as part of that country's new National Disaster Warning Centre.

Scope of impact: Pacific Coast states (HI, OR, WA, AK, CA)
International (Thailand)

Funding: Smith Lever 3(b)(c)
State Extension funds

C. Key Theme: Forest Resource Management

1. Title: Wood Magic - Forestry and Forest Products Program for Elementary-school-age Students and Their Teachers

Issue: Elementary-school-age children and elementary school teachers often receive mixed messages about conservation and intelligent use of natural resources. They need information to make better decisions about the products they use every day and how wood products, a renewable natural resource, compare to other products. The objective is to provide accurate information about forestry, and wood products in particular, in an educational setting.

Target audience: Approximately 3,000 fourth- and fifth-grade elementary students, their teachers and their parents.

What was done: Wood Magic (Demonstration) workshops are offered twice per year, at Oregon State University, Corvallis (a 3-day event) and at the World Forestry Center, Portland, OR (a 2-day event). Nine stations (most hands-on) are set up to demonstrate the usability of wood as a material, how wood is processed into useful products, and the multitude of products made from wood that the students use every day. Teachers receive sets of lesson plans tied to the Oregon State Curriculum Benchmarks for use prior to and following the program.

Impacts: From evaluations, we know the programs are an enjoyable learning experience for the students and the adults (a post-workshop rating of 5 out of a possible 5 for all stations is not uncommon), but we also are concerned about student retention of key concepts taught during the program. A short-answer test using a pre-, post-, and delayed post-test design was used to evaluate students' retention of key concepts from the program. About 700 students took the test prior to attending the program and then took the test again after the field trip – usually about a week later. Three months later, these students took a third test to assess long-term retention. Paired t-tests, at a confidence level of 97.5% (repeated use of the same test) showed that student test scores significantly increased ($P < 0.001$) from the first to the second administration. There was less than a half-point loss in mean scores after re-testing 3 months later, suggesting that students not only increased their knowledge but also retained that knowledge.

Scope of impact: Oregon Statewide.

Funding: State Extension funds
Smith-Lever 3(b)(c)
Smith-Lever 3(d) – RREA

2. Title: Backyard Woodlands Project

Issue: “Backyard” woodland owners—those with 30 acres or less—are a growing segment of an increasingly fragmented landscape. Collectively, this aggregation of owners influences a huge portion of ecosystems important to healthy forest and wildlife populations as well as resistance to catastrophic events such as wildfires. In Oregon alone there are more than 114,000 landowners who have 10 acres of forestland or less. Many purchase these lands for wildlife, aesthetics and other non-commodity values.

Target audience: Owners of relatively small tracts of forestland within the urban–rural interface.

What was done: The Backyard Woodlands Program was developed to educate rural landowners in concepts and topics important to the long-term stewardship of their property (woodland health, wildlife enhancement, protection of water, etc.). In addition, an important focus of the Backyard Woodlands Program is to provide awareness of the risk that rural landowners face from wildfire and the responsibility they have as landowners in protecting their home and property. Many of the target audience have not owned forested property before and often do not know where to get assistance when they need it. The Backyard Woodland Program helps to connect landowners to resources they can use, including people, agencies, and educational materials. Educational delivery of the Backyard Woodlands Program is through regional workshops that include classroom and field components. Each participant also gets a comprehensive landowner resource notebook.

Impact: Approximately 200 backyard woodland owners have attended these regional workshops across Oregon since 2001. Following the workshops:

- More than 50% said they contacted a resource professional for assistance.
- Forty-four percent had a resource professional visit their property.
- Eighty-two percent have taken action including thinning, pruning, reducing fuels, planting trees and shrubs, creating wildlife habitat and removing noxious weeds.
- More than 60% said their knowledge had increased and they were more confident in making decisions about their property.

Participants especially like the notebook because it provides resource materials at their fingertips and it also acts as a place to file other resource material that they may acquire over time. One participant wrote us about the notebook, *“I’ve attended enough schools/classes/courses to obtain 2 graduate degrees and I don’t believe I have had any ‘notebook’ or textbook to compare to this. I’ve recycled all my others. I would never part with this!”*

Scope of impact: Oregon Statewide

Funding: Smith-Lever 3(d) - RREA
State Extension funds
Smith-Lever 3(b)(c)

3. Title: Master Woodland Manager Program

Issue: In Oregon, 4.5 million acres of forestland, 40% of the private forestland base, is managed by nonindustrial private forestland owners. Despite several study results indicating that these landowners highly value their forestland properties and would not give them up, private forests are being converted at a rate of 26,000 acres per year. These studies indicate that development pressure, economic hardship, a lack of knowledge regarding management options, and a changing demographic in the state including intergenerational transfer (Oregon Forest Resources Institute 2005) might be contributing to this change .

In an attempt to reach a larger percentage of the 166,000 nonindustrial private forest landowners in Oregon, the Master Woodland Manager (MWM) program was initiated as a collaborative effort by the OSU Extension Service, Oregon Department of Forestry, and the USDA Natural Resource Conservation Service. The goal was to train experienced woodland owners to be more effective managers of their own land and train community forestry volunteers to motivate other woodland owners and inform nonforestry audiences about forestry-related issues. Since its inception, more than 300 individuals have gone through the MWM program, contributing almost 30,000 hours in volunteer service in many different ways, according to the unique strengths of each volunteer.

Target audience: Small, family forestland owners (between 1 and 5000 acres)

What was done: Major accomplishments for 2005 include:

- Work toward revising the MWM curriculum. This includes coordination among 12 authors to revise and update eight chapters.
- An advanced statewide training for MWM volunteers. Nearly 100 volunteers attended the 3-day event, which offered hands-on activities such as Global Positioning Systems (GPS) training, field tours and classroom sessions on a wide array of leadership and forestry management topics.
- On a local level, MWMs continually support their local county staff and participate in a variety of events, such as “Kids Day for Conservation,” “Tree School,” and the statewide Oregon Small Woodlands Association meeting.

In Benton County, MWM Gary Springer is an example of how MWM volunteers contribute not only technical assistance through one-on-one site visits to landowners but also hosts tours on his property during salmon runs, writes articles for woodland-group newsletters, and fills an important role as a leader of the local woodland manager community, serving as president of the Benton County chapter of the Oregon Small Woodlands Association.

Impacts: Master Woodland Managers have stimulated active management among forestland owners through many different means, including one-on-one site visits and assistance to

local county agents. MWMs also have improved general public awareness of the economic, social and ecological impact of private forestland owners through their contribution to community events and educational activities. For example, Roger and Lolly Fendall edit and publish a bimonthly newsletter in their county; the Gahr family maintains a digital inventory of habitat types, flora and fauna species that they find on their property. The Gahrs also publish all this information, as well as their forest stewardship plan, on a website (Gahr 2005). Respondents reported 4815 volunteer hours in a 2003 survey and 26,857 total hours of volunteer service. This translates into more than 12 full-time Extension foresters.

Scope of impact: Oregon Statewide

Funding: Oregon Forest Resources Institute
State Extension funds
Smith-Lever 3(b)(c)

4. Title: Oregon Logging Safety Activities

Issue: Oregon has a new revised Forest Activities Code that addresses work hazards and safety and health management by the contractor-dominated logging and forestry services sector. The Oregon Occupational Safety and Health Administration Training needed training materials to address new safety concepts for forestry services work and logging by both English and Spanish speaking workers. OSU Forest Engineering Extension has much experience in designing and delivering educational programs to the forestry workforce. Some Spanish-language materials produced in the past for forestry work have used nontechnical and inappropriate translations that diminish the educational message.

Target audience: Hispanics make up 10% of Oregon's population and a much larger proportion of the forestry workforce. Hispanic workers dominate the forestry services sector (tree planting, silvicultural treatments, and fire fighting) and are increasing in the dangerous logging sector. At peak seasonal employment, the forestry services workforce can reach 4,000+ workers while the logging workforce is about 9,000 workers. Oregon's Forestry Activities Code is emulated by other western states, and training materials apply elsewhere in the United States and globally.

What was done: Educational materials were produced and translated into Spanish. This included two glossaries of technical terms and safety concepts in English and Spanish (short and expanded versions) and "A Rigging Guide" in English and Spanish. Also produced were ten training cards in various formats: pocket size, page size, and an electronic document (PDF) for user printing.

Finally, a display board was developed of proper and improper rigging with English and Spanish terms. Spanish terms were validated with cooperators in Chile (where logging practices from the PNW were adapted from OSU Forest Engineering Extension) and with Hispanic workers in cooperating logging and forestry services firms. The written materials now are available at the Oregon Occupational Safety and Health Administration and on CD from OSU Forest Engineering. Four 1-day demonstrations of rigging practices using newly

researched synthetic rope (replaces heavy wire rope) were completed in strategic locations around Oregon. The demonstrations were cooperatively arranged with local Forestry Extension agents and were attended by 160 loggers, contractors, supervisors and safety personnel. Materials from the project were used and highlighted at other events such as the Associated Oregon Loggers Annual Safety Meeting and the Oregon Logging Conference.

Note: Prior research by OSU demonstrated that synthetic rope can be used to replace heavy steel wire rope in logging operations. This results in greater ergonomic efficiency and allows loggers to work in the field at a more advanced age. Skills of older workers are therefore retained in the workforce.

Impacts: Post-event evaluations of the demonstrations showed the participants valued the experience. A total of 100 evaluations out of 160 were returned. The overall score was 4.44 on a 5-point scale.

- When asked “was the information new to you?” 57% of respondents said yes.
- When asked “would you use the information in your current job?” 57% of the respondents also indicated in the affirmative.

As a result of OSU research and extension programming, more than 200 logging firms now use synthetic rope in their forest operations. Effective materials in Spanish will help Hispanic workers understand the principles employed in the Safety Code and to more readily learn the English technical terms in logging and the forestry services work.

Scope of impact: Western United States
Chile

Funding: Oregon Occupational Safety and Health Administration
State Extension funds
Smith-Lever 3(b)(c)

Goal 5: Enhanced economic opportunity and quality of life for Americans.

A. Key Theme: Leadership Training and Development

1. Title: Developing Leadership Skills for Life: 4-H Youth Leadership Development Program

Issue: Positive youth development theory recognizes that youth need support and opportunities in order to develop into competent, confident and successful adults. Research indicates that positive youth development programs, such as 4-H, need to provide opportunities for youth to learn and practice critical life skills. This is especially true in the area of leadership development. Rural and urban communities share a need for competent, well trained community leaders, both youth and adult. The 4-H Youth Leadership Development program helps youth prepare for these important roles.

Target audience: Youth ages 13-19

What was done: In 2005, almost 13,000 Oregon youth participated in 4-H programs designed to develop leadership skills in youth. One key component of the 4-H leadership development program is the six regional youth leadership retreats held across the state. Each retreat takes place over 2 or 3 days, in a residential camp-like setting. The design of the retreats allows plenty of opportunity for hands-on learning about leadership skills. In many cases, the retreats are planned and led by older youth who gain real experience in planning, teamwork, responsibility, communicating and teaching others. Nearly 300 youth participated in the regional leadership retreats in 2005. In addition to paid Extension staff, 44 volunteers contributed 320 hours to planning and delivering the retreats, for a volunteer time investment of \$5,773.

Impact: The 4-H program provides opportunities for youth to develop important life skills. These skills, in turn, help youth develop outcomes that ensure a successful transition into a happy, healthy and productive adulthood.

- Eighty-one percent of leadership retreat participants reported that the program helped them gain important leadership skills.
- Pre and post surveys showed that leadership retreats help youth make significant gains in skills such as understanding the responsibilities of being a leader, being prepared to take a leadership role, developing skill in working as a team, feeling prepared for the future, and being able to practice leadership skills.
- Research conducted on Oregon 4-H youth revealed that older 4-H teens who participate in leadership opportunities show greater levels of development—such as higher self-esteem, better proactive coping skills, and a sense of contribution to others—than teens who do not participate in 4-H leadership programs.

It is clear that Oregon's 4-H leadership retreat programs are contributing to the development of important leadership skills in youth, helping set the stage for long-term success as adults.

Scope of impact: Oregon Statewide

Funding Sources: Smith-Lever 3(b)(c)
State Extension funds
Oregon 4-H Foundation

B. Key Theme: 4-H Youth Development

1. Title: Oregon 4-H Know Your State Government

Issue: The number of students per class has greatly increased, impacting teachers' abilities to teach government and citizenship skills effectively. Educators report that students are apathetic and research indicates that young adults (ages 18–25) are less likely to vote than other age groups. Research data also support premise that today's youth are much less likely to become engaged in the political process.

Target audience: Youth ages 13–19

What was done: Oregon 4-H has more than a decade of experience leading a program dedicated to increasing youth understanding of state government. The Know Your State Government (KYSG) program is experiential in nature and relies on constructivist pedagogy. Empowering youth to affect legislation and improve communities requires that they demonstrate more than academic proficiency. This program strengthens the connection between teens and the political networks through education, experience, application and inspiration. Students in seventh through twelfth grades participate in workshops, mock legislative and judicial sessions and news media production. Youth work with elected officials, government employees and university faculty to understand decision-making processes, teen influences, judicial systems and political give and take.

Impact: Data indicate participants understand and apply knowledge relevant to government, the political system and the rights and responsibilities of young citizens. An evaluation of the program conducted in 2005 utilized a pre–post retrospective design and Lickert-type scales to rate the level of learning achieved.

- Delegates reported that they understood the roles of House and Senate committee hearings, the steps necessary for a bill to become law, the role of legal counsel, how teens could impact legislation and the function of lobbyists.
- Delegates understood the judicial system, knew that direct examination allows the witness to tell his side of the story, knew that the trial system is adversarial, and knew cross examination tries to prove the witness lied or could not remember.

As a result of the program, youth also are more likely to actively support a political philosophy/ideology, engage in social action, pursue career/academic aspirations and engage in decision-making processes. Long-term outcomes include increased social capital of communities, more positive attitudes toward government and increased rate of voting in the 18–25 age group.

Scope of impact: State-Specific
Funding Sources: Smith-Lever 3(b)(c)
State Extension funds
Chevron, Inc.
Private gifts

2. Title: 4-H Wildlife Stewards Focus Groups

Issue: An increasing number of youth are out of touch with the environment in which they live. As these young Oregonians someday will be making decisions regarding the future of the state, it is important that they have an interest and knowledge base to support an informed decision. It is also important that they gain the life skills to effectively communicate their knowledge and opinions to others.

Target audience: Youth ages 10–12

What was done: Focus groups were conducted in spring 2005 with fourth, fifth, and sixth grade students who have participated in the program for 2 years. School principals, teachers and parents supplied names and gave permission for inclusion of the project. Five to seven students participated at six different schools in four counties. Children’s responses were recorded on audio and video tape and by a human note-taker.

Impact: Students self-reported that 4-H Wildlife Stewards is a positive and attractive educational experience that greatly enriched their school science education.

- Students indicated that their attitudes toward science, school, and each other were improved as a result of participation.
- Youth cited increased pride in their schools as a result of their outdoor habitats.
- Youth took care of habitat areas and became more aware of the appearance of the outdoor components of their schools, and how other people saw them.
- Youth mentioned concepts about the personal nature of scientific inquiry, adaptation and the role of ecology in neighborhood life.
- Students said that their state benchmark testing was improved because they recognized major concepts such as nutrient cycles or environmental interaction.

Scope of impact: State-Specific
Funding: Smith-Lever 3(b)(c)
State Extension funds
National Science Foundation

3. Title: 4-H Wildlife Stewards Youth Summit

Issue: An increasing number of youth are out of touch with the environment in which they live. As these young Oregonians someday will be making decisions regarding the future of the state, it is important that they have an interest and knowledge base to support an informed decision. It is also important that they gain the life skills to effectively communicate their knowledge and opinions to others.

Target audience: Youth ages 10–12

What was done: The Oregon 4-H Wildlife Stewards Program provides training and opportunities for youth and adults to increase their natural science knowledge and communication skills. Trained volunteers work with students and teachers to explore, discuss and apply their knowledge and interest through the creation, use and maintenance of wildlife habitats on school grounds. The program reached 13,441 students at 54 schools in 2005. A Wildlife Stewards Summit provides a venue for youth from member schools to showcase their science knowledge. The 1-day event is held on or near Earth Day to connect youth to a local and national day of celebration. Youth can present their project through an educational display or PowerPoint presentation, orally communicate their project to a judge, rotate through a series of hands-on natural science learning stations provided by local and statewide natural resource educators, participate in a habitat tour of the host school and listen to a presentation from a science professional or storyteller. In preparing for this event, youth gain skills in organization, teamwork, layout and design, leadership and public presentation.

Impacts: The 4-H Wildlife Stewards Summit has been offered to youth in 4-H Wildlife Stewards member schools since 2003. In 2005 the event served 41 teams comprising 117 students.

- Using a 5-point rating scale (1=strongly disagree 5=strongly agree) 45 of 67 youth indicated a 4 or 5 in rating when asked if their participation in the 4-H Wildlife Stewards program helped them to like science.
- Thirty one respondents indicated a 4 or 5 when asked if the program had helped them to get better at science.
- More than 80% of students gained knowledge about native plants and animals in their area, learned about people who have careers in natural resources, know that humans use natural resources in everyday life, increased their skills in making a presentation and working as a team and increased their confidence about speaking in front of others.
- Teacher evaluations showed students gained positive learning/growing experiences as a result of their participation in this event. Teachers also reported increased leadership among students as a result of participation, growth in cooperation working on a group project and increased confidence in their public speaking ability.

Scope of impact: Oregon Statewide

Funding: Smith-Lever 3(b)(c)
State Extension funds
National Science Foundation

C. **Key Theme: Aging**

1. Title: See the Future: Vision and Aging

Issue: Good vision is very significant for older adults in maintaining their safety and independence. Some vision-related changes are a normal part of aging. However, significant changes or loss of vision is not normal. Older adults often lack information and ongoing care related to their vision.

Target audience: Older adults

Goals: This lesson helped participants:

- Understand changes in eyes and vision as they age
- Learn how to protect their vision
- Become aware of warning signs of possible eye disorders
- Be able to identify the most common eye disorders in later life

What was done: A workshop, “Vision and Aging,” was developed and offered in 13 counties in Oregon. Evaluations were returned by 274 members of Oregon Family and Community Education groups.

Impact: Participants were asked to complete a retrospective pre-test evaluation in which they rated their knowledge at the end of the program and their understanding at the beginning of the program.

- Before the program, 51% of participants had only little or some knowledge about how age affects their vision. After the program, 90% of respondents reported very good or good understanding of how age affects vision.
- Before the program, 52% of participants had only little or some knowledge about the signs and symptoms of common vision disorders. After the program, 90% of respondents reported very good or good understanding of the signs and symptoms of common vision disorders.
- Before the program, 47% of participants had only little or some knowledge about what to do to protect eyes and vision. After the program, 88% of respondents reported very good or good understanding of what to do to protect eyes and vision.
- Sixty three percent of participants indicated they intended to take action as a result of this class. When asked for examples, the most common responses were: Have an eye exam and protect eyes from the sun.

Follow-up phone calls were made to the Portland metro area FCE teachers 3–4 months after they received the training. Eleven leaders responded to phone calls. All had taught the lesson for their respective FCE groups. When asked if they had “done anything differently” after taking and then teaching the lesson, seven participants had shared the information with people other than their FCE group. All respondents remarked positively on how the lesson had gone for their group.

Scope of impact: 13 Oregon counties

Funding: Smith-Lever 3(b)(c)
State Extension funds
County Extension funds

Summary of FTE and Funding Sources for Goals 1–5

National Goal	FTE	Smith Lever 3(b)(c) Funds	State Appropriated Funds	County Appropriated Funds
1	44	\$918,532	\$3,210,782	\$976,704
2	9	\$195,397	\$639,911	\$192,864
3	9	\$180,366	\$662,364	\$199,631
4	49	\$1,022,911	\$3,570,030	\$1,075,978
5	43	\$897,657	\$3,143,423	\$947,402
Totals	154	\$3,214,863	\$11,226,510	\$3,392,579

Stakeholder Input Processes

The Oregon State University Extension Service utilizes numerous approaches to garner input from stakeholders statewide. These are summarized as follows:

A. The Extension Citizen Advisory Network.

- Actions taken to seek input and encourage participation.
 - The Network is composed of stakeholders from each county in the state and includes both representatives with specific program foci and representatives from county government. The Network meets twice annually with Extension leadership (Dean and Director, Assistant Directors, and Program Leaders) to provide input on programming and Extension policy issues. Extension provides travel reimbursements, meals and a desirable meeting location to encourage participation. In addition, members are contacted throughout the year by email to solicit input on critical issues.
- Process used to identify individuals and groups that are stakeholders and to collect input from them.
 - Members are nominated for service on the Network by county Staff Chairs in consultation with local stakeholders. Often these consultations include conversations with recipients of Extension programming, local political leadership, and representatives of organizations with linkages to Extension. Care is taken to assure that membership is capable of representing the broad interests of Oregon society and that they are capable of providing input from very divergent viewpoints such as youth and adults, urban and rural, agriculture/forestry/fisheries and environmental stewardship, large production systems and small production systems, small county government and large county government, traditional audiences and new, emerging (including ethnic) audiences, etc. In addition, special efforts are employed to assure that meetings are relevant to each member. The Network is involved in very key discussions related to the management, funding, and impacts of Extension in Oregon.
- How input from the Network is considered in decision-making processes.
 - Input comes to Extension from the Network through several processes. During the semiannual meetings, key decision makers within Extension and the university are invited to participate. Discussions are very active, and input is often immediate as issues are discussed. In addition, input is solicited throughout the year on key issues. This often is done through email and telephone contacts. Finally, local faculty and Staff Chairs have close contact with Network members in their counties. This permits local feedback on issues. Input from the Network frequently is considered by the Dean and Director, the Extension Cabinet and Program Leaders in guiding the development and execution of programming statewide.

B. College-based Advisory Structures.

- Actions taken to seek input and encourage participation.
 - Because Extension at OSU is integrated into colleges and respective academic departments, there are numerous mechanisms used to garner stakeholder input at this level. Most colleges and many departments with Extension faculty have a formal advisory council that is charged with providing input on research, teaching and Extension programs. These meet at least once per year with additional input sought via email and teleconferences between meetings. In addition, there are more Extension-specific advisory structures for the 4-H, Forestry, Sea Grant, and FCD programs. These are highly targeted efforts that seek specific input on Extension programs. In addition, the Forestry Extension Program has listening sessions in at least one county per year. The general public is invited to these sessions.
- Process used to identify individuals and groups that are stakeholders and to collect input from them.
 - Generally, a broad representation of individuals is sought for these committees and advisory forums. Membership is often based on a desire to have representation from key stakeholder groups that include agricultural, forestry, and marine commodity producers; federal, state, and local agencies; persons with keen understanding about the needs of ethnic minorities and other diverse audiences; representatives of various environmental groups; educators; local government leadership; and OSU faculty and staff. In many cases, strategic planning processes have been used to identify appropriate representation on respective advisory committees.
- How input from advisory groups is considered in decision-making processes.
 - Input from these groups has been used in universitywide strategic planning efforts, in program design and in allocation of resources. In addition, feedback from advisors has been used to better understand political realities and steps necessary for garnering support from local, state and private sources.

C. County-based Advisory Structures.

- Actions taken to seek input and encourage participation.
 - Each faculty member is encouraged to maintain an advisory function for their programming. In addition, most counties maintain a formal advisory committee. Most structures utilize regularly scheduled meetings with stakeholder representatives to garner input.
- Process used to identify individuals and groups that are stakeholders and to collect input from them.
 - Staff Chairs and faculty members are encouraged to identify stakeholders that represent the needs and perspectives of a broadly defined community. Membership tends to represent current clientele, potential clientele, other agencies, county leadership, and representatives from the private sector. Input is

collected during regularly scheduled meetings, special meetings, and through periodic contact via email, telephone, mail and personal interaction.

- How input from advisory groups is considered in decision-making processes.
 - Input from local stakeholders is utilized to develop local priorities. These are reflected in local programming designs and outcomes. Additionally, input flows up through the organization and is considered and utilized in the development of statewide and regional efforts. Input from local groups is also extremely valuable in developing administrative structures and delivery systems that are compatible with local needs, customs and skill sets.

Program Review Process

There have been no significant changes in the program review process submitted in the 5-Year Plan of Work.

Evaluation of Success of Multistate and Joint (Integrated) Activities

Oregon State University has longstanding interactions with surrounding states, and each Extension program area and every Extension faculty member is expected to develop a professional network that includes peers in other states. These networks, whether formal or informal, involve information sharing, opportunities for professional development, curriculum and educational material development, and joint program development and delivery. Additionally, Oregon State University was a pioneer in integrating Extension with the teaching and research functions of the institution. All Extension faculty are members of campus-based departments. They actively participate in departmental activities including planning and promotion and tenure processes. Many faculty now have joint Extension–research appointments.

Processes are in place to gather important input from key stakeholders and to assure that critical issues are recognized and addressed. Input from stakeholders is incorporated into the development of both outreach and research programs. For example, advisory committees meet regularly with Extension faculty, faculty and staff at agricultural research stations, and with departments and college and Extension leadership. Stakeholders are very engaged in exchange of ideas, evaluating effectiveness of existing projects and in the creation of new efforts. As a result of this collaboration, Extension and research efforts are very responsive to the needs of society. Integrated programs are very commonplace in Oregon with Extension faculty engaged in applied research trials throughout the state in collaboration with Experiment Station and Forest Research Laboratory scientists. Multistate programs are addressing key issues such as disease problems in potatoes and onions; erosion and weed control in dryland cropping systems; adding value through introduction of new crops, varieties and root stocks; water usage and protection of threatened and endangered species; reducing pesticide use through integrated pest management strategies; and development of new irrigation techniques. Additionally, multistate programs are improving the efficiency of outreach

processes through the joint production of educational materials and other resources such as plant disease, weed and insect control handbooks.

Planned programs are designed to meet the needs of both under-served and under-represented populations of the state. Specific steps have been taken to reach out to Latino populations through the development of Spanish-language materials, providing training in both English and Spanish, and by developing programs that are sensitive to the specific cultures within the Latino communities. Latino mid-managers also have been leveraged to educate farm workers about proper handling of pesticides and other hazardous materials. Watershed restoration efforts have involved Native American tribal leaders to assure that educational efforts are pursued in manners that are culturally sensitive and compatible with tribal goals and objectives. For example, research and outreach efforts initiated in response to the water crises in the Klamath Basin not only examined the natural resource and economic issues associated with reduced water availability but also closely examined both legal and cultural issues from tribal perspectives.

Efforts have been made to assure that outcomes and impacts from both multistate and integrated programming are well documented and communicated to key stakeholders. For example, multistate efforts focused on improving disease and pest management in key fruit and vegetable species have reduced production costs dramatically (by \$300/acre in onions, \$60/acre in potatoes, and \$50/acre in cherries). New introductions of root stock, varieties and species have resulted in improved production efficiency. For example, new root stocks have reduced the time needed to achieve return on investment associated with planting new cherry trees from 15 years to only 7 years. Fully 70% of all new cherry trees in Oregon are on these new root stocks. New fruit and vegetable varieties are also improving the bottom line for producers by enhancing product quality and yields. Changes in cherry varieties as a result of efforts by OSU and WSU Extension and research faculty have resulted in increases of \$.08 to \$.81 per pound in cherry prices in the Mid-Columbia region. More specific examples of impacts are described in the following sections.

Planned programs have also resulted in tremendous improvements in programming efficiency. Expertise is readily shared across state borders with Washington, Idaho and California. In addition, the Pacific Northwest Publications series generate tremendous efficiency by jointly publishing Extension materials with Washington and Idaho. The integration of Extension faculty into academic departments also creates improved efficiencies by enhancing communication between Extension and research faculty. As a result, research is more targeted to the needs of society and Extension programming is more effectively tied to the latest science.

Multi-State Activities and Impacts

The Oregon State University Extension Service has created an audit trail for funds supporting the following multi-state activities. Descriptions of these activities and outcomes/impacts are below.

1. Pacific Northwest Cooperative Publishing

The Pacific Northwest Publishing Cooperative, operated by the Extension Services of Oregon State University, Washington State University and the University of Idaho, addresses important economic, environmental and social issues in Oregon, Washington and Idaho by helping individuals and groups of potential authors from the states' Land Grant universities produce educational materials that inform and educate multi-state audiences. In 2005, the cooperative venture published educational materials on managing nitrogen for hard winter and summer wheat crops, identifying control measures for new noxious agricultural weeds (field bindweed and oxeye daisy), introducing a new herbicide for weed management in potatoes, helping older family members handle finances, and providing guidelines for 4-H members, leaders and judges in competitive horse activities. The tri-state effort, the sole remaining cooperative publishing program in the national Extension network, is designed to share expertise among states, prevent conflicting recommendations in bordering areas, prevent duplication of effort, ensure wider review and distribution, increase the quality of educational materials, and save money. Since it was created in 1949, the Pacific Northwest Publishing Cooperative has provided the public with more than 580 printed and online publications, software packages, videos, CD-ROMs and DVDs that address important Northwest issues.

2. Northwest Berry and Grape Information Network

The Northwest Berry and Grape Information Network offers a comprehensive information and communications resource for researchers, Extension educators, processor field representatives, and growers. They can access market reports and production statistics, search databases and libraries, and discuss issues with one another. Environmental impacts of production practices are among the issues discussed on the Internet—e.g., ways to reduce pesticide applications, recommendations about “softer” pesticides, use of biological control agents, and ecological (and economic) benefits of cover crops. Computer predictions of pest problems (e.g., from information such as heat accumulation) allow growers to reduce pesticide applications, spraying only when necessary rather than on a regular basis. Growers can monitor changes in daily market prices and storage volumes, giving them better knowledge of current market conditions and the value of their crop. Latest research updates are also online, encouraging more rapid adoption of research results. Email discussion groups synthesize the collective wisdom of those with similar interests from all over the world and facilitate group learning. Two of these email-groups have more than 300 subscribers from at least 20 countries. Oregon and Washington are very active in this effort. This site averaged more than 300,000 hits and about 30,000 visitor sessions per month in 2005. Timely newsletters on grapes and berries disseminate latest information on production as well as industry events.

3. The Pacific Northwest Plant Disease, Weed, and Insect Control Handbooks

The Pacific Northwest Plant Disease, Weed and Insect Control Handbooks are Extension's primary method of delivering pest control information to clientele in the Pacific Northwest. This is a collaborative effort among Oregon, Washington, and Idaho. The clientele, which includes university faculty (both state and county personnel), consultants, field scouts, Oregon Department of Agriculture inspectors, field and nursery people, Master Gardeners, and chemical industry representatives, consider this publication series their primary source of pest management information. Home gardeners and Master Gardeners use the information in the Plant Disease and Insect handbooks, generally in consultation with their county Extension agent. Using the handbooks, growers can more efficiently treat weeds, insects, and diseases affecting their plants, thereby improving yields, saving crops, and reducing production costs. Correct identification of plant problems aids in using the best and most efficacious management tactics. Although chemical tactics are recommended, nonchemical cultural control tactics are highlighted including organic techniques. Evaluation of type and level pesticide sales indicates that use of these books throughout the Northwest (WA, ID, OR) has reduced the amount of pesticide applied by improving efficiency and efficacy of pesticide applications.

4. Pea Production and Walla Walla Watershed

OSU faculty are working jointly with USDA scientists and others in Washington to resolve issues endemic to the Walla Walla watershed. Projects have been designed and delivered to evaluate tillage practices and most appropriate green pea varieties for the region. Additionally, cooperative efforts are underway to assess the impact of reduced irrigation water as farmers relinquish water to increase in-stream flow and aid endangered-fish habitat. In both cases, critical data are being collected and results are expected at the end of 2006.

5. Onion Production

Significant onion production occurs in the Snake River Basin that straddles the Oregon-Idaho border. Regional Extension personnel and researchers collaborate to deliver joint programming in the region. This includes a joint newsletter, an Idaho-Oregon annual educational meeting, and individual crop consulting across state lines. One area of focus has been control of onion thrips in the region. Efforts have resulted in improved yields and reduced pesticide costs. Those growers who were able to use this program had additional benefits in 2005 of 104 CWT or \$780/acre increased gross returns. Approximately 3,000 acres used the program with a total benefit of \$2.3 million.

6. Cherry Production

Sweet-cherry growers in the Columbia River Basin (Oregon and Washington) are trained by OSU and WSU faculty to use Integrated Fruit Production (IFP) strategies to control pests in their orchards. This includes strategies such as using soft-control options and spraying pesticides only when pests exceed specified threshold levels. Less disruptive control methods also are replacing aerial spraying, and growers are learning to control spray drift and reduce pesticide contamination of water. Reduction in spraying levels result in savings of up to \$50/acre. An estimated 1,000 acres are affected annually, making the total saved each year about \$50,000. Additionally, a network of

weather stations was established to help implement IFP methods. This system also significantly reduces potential for frost damage. Frost historically has resulted in significant harm to crops once every 5 years. But with information from the weather stations, growers will be able to save at least 20% of their crop every 5 years. The north-central cherry production area of Oregon had 9,700 acres of sweet cherries in 2005 with a total in gross sales of more than \$35 million. Therefore, the weather station network should save growers \$1.4 million/year $[(20\% \times \$35 \text{ million}) \div 5\text{years}]$. Finally, OSU and WSU faculty have cooperated in evaluation of new cherry varieties and root stocks. As a direct result, new varieties are being produced in the region. In Wasco County, Oregon, alone, these varieties are yielding up to 48¢ per pound more than Bing cherries. It is estimated that total returns to farmers in the region have been increased by over \$5.8 million annually as a result of new variety introductions. Dwarfing root stocks also have been widely accepted; approximately 70% of new trees in Oregon and 30% of new trees in Washington are on dwarfing root stocks. Research at the OSU Mid-Columbia Agricultural Experiment Station indicate that return on investment is achieved 7 years earlier with dwarfing root stock than with nondwarfing root stock (8 vs. 15 years).

7. Irrigated Agriculture

The Columbia River Basin encompasses a large region of north-central Oregon and south-central Washington. Most issues in the region transcend state boundaries. Extension specialists at the Hermiston Agricultural Research and Extension Center work closely with counterparts from Washington (WSU, USDA/ARS, and industry representatives) to resolve issues in the region. Virtually all aspects of the irrigated agriculture program at the station have multi-state components. This includes development of joint publications on Christmas tree production (OR, WA), soil acidification (OR, WA), and onion production (OR, WA, ID). In addition, the Pacific Northwest Vegetable Association is a consortium of organizations that supports research and outreach efforts in the tri-state region. OSU faculty serve as advisory members and have collaborated with other states on projects funded by PNVA. This organization also hosts tri-state meetings for producers. These events generally attract approximately 450 growers from Oregon, Washington and Idaho. OSU faculty also participate in regional grants that assist in developing improved varieties, organic, and non-organic production technologies for potatoes (ID, OR, WA). The latter has already yielded impacts in Idaho where there have been documented reductions in fertilization and pesticide usage by program participants. Additional multi-state programming being developed includes reducing water inputs for potato and onion production by using drip irrigation technologies.

8. PNW Potato Production

OSU research and Extension personnel at the Hermiston Agricultural Research and Extension Center, along with USDA/ARS scientists from Prosser and Wapato, Washington and a private contractor, have conducted outreach and applied research leading to integrated pest management strategies for potato producers. Conventional control of the Colorado potato beetle, beet leafhopper, potato tuber worm and the green peach aphid cost approximately \$200/acre. Today, IPM strategies reduce the cost to about \$120/acre, saving producers approximately \$80/acre. Concurrently, yields have increased by 4.5 tons/acre. Estimated net impact in 2005 of the program in two counties in northeastern Oregon is \$3 million annually.

9. Dryland Crop Production and Solutions To Environmental and Economic Problems (STEEP) Solutions

Research and Extension personnel in Oregon, Washington and Idaho are doing long-term research and outreach to reduce erosion in the region (northeast Oregon, eastern Washington and northern Idaho). The effort includes long-term research trials, demonstration projects, a website, publications and other educational programming. Outcomes and impacts of this program are:

1. Adapted soil erosion prediction technology for the climate conditions, soils, landscape and production systems unique to the PNW.
2. Developed and tested many of the conservation options producers are using to meet conservation compliance requirements of recent Farm Bills.
3. Documented the impacts of cropland soil erosion on long-term soil productivity, environmental quality and farm and regional economics, and increased producer and public awareness of the problem.
4. Increased producer use of conservation tillage systems and supporting conservation practices in the PNW.
5. Developed technology and prototype equipment for improving residue placement, fertilizer use efficiency, seed placement and overall success of conservation tillage systems.
6. Increased number of agricultural service industries and producers building or modifying their equipment for direct application of fertilizer with little or no prior tillage under “shank and seed” minimum tillage systems, which provides cost-effective conservation options.
7. An improved understanding of the interactions between crop pests and tillage systems, crop rotations and other production practices has lead to the development of more successful pest management systems in conservation tillage and reduced the reliance on pesticides.
8. Breeding of new crop cultivars with improved pest resistance has facilitated the adoption of conservation practices and reduced pesticide use.
9. Adaptation and evaluation of predictive models has helped develop effective pesticide and nutrient management practices for increased protection of surface water and groundwater quality.
10. Development of alternative crops and their production practices has improved the success of conservation tillage systems through improved pest control and economic stability.
11. Increased producer access to new technologies has improved effectiveness and profitability of conservation farming systems.

10. Weed Control in Dryland Crop Production

Extension faculty at the Columbia Basin Agricultural Research Center work with counterparts at Washington State University and the University of Idaho to provide research-based information to producers about effective and sustainable weed control processes. Cooperative studies are conducted in multiple locations throughout the three-state region. This project has increased efficiency of herbicide use and reduced losses from weed competition in wheat. As a result, wheat farmers in the Columbia Basin in Oregon and Washington are realizing an average 1% yield increase for winter wheat. An additional improvement has resulted from enhanced quality due to use of newly developed herbicide-resistant wheat. This quality differential has provided producers with approximately 0.5% enhancement in net returns. In 2002, the region had 807,950 acres in

wheat, yielding 27 bu/acre, sold at \$3.97/bu. A 1% yield increase and a 0.5% in value due to improved quality result in an estimated increase in revenues of \$1.2 million/year.

11. Small Fruits

Oregon researchers and Extension professionals working closely with counterparts at Washington State University are conducting variety trials, optimizing water usage, developing mulching strategies, optimizing nitrogen fertilization rates, and developing mechanical harvesting strategies for blueberries and cane berries. Efforts to expand markets for blueberries in China have been successful. Additionally, research and outreach efforts have focused on introduction of Hardi kiwifruit.

As a result of these programs, blueberry growers in Oregon are not using as much surface sawdust mulch and are saving over \$350/acre or \$175,000/year (\$350 x 500 acres). Blueberry growers in the Pacific Northwest also use the video *A Grower's Guide to Pruning Highbush Blueberries* (VTP002) to train pruning crews. Due to efforts over the past few years by OSU Extension, Oregon now has a 3 million pound market for blueberries in China. This is up from nearly zero just a few years ago. Hardi kiwi, despite high production costs, is showing economic promise on land that was formerly pasture, grass seed, or other berries. A newly revised Extension publication, *Growing Kiwifruit* (PNW 507), also is helping the commercial kiwi industry, whose current gross production/sales value is about \$600,000/year.

Joint (Integrated) Activities and Impacts

The Oregon State University Extension Service has created an audit trail for funds supporting the following integrated activities. Descriptions of these activities and outcomes/impacts are listed in the following narratives.

1. NRSP-4 Pesticide Registration for Minor Crops

After implementation of the 1996 Food Quality Protection Act, critical pest management substances became unavailable to many minor crop producers. Many of the high-value crops in Oregon fall into this category. Sales of these crops contribute more than \$500 million to the Oregon economy annually and represent a significant part of the agricultural production of the state. A center was established at the North Willamette Research and Extension Center to help submit materials to register products, monitor residues and report appropriate data. The Center has facilitated approval of numerous materials for application in minor crops in a responsible and sustainable manner. Section 18 and SLN 24c (Special Local Need Requests) registrations alone document that \$22 million/year would be lost if these materials were not available to farmers. Approximately half of this amount is directly attributed to the efforts of the Center and its expedition of registration of pest management substances for minor crops. Recently the Oregon Department of Agriculture chose to invest in this program, enhancing the funding base by an additional \$75,000. (See section B. 1. for a detailed list of the financial impacts from registrations.)

2. Integrated Pest Management for Nursery and Berry Crops

The OSU Integrated Plant Protection Center has developed an online database of Integrated Pest Management (IPM) resources (<http://ippc.orst.edu/dir/>). This database is continuously updated and expanded. As a retrieval and referral system, it links researchers and practitioners. The system disseminates IPM information, raises awareness about new and emerging techniques in pest control, and supports IPM decision making. Integrated Pest Management promotes judicious use of pesticides and generally reduces the amount of agricultural chemicals used. Thus, this database has indirect, but substantial, environmental benefits. When agricultural or forest operators obtain and apply relevant information from the IPM resources database, farm and forest workers experience less risk of exposure to potentially toxic chemicals, and consumers benefit from reduced pesticide residue on food. The North Willamette Research and Extension Center is researching integrated management of *Phytophthora* species, honey locust pod gall midge, and lygus bug. Results are communicated to growers through newsletters, presentations and websites.

3. New Landscape Plant Introduction.

The Central Oregon Horticulture Program home segment evaluates new landscape strategies and conducts workshops, provides educational materials on such topics as fire-resistant materials and encourages home gardeners to develop “defensible space” around their homes that may help protect their homes in case of wildfire. Xeriscaping results in more efficient use of water in landscaping and is being adopted at an increased rate in Central Oregon and in the Willamette Valley. Applied research in the Willamette Valley is helping us identify new plant materials that are drought resistant and of commercial production interest to the nursery industry. The research-based information on gardening and plant health distributed by this program educates consumers about appropriate, timely use of pesticides and fertilizers, discouraging their overuse. This research and outreach allows home gardeners to achieve their gardening goals while using more environmentally friendly methods.

4. Berry Production Systems

Blueberry is one of the most rapidly expanding berry crops in the Pacific Northwest, where acreage has increased almost threefold since 1992. Over the last few years, an average of 350 acres/year has been planted. Establishment cost is about \$9,500/acre. In 2005, Oregon harvested 3,800 acres with a total production of 32.4 million pounds and a farm gate value of more than \$30 million. About 50% of this high-value crop is hand harvested.

The Extension Berry Production Program develops new knowledge and disseminates research-based information to members of the strawberry, raspberry, blackberry, and blueberry industries through newsletters, articles, publications and presentations. Related research emphasizes biological, rather than chemical, control of berry pests; but when chemicals are still needed, effective control with more environmentally friendly materials and fewer applications is sought. Getting these research results and associated recommendations out to growers can have profound environmental benefits as well as impressive economic results. For example, the cost per acre for each of the registered herbicides was compared to the benefits such as quality of weed control and

the range of weeds controlled. Growers who adopted the recommendations are now saving money by making sound weed control choices and by applying the correct amount of each product. Using biological pest controls and other “softer,” more environmentally friendly, pesticides, plus using all materials at appropriate rates, reduces human exposure to harmful, toxic chemicals.

5. Landscape and Production Nurseries

Roses in Landscapes and Rose Production Nurseries Rose midge eggs are laid inside rosebud sepals where the larvae damage or destroy the flower bud. The pest is widespread and is increasing across the northern states and into Canada. This project tests IPM methods of control for their efficacy. In 2005, researchers compared controlling the midge with (a) one pre-larva-emergent application of Merit Granules (imidicloprid) with (b) the current IRTG management practice of applying Tempo (cyfluthrin) every 2 weeks throughout the season. Results show considerable promise for successfully managing this midge while greatly reducing the number of insecticide applications. Further scrutiny of this application timing could prove useful to designing management programs for midges on honeylocust, maples, daylilies, lupines, blueberries, and salix, just a few of the plant genera affected by cecidomyiid midges. One application of insecticide versus 12–14 applications directly saves on chemical and labor costs.

Perennial Container Nursery Stock While all research on container nursery crops seeks to solve production problems without adverse environmental effects, one research project in particular seeks to combat a troublesome environmental problem: the invasion of an ornamental plant, *Buddleia* or butterfly bush (BB). BB is found in a wide variety of sites but is four times more prevalent in riparian than in other disturbed sites. Analysis using genetic markers will determine which are the invasive and which the noninvasive cultivars of BB. Herbicides selected for safety, appropriate labeling and effectiveness on woody species are being tested for suitability in controlling BB at infested sites, always with the do-no-further-harm environmental constraint.

Appendix A

**U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Actual Expenditures of Federal Funding for Multistate Extension and Integrated Activities**

(Attach Brief Summaries)

Fiscal Year: 2005

Select One: Interim Final
Institution: Oregon State University Extension Service
State: Oregon

**Multistate
Extension
Activities
(Smith-Lever)**

<i>Established Target %</i>	3%
<i>This FY Allocation (from 1088)</i>	\$3,214,863
<i>This FY Target Amount</i>	\$96,446

Title of Planned Program Activity

Pacific Northwest Publications				\$32,532
NW Berry and Grape INFONET				\$11,128
National Pesticide Info. Network				\$7,003
Pea Production and Walla Walla Watershed				\$20,058
Onion Production				\$17,283
Water Allocation and Endang. Species				\$21,629
Cherry Production				\$18,845
Pacific NW Potato Production				\$29,660
Dryland Crop Production and STEEP				\$19,567
Weed Control in Dryland Crops				\$19,127
Small; Fruits				\$24,662

Total	<u>\$221,494</u>
Carryover	<u><u> </u></u>

Certification: I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays represented here accurately reflect allowable expenditures of Federal funds only in satisfying AREERA requirements.

A. Scott Reed

Dean and Director

Appendix B

U.S. Department of Agriculture

Cooperative State Research, Education, and Extension Service

Supplement to the Annual Report of Accomplishments and Results

Actual Expenditures of Federal Funding for Multistate Extension and Integrated Activities

(Attach Brief Summaries)

Fiscal Year: 2006

Select One: Interim Final
Institution: Oregon State University
State: Extension Service
Oregon

**Integrated
 Activities
 (Smith-
 Lever)**

<i>Established Target %</i>			3%
<i>This FY Allocation (from 1088)</i>			\$3,214,863
<i>This FY Target Amount</i>			\$96,446

Title of Planned Program Activity

NRSP-4 Pesticide Registration for Minor Crops			\$84,532
IPM for Nursery and Berry Crops			\$50,431
New Landscape Plant Introductions			\$74,781
Berry Production Systems			\$65,550
Greenhouse Systems			\$44,997

Total	<u>\$320,291</u>
Carryover	<u><u> </u></u>

Certification: I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays represented here accurately reflect allowable expenditures of Federal funds only in satisfying AREERA requirements.

A. Scott Reed
 Dean and Director