2013 Washington State University Combined Research and Extension Plan of Work

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I. Plan Overview

1. Brief Summary about Plan Of Work

The goals of the Washington State University Agricultural Research Center (ARC - the Agricultural Experiment Station of the State of Washington) and Washington State University Extension are to conduct research beneficial to the citizens of Washington State and to deliver and apply relevant research results to the right target audiences within the state. These activities are designed to result in improved economic viability, environmental sustainability, and quality of life for the people of Washington State and, insofar as the activities apply to other regions, to the people of the United States and the world. The ARC and WSU Extension recognize that they have unique land grant research and outreach missions. We must first serve the people of Washington and promote their interests, in responding to the objectives of the Morrill Act of 1862 that led to the foundation of WSU as a land grant institution. The ARC provides leadership in discovering and accessing knowledge by carrying out high quality research that contributes to a safe, abundant food and fiber supply; promotes the well-being of individuals, families, and communities; enhances sustainability of agricultural and economic systems; and promotes stewardship of natural resources and ecological systems. WSU Extension creates outreach programs that leverage the research base of the University and the nation to address issues in ways that lead to improvements in agricultural productivity, efficiency, and sustainability; natural resource stewardship; economic development; health and well-being of our youth, families, and communities; and our energy security. While not the principal agents in many of these areas, it is an important component of the state's ability to design local solutions to local problems that affect the long-term viability of many of the state's important industries and communities. The synergy provided by connecting the problem-solving skills of professionals with the experience gained from considering a number of different perspectives can be quite powerful and makes a valuable contribution to many aspects of Washington's quality of life.

A number of years ago, as a result of decreasing state support to the University, the Agricultural Research Center narrowed the scope of its research emphasis to focus on the food systems of Washington and the needs of the various stakeholders in this system. As part of this focus, we have made significant commitments to both conventional and organic agricultural production systems by supporting research and extension programs that emphasize economic and environmental sustainability. While significant components of our Extension programs are aligned with research base of the ARC, Extension also delivers significant outreach related to topics like energy security, natural resource stewardship, health and wellness, and youth, family and community development. The research foundation for these 'other' programs is more distributed at WSU, residing in colleges and interdisciplinary centers, including the College of Agricultural, Human and Natural Resource Sciences (CAHNRS); the College of Engineering and Architecture; the College of Liberal Arts; the College of Pharmacy; the College of Veterinary Medicine; the Center for Environmental Research, Education and Outreach; and the William D. Ruckelshaus Center (a joint program with the University of Washington). Additionally, through close partnerships and collaborative agreements, our Extension educators also extend the research conducted by faculty at other regional centers of expertise, including the University of Washington, Oregon State University, and the University of Idaho.

It is often tempting to think of agriculture as a stable and settled industry, but we believe it is more useful to think of it as metastable, with many destabilizing commercial, biotic and abiotic challenges that must be dealt with to maintain production. While this can lead to a sort of "sky is falling" approach to new

challenges, it is clear that there are many pressures on the commercial viability of our crops: new varieties take market share from our apples; weather and various changes in disease and pest pressure affect our yields; input costs and per bushel prices affect how we grow our wheat; agriculture labor supply affects the timing and cost of our fruit harvests. As we figure out how to adapt to these new constraints, we believe they also create opportunities and, in any case, they must be dealt with if the agricultural systems are to remain viable. Examples include the possibility of using perennial wheat varieties and no-till farming in low rainfall areas of the state to decrease input costs and secure erosion prone soil, developing techniques suitable for local viticulture and enology, recovering energy from forestry, animal husbandry and urban waste operations. Washington has the second largest wine industry in the United States but our northern location means that there are issues related to climate, soil, and management that need to be resolved in order to exploit the potential of this crop. Our natural resources are also at risk from conversion, wildfire, and pollution. Weather variability and climate change will have significant impacts on water availability and may facilitate migration of new plant and animal diseases and pests into the state.

Furthermore, our human populations and communities are undergoing unprecedented change. Demographics have shifted dramatically with the rapid expansion of Latino populations in Washington (almost tripling statewide between 1990 and 2010), especially in Central and South-Central counties, and of Asian populations in Western Washington (doubling between 1990 and 2010). Additionally, large refugee populations now call Washington State home, with the Seattle metro area becoming the 5th most popular resettlement area for refugees nationally. This new diversity is enriches the state by bringing a multitude of new cultures, foods, and arts, but these demographic shifts also strain social services and challenge educational delivery systems. The health and wellness of our youth are also at risk with over 25% of our adult population categorized as obese and almost 30% of our youth categorized as overweight or obese. As in many regions of the country, our rural communities are struggling with increased poverty and with differential access to technology, health services, and educational opportunities.

The role of Research and Extension in dealing with these issues is to develop and deliver an excellent empirical and theoretical knowledge base and use this to offer advice and assistance to our constituents. The strategy is to use cutting edge technology to test new ways of doing things and then to make the best of the possible solutions available to our stakeholders. This is especially important as we function as part of one of the major universities of the state. The students we mentor are one of our most important products and the concept of listening, investigating, testing, trying and ultimately succeeding is one that we believe is integral to making world-class educational opportunities available to them. We have particular skills in areas like plant biotechnology and genomics and are leading in several efforts to apply these to issues like cropping systems research and cultivar development for specialty markets. As a result of studies on water management for multiple uses, our economists have been critically examining current and future water use for urban development, crop production, fisheries, and recreation. The biological systems engineers are working on precision systems for delivering water at appropriate times for good crop yield. Our integrated pest management programs are developing techniques to minimize pesticide use while effectively controlling pests across the broad variety of agricultural crops and urban environments. The range of issues and approaches within WSU provides many handles for students to engage the problems and imagine the possibilities.

Millions of tons of biomass are generated in agriculture and forestry and available from other sources such as municipal waste streams. The presence of these energy sources coupled with the desire to create a Washington State bioeconomy has led us to try to develop and deliver technologies and processes to convert Washington based biomass feedstocks to products and fuels and to do this in a way that fits what the state can produce sustainably. A group of WSU economists led a critical analysis of the needs and opportunities for biologically based energy generation within the state; their work highlighted the areas where large scale biomass strategies might be successful and areas, like wine production, where products of higher value than fuel-grade ethanol are likely to dominate. Oilseed and grassy lignocellulose crops, and urban, forestry and agricultural waste streams are the most likely to be viable but, as recent experience to

stimulate production of oilseed crops has demonstrated, it is important to have enough history and experience with new things to set appropriate incentives for changing patterns of production.

There are numerous societal challenges that can be addressed by cutting-edge research and through the application of that research to the practical issues that drive production. Our research and outreach helps ensure that the people of Washington State maintain a high quality of life by limiting the negative impacts of chronic disease, food insecurity, and obesity and our programs help ensure that the beauty of the state and its natural resources are sustained for future generations. In managing our Research and Extension portfolios, we carefully prioritize our efforts to ensure the greatest impact is derived from our research and extension programs, a prioritization process that has been honed by recent significant cuts to our budgets as the result of decreased state allocations. Although we believe we will be able to continue to deliver important outcomes to our stakeholders, including excellent quality education to our students and substantial economic benefits to agricultural and natural resource-based industries, communities, and individuals, it must be recognized that developing a critical mass of people and an adequate infrastructure to allow them to be productive is not something that happens easily. The USDA formula funds are an integral part of a federal/state partnership that is extremely important to sustaining these efforts. There seems to be little question that all parts of this partnership have been under considerable stress in the past few years. It seems likely that these stresses will continue and that we will continue to "do the best we can with what is available". Our integrated 2012- 2016 Plan of Work outlines the scope of the work ahead and the outcomes that we seek to achieve.

Estimated Number of Professional FTEs/SYs total in the State.

Year	Extension		Research	
	1862	1890	1862	1890
2013	535.0	0.0	440.0	0.0
2014	535.0	0.0	440.0	0.0
2015	535.0	0.0	440.0	0.0
2016	535.0	0.0	440.0	0.0
2017	535.0	0.0	440.0	0.0

II. Merit Review Process

1. The Merit Review Process that will be Employed during the 5-Year POW Cycle

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

2. Brief Explanation

Agricultural Research Center (ARC) projects describe work to be done by individual faculty members or faculty teams. The ideas for project topics can be developed first at a number of levels and are generally in response to stakeholder inquiries or the initiative of faculty members. Proposals that are the results of these discussions are first submitted to an appropriate department chair, who reviews the submission and, sometimes after consulting with other administrators, ascertains whether the topic of the research is consistent with departmental and College goals. If so, each individual ARC project proposal is sent to internal and external reviewers. These are asked whether the research represents solid science, is directed to topics of current interest, will advance the field of study and whether the research plan is appropriate. Reviewers are asked to offer suggestions for improvement and to identify the strongest and weakest points of the proposal. After comments are received from the reviewers, the chair assembles the commentary and submits it to the faculty member. The faculty member then revises the project proposal. After examining (and sometimes iterating) these changes, the Chair submits the project proposal to the Agricultural Research Center where it is reviewed by either the Director or the Associate Director. After this review, the proposal is sent to USDA-NIFA, where it is reviewed and generally approved, by the appropriate National Program Leader. Revisions may also be requested at this stage. When approval is final, the approved project is entered into our database and into the CRIS system. We also use this system as a way of tracking most ARC research projects funded by external funds as a mechanism for tracking the majority of our research activity in one database. In addition to reviewing individual projects prior to their establishment, the programs are evaluated on a yearly basis and may also be reviewed in the context of various university planning and evaluation processes. We also make use of the NIFA system that arranges for external review teams to examine specific departments or activities, such as our R&E Centers.

For various reasons, extension projects are reviewed slightly differently. The Plan of Work will be circulated among extension leadership at the University of Idaho and Oregon State University and comments will be solicited. Additionally, the plan will be shared with college and university leadership at WSU. Individual WSU Extension faculty program plans are developed through statewide planning processes informed by the WSU Extension Strategic Framework, the NIFA Plan of Work, the College of Agricultural, Human and Natural Resource Sciences Strategic Plan, and the WSU Strategic Plan. Extension faculty members prepare annual plans of work that are reviewed by Program Directors. This represents modification of our procedures, since the geographical matrix of organization has been eliminated in order to make our administrative structure less complex and focus more on statewide delivery within a subject area. WSU Extension faculty receive over 60% of their total funding from extramural sources, including USDA grants, grants from other agencies, foundation grants, and commodity commission grants. This generally involves another level of merit review since these stakeholders subject our proposals to their own review processes, which typically include expert peer review by scientific panels and by industry professionals and farmers. All faculty report at the beginning of the calendar year into WORQS (WSU Online Reporting and Query System), our electronic database system. This database contains information that summarizes each faculty member's accomplishments and provides a convenient way of aggregating information for unit level reports. The work is reviewed as an integral part of the annual performance review process by Program Directors, Department Chairs, and the Deans and Associate Deans of the colleges involved. WORQS documents can be accessed quickly at any time during the year that the information is needed. All WSU Extension publications undergo a double blind peer review. Reviewers include faculty at WSU or other Land Grant Universities, state and federal agencies,

or research faculty at other non-Land Grant universities.

III. Evaluation of Multis & Joint Activities

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

Since the desirability of establishing a project is generally established through discussions prior to proposal submission, the internal and external peer review involved in the merit review process used to approve ARC projects and WSU Extension programs is primarily to assess adequacy with which the proposal meets the perceived need, the overall focus of the proposed project and the technical issues involved in project implementation. Input from our stakeholders occurs via contacts with agricultural producers, natural resource managers, public health professionals, energy managers, and educators, both individually and through commissions, professional organizations and other representatives. At an administrative level, NIFA guidelines; the WSU College of Agricultural, Human, and Natural Resource Sciences strategic plan and the WSU Extension Strategic Framework guide prioritization. Our strategic documents are developed with diverse inputs from university and state agencies, the CAHNRS Advisory Council, the Center for Sustaining Agriculture and Natural Resources (CSANR) Advisory Council, county advisory councils, and the CAHNRS Dean's Kitchen Cabinet. This input influences the research and extension agendas by providing reference criteria for rating programs relative to CAHNRS and WSU Extension priorities. Six years ago, we persuaded the Washington legislature to appropriate funds to administer an internal grants program to target resources toward emerging opportunities or emergency needs, with the understanding that these allocations will be reviewed after the fact. So far, this funding mechanism has been notably successful at leveraging additional resources from external sources, at least partly because it has been successful at helping to encourage team oriented attempts to address important research problems. Unfortunately, the program has been suspended because of the need to use resources in other areas of critical need during state budget cuts.

2. How will the planned programs address the needs of under-served and under-represented populations of the State(s)?

Washington was selected as a Change Agent State for Engagement (CASE) in 2004. As a direct result, WSU Extension implemented a holistic plan to increase the recruitment and retention of persons of color in our faculty ranks and among our clientele. WSU Extension also reviews the civil rights record of each county extension program every five years to assure that faculty and staff are pursuing programs that, in addition to being non-discriminatory, also create a comfortable and productive environment for minority participants. WSU Human Resources routinely sends summaries of the applicant pool to Deans and Directors in order to allow them to have an overview of the profile of the applicants for all faculty and staff positions.

WSU Extension's Indian Reservation Programs receive federal (FRTEP) grant money that is leveraged with state and tribal funds and gifts to support strong Extension programs. Nutrition programs, including the Expanded Food and Nutrition Education Program (EFNEP and the Supplemental Nutrition Assistance Program Educational Program - SNAP-Ed), along with other programming for families that are focused on limited-income audiences. Agriculture and natural resource programming designed specifically for Latino, Hmong, Somali, Native American, and other underserved audiences include programs designed to increase minority ownership of farms and ranches, such as our participation in the Beginning Farmer and Rancher Development Program (BFRDP) through a USDA grant.Youth programs are designed to reach Latino, Native American and other minority groups with educational activities that

strengthen life skills and life-longachievement.

We also actively seek diverse representation on advisory groups at the local and statewide level. This input has led to research and extension programs designed to address needs of underserved audiences, including research designed to minimize risks to farm workers; extension programs in Spanish, Hmong, and Russian; culturally and language appropriate publications and videos, and other mechanisms for actively engaging with underserved populations.

3. How will the planned programs describe the expected outcomes and impacts?

Research projects are usually funded for five years, and we are moving toward a system where related projects are grouped into more team and concept oriented sub programs. This has been supported by a small state-supported internal grants program designed to integrate research and extension activities. Projects are reviewed at least annually to see whether the objectives are worthy and the procedures will lead to results and whether the projects will contribute to meeting benchmarks established by the departments and the College in terms of publications, students trained, success in external funding and other review processes, and program impact. Funded faculty PIs are also reviewed annually by their department or program chairs as part of the WSU management process and their progress reports are reviewed in the ARC by the Director or Associate Director. Some of the focus in the Annual Report document is on specific areas where we can list accomplishments where support is at least partially derived from USDA formula funds. These are integrated with state support and external funding but it must be emphasized that the formula funds are a key component of the recurrent funding that supports our baseline commitment to projects related to the Planned Program objectives.

Expected outcomes and impacts of integrated extension/research programs are often quantified in the "planned programs" section through measurement of learning (short-term outcomes); application of learning (intermediate-term outcomes); and social, environmental, and economic benefits derived from application of learning (long-term outcomes). Outcomes will be documented by surveys, collection and analysis of on-site data, and measurement of progress of sample populations.

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

Unlike the previous organization of Research Planned Programs, which were departmentally based, the current Planned Programs are organized around research objectives,. This should promote integration of the work being done under these new Programs, and it is hoped that this will lead to better research coordination and effectiveness. How influential this will be will be difficult to gauge since there is already considerable communication between the units and between faculty and research programs at different locations. Changing the way in which metrics are applied through these new Planned Programs is likely to supplement other research overviews, rather than being the primary tool used to evaluate our status.

However, after reporting on the new set of Planned Programs for the first time, we believe we have given USDA the information requested but that our effort, while useful from a statistical perspective, may not be making the contribution toward a national argument for the value of the formula funding that we think could be made. There do not appear to be good places within the Planned Program boxes to adequately describe specific projects or programs that contribute to a Planned Program. This may be the result of the way we phrased our state

objectives but some of the problem is in the way we are being asked by the rubric to describe our programs, outcomes and impacts. The process was frustrating and we anticipate that it may be frustrating for those evaluating our Annual Report. We do not know how much the process could be changed to allow the National Leaders to collect information about specific efforts that have had impact. But we would welcome the possibility of discussing alternative ways of reporting on our activities.

There does not appear to be a place in this category to report on multi and joint activities so we have included some of that information here:

Multi-state programming helps the ARC and WSU Extension garner efficiencies by collaborating with surrounding states in order to reduce research and extension programming redundancies. For example, the Pacific Northwest Publications series is a long-running effort by Washington, Oregon and Idaho to produce joint publications that tap into the knowledge bases of these institutions and eliminate duplication of effort. Additionally, many ARC scientists and WSU Extension faculty are members of regional research and/or extension coordinating committees. The extent of collaboration varies from informal relationships to very structured multistate efforts, especially related to dryland agriculture in WA, OR, and ID.

Additionally, WSU has long-standing collaborations with the University of Washington that include co-locating of faculty, jointly funded programs, and coordination of legislative and budgetary processes. Collaborative research occurs between the ARC and WSU Extension, between other WSU research entities and ARC/WSU Extension, and between ARC/WSU Extension and research and extension programs at the University of Washington, Oregon State University, and the University of Idaho. This integration strengthens the research and outreach efforts and helps ensure that the best practices for yielding tangible outcomes are employed by farmers and ranchers, natural resource managers, individuals, communities, and businesses.

IV. Stakeholder Input

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

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

- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public

Brief explanation.

Stakeholder involvement is sought through a variety of means. Electronic media (email, websites, and blogs) are increasingly being used to solicit information but we recognize that many individuals do not have convenient access to these 'new' media, so more traditional approaches are also used. These include the use of radio, direct mail, telephone contacts, and personal visits. Our many advisory councils and committees are kept abreast of activities within the College of Agricultural, Human, and Natural Resource Sciences and WSU Extension through newsletters, telephone calls, emails, blogs, and direct meetings. These groups meet at regular intervals. During these meetings, they are briefed about new initiatives, on-going work, and issues related to the College and WSU Extension. Feedback is also solicited at these events. This feedback is key to developing new initiatives and outreach programs. CAHNRS supports a Marketing, News and Educational Communications unit that now includes Extension, which was reorganized into the College three years ago. This unit has been very successful in communicating research and Extension activities through its own publications and links with state newspapers and electronic media (see http://cahnrsnews.wsu.edu/). We expect this activity to expand over the next five years through stakeholder-targeted and general interest (http://cahnrsnews.wsu.edu/rock-doc/) communications.Electronic surveys are increasingly used to capture rapid feedback from program participants, advisors, and the general public. These are generally conducted via media such as Survey Monkey or through Microsoft SharePoint although we have also used clickers at workshops to gather information rapidly. These assessments are extremely valuable in that response rates are generally much higher and data are delivered in a 'pre-analyzed' format. These rapid assessments are often critical in the development of projects with short timelines as is often the case when responding to federal, state, and foundation calls for grant proposals. Finally, web content delivery and web conferencing is being increasingly used to both communicate with the public and to present research results. WSU Extension has recently upgraded its web capabilities by employing a content management system. This has enabled greater ease of use and access to information. In addition, key elements are monitored using Google Analytics, which allows assessment of both the size and geographical location of audiences. Web conferencing is generally delivered via Adobe Connect. This allows ARC scientists and Extension educators to communicate broadly and simultaneously collect feedback from these audiences through online chats and polls.

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

1. Method to identify individuals and groups

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

Brief explanation.

The ARC and WSU Extension use local and statewide advisory committees to provide input the leadership and to faculty and staff. These include the College of Agricultural, Human and Natural Resource Sciences (CAHNRS) Advisory Council, the Dean's "Kitchen

Cabinet," the Center for Sustaining Agriculture and Natural Resources Advisory Committee, advisory committees at each of the four Research and Extension Centers, and county, departmental, and program-specific advisory committees.

When appropriate, feedback is sought through designed focus groups and designed surveys. This form of feedback is critical for evaluating new approaches, technology applications, and new outreach methods. Additionally, technical surveys are often designed by the Division of Governmental Studies and Services to assess public attitudes. Needs assessment is an expectation of all WSU Extension faculty members. These processes are deeply engrained in our program development processes. Alternative mechanisms have been developed to garner input from non-English speaking communities, refugee communities, and from other underserved populations. In these cases, WSU Extension often employs individuals from these communities who understand the cultures and traditions. This improves communication and assessment of need.

The ARC and some parts of Extension work closely with the numerous commodity commissions in the state to clearly understand the needs of their clientele. Joint work with these commissions often involves collaborative project design and follow-up presentation of results. In addition, the leadership of CAHNRS and WSU Extension sit on several statewide boards and numerous statewide committees and councils. These venues provide opportunities for soliciting and receiving input from numerous segments of society including tribes, state and federal agencies, the private sector, and the general public.

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

1. Methods for collecting Stakeholder Input

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

Brief explanation.

Annual assessments of general population characteristics, agricultural trends, natural resource-related issues, human health trends, and business dynamics are carried out as needed and are largely based on analysis of data collected by agencies external to the university, such as the US Census Bureau, National Agriculture Statistics Service, Washington Department of Natural Resources, Washington Department of Health, and the

Washington Department of Commerce. To meet specific needs, these are supplemented in some cases by focused internal or stakeholder commissioned studies. The data help WSU faculty and staff and the commissioning stakeholders identify target audiences and define specific needs. If appropriate, we then develop appropriate research and outreach to address these needs. Stakeholder input from groups and individuals identified by these processes is collected through a variety of processes that include individual meetings with individuals and groups, surveys, and other forums. Information from these activities is generally summarized and shared broadly. Additionally, key WSU personnel are invited to participate in these venues to receive input directly on both on-going and planned research and outreach.

3. A statement of how the input will be considered

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

Brief explanation.

Input is generally solicited in processes involving application of resources, including developing priorities for research and outreach, project design, and program delivery. Additionally, input from stakeholders strengthens our ability to assess need and identify potential partners, identify emerging issues, and evaluate the effectiveness of our research and extension programs in addressing these issues and needs as we proceed.

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Natural Resouces Stewardship

2. Brief summary about Planned Program

A major focus of our efforts in the Natural Resources Stewardship area is on the interface between Natural Resources and managed ecosystems, such as farms, orchards and forests. The proportion of resource under intensive management can vary considerably, nearing 100% in the wheat country of eastern Washington to a relatively small fraction in the non-agricultural desert and mountain regions of the state. WSU scientists continue to seek better understanding about how native plants and animals interact with their environments in order to more effectively manage, conserve, and protect these valuable resources. Additionally, they seek to better understand the complex interrelationships among our natural resource systems (terrestrial, aquatic, and atmospheric), human societies, and our economic systems. An example of this is in some of our integrated pest management research, where the "natural" regions adjacent to cultivation provides a refuge for natural pests and predators and must be taken into account in designing control strategies. Our researchers are also improving the productivity of plants like hybrid poplars and black cottonwoods, which hold great promise as carbon sinks, riparian buffers, harvested wood, and energy sources. Similarly, WSU scientists are developing mechanisms for re-vegetation of mining sites, restoration of watersheds, and reestablishing native prairies. This work is complemented by studies of the habitat requirements of key large carnivores and herbivores in forest and range ecosystems, with some effort directed toward preservation of endangered mammals. Our extension professionals focus on three major natural resource areas--water, forestry and range management. Water represents the largest component of our extension natural resources programs because it is a critical, limiting and limited resource in the region. Significant work is underway to apply the research and knowledge bases of the University to address issues related to both water quality and quantity. So, for example, close collaboration with state agencies, the city of Puyallup and on-going research at the WSU Puyallup Research and Extension Center, is developing strategies and deploying solutions to mitigate the impacts of storm water runoff into the Puget Sound in work that is partly supported by a grant from the US Environmental Protection Agency. These include the installation and testing of permeable paving materials, rain gardens, and other strategies designed to reduce the flow of water across man-made surfaces, a process that rapidly dumps accumulated debris into streams and estuaries. Significant efforts are also underway to investigate and ameliorate the impacts of agriculture on water quality through establishment of appropriate buffers, converting animal waste to energy and other useful byproducts, and decreasing pesticide contamination through integrated pest management strategies on farm and ranches. The latter efforts have led to substantial reductions in the amounts of pesticides applied to Washington crops, and corresponding reductions in these chemicals in nearby environments. Some of this effort was made necessary by the phasing out of organophosphates, a process that we believe will be shown to have been successfully done by the target date of 2012. Our Master Gardener volunteers work with homeowners to heighten awareness of the impacts of lawn and garden chemicals on surface and ground water leading to reduction in improper use of these materials. Our marine program includes significant volunteer efforts in the Puget Sound area (see http://county.wsu.edu/kitsap/nrs/Pages/BeachWatchers.aspx). In addition, other efforts focus on reducing hazards to shipping, improving fisher safety, reducing the impacts of fishing on marine ecosystems, and reducing the impacts of human habitation on costal marine environments. Finally, our range and forestry management programs engage landowners and land managers to increase application of best management practices leading to improved water quality and quantity, reduced conversion of forestland to other purposes (such as development), control of invasive species, reduced risk of wildfires, improved wildlife habitat, increased energy production from woody biomass, increased biodiversity, and improved

Recent reorganization at WSU within the Natural Resource area is leading to the merger of the Department of Natural Resource Sciences with the School of Earth and Environmental Sciences located in the College of Sciences. The resulting School of the Environment (http://environment.wsu.edu /) will house much of the WSU activity in this area and its development will obviously be a crucial component of WSU's Research and Extension activities in the next five years. In discussions with the Director of the School, the ARC has indicated that he will have considerable input into directing ARC resources to be most effective in pursuing Natural Resource Stewardship goals. .

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
111	Conservation and Efficient Use of Water	10%		5%	
112	Watershed Protection and Management	10%		5%	
121	Management of Range Resources	10%		5%	
122	Management and Control of Forest and Range Fires	9%		10%	
123	Management and Sustainability of Forest Resources	10%		10%	
124	Urban Forestry	5%		4%	
125	Agroforestry	2%		3%	
133	Pollution Prevention and Mitigation	5%		5%	
135	Aquatic and Terrestrial Wildlife	5%		15%	
136	Conservation of Biological Diversity	10%		6%	
213	Weeds Affecting Plants	5%		5%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	2%		2%	
215	Biological Control of Pests Affecting Plants	5%		12%	
302	Nutrient Utilization in Animals	0%		3%	
403	Waste Disposal, Recycling, and Reuse	5%		5%	
605	Natural Resource and Environmental Economics	2%		5%	
610	Domestic Policy Analysis	5%		0%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Washington State has a very rich natural resource base that supports the state's economy and contributes greatly to the quality of life in the region. Washington is home to vast mountain ranges, major river systems, forests, agricultural and rangelands, coastal regions, and the Puget Sound. These resources largely define our economy and the lifestyles that many generations have enjoyed. These resources are also under increasing pressure as the population of the state continues to expand, as snowpacks and steam flows are impacted by climate change, and as energy shortages result in increasing reliance on our natural systems for biomass production.

Priorities include: 1) Improvement of water quality through reduced soil erosion and movement of pesticides, fertilizers and other non-point source pollutants into streams, waterways and the Puget Sound; 2) Improvement in the condition of our range and forestlands leading to greater biodiversity, reduced risk of wildfire, and improvement in economic returns to landowners and managers; 3) Improved understanding of the habitat needs of plants and animals of the state, with the goal of maintaining species in a sustainable way.
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2. Scope of the Program

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

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We are assuming that the population of Washington State will continue to increase; that energy prices will continue to rise; that global climate change will impact snowpacks and affect the life histories of plants, pests and pathogens relevant to both agricultural and natural ecosystems, and that the public will increasingly demand good stewardship of our wildlife, watersheds, forests, agricultural and range lands, and coastal regions. We are also assuming that funding will continue to be available to support research and outreach related to natural resources stewardship.

2. Ultimate goal(s) of this Program

The ultimate goals of this planned program are increased water, land and air quality, improved habitat for native aquatic and terrestrial species, effective control of invasive plant and animal species, and increased sustainability and financial returns for natural resource-based industries.

V(E). Planned Program (Inputs)

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

Year	Extension		Research	
	1862	1890	1862	1890
2013	75.0	0.0	25.0	0.0
2014	75.0	0.0	25.0	0.0

Year	Extension		Research	
	1862	1890	1862	1890
2015	75.0	0.0	25.0	0.0
2016	75.0	0.0	25.0	0.0
2017	75.0	0.0	25.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

WSU scientists will conduct research leading to better understanding of the interaction between human development and terrestrial, aquatic, and atmospheric conditions; genetically improve poplar and black cottonwood species to more effectively sequester carbon, restore riparian areas, and provide wood and fuel using sustainable production practices; develop innovative mechanisms for revegetating mining sites, watersheds, and native prairies; and understand habitat requirements of key species. Extension educators will work with researchers and local communities to develop customized, science-based solutions to local problems and educate target audiences about new tools to more effectively manage natural resources. This education will in turn lead to behavior change and ultimately to improved condition of the natural resource base in Washington State.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations	● Public Service Announcement ● Newsletters ● TV Media Programs ● Web sites other than eXtension

3. Description of targeted audience

The target audiences include landowners and managers; state, federal, and local natural resource agency personnel; K-12 educators, local and state governments; and the general public, including the scientific disciplines that relate to these issues.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of extension workshops, demonstrations, and conferences conducted with a natural resources focus.
- Number of peer-reviewed (official) WSU Extension publications produced on natural resource stewardship topics.
- Number of graduate students with a significant professional orientation in the area of Natural Resources stewardship.

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.
2	Percentage of participants evaluated who applied knowledge acquired from WSU scientists or extension educators.
3	Number of acres of rangelands and forests exhibiting improved condition as a result of WSU programs or program partnerships.

Outcome # 1

1. Outcome Target

Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 124 - Urban Forestry
- 125 - Agroforestry
- 133 - Pollution Prevention and Mitigation
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 213 - Weeds Affecting Plants
- 214 - Vertebrates, Mollusks, and Other Pests Affecting Plants
- 215 - Biological Control of Pests Affecting Plants
- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics
- 610 - Domestic Policy Analysis

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Percentage of participants evaluated who applied knowledge acquired from WSU scientists or extension educators.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management

- 121 - Management of Range Resources
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 124 - Urban Forestry
- 125 - Agroforestry
- 133 - Pollution Prevention and Mitigation
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 213 - Weeds Affecting Plants
- 214 - Vertebrates, Mollusks, and Other Pests Affecting Plants
- 215 - Biological Control of Pests Affecting Plants
- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics
- 610 - Domestic Policy Analysis

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Number of acres of rangelands and forests exhibiting improved condition as a result of WSU programs or program partnerships.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 124 - Urban Forestry
- 125 - Agroforestry
- 133 - Pollution Prevention and Mitigation
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 213 - Weeds Affecting Plants
- 214 - Vertebrates, Mollusks, and Other Pests Affecting Plants

- 215 - Biological Control of Pests Affecting Plants
- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics
- 610 - Domestic Policy Analysis

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Numerous external factors can potentially impact the success of our research and extension programs. Although we were remarkably effective at renewing contracts with counties for Extension activities during 2011, reduced availability of funding at several levels, but especially from state sources, has damaged our ability to achieve previous targets. We have to some extent compensated through the use of technology and reprioritization to increase efficiency; however, this sort of increased output per professional FTE cannot be expected to continue to rise at current rates. Changes in political priorities also impact the effectiveness of our work, either by changing the availability of resources supporting our programs or by altering the available options for target audiences. Additionally, legislative action can create new pressures on researchers and extension educators due to unfunded mandates and changes in organizations that have been our traditional partners. Because of the physical, production, market and population diversity referred to elsewhere, WSU is particularly vulnerable to this type of change--we are not very deep and have become highly collaborative with other organizations in order to maintain the coverage our stakeholders expect. While stakeholders now can "get on the web" to find information, much of the best of that information was generated previously by organizational structures that are severely threatened. To make a five-year plan under these circumstances is fraught with difficulties but serves to reemphasize core priorities and reengage core constituencies. In the past, Washington State has also experienced natural disasters such as earthquakes, storms, and volcanic eruptions. Each of these has potential impacts on our work and on those that we seek to help with our research and science-based extension programs.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Our evaluation methodologies are designed to assess the amount of learning acquired during our activities and retained at intervals afterword; the degree of application of that learning; and the social, environmental and economic value of these applications. We will use post-program, retrospective, and before and after assessments to document changes in knowledge. We will use survey methods after an appropriate time lag to assess how much of the new knowledge was actually applied. Finally, we will use research methodologies, industry assessments, and survey responses to determine the social, economic and environmental values derived from the application of new techniques.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Global Food Security and Hunger

2. Brief summary about Planned Program

Washington State's diverse microclimates produce over 300 crops, including small grains, vegetables, fruits, legumes, and livestock. Washington State University (WSU) conducts research and extension programs focused on increasing the productivity and efficiency of our farms and ranches by reducing plant and animal pests and diseases, developing new genetic resources that increase productivity relative to inputs, optimizing the use of nutrients for plant and animal production, improving product quality, enhancing business management and marketing effectiveness, and reducing negative environmental impacts of agricultural production through more effective tillage, integrated pest management, and effective water and waste management.

WSU is a global leader in plant molecular biology and in the application of traditional breeding. Many wheat and barley varieties used in the Pacific Northwest (PNW) are products of these breeding programs; similar efforts are yielding promising new varieties of apple, legume, potato, hop, and other crops. Crop genetic improvement epitomizes integration of research and extension as innovations from laboratories advance to controlled greenhouse and field studies, to variety comparisons conducted by extension specialists, to ultimate application by growers. These dynamic programs are critical for keeping our crops competitive in a global marketplace and in helping farmers stay one step ahead of emerging weeds, pests, and diseases that are becoming even more of a threat as a result of global climate change.

Many areas in the PNW have steep topography, recurrent high winds and seasonal flooding, which create high erosion potential and risk of runoff into waterways and aquifers. WSU research and extension programs have been leaders in developing and delivering new strategies to help sustain cropping under these conditions. Concerns about input costs have also renewed interest in minimum tillage systems and precision agriculture. WSU research and extension programs are delivering approaches that lead to reduced fuel and fertilizer inputs, improved soil stability, and maintenance of high production levels.

Interest in sustainable and organic production in the PNW is high and increasing. WSU responded with new research and extension programs that impact non-traditional farming approaches. Through our research programs located near Pullman (Eastern WA), Wenatchee (Central WA) and Mount Vernon and Puyallup (Western WA), new sustainable and organic production methods are being evaluated and disseminated. Animal production is a significant portion of our agricultural economy. Dairy production is evolving from small-scale operations in Western Washington to large integrated dairies in the Columbia Basin, which is also home to many commercial feedlots. Waste management is a major concern for both confinement dairies and feedlots. Significant work is underway to reduce waste volume and to convert waste into economically useful materials, such as methane and dry phosphorus fertilizer. Beef cattle graze much of the land that is not appropriate for cropping. Research and extension programs focus on increasing the efficiency of production of these herds while seeking to minimize impacts on range and forest ecosystems and watersheds.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	5%		3%	
102	Soil, Plant, Water, Nutrient Relationships	5%		5%	
104	Protect Soil from Harmful Effects of Natural Elements	5%		3%	
111	Conservation and Efficient Use of Water	8%		7%	
112	Watershed Protection and Management	5%		3%	
121	Management of Range Resources	2%		3%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		9%	
202	Plant Genetic Resources	6%		8%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		9%	
205	Plant Management Systems	5%		6%	
206	Basic Plant Biology	0%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	12%		8%	
212	Pathogens and Nematodes Affecting Plants	12%		9%	
213	Weeds Affecting Plants	10%		3%	
215	Biological Control of Pests Affecting Plants	8%		5%	
216	Integrated Pest Management Systems	10%		4%	
301	Reproductive Performance of Animals	2%		3%	
302	Nutrient Utilization in Animals	2%		3%	
303	Genetic Improvement of Animals	3%		2%	
304	Animal Genome	0%		2%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Washington State is extremely variable in climate and topography, leading to an ability to produce over 300 different agricultural commodities. Much of the agricultural production of the state is exported, primarily to Pacific Rim countries. As a result, Washington producers must be competitive in global markets and have a keen understanding of the demand components from other societies. The state's productivity is also highly dependent upon the application of appropriate technologies for irrigation, farming of lands with high erosion potential, effective control of existing and invasive pests and diseases, and effective transport of agricultural products to distant markets. Our priorities include development and distribution of new genetic materials including new crop varieties designed to increase productivity and production efficiency; improving efficiency in using inputs in plant and animal production; reducing soil erosion from wind and water; improving water quality through appropriate irrigation methods, waste management, and optimal application of pesticides and herbicides; reducing risk to human health by use of appropriate production practices and ensuring that these practices result in a safe and abundant food supply; improving tillage practices to meet environmental and economic benchmarks; and diversifying production methods to respond to emerging consumer preferences.

2. Scope of the Program

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

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We are assuming that funding (through a variety of sources) will remain accessible for research and extension programs; that no major crises occur within the state, nationally, or internationally that significantly impact the ability of farmers to apply new technologies; that fuel, fertilizer, and other input costs will continue to rise; that consumers will continue to become more concerned about the type and quality of the food they eat; that the public will increase their demand for environmental stewardship; and that agriculture will be exposed to new plant and animal pests and diseases due to global climate change and increased international commerce. Through 2011 we were successful in expanding our external funding base but changes in federal and state priorities, while they offer opportunities, also threaten some of the funding that is needed for long-term cropping systems research needed in many areas of the state. While we assume that some funding for these programs will be available, this is perhaps the weakest area of our portfolio because of the considerable time required to obtain results. However, long term studies are crucial in evaluating whether a set of agricultural practices can be sustained. Changes at the federal level to emphasize large coordinated programs have also created some issues in allowing effective development of new faculty since this reorganization has made it more difficult to establish independent programs.

2. Ultimate goal(s) of this Program

The ultimate goals of this planned program are to increase agricultural productivity, profitability, and production efficiency and to do this in a way that is sustainable. The last criterion requires practices that emphasize reduced soil erosion; improved water quality; reduced energy inputs in agriculture; improved quality and safety of agricultural products; and reduce the carbon footprint of agriculture in the state.

V(E). Planned Program (Inputs)

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

Year	Extension		Research	
	1862	1890	1862	1890
2013	145.0	0.0	290.0	0.0
2014	145.0	0.0	290.0	0.0
2015	145.0	0.0	290.0	0.0
2016	145.0	0.0	290.0	0.0
2017	145.0	0.0	290.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Fundamental, translational and applied research will be conducted in laboratories, at research and extension centers, and in collaboration with farmers and ranchers. Extension programs will operate to hasten the application of new and existing science within the agricultural industries of WA State.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations	● Newsletters ● Web sites other than eXtension ● Other 1 (Decision Aids)

3. Description of targeted audience

Target audiences include farmers and ranchers, agricultural consultants, scientists, commodity commissions, educators, state and federal agency professionals, elected officials, food processors, transporters, agricultural chemical producers and applicators, and the general public.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of workshops, demonstrations, and field days conducted annually
- Number of peer reviewed (official) WSU Extension publications published
- Number of graduate students with a significant professional orientation in the area of Global Food Security.

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.
2	Percentage of participants evaluated who applied acquired knowledge
3	Percentage increase in yield realized among program participants as a result of application of WSU-recommended practices.
4	Increase in profitability resulting from practices developed by or recommended by WSU Extension personnel and/or ARC scientists.
5	Increased number of acres managed with "Best Management Practices" designed to yield improved environmental quality.

Outcome # 1

1. Outcome Target

Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 101 - Appraisal of Soil Resources
- 102 - Soil, Plant, Water, Nutrient Relationships
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 202 - Plant Genetic Resources
- 205 - Plant Management Systems
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 213 - Weeds Affecting Plants
- 215 - Biological Control of Pests Affecting Plants
- 216 - Integrated Pest Management Systems
- 301 - Reproductive Performance of Animals
- 303 - Genetic Improvement of Animals

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 2

1. Outcome Target

Percentage of participants evaluated who applied acquired knowledge

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 101 - Appraisal of Soil Resources
- 102 - Soil, Plant, Water, Nutrient Relationships
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 111 - Conservation and Efficient Use of Water

- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 202 - Plant Genetic Resources
- 205 - Plant Management Systems
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 213 - Weeds Affecting Plants
- 215 - Biological Control of Pests Affecting Plants
- 216 - Integrated Pest Management Systems
- 301 - Reproductive Performance of Animals
- 303 - Genetic Improvement of Animals

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Percentage increase in yield realized among program participants as a result of application of WSU-recommended practices.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 101 - Appraisal of Soil Resources
- 102 - Soil, Plant, Water, Nutrient Relationships
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 111 - Conservation and Efficient Use of Water
- 121 - Management of Range Resources
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 205 - Plant Management Systems
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 213 - Weeds Affecting Plants
- 215 - Biological Control of Pests Affecting Plants
- 216 - Integrated Pest Management Systems
- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 303 - Genetic Improvement of Animals

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 4

1. Outcome Target

Increase in profitability resulting from practices developed by or recommended by WSU Extension personnel and/or ARC scientists.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 101 - Appraisal of Soil Resources
- 102 - Soil, Plant, Water, Nutrient Relationships
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 205 - Plant Management Systems
- 206 - Basic Plant Biology
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 213 - Weeds Affecting Plants
- 215 - Biological Control of Pests Affecting Plants
- 216 - Integrated Pest Management Systems
- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 5

1. Outcome Target

Increased number of acres managed with "Best Management Practices" designed to yield improved environmental quality.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 101 - Appraisal of Soil Resources
- 102 - Soil, Plant, Water, Nutrient Relationships
- 104 - Protect Soil from Harmful Effects of Natural Elements
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 213 - Weeds Affecting Plants
- 215 - Biological Control of Pests Affecting Plants
- 216 - Integrated Pest Management Systems

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Progress in generating new knowledge is very dependent on funding for research since the number of studies is a function of the number and quality of researchers available and the accessibility

of operation funding needed to carry out the research. Progress in increasing knowledge is largely determined by the interest level of the target audiences and the ability of WSU Extension professionals to reach the audience with appropriate information. This process is largely determined by state, county, federal and philanthropic support levels; however, in our experience farmers, ranchers, and agricultural professionals are more likely to seek new knowledge when they possess the economic resources to potentially apply what they have learned.

Application of new knowledge and the value of that application are often determined by potential profit or loss and weather conditions. Profit level is determined by the price of the commodity produced, which is in turn determined by supply and demand. Because WA State is very dependent upon Pacific Rim commodity markets, external factors like currency valuations and transportation costs frequently have very large impacts on prices received at the farm gate.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Our evaluation methodologies are designed to assess amount of acquired learning; degree of application of learning; and the social, environmental and economic value of this application. We will use post-program, retrospective, and before and after assessments to document changes in knowledge. We will use survey methods after an appropriate time lag to assess how much of the new knowledge was actually applied. Finally, we will use research methodologies, industry assessments, and survey responses to determine the social, economic and environmental values derived from the application of new techniques.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Energy

2. Brief summary about Planned Program

Developing a set of energy alternatives based on sound science, responsible engineering, and accurate economic assessment is an overall goal for this Planned Program. As a northern state, Washington's climate is relatively cool, has a high annual variation of sunlight and a pronounced winter season. There are many areas where available water limits crop alternatives. These factors constrain available strategies for bioenergy production. The foci of the biologically-related energy production research effort at Washington State University have been on basic plant sciences related to metabolite biosynthesis and partitioning, with the goals of developing new energy crops and also in helping regional farmers to find niche crops that can be grown for use as fuels. Additionally, our research seeks to create mechanisms by which local waste streams, including those from animal rearing operations and municipal waste, can be converted into power, heat, and stable and useful byproducts of anaerobic digestion. The basic plant science energy research is investigating how various plant metabolites are made and how their synthesis is coordinated. The ultimate goals of this type of research are to increase agricultural production of biofuel and bioproduct related materials by increasing energy yield from photosynthesis, and to develop plants that allocate their productivity into a more useful spectrum of energy molecules. Research and extension programs are assessing potential non-food energy plants including poplar, switchgrass, algae, and camelina for biomass and bioproduct production. Various small- to medium-scale processing options are being investigated, including various types of fermentation and thermochemical processing, like pyrolysis. Pyrolysis is likely to produce large amounts of biochar as a byproduct and we are investigating how biochar might be used to improve soil, while simultaneously sequestering carbon. Waste streams are also promising energy sources, with the collateral benefits of generating revenue by reducing waste mass and environmental pollution. We are developing technologies for handling forest, animal, and municipal waste, and also potential new uses for the products of these technologies. Having bioenergy and bioproduct options can help improve the sustainability of our agriculture, food systems, and rural communities through diversification (economic and biological); recovery and recycling of carbon, nutrients and energy from organic wastes; reduction of environmental pollutants; and generation of income and investment opportunities for farmers and rural communities. WSU has the ability to carry out life-cycle analyses to estimate under what conditions developing these alternatives might make sense. The WSU Extension Energy Program supports development of renewable solar and wind energy by actively engaging with utilities, workforce training facilities, builders and consumers. Additionally, the WSU Extension Energy Program focuses considerable effort on energy conservation, the most cost effective mechanism for matching energy supply with demand. The WSU Extension Energy Program creates and maintains regional and national clearinghouses for delivering energy information related to energy use and conservation, innovative industrial energy use strategies, energy efficiency, and regional energy development. Much of this activity has been in partnership with the US Department of Energy and other federal agencies and with various state agencies.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		5%	
123	Management and Sustainability of Forest Resources	10%		5%	
131	Alternative Uses of Land	10%		5%	
133	Pollution Prevention and Mitigation	10%		2%	
141	Air Resource Protection and Management	5%		3%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		5%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		15%	
204	Plant Product Quality and Utility (Preharvest)	0%		15%	
205	Plant Management Systems	0%		5%	
206	Basic Plant Biology	0%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
402	Engineering Systems and Equipment	25%		5%	
403	Waste Disposal, Recycling, and Reuse	15%		10%	
511	New and Improved Non-Food Products and Processes	0%		5%	
601	Economics of Agricultural Production and Farm Management	10%		5%	
603	Market Economics	10%		2%	
605	Natural Resource and Environmental Economics	5%		3%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Continued national competitiveness, economic growth and quality of life is dependent in large

measure on our ability to find clean, cost effective, and renewable sources of energy. Washington's economy has long relied upon relatively cheap energy largely derived from hydropower. Further growth of the hydropower energy sector is virtually impossible given societal resistance to the creation of new dams. However, other ecosystem conversion sources of energy appear to be viable in the region, including solar, wind, and biomass conversion. Among these, solar and biomass technologies are still evolving. Additionally, though economic analyses are helping to unravel these complex systems, there are still gaps in our knowledge about the economic viability of these strategies. Our priorities are 1) to develop locally applicable biomass and bioenergy alternatives; 2) to increase energy efficiency on farms, in industrial settings, and within residential dwellings, 3) to increase understanding and appropriate application of new alternative energy resources including biomass conversion and solar applications.

2. Scope of the Program

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

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

The cost of energy produced from oil and natural gas is likely to become increasingly more expensive, although this has become an increasingly complicated issue regionally because of the interplay of new technology and processing and distribution issues. Regional reliance on coal is likely to be phased out because of environmental concerns but in both cases, the incoherence of the federal energy policy is creating difficulties in integrating planning for the short, medium and long term. While we believe that understanding the links between human action and climate change will become more widely accepted and lead to increased regulation and societal pressures to expanded application of alternative clean energy systems, the obvious reluctance to remodel energy markets in response to the projected consequences mean that many efforts are limited to testing prototype strategies and retrofitting advanced solutions only where the immediate economic return is already substantial. While it seems likely that cost structures will evolve to make alternative energy systems more cost effective and competitive, the degree to which operators at a number of levels are interfering in the markets for energy and energy related commodities makes the five year future very unclear.

2. Ultimate goal(s) of this Program

Increase energy efficiency of homes, manufacturing processes, and commercial buildings.

Increase the percentage of total energy consumed in the Pacific Northwest that is derived from clean alternative energy sources such as biomass, solar, and wind.

V(E). Planned Program (Inputs)

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

Year	Extension		Research	
	1862	1890	1862	1890
2013	80.0	0.0	45.0	0.0
2014	80.0	0.0	45.0	0.0
2015	80.0	0.0	45.0	0.0
2016	80.0	0.0	45.0	0.0
2017	80.0	0.0	45.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Research will be conducted on energy-related yield and production and processing efficiency of using agricultural and woody biomass, algae and oil seeds. Economic analyses will be conducted on these various energy systems to assess thresholds for local and regional application of these technologies. Extension programs will be developed to teach and demonstrate alternative energy systems such as anaerobic digestion, biomass production, oil seed production, increasing energy efficiency, and utilization of wind and solar energy systems.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations	● Web sites other than eXtension

3. Description of targeted audience

The target audiences will include farmers, business owners, homeowners, industry technology providers, project developers, and public agencies and utilities.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of workshops, demonstrations, and symposia conducted related to alternative energy and energy efficiency.
- Number of peer reviewed (official) WSU Extension publications published annually.
- Number of graduate students with a significant professional orientation in the area of Sustainable Energy.

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.
2	Percentage of participants who demonstrate application of new knowledge resulting from WSU energy workshops, demonstrations, or symposia.
3	Number of households and enterprises reporting reduced energy consumption as a result of WSU programs.
4	Amount of new sustainable energy (MW/YR) produced as a result of WSU programs.

Outcome # 1

1. Outcome Target

Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 123 - Management and Sustainability of Forest Resources
- 131 - Alternative Uses of Land
- 133 - Pollution Prevention and Mitigation
- 141 - Air Resource Protection and Management
- 402 - Engineering Systems and Equipment
- 403 - Waste Disposal, Recycling, and Reuse
- 603 - Market Economics
- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Percentage of participants who demonstrate application of new knowledge resulting from WSU energy workshops, demonstrations, or symposia.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 123 - Management and Sustainability of Forest Resources
- 131 - Alternative Uses of Land
- 133 - Pollution Prevention and Mitigation
- 141 - Air Resource Protection and Management
- 402 - Engineering Systems and Equipment
- 403 - Waste Disposal, Recycling, and Reuse
- 603 - Market Economics
- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Number of households and enterprises reporting reduced energy consumption as a result of WSU programs.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 141 - Air Resource Protection and Management
- 402 - Engineering Systems and Equipment

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Amount of new sustainable energy (MW/YR) produced as a result of WSU programs.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 123 - Management and Sustainability of Forest Resources
- 131 - Alternative Uses of Land
- 133 - Pollution Prevention and Mitigation
- 141 - Air Resource Protection and Management
- 402 - Engineering Systems and Equipment
- 403 - Waste Disposal, Recycling, and Reuse

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Numerous external factors can potentially impact the success of our research and extension programs. National energy policy remains confused and has been difficult to track from a research perspective. Reduced availability of local funding has most recently damaged our ability to achieve previous targets and, although we have been successful in competing for large federal grants related to energy, it is difficult to argue that we have a coherent, integrated strategy that is properly resourced to deal with the various aspects of energy change in the state. We have to some extent compensated for shifts in the funding pattern through the use of technology to increase per person efficiency but this sort of increased output per professional FTE cannot be expected to continue to rise at current rates. Changes in political priorities impact the effectiveness of our work either by changing the availability of resources supporting our programs or by altering the available options for target audiences. Additionally, legislative action create new pressures on researchers and extension educators due to unfunded but mandated changes in priorities and as a result of changes in organizations that have been our traditional partners. In the past, Washington State has also experienced natural disasters such as earthquakes, storms, and volcanic eruptions. Each of these has potential impacts on our work and on those that we seek to help with our research and science-based extension programs.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Our evaluation methodologies are designed to assess the amount of acquired learning; degree of application of learning; and the social, environmental and economic value of this application. We will use post-program, retrospective, and before and after assessments to document changes in knowledge. We will use survey methods after an appropriate time lag to assess how much of the new knowledge was actually applied. Finally, we will use research methodologies, industry assessments, and survey responses to determine the social, economic and environmental values derived from the application of new techniques.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Climate Change

2. Brief summary about Planned Program

The impact of global climate change will be important to the Pacific Northwest although the region's climate is expected to change in diverse ways that preclude a single type of response. Of major concern is retention of snowpacks in the Cascade Range and in the upper Columbia River watershed in southern Canada. As winters become warmer, less moisture will be retained, stream flows will peak (and may end) earlier, and flooding will likely be more acute. To a large measure, these impacts are already being felt with almost the entire Cascade and Olympic Ranges in Washington State exhibiting a downward trend in April 1 snowpack since 1916. Trends in precipitation are more variable with some regions of eastern Washington receiving greater annual precipitation while western Washington and the Cascade Range have witnessed generally lower precipitation levels. Winter temperatures will likely increase in the Columbia Basin and much of northeastern Washington whereas summer temperatures will likely decrease in much of eastern Washington. In addition to change in stream flows, shifts in mean and extreme temperatures will likely create opportunities for invasive pests, diseases, and plants to become established in the region. New disease and pest resistant crop varieties will be needed and integrated pest management strategies will need to become more dynamic.

WSU research and extension programs will focus on two major areas related to climate change: adaptation/mitigation and greenhouse gas emission. We will strive to help Washington agriculture adapt by producing new varieties that resist new pests and diseases, that can withstand changes in minimum and maximum temperatures, and that might take advantage of the longer growing season. WSU Extension has also entered into a partnership with Oregon State University and the University of Idaho to create a grant-funded climate extension specialist position. This position will allow us to work more effectively with farmers, industry, public agencies, and communities to plan for the impacts of global climate change and take appropriate steps to ensure that the state can effectively deal with challenges of limited water supplies, flooding, and increasing wildfire frequencies. Our cutting-edge plant molecular biology and variety development programs along with effective integrated pest management strategies and general crop management will help remediate changes in the range of plant pests and diseases associated with climate change. Both farms and forests are large potential carbon sinks. Therefore, we will seek new opportunities for agricultural producers and forest landowners and managers by evaluating policies and implementation alternatives related to greenhouse gas emission and carbon sequestration. Farmers and foresters will need to be able to assess their options in comparing the value of reduced greenhouse gas emissions associated with change in operational practices to the potential loss of productivity. WSU research will also develop new tillage and soil management practices to ensure that productivity can be maintained while maximizing carbon sequestration effects. Finally, WSU faculty will support creation of sound policy relating to climate change by providing science-based information to key decision-making groups and individuals at the local, state and national levels.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		5%	
111	Conservation and Efficient Use of Water	10%		5%	
112	Watershed Protection and Management	10%		5%	
122	Management and Control of Forest and Range Fires	10%		5%	
123	Management and Sustainability of Forest Resources	5%		5%	
132	Weather and Climate	5%		5%	
133	Pollution Prevention and Mitigation	5%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		10%	
202	Plant Genetic Resources	0%		5%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		10%	
205	Plant Management Systems	20%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		10%	
212	Pathogens and Nematodes Affecting Plants	10%		10%	
213	Weeds Affecting Plants	0%		3%	
216	Integrated Pest Management Systems	10%		5%	
404	Instrumentation and Control Systems	0%		2%	
605	Natural Resource and Environmental Economics	0%		5%	
610	Domestic Policy Analysis	5%		0%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

We anticipate that range will be reduced, and snow melt will occur earlier in the season resulting in spring flooding and low or interrupted stream flow during the summer and fall. These changes will impact communities, agriculture and natural resource management, navigation, and electrical generation in the Pacific Northwest. Additionally, new plant and animal pests and diseases are likely to emerge in the region because of lower winter mortality and the potential for more generations during the extended warmer months. So, for example, the range of the glassy winged sharpshooter, the vector for Pierce's disease in grapes, is currently limited by our cold winters but might enlarge, especially into the warmer coastal areas

of Oregon and Washington that are now locations of many smaller wineries. Some areas may have longer effective growing seasons, allowing longer production period and more efficient use of labor and capital equipment. Depending on policy alternatives, new opportunities for farmers and forestland managers may appear as reward systems are established for reducing greenhouse gas emissions.

Our priorities related to climate change are to 1) provide technical information and assessments to communities and agencies relative to expected impacts of climate change; 2) develop new crop varieties and crop management strategies to deal with the increased challenges and opportunities presented by altered climate. (We have found that it is most effective to present this to our constituents as extending our normal operations with a bias toward anticipated changes rather than as a new initiative. This is both accurate and less provocative.); 3) develop and deliver effective strategies to monitor and control plant and animal pests and diseases that may be enhanced by changes in weather; and 4) develop and deliver decision tools to help farmers and foresters evaluate incentive systems for reduced greenhouse gas emission strategies.

2. Scope of the Program

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

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We assume that new competitive funding will be available to support research and outreach related to climate change through USDA NIFA, NSF, NOAA and other sources. During 2011 WSU groups were part of successful applications for multiyear funding in the area of climate change monitoring and mitigation research and these efforts will obviously continue. We also assume that base state and federal funding for applied research and extension will continue at a level that allows WSU to effectively engage in this area. Finally, we assume that public skepticism related to the validity of climate change will not reduce the emphasis on addressing this critical issue.

2. Ultimate goal(s) of this Program

Improve the ability of the residents of WA State to deal with the impacts of climate change including communities, agriculture, forestry, and the general public. Increase potential for carbon sequestration and/or reduce production of greenhouse gases by agricultural and natural resources-based industries.

V(E). Planned Program (Inputs)

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

Year	Extension		Research	
	1862	1890	1862	1890

Year	Extension		Research	
	1862	1890	1862	1890
2013	20.0	0.0	65.0	0.0
2014	20.0	0.0	65.0	0.0
2015	20.0	0.0	65.0	0.0
2016	20.0	0.0	65.0	0.0
2017	20.0	0.0	65.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Research and outreach will be conducted to facilitate conversion of agricultural, forestry, and industrial waste streams into clean energy and stable construction grade materials. This includes development of new products and transfer of associated technology to the private sector. Delivery of information to the general public will continue to be a high priority.

Our plant breeding and molecular biology programs will continue to develop new crop varieties that are able to withstand emerging disease and pest threats associated with climate change. We will investigate the possibilities that changed climatic conditions might present opportunities for growing new crops or growing traditional crops in new ways or new areas.

We will assess climate change related policies and develop research and outreach programs to position Washington's agriculture and forestry industries effectively to increase sequestration of carbon and to benefit from future carbon trading protocols or other greenhouse gas mitigation policy mechanisms.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations	● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

Owners and managers of crop and range lands, forest resources, and wood products industries; community leaders; and public agencies and organizations.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of workshops and other educational venues delivered.
- Number of peer reviewed (official) WSU Extension publications published per year.
- Number of graduate students with a significant professional orientation in the area of Climate Change.

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.
2	Percentage of evaluated program participants who applied knowledge attained from WSU.
3	Acres planted with WSU-developed crop varieties that are more adapted to environmental conditions or more resistant to emerging plant pests and diseases.
4	Number of farms employing anaerobic digestion or other methods to reduce GHG emissions or to sequester carbon.

Outcome # 1

1. Outcome Target

Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 133 - Pollution Prevention and Mitigation
- 205 - Plant Management Systems
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 216 - Integrated Pest Management Systems
- 610 - Domestic Policy Analysis

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Percentage of evaluated program participants who applied knowledge attained from WSU.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 133 - Pollution Prevention and Mitigation
- 205 - Plant Management Systems

- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 216 - Integrated Pest Management Systems
- 610 - Domestic Policy Analysis

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Acres planted with WSU-developed crop varieties that are more adapted to environmental conditions or more resistant to emerging plant pests and diseases.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 216 - Integrated Pest Management Systems

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 4

1. Outcome Target

Number of farms employing anaerobic digestion or other methods to reduce GHG emissions or to sequester carbon.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 205 - Plant Management Systems

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Numerous external factors can potentially impact the success of our research and extension programs. Reduced availability of funding has damaged our ability to achieve some previous targets and success in obtaining directed support leads to modification of effort. We have to some extent compensated for decreases in flexible budgets by using technology to increase per person efficiency but this kind of increased output per professional FTE cannot be expected to continue. Changes in political priorities impact the effectiveness of our work either by changing the availability of resources supporting our programs or by altering the available options for target audiences. Especially in the climate change area, lack of a clear consensus (much less a mandate) makes it difficult to work with many of our constituents using climate change as a long-term motivation. Since we already are active in dealing with the short-term problems associated with climate change, like adapting production to local microclimates, this does not alter much of what we are doing now but may alter what we do in the future. Additionally, legislative action can create new dynamics for researchers and extension educators due to unfunded mandates and changes in organizations that have been traditional partners. In the past, Washington State has also experienced natural disasters such as earthquakes, storms, and volcanic eruptions. Each of these has potential impacts on our work and on those that we seek to help with our research and science-based extension programs.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Our evaluation methodologies are designed to assess amount of acquired learning; degree of application of learning; and the social, environmental and economic value of this application. We will use post-program, retrospective, and before and after assessments to document changes in knowledge. We will use survey methods after an appropriate time lag to assess how much of the new knowledge was actually applied. Finally, we will use research methodologies, industry assessments, and survey responses to determine the social, economic and environmental values derived from the application of new techniques.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Childhood Obesity

2. Brief summary about Planned Program

Approximately 25% of children in Washington State are overweight or obese, and the problem is even more severe among Hispanic youth, with over 34% of these youth categorized as overweight or obese. Though Washington State holds the fifth lowest rank (5th best) in overweight and obese youth, the problem is significant and demands a concerted response. Left unresolved, overweight or obese youth are more likely to have higher risk factors for cardiovascular disease, including high blood pressure, high cholesterol, dyslipidemia, and type 2 diabetes. Other complications include asthma, sleep apnea and liver damage. Additionally, obese youth are more likely to become obese adults and experience greater risk of early death.

Washington State University will undertake three major outreach efforts to reduce the incidence of overweight and obese youth. 1) Through our nutrition education programs supported by USDA SNAP-Ed (Supplemental Nutrition Assistance Program - Education) and the USDA EFNEP (Expanded Food and Nutrition Education Program), we will reach limited resource households with training and support leading to greater awareness and behavior change related to dietary habits and obesity prevention and mediation. 2) Work in our 4-H Youth Development Program highlights increased physical activity for youth. This includes a number of activities such as Adventure Education, Challenge, and Environmental Stewardship programs which actively engage youth in an outdoor environment and include physical activity as a major component of each enterprise. Other programs such as the equestrian and dog obedience projects require both the animal and the handler to engage in significant levels of physical activities. 4-H youth involved in the State 4-H Conference also engage in activities that involve both their minds and bodies. 3) Our Small Farms Team and the Center for Sustaining Agriculture and Natural Resources conduct outreach programming designed to increase availability of locally produced foods - helping to ensure that healthy foods are available in communities throughout the state. These programs assist farmers in effectively growing and marketing their produce in urban areas. Decision-makers are also engaged to develop policies that support locally grown foods.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
134	Outdoor Recreation	5%		0%	
601	Economics of Agricultural Production and Farm Management	5%		0%	
604	Marketing and Distribution Practices	5%		0%	
607	Consumer Economics	0%		60%	
701	Nutrient Composition of Food	10%		40%	
703	Nutrition Education and Behavior	20%		0%	
704	Nutrition and Hunger in the Population	15%		0%	
724	Healthy Lifestyle	20%		0%	
806	Youth Development	20%		0%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Fully one fourth of Washington's youth are either overweight or obese. Left unchecked, these youth will experience greater health challenges, such as increased rates of diabetes, stroke and heart disease and certain types of cancers. Programs that encourage healthy eating behaviors and increased physical activity will be delivered by extension educators and come under the Program definition. Additionally, increased availability of locally-grown produce will be supported through programs delivered by our Small Farms Team and the Center for Sustaining Agriculture and Natural Resources.

Priorities for this planned program include 1) increasing consumption of healthier diets and more specifically, increasing the number of servings of fruits and vegetables while reducing consumption of high fat and high carbohydrate processed foods; 2) increasing physical activity levels among K-12 youth; and 3) increasing availability of fresh produce by expanding local food systems.

2. Scope of the Program

- In-State Extension
- Multistate Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We assume that funding for programs such as SNAP-Ed and EFNEP will continue at current or expanded levels. We also assume that base funding supporting our youth development programs will continue to be available at current or increased levels. Finally, we assume that local food systems will continue to expand and that the interest in these systems on the part of local communities, agencies and

institutions will continue to increase.

2. Ultimate goal(s) of this Program

Reducing the percentage of overweight and obese youth in Washington State.

V(E). Planned Program (Inputs)

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

Year	Extension		Research	
	1862	1890	1862	1890
2013	40.0	0.0	2.0	0.0
2014	40.0	0.0	2.0	0.0
2015	40.0	0.0	2.0	0.0
2016	40.0	0.0	2.0	0.0
2017	40.0	0.0	2.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Educational programming will be delivered to limited resource families through our nutrition education programs funded by SNAP-Ed and EFNEP (Smith-Lever 3-D) programs. Additionally, youth development programs will expand emphasis on physical activity in a number of programs and project areas. Finally, technical assistance will be provided to farmers in the urban fringe to help them produce and effectively market produce to urban residents.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations	● Newsletters ● Web sites other than eXtension ● Other 1 (Email Lists)

3. Description of targeted audience

Limited resource families, youth enrolled in 4-H programs, and agricultural producers (generally small producers) operating in the urban fringe.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of educational programs delivered focused on increasing local food supplies, improving dietary quality, and increasing physical activity.
- Number of peer reviewed (official) WSU Extension publications published per year.

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.
2	Percentage of participants evaluated who applied acquired knowledge to improve their diet quality, level of physical activity, or production of locally-grown produce.
3	Percentage of participants reporting increased physical activity.
4	Number of communities cooperating with WSU program with farmers' markets and community gardens producing and/or selling locally grown fruits and vegetables.

Outcome # 1

1. Outcome Target

Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 134 - Outdoor Recreation
- 701 - Nutrient Composition of Food
- 724 - Healthy Lifestyle
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Percentage of participants evaluated who applied acquired knowledge to improve their diet quality, level of physical activity, or production of locally-grown produce.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 134 - Outdoor Recreation
- 701 - Nutrient Composition of Food
- 724 - Healthy Lifestyle
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Percentage of participants reporting increased physical activity.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 134 - Outdoor Recreation
- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Number of communities cooperating with WSU program with farmers' markets and community gardens producing and/or selling locally grown fruits and vegetables.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management
- 604 - Marketing and Distribution Practices
- 701 - Nutrient Composition of Food
- 704 - Nutrition and Hunger in the Population

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

Given that many program participants have limited incomes, maintenance of resources related to Food Stamp eligibility and access to SNAP-Ed funded programs are critical for program success. Additionally, continued institutional support for small farms programs, youth development and nutrition education are key to advancing the goals of the program.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Our evaluation methodologies are designed to assess amount of acquired learning; degree of application of learning; and the social, environmental and economic value of this application. We will use post-program, retrospective, and before and after assessments to document changes in knowledge. We will use survey methods after an appropriate time lag to assess how much of the new knowledge was actually applied. Finally, we will use research methodologies, industry assessments, and survey responses to determine the social, economic and environmental values derived from the application of new techniques.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Food Safety

2. Brief summary about Planned Program

WSU food safety research pursues several avenues to ensure that our food is safe and nutritious. The epidemiology of virulent enteric bacteria in cattle herds is being studied, with the goal of decreasing the level of these bacteria in feces and present at slaughter. Scientists are developing methods and media to effectively detect and monitor foodborne pathogens and spoilage microorganisms in food products, thereby improving detection of problems before food reaches consumers. New processes have also been developed at WSU that allow microwave sterilization of foods leading to safe, shelf-stable foods that retain many of the characteristics of freshly prepared foods. This process holds great promise for enhancing both the quality and safety of pre-packaged foods. Microwave technology is also being used to develop novel pasteurization techniques. Extension food safety programs address both consumer and industrial food safety issues. These programs target food processors, food purveyors, and families to ensure safe food handling processes leading to reduced risk of foodborne illness among the residents of Washington State and beyond. In some counties, programs are in place that leverage trained volunteers to provide expanded outreach to the public to ensure safe practices are used to preserve homegrown and purchased raw foods.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
307	Animal Management Systems	0%		20%	
315	Animal Welfare/Well-Being and Protection	0%		5%	
504	Home and Commercial Food Service	25%		5%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	15%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	25%		50%	
723	Hazards to Human Health and Safety	35%		10%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

The Centers for Disease Control and Prevention estimated in 2010 (http://www.cdc.gov/foodborneburden/2011-foodborne-estimates.html) that foodborne diseases cause 48 million people to get sick annually in the US, with 128,000 hospitalizations, and 3,000 deaths. More than 200 known diseases are transmitted through food, including bacteria, viruses, parasites, toxins, metals, and prions. In Washington State alone, 30-150 foodborne disease outbreaks occur each year. Washington State University's priorities include reducing the incidence of pathogenic bacteria in the flora of farm animals and contamination of commercially processed foods, foods prepared by food purveyors, and food prepared in the home. Additionally, WSU research and extension programs focus on identifying and eliminating toxins from raw and processed foods.

2. Scope of the Program

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

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We assume that foodborne illness will continue to occur in Washington State and that every year thousands of persons will be at risk of hospitalization or death. We also assume that funding supporting research and outreach related to food safety will continue to be available.

2. Ultimate goal(s) of this Program

Reducing the incidence of foodborne illness in Washington State.

V(E). Planned Program (Inputs)

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

Year	Extension		Research	
	1862	1890	1862	1890
2013	45.0	0.0	13.0	0.0
2014	45.0	0.0	13.0	0.0
2015	45.0	0.0	13.0	0.0
2016	45.0	0.0	13.0	0.0
2017	45.0	0.0	13.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Research into epidemiology of foodborne diseases, especially in animal herds, and in mechanisms whereby pathogenic organisms reach the consumer. Conferences, workshops, and onsite visits will be conducted. In some counties, volunteers will be trained to engage with the general public to provide training on home food preparation and preservation. Publications and websites will also be maintained as outreach instruments to the food industry and to consumers. A major continuing effort involves the transfer of microwave sterilization technology, which has achieved FDA approval at two levels, into commercial applications.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● One-on-One Intervention	● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

Food processors, food purveyors, food producers and the general public.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of conferences, workshops or other training sessions conducted by WSU Extension educators related to food safety.
- Number of peer reviewed (official) WSU Extension publications published per year
- Number of graduate students with a significant professional orientation in the area of Food Safety.

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.
2	Percentage of evaluated participants who applied at least one practice learned from WSU Extension workshops, conferences, or training sessions.
3	Percentage of participants who will institute a HACCP or GAP plan as a result of attending WSU workshops.

Outcome # 1

1. Outcome Target

Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 504 - Home and Commercial Food Service
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
- 723 - Hazards to Human Health and Safety

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Percentage of evaluated participants who applied at least one practice learned from WSU Extension workshops, conferences, or training sessions.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 504 - Home and Commercial Food Service
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
- 723 - Hazards to Human Health and Safety

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Percentage of participants who will institute a HACCP or GAP plan as a result of attending WSU workshops.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 307 - Animal Management Systems
- 504 - Home and Commercial Food Service
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
- 723 - Hazards to Human Health and Safety

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Numerous external factors can impact the success of our research and extension programs. Reduced availability of funding has recently impacted our capacity to deliver some programs related to food safety. It has become necessary for us to reduce the number of trained volunteers in the state because of limited resources to train and supervise this resource. Potential future factors include further reductions in funding or changes in institutional priorities.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Our evaluation methodologies are designed to assess amount of acquired learning; degree of application of learning; and the social, environmental and economic value of this application. We will use post-program, retrospective, and before and after assessments to document changes in knowledge. We will use survey methods after an appropriate time lag to assess how much of the new knowledge was actually applied. Finally, we will use research methodologies, industry assessments, and survey responses to determine the social, economic and environmental values derived from the application of new techniques.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Youth, Family and Community Development

2. Brief summary about Planned Program

Washington State University's 4-H Youth Development, Family, and Community Development programs create opportunities and deliver educational programs that advance the situations for young people, families and their communities. Our youth development programs focus on enhancing the capability of youth in grades K- 12. Interventions that these youth receive develop their assets (generally referred to as "life skills)." While it has been long accepted that parents, siblings, and local communities make significant impact on a youth's life, young people today are also influenced by values and ideas far beyond the borders of any single family or community. Exposure from web-based media, cable television, and other technologies has large and lasting influences on our youth.

4-H youth development programs use planned educational outreach programming and opportunities to build not only the life skills of youth but also of the adults who mentor them. WSU Extension adds further value to its work in youth development through its capacity to engage families. Parents have the greatest potential to support a young person's successful transition to adulthood. Extension professionals in youth and family development work to ensure that both parents and young people are accessing the skills that they need to build strong families. In addition WSU supports family development by training other professionals who provide parenting education and child care to families in communities across the state and region. Our Community Development program leverages research in WSU's College of Liberal Arts and College of Agricultural, Human, and Natural Resources along with the University of Washington's Evans School of Government to develop and deliver educational programming that allows the people of Washington State to realize their desired futures. These programs help individuals, organizations, and local government collectively resolve conflict, develop leadership capacity, and address critical issues such as poverty from various social and economic perspectives. Research in WSU's Department of Human Development focuses on community and social mechanisms related to risk-related behavior, stress management, sexual and sexual orientation issues, alcohol and drug abuse behavior, parental-child communication and strategies for coping with depression in aging populations.

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
801	Individual and Family Resource Management	5%		0%	
802	Human Development and Family Well-Being	25%		10%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	15%		30%	
805	Community Institutions, Health, and Social Services	5%		50%	
806	Youth Development	50%		10%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Researchers, youth workers, and policy makers recognize that it is short-sighted and expensive to focus attention on dealing with acute problems of troubled youth while ignoring effective and economically viable preventive measures that can lower the incidence of these acute problems. Today, increasing attention is paid to "preventive factors" that make youth more resilient and thus able to overcome adversity and emphasize mechanisms that allow problems to be identified and dealt with at earlier ages. Public concern and policy directed toward youth has also shifted from public investments in programs targeting specific problems and threats to young people to a broader, more holistic view of helping youth realize their full potential. A significant proportion of Washington's children are at risk related to one or more of several negative indicators, including abuse, neglect, poor health, substance abuse, teenage pregnancy and violence. Approximately 32% of children under the age of 18 are considered to be in low-income households and 12% of the state's youth live in poverty. Poverty exacerbates other risk factors and is the central reason why many children and families do not thrive. Young people need to be in environments where they have an opportunity to acquire the basic skills necessary to become responsible family and community members, participants in the workforce, and contributing citizens.

Washington State has experienced very high rates of military deployments. During the long periods of deployment, families may move frequently and parents are often separated from their children. Youth in military families especially need assistance in connecting with other youth, caring adults, and community programs and services that are sensitive to their specific situations and needs.

Washington State is a state of great demographic contrasts. It has vast rural areas, but the majority of its population lives in urban areas. Rural communities that once relied upon forestry, fishing, or agriculture industries, are struggling as these industries have declined or have become more labor efficient. Rural and urban populations often have different views about the future of the state, and proponents of urban growth and job creation are often at odds with those striving for sustainable development, preservation of agricultural and forest lands, and protection of endangered species, wetlands and watersheds. Large numbers of migrants, primarily from Mexico and Central America, now reside in Washington. In some counties, Latinos now make up the majority of the population. This demographic shift has resulted in positive outcomes (new markets, new business start-ups) and challenges to existing school, healthcare,

and judicial infrastructure. Priorities for our youth, family and community development programs include conflict resolution and consensus building; poverty reduction; rural development; improvement in local services; youth life skill development; leadership development among youth and adults; promoting health and wellness among youth and families; strengthening families and communities; promoting good governance - including youth engagement in government; and strengthening science, engineering and technology interest and literacy among youth.

2. Scope of the Program

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

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Youth, families, and communities will be under greater stress as a result of the current economy and associated job losses, unemployment and business closures.

Military deployments will continue for the next several years. Washington bases play a major role in troop deployments ot Afghanistan and Iraq.

Funding (both public and private) will be available to support programs that address critical community and human development needs.

Urban areas in Washington State will return to economic growth while rural areas will continue experience challenges associated with job loss, gentrification, and reduced local tax bases having difficulty addressing critical issues such as roads, law enforcement, and education.

2. Ultimate goal(s) of this Program

Strengthen life skills among youth leading to greater ability to cope with life's stresses and leading to greater social, educational, and economic success.

Strengthen families to enhance preventive measures and to make them more resilient and resistant to social and economic stresses.

Enable communities to resolve conflicts, address critical issues such as poverty, strengthen leadership, and efficiently deliver government services

V(E). Planned Program (Inputs)

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

Year	Extension		Research	
	1862	1890	1862	1890
2013	130.0	0.0	1.0	0.0
2014	130.0	0.0	1.0	0.0
2015	130.0	0.0	1.0	0.0
2016	130.0	0.0	1.0	0.0
2017	130.0	0.0	1.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Research-based programs will be delivered by extension professionals and supervised volunteers. These programs include 4-H club programs, and school and after school youth and family-based programs, such as Strengthening Families, that focus on enhancing preventive mechanisms. Additionally, communities will be engaged to collectively analyze situations, resolve conflicts, and assess and recommend mechanisms to enhance public services. These programs will be customized based upon community need and delivered by program such as Horizons, the William D. Ruckelshaus Center, and the WSU Division of Governmental Studies and Services. Finally, programs will be delivered that lead to enhanced leadership and facilitation skills of youth, adults, and communities.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations	● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

Youth (K-12) throughout the state; military families; urban and rural communities; current and future community and organization leaders; families; and volunteers, teachers and other educators.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of workshops, demonstrations, and projects developed to foster positive youth, family and community development.
- Number of peer reviewed (official) WSU Extension publications published annually.

☑ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.
2	Percentage of participants evaluated who applied knowledge or skills from WSU programs.
3	Difference in grade point average between former 4-H members and peer students at WSU when they enter as university freshman.
4	Number of persons completing a WSU leadership development program who serve in a community, county, state, or agency leadership role.
5	Number of communities enacting processes to increase economic development or to address poverty and its impacts as a result of WSU programs.

Outcome # 1

1. Outcome Target

Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 805 - Community Institutions, Health, and Social Services
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Percentage of participants evaluated who applied knowledge or skills from WSU programs.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 805 - Community Institutions, Health, and Social Services
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Difference in grade point average between former 4-H members and peer students at WSU when they enter as university freshman.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Number of persons completing a WSU leadership development program who serve in a community, county, state, or agency leadership role.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 805 - Community Institutions, Health, and Social Services

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 5

1. Outcome Target

Number of communities enacting processes to increase economic development or to address poverty and its impacts as a result of WSU programs.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities

- 805 - Community Institutions, Health, and Social Services

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Numerous external factors can potentially impact the success of our programs. Reduced availability of funding has most recently damaged our ability to achieve previous targets, especially because there are fewer people employed by Extension than our historical average. We have partially compensated through the use of technology to increase per person efficiency; however, this sort of increased output per professional FTE cannot be expected to rise at current rates. Changes in political priorities also impact the effectiveness of our work either by changing the availability of resources supporting our programs or by altering the available options for target audiences. Additionally, legislative action can create new pressures on researchers and extension educators due to unfunded mandates and changes in organizations that have been traditional partners. The political philosophies that direct funding to people and communities will be evaluated in the coming election and these could affect both funding and organizational relationships in various ways.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Our evaluation methodologies are designed to assess amount of acquired learning; degree of application of learning; and the social, environmental and economic value of this application. We will use post-program, retrospective, and before and after assessments to document changes in knowledge. We will use survey methods after an appropriate time lag to assess how much of the new knowledge was actually applied. Finally, we will use research methodologies, industry assessments, and survey responses to determine the social, economic and environmental values derived from the application of new techniques.