2009 University of Alaska Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

The University of Alaska Fairbanks' School of Natural Resources and Agricultural Sciences (SNRAS), Agricultural and Forestry Experiment Station (AFES), and Cooperative Extension Service (CES) are dedicated to providing research, education and outreach relevant to the sustainable development and use of Alaska's natural resources; developing new economic opportunities; and improving the quality of life in Alaska and the circumpolar north. SNRAS, AFES, and CES carry out the land-grant mission for the University of Alaska Fairbanks (UAF).

The land-grant system is a partnership between the federal government and the states through matching funds to universities that agree to maintain programs of research, instruction, and outreach in planned programs of agriculture, natural resources, and sustaining individuals, families and communities with activities relevant to that state, the nation, and the world. A special characteristic of land-grant programs is their commitment to develop and apply research-based knowledge important in the real world for the successful long-term management of natural resources to meet both human needs and values.

The School and Experiment Station (SNRAS/AFES) operate major facilities in Fairbanks and Palmer, research sites at Delta Junction, Nome, and Bonanza Creek and manage research projects located throughout Alaska. SNRAS/AFES is organized into four departments: Forest Sciences, Geography, High Latitude Agriculture, and Resources Management.

CES is housed in the Office of the Provost at the Fairbanks campus and operates programs in Agriculture/Horticulture, Natural Resources and Community Development, Home/Health/Family Development, and Positive Youth Development/4-H in eight districts around the state.

AFES and CES accept federal capacity funds and receive state matching funds, as well as other state appropriations, state and federal grant funds, and private funding. SNRAS/AFES is estimating professional SYs on total capacity funds received that includes Hatch, Hatch Multistate and McIntire-Stennis funding sources. CES estimates FTEs on Smith-Lever 3, B and C funding. Although linkage between the units is not administratively mandated at the University of Alaska Fairbanks, they are linked by federal legislation, joint funding, and this joint Plan of Work.

Alaska is recognized for its immense size and sparse population and its cultural, geographic and environmental diversity. Alaska represents a major region of renewable and non-renewable natural resources in the United States. Its 365 million acres include the nation's largest oil reserves and coal deposits. The state also contains an array of mineral deposits including gold, zinc, boron, and molybdenum. Alaska has a diverse geography that offers soils for production of food and fiber as well as a multitude of recreational and tourism activities. Waters surrounding Alaska's shoreline and riparian habitats contain large stocks of salmon, cod, pollock, halibut and shellfish that support thriving commercial, sport and subsistence fisheries. Alaska's natural resources have historically been the foundation of the state's economy. Thus, the use and management of these resources is a predominant force in the planning and delivery of any teaching, research, extension, and engagement programs. The finite nature of the state's non-renewable resources and local and national controversies surrounding resource extraction and related environmental concerns affect the activities of SNRAS/AFES and CES. The University of Alaska Fairbanks in general and SNRAS/AFES and CES in particular, meet the challenges to increasing demands for research, education and outreach relevant to sustainable management of Alaska's resources and bringing communities' ideas to the university for further development of the state's resources.

During the past 40 years, Alaska's economy has become dependent upon revenues related to petroleum development. To diversify its economy, the state is moving toward non-petroleum natural resources for economic opportunities that are cost-effective and sustainable. The programs of SNRAS/AFES and CES play a vital role in linking the knowledge generated by SNRAS/AFES, the University of Alaska Fairbanks, the University of Alaska state-wide and other information sources to meet the needs and interests of Alaskans then providing citizens a way to influence future research and education priorities. CES is a critical partner for the university as a whole in providing a two-way engagement linkage between researchers and producers to deliver the latest research findings and educational and outreach opportunities.

Alaska imports a high percentage of foods and other agricultural products consumed in the state. Growers in the agricultural sector produce products primarily for in-state consumption including fresh market potatoes, vegetables and herbs; forages, grains, and manufactured livestock feeds; controlled environment products which include bedding plants, florals, landscape ornamentals, short season vegetables and a variety of "niche market" crops. Livestock enterprises include dairy, beef, swine, reindeer, and alternative game animals such as muskoxen, elk, and bison. Producers will require increasing information specific to northern latitudes as consumer demand increases due to changing preference and a growing population. Furthermore, as transport costs increase and Alaska population grows, more locally and regionally produced food will be needed.

The mission of SNRAS/AFES is to "generate and provide knowledge and train students for successful long-term

management of natural renewable resources in Alaska and the circumpolar world, and to discover, describe, explain, and interpret the spatial characteristics of the northern regions of the earth." The School and Experiment Station are committed to assisting and training natural resource managers who make and implement decisions to develop, sustain, or protect natural systems to meet human needs and values.

The mission of CES is "to interpret and extend relevant research-based knowledge in an understandable and usable form; to encourage the application of this knowledge to solve the problems and meet the challenges that face the people of Alaska; and to bring the concerns of the community back to the university." CES is committed to promoting the sustainability and economic security of individuals, families and communities by providing practical, non-formal education services that promote the wise use of natural resources, respect for cultural and ethnic diversity, and being responsive to emerging stakeholder needs and interests.

The elements of this report show strong linkages between CES and SNRAS/AFES supporting agriculture, horticulture, forestry, and rural and economic development. The units work cooperatively as well as separately with other units within UAF, the University of Alaska statewide system, federal and state agencies, non-governmental organizations, private industry; and through multistate collaborations with other land-grant universities. They collectively and individually generate and disseminate knowledge to stakeholders who include higher education students, individuals, businesses, industry, government, non-governmental organizations and communities throughout Alaska and the circumpolar north and the nation. CES brings the University to Alaskans while bringing community concerns back to the University.

Planned programs for purposes of this report include Agriculture and Horticulture, Sustainable Individuals, Families and Communities, Management of Ecosystems, Natural Resources and Community Development and Youth Development.

AGRICULTURE AND HORTICULTURE

Agriculture and horticultural research focused on new crops and new uses for traditional crops and expansion of knowledge of reindeer as an important Alaska livestock species. New crops and species varieties for production in Alaska were identified and growers were organized to better meet market conditions. Research in tillage methods and fertilizer application, greenhouse and field production methods continued. Tillage method and fertilizer rate were shown to directly affect yield and quality of barley and bromegrass. Variety trials for food crops under hoop house and field conditions, and controlled environment production of cut flowers, vegetables, and herbs continue to provide growers with multiple crop production options in Alaska. At least 75 agricultural producers have adopted production of crops identified by AFES researchers as applicable to Alaska growing conditions.

One very visible outreach activity is the AFES Georgeson Botanical Garden where visitors can see variety trials as well as landscaped gardens. Every year seed companies request testing of varieties in this subarctic location. More than 500 cultivars of ornamentals, vegetables and herbs were grown in trial plots to determine the usefulness in Alaska landscapes. The Peony Growers Association consisting of 33 private growers and 13 businesses has been meeting for two years now and is doing well. Economic sustainability research focused on helping peony producers enter national and international markets. To assist peony producers enter national and international markets, a hedonic price model was applied to US peony data. It was designed to help growers understand how basic marketing decisions and cultivar characteristics affect the pricing of cut-flower peonies in US wholesale markets. As a result of our peony production work and economic modeling assistance, 13 new peony producers are ready to bring their product to market in the 2009 season. Alaska growers have learned that they should cultivate relationships with flower growers in the northeastern US and remain focused on double bloom varieties.

Greenhouse, controlled environment, and extended season research at both the Fairbanks and the Palmer research site identified more than 10 specific varieties for use in commercial production of tomatoes, potatoes, herbs, and beans. Vegetable, fruit and berries were evaluated in rural villages and road system locations. Six rural villages attempted subsistence gardens and produced sufficient output at harvest to distribute food to 30 community elders.

Muskox and reindeer are natural species for livestock production enterprises in Alaska; providing fiber (qiviut), meat, and antler for commercial markets as well as being highly desirable species for agrotourism enterprises in this state. Both species evolved in the arctic and adapt well to basic husbandry practices, but there is currently little information available on reproductive management. Research objectives are to increase understanding of reproductive biology of high latitude ruminant species and to determine means of improving reproductive management of domestic ruminants on farms in Alaska. Profitability of reindeer ranching can be increased through reducing imported feed components by using locally produced feed and through the development of reproductive management strategies. Profitability of reindeer farming is influenced by the high shipping costs of imported feed components. Grass haylage can be produced in Alaska. Reindeer calf growth rate are compared annually when fed different bromegrass-based diets.

Use of herbicide induced maturation reduced green seed and hastened maturity of Alaska grown canola. Oil content remains high and is highly usable for biodiesel or human consumption. AFES researchers have established research plots for agricultural products for energy production in Alaska. Oilseeds, canola in particular, have been identified as a viable Alaska grown crop. Perennial grasses and woody cellulosic plants for fiber to be used in renewable energy are being established.

Agriculture and horticulture outreach through CES includes animal agriculture, agronomy, agroforestry and horticulture.

Commercial agriculture and horticulture: A variety of CES conferences in 2009 provided resources to producers, including the Sustainable Agriculture Conference and Organic Growers School, Alaska Greenhouse and Nursery Conference, Delta Farm Forum, Harvest Wrap-up and Potato, Vegetable and Fruit Growers Conference. Livestock specialist also continued to develop and update a series of animal science classes aimed at increasing knowledge of producers.

Extension provided support to commercial horticulture clients trying to grow a promising new high-value crop, peonies, which mature in Alaska at a time when they are not available elsewhere in the world. Support was provided to producers through phone calls, e-mail and on-site visits. Precision agriculture continues to be extended to Alaska farmers with the expectation of reduced fertilizer use.

Consumer horticulture: Most of our horticultural educational outreach emphasis is targeted toward the home gardener. With the high cost of importing food and concerns about food security, the interest in home gardening has increased. Extension trained more than 250 Master Gardeners in 2009. Home gardeners also attended a variety of composting, seed starting and organic and home gardening classes.

Invasive weeds, noxious plants and integrated pest management (IPM): The program conducted group and one-on-one educational activities with specific sectors of the pest management, agricultural and horticultural industries and the general public to provide pest identification and management information. The IPM program addressed the public need for pest management education within Alaska with seven seasonal technicians across Alaska and three full-time staff. Altogether, Extension faculty and IPM staff offered 35 workshops. Technicians monitored selected urban and rural communities for the presence of invasive weeds and noxious plants. They worked with partnering agencies to provide a coordinated response to invasive weeds, noxious plants and pest management and counsel green industry professionals, farmers, gardeners and horticulturists about the least toxic pest management practices. Alaska's diverse pest management projects include the IPM technician program, the Pesticide Safety Education Program, Western Region IPM and the Western Plant Diagnostic Network. The Alaska Pest Management Program continues to be the premiere pesticide use resource for Alaska with more than 2,800 contacts annually through the website at www.alaskapestmanagement.com.

Pesticide Safety Education: Workers who apply pesticides as part of their workplace activity are required to complete pesticide safety training and pass a state of Alaska Department of Environmental Conservation exam and must be recertified annually. Extension faculty taught pesticide applicator safety certification trainings and training for certification of noxious, weed-free forage and straw inspectors.

Environmental Quality Incentives: Nutrient and pest management conservation practices are two components of most farmers' EQIP long-term contracts that require the assistance of Extension to provide nutrient recommendations, pest scouting and Integrated Pest Management recommendations. Through the EQIP program, 54 clients applied pesticides and nutrients at the specified rates and were educated in weed identification and soil sampling techniques.

SUSTAINABLE INDIVIDUALS, FAMILIES AND COMMUNITIES

Health, Nutrition and Foods: Alaska has abundant sources of naturally occurring food in our fish, game meat, and wild berries. Many Alaskans supplement their diets with these foods because of their high nutritional value and high antioxidant values. The cost of importing food is high due to transportation costs. Our food preservation program reflects those needs and concerns. Agents taught 85 food preservation and food safety classes in 33 communities, and created the fifth and sixth DVDs in a 10-part series that focuses on preserving Alaska's foods. Six additional online instructional modules with similar information were completed, and, in addition, Extension ran a food preservation hotline. Research has also focused on processing procedures for indigenous foods. Our programming also supports healthy living. The Alaska senior population is growing faster than all states. Extension conducts StrongWomen classes in all seven districts and our Soldotna agent has trained 43 new leaders. We also trained 59 leaders for the Living Well Alaska program, which teaches skills for living with chronic health conditions. Over the past 20 years, diabetes has increased 80 percent among Alaska Native population and has increased in other segments of population. Our Dining with Diabetes classes teach people how to embrace a diabetic diet.

Human Development: Early childhood development classes are less available in rural areas. Agents teach early child development and child literacy classes in rural areas.

Consumer Resource Management: Budgeting concerns have come to the forefront in tight times. Agents have taught the cost of credit to more than 200 high school students and budgeting and money management to other youth and adults.

Home and Energy: Programming has focused on awareness of energy conservation. Agent taught cold climate homebuilding techniques, retrofitting homes and solar energy design classes to 943 people in 11 communities. Agents also provided energy conservation programs and resources to clients, ranging from maximizing gas mileage to reducing appliance energy consumption.

MANAGEMENT OF ECOSYSTEMS

Researchers in the Management of Ecosystems Planned Program concentrated on data collection and analysis for the development of models related to growth, yield and disturbance in the boreal forest and Alaska lakes. The timing of soil moisture related to climate change is dramatically affecting the ecosystem in Alaska. Long-term forest growth monitoring started in 1968 provides baseline data and leads to a detailed understanding of the boreal forest ecosystem and the effects of climate change. Models have been created to estimate bark thickness of white spruce in Interior Alaska, to estimate fire severity, to provide recommendations for management for residential or recreational lakes concerned with evaporation, and a temperature model for climate change in Interior Alaska. Numerous scenario models predictive of future climate change effects have been requested by collaborators. Information has been made available to the public at http://www.faculty.uaf.edu/ffj12. USFS, state foresters and BLM use the Burn Ratio model and the climate data temperature model created and updated to predict fire severity. Permafrost soil research will help establish hydric and volcanic soil

development projects.

NATURAL RESOURCES AND COMMUNITY DEVELOPMENT

AFES and CES have now merged the 2008 Natural Resource Use and Allocation Planned Program into this program as we work toward more integrated reporting. Research in economic sustainability focused on strategies for sustainability of the Alaska Tanner crab industry. Work examining the inconsistencies between the state of Alaska's Intensive Management Statute and laws regulating wildlife management on National Park Service lands is completed. The courts failure to correctly apply the term "scientific" is under investigation in coordination with the U.S. Fish and Wildlife Service. Multiple projects focus on ways to involve the public in decisions that affect their lives and improve the ability of natural resource policy makers to seek out and facilitate the involvement of all concerned stakeholders. These efforts resulted in improved urban/wild lands interface planning and improved planning for Interior Alaska in the face of environmental concerns primarily centered on fuel price fluctuations and atmospheric limitations placed by the U.S. EPA on emissions in the Fairbanks area.
Economic development efforts continue in regard to the wood products field. Biofuels and biomass research has resulted in new product development. Work continues with the goal to offset high energy costs, especially for rural communities. Multistate wood composite research continues with the goal of diversifying the Alaska economy. Recreation research exploring the link between recreation and human well-being report a change in knowledge in the Alaska Residents Statistics Program. A better understanding has been realized of the factors related to natural resources and nature based recreation that impact community resilience and well-being. A change in knowledge has occurred from the pilot test of the longitudinal study. Researchers now have a better understanding of what methods might work to assess benefits associated with recreation. A change in knowledge occurred from the presentation and meetings at the World Wilderness Congress. The meetings provided a forum to exchange information with managers of the protected areas on the Kamchatka Peninsula. This change in knowledge will hopefully lead to a change in action as the Kamchatka managers are aware of new tools available to them.

CES provides outreach education regarding forest resources, mineral resources and mining, water resources, and rural communities. Program faculty and staff partner with a wide variety of local, state and federal governments, local and regional Native Alaskan tribal organizations and non-governmental organizations to address such issues as resource management, economic analysis, public policy education, and rural development.

This program relies heavily on stakeholder input and advisory groups. Three areas of focus identified were climate change, renewable energy and rural leadership. Because of particularly high energy costs in rural Alaska, the program has focused on ways to reduce dependence on petroleum resources. Extension personnel worked with two rural communities to develop biomass projects to heat schools and worked with a group of sawmill operators to form a biomass cooperative for the manufacture of compressed wood products. Extension hosted workshops in Juneau and Sitka about responsible wood burning and continued to develop a wood heat website with a wealth of information about locations to harvest wood, heating efficiency of wood and safety issues.

Resource decision-making: Residents of the lower Kuskokwim River are faced with making decisions regarding a large proposed mine in their area. Extension developed a mine information tour DVD, which described a 2008 Extension tour of two Alaska gold mines by a group of nine Alaska village representatives. CES developed and delivered a two-part session at the Alaska Forum on the Environment modeling a public issues forum discussion as a tool for discussing natural resource management issues in rural communities.

The nature of natural resource management is to work in rural and remote areas, which do not have many existing medical personnel. Extension co-sponsored 4-H training as emergency medical services First Responders to provide a link between the medical field and natural resources. 4-H Natural Resource and Youth Development program also supported rural classroom salmon incubation projects as a way to enhance math and science literacy of rural youth, and encourage their involvement in local resource management.

YOUTH DEVELOPMENT

Alaska 4-H incorporates the Essential Elements through volunteer training, newsletters, videos and handouts. All 4-H activities are grounded in the Essential Elements. 4-H programs focus on developing leadership and competences that translate into effective work skills and interests and advanced education. Kids who raise and sell market animals learn about showmanship and marketing, and teens who are trained as camp counselors learn leadership skills, management and help run a youth camp. Some kids have started businesses. Altogether, in 2009, more than 14,000 youth participated in clubs, after-school programs and special activities, including camping and video work. Teens participating in the 4-H Youth in Governance Program traveled to Juneau to see firsthand how the Legislature conducts business.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	30.0	0.0	20.4	0.0
Actual	30.1	0.0	33.4	0.0

II. Merit Review Process

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

- Internal University Panel
- External University Panel
- Expert Peer Review

2. Brief Explanation

The School of Natural Resources and Agricultural Sciences and the Agricultural and Forestry Experiment Station uses its established scientific peer review process to review and evaluate proposals, publications, and specific annual reports that could include the annual narratives that are required to report activities related to the POW. Extension uses the merit review process and uses the general review process for this joint Plan of Work.

The Agricultural and Forestry Experiment Station (AFES) complies with sections 3(c)(1) and (2) of the Hatch Act and section 1445 of NARETPA (Hatch Regular Capacity Funds) and the amendment to the Hatch Act of 1887 to Section 104 by AREERA for programs funded under section 3(c)(3) of the Hatch Act (Hatch Multistate Research Funds) by using its established scientific review process for all proposals, publications, and specific annual reports that could include annual progress of work accomplished under this Plan of Work. All new and revised Hatch (and McIntire-Stennis) project proposals within the Agricultural and Forestry Experiment Station undergo scientific peer review. At present we are using the process established by NSF and NRI (now AFRI). Previously we had used the Hatch and McIntire-Stennis Administrative Manual's Appendix F "Essentials of a Project Proposal", which is less stringent. All proposals are submitted for Director approval. The blind peer review panel is composed of a minimum of three members invited by the Director. The panel consists of competent authorities in the discipline of the proposal/publication/annual report or related disciplines and includes at least one authority in a supporting discipline. Each reviewer completes a Peer Review Form that includes specific criteria, provides for other comments and suggestions, and makes a recommendation to the Director. Reviews are returned to the Director for transmittal to the author(s). The author(s) review all comments and recommendations of the reviewers and make adjustments or explanations in the document. The Director reviews all comments and recommendations from the reviewers along with the revised proposal/publication/report. The signature of the Director on form AD 416 submitted to USDA NIFA will indicate approval of the project by the Director and will certify that the proposal has been recommended for approval by a majority of the members of the Peer Review Panel. Scientific peer review of multistate research projects are carried out for individual projects under the aegis of the Regional Coordinating and Implementation Committee (RCIC). The specific review process can be found in the Section I.G. "Summary of the Western Review Process" in the Supplementary Manual of Procedures for Western Regional Research. This can be found on-line at http://www.colostate.edu/Orgs/WAAESD/. All faculty in SNRAS/AFES who are participants in Hatch multistate projects are required to have an approved Hatch General project that is related to the field of study of the Hatch multi-state project in which they are a member. The Associate Director of AFES is a member of the RCIC.

Peer review of the Extension components of the POW consist of internal and external reviews. Internal review of the Extension components of the POW are achieved by a panel of University of Alaska Fairbanks faculty and administrators. Extension's State Advisory Council conducted external reviews of programs. The different review panels assessed how well the activities and resources proposed in the plan contribute to achieving the proposed goals and established emphasis on climate change, chronic health issues, food security and safety, economic development, positive youth development and renewable energy as priorities for the future. Collective feedback from reviews are incorporated into the future iterations of the Extension components of the Plan of Work.

III. Stakeholder Input

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

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

Brief explanation.

SNRAS/AFES has traditionally met with regional audiences around the state in both formal and informal settings each year. Examples of these include:

- Regional and Statewide Farm Bureau
- Alaska Produce Growers
- Delta Farm Forum
- Alaska Greenhouse Growers
- Reindeer Herders Association
- Alaska Northern Forest Cooperative
- Alaska Livestock Producers
- Association of Peonies Growers
- On-demand meetings at the request of stakeholders

These traditional meetings are focal points for listening to and receiving input from stakeholders. As required by the AREERA of 1998, and in cooperation with the Cooperative Extension Service, these are advertised as broadly as possible and identified as points of contact for public input into research and extension program development.

Extension sponsors many agricultural and horticultural conferences and outreach activities with SNRAS/AFES and the units share mechanisms to gather formal and informal stakeholder input. Outreach events in 2009 included the Delta Farm Forum, Harvest Wrap-up, Potato, Vegetable and Fruit Growers Conference, Alaska Greenhouse and Nursery Conference, and invasive species conferences. Extension also relies on advisory groups as an important stakeholder needs assessment process. Extension has a Statewide Advisory Council and faculty in districts across the state use local advisory committees to provide them with community input related to local program stakeholder needs and interests. The State Advisory Council met in-person twice and conducted audio-conference meetings regularly throughout the fall, winter and spring. Faculty, staff and administrators within Extension are also members of the advisory committees and boards of organizations that are stakeholders of the organization. This service on committees and boards provides another venue for stakeholders to provide input to Extension.

Extension faculty conducted needs assessments within their districts and focus groups with their stakeholders. In addition, Extension faculty members gathered stakeholder input as part of their program planning and development process as well as surveys both during instructional and conference presentation activities. Extension staff have brought outside participants into a newly developed engagement activity that involves a moderated wiki for communities of interest in energy and leadership, with community members as active moderators encouraging broad participation in the web-based interaction.

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

1. Method to identify individuals and groups

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

Brief explanation.

SNRAS/AFES relies on stakeholder input from agricultural advisory groups, collaborators, federal and state agencies, colleagues, faculty and students for assistance in establishing priorities and developing program direction in consultation with appropriate constituencies. Major stakeholders include the Fairbanks North Star Borough, Matanuska-Susitna Borough, Alaska Northern Forest Cooperative, USDA/NRCS, USDA/ARS, US Forest Service, Fairbanks Economic Development Corporation, and industries involved in food, fiber, and fuel/energy production.

Members from the public who have participated in or who have an interest in Extension's program offerings represent one segment of the organization's stakeholders. Stakeholders often identify themselves by e-mailing or calling Extension faculty or staff. Advisory groups lead us to stakeholders. Another significant stakeholder group is public and private agencies and organizations that have professional and programmatic relationships with Extension or direct interest in Extension programming. Some of Extension's major stakeholder organizations include, but are not limited to the Alaska State Legislature, Farm Bureau, Grange, Reindeer Herders Association, Greenhouse Growers, Food Banks of Alaska, Department of Natural Resources (Alaska), Forest Service, Boys and Girls Clubs, and Future Farmers of America, school districts, electric cooperatives, the Alaska Municipal League, and research service units of the university.

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

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of the general public
- Meeting with invited selected individuals from the general public

Brief explanation.

Survey information was collected using formal survey preparation and analysis techniques. Meetings and workshops were scheduled around themes and to gather specific information in meeting minutes and transcripts which was used in strategic planning of research and extension programs. The feedback loop provided information to research and outreach programs and from research and outreach programs to stakeholders and individuals.

Extension agents use advisory or focus groups to collect stakeholder input. Specialists also have specific groups they rely on for information. For example, the housing specialist works closely with the Alaska Building Science Network and the Alaska Housing Finance Corporation for additional input. The food specialists work with small business owners and agency groups to plan programming, workshops and consultations in order to influence the development and marketing of products.

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
- Other (Underserved populations identified)

Brief explanation.

SNRAS/AFES and CES joint research and outreach planned programs are directly related to the SNRAS/AFES and CES Strategic Plan produced by faculty. The Plan reflects ideas and advice given by SNRAS/AFES and CES client user groups, students, the board of advisors, expert advisors, state and national peers and cooperators, and UAF administration. During the 2009 reporting period the four focus areas of energy, climate change, local and regional food production and food safety, and the need for adult and youth education and training to fill Alaskan job and career demands began to emerge. These focuses were used to set priorities in meeting the many needs for knowledge about Alaska and circumpolar resources and geography. Input was considered in the budget process. Capacity funds were used in response to research needs based on the four emerging focus areas.

Needs assessments helped Extension faculty identify emerging issues in the five planned programs, generating plans based on logic models. The faculty used this information to generate their individual work plans. Based upon information generated by the needs assessments, future programming needs related to hiring have been affected. Stakeholder needs will continue to be a driving factor in determining Extension priorities and programming. Cooperative Extension is a grass roots-driven program. Agents use the stakeholder input to identify programming needs and work to offer programs and information that meet those needs. Stakeholder input in 2009 led to increased programming in rural energy options, energy-efficient home construction, climate change, health programming, food security and positive youth development.

Brief Explanation of what you learned from your Stakeholders

Alaskans desire information necessary to make decisions related to a healthy lifestyle and a healthy economy. Issues pertinent to subsistence and small agriculture carry particular impact for our stakeholders. Food security, energy, climate change, chronic health issues and youth development have risen to the forefront as areas of particular importance for our Alaskan stakeholders and are therefore leading to development of research and extension programming in those particular areas.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1074347	0	1089642	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	981673	0	1032694	0
Actual Matching	1074348	0	1016894	0
Actual All Other	5938622	0	3128624	0
Total Actual Expended	7994643	0	5178212	0

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

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Agriculture and Horticulture

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%		11%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	10%		0%	
204	Plant Product Quality and Utility (Preharvest)	10%		0%	
205	Plant Management Systems	10%		40%	
212	Pathogens and Nematodes Affecting Plants	0%		3%	
213	Weeds Affecting Plants	10%		0%	
216	Integrated Pest Management Systems	10%		0%	
301	Reproductive Performance of Animals	0%		10%	
302	Nutrient Utilization in Animals	0%		2%	
307	Animal Management Systems	10%		10%	
308	Improved Animal Products (Before Harvest)	10%		0%	
315	Animal Welfare/Well-Being and Protection	0%		3%	
401	Structures, Facilities, and General Purpose Farm Supplies	0%		5%	
402	Engineering Systems and Equipment	0%		3%	
404	Instrumentation and Control Systems	0%		3%	
405	Drainage and Irrigation Systems and Facilities	0%		5%	
502	New and Improved Food Products	10%		5%	
504	Home and Commercial Food Service	10%		0%	
601	Economics of Agricultural Production and Farm Management	10%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	9.0	0.0	13.8	0.0
Actual	8.8	0.0	16.1	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
341136	0	595802	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
373341	0	693763	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1497981	0	1450298	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Agriculture and horticulture research and outreach includes animal agriculture, agronomy, agroforestry and horticulture. Alaska imports more than 95 percent of its food supply and with increasing transportation costs; commercial agriculture may become more viable for small and medium-sized crop producers in the state. Constraints include a short growing season, isolation from other producers and markets and high transportation costs. A need exists for educational support and expertise for producers to help make their operations more economically viable. The Agriculture and Horticulture program strives to decrease Alaska dependence on imported food, increase production and economic viability of Alaska crop and livestock farms, improve food production from community gardens and home gardens and to increase production of commercial horticulture enterprises. The reindeer research program includes research on herd health, feed and reproductive management. Reindeer are natural species for livestock production enterprises providing meat and antler for commercial markets as well as agrotourism enterprises. Reindeer evolved in the arctic and adapt well to basic husbandry practices.

Extension supported commercial and consumer stakeholders in 2009 with classes, newsletters, conferences, consultations and publications.

Commercial agriculture and horticulture: A variety of conferences in 2009 provided resources to producers, including the Sustainable Agriculture Conference and Organic Growers School, Alaska Greenhouse and Nursery Conference, Delta Farm Forum, Harvest Wrap-Up, and Potato, Vegetable and Fruit Growers Conference. Livestock specialist also provided a series of animal science classes aimed at increasing knowledge of producers. This year, Extension provided support to commercial horticulture clients trying to grow a promising new high-value crop, peonies, which mature in Alaska at a time when they are not available elsewhere in the world. An agent who is knowledgeable about precision agriculture introduced Alaska farmers to the technology, which is expected to save farmers money on fertilizer costs. He also helped develop precision agriculture cooperative, which will lower costs for implementation.

Consumer horticulture: Most of our horticultural educational outreach emphasis is targeted toward the home gardener. With the high cost of importing food and concerns about food security, the interest in home gardening has increased. Extension trained more than 250 Master Gardeners in 2009. Home gardeners also attended a variety of composting, seed starting and organic and home gardening classes.

2. Brief description of the target audience

- Commercial vegetable growers
- Organic vegetable growers
- Commercial nursery operators, including chain stores
- Greenhouse owners for home consumption
- Community gardener
- Home gardeners
- Commercial livestock producers
- Livestock producers
- Horse owners
- Forage growers
- Forage consumers
- Youth and 4H
- Policy Makers

- Arborists
- Botanical garden volunteers
- Child care centers
- Researchers

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	13000	1800	200	500
Actual	14670	389714	629	20522

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

Patent Applications Submitted

Year: 2009

Plan: 0

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	0	21	
Actual	2	28	30

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Output Target 1: Field faculty will provide agricultural and horticultural workshops and conferences, including information on invasive weeds, noxious plants and integrated pest management.

Year	Target	Actual
2009	185	141

Output #2

Output Measure

- Output Target 2: Field faculty will provide agricultural, horticultural and pest management information through one-on-one consultations and consultations with other organizations (in contact hours).

Year	Target	Actual
2009	2600	3641

Output #3

Output Measure

- Output Target 3. Horticultural field crop research will concentrate on home and commercial varieties appropriate to Alaska and crops that fill niche markets with high-end values. Business starts and publications are the output measures.

Year	Target	Actual
2009	4	11

Output #4

Output Measure

- Output Target 4. Controlled environment horticulture will focus on controlled environment technology and technology transfer and appropriate crops and best management practices for crop production in specific environments. Output measures will be publications and technologies transferred.

Year	Target	Actual
2009	4	4

Output #5

Output Measure

- Output Target 5. Focus will be on best management practices for feed crops, evaluation of crops and varieties for fuel production. Output measures will be publications.

Year	Target	Actual
2009	6	5

Output #6

Output Measure

- Output Target 6. Potato varieties will be evaluated for niche market sales, disease resistance, and yield and best management practices determined. Output measures will be number of varieties selected and publications.
  Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Output Target 7. Sports turf research will continue including variety selection and expansion into multiple sport use. Output measure will be publications.
  Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Output Target 8. Animal research will continue to concentrate on alternative livestock emphasizing diet, meat quality and reproductive biology. Output measure will be publications.

Year	Target	Actual
2009	4	6

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcome Target 1: Increase agronomic crop producers' ability to understand and assess optimum production practices.
2	Outcome Target 2: Increase traditional and alternative livestock producers' ability to understand and assess optimum production practices.
3	Outcome Target 3: Increase participants' commercial and home horticulture optimum techniques and improve management practices.
4	Outcome Target 4: Increase participants' crop and livestock optimum production techniques and management practices.
5	Outcome Target 5: Increase targeted agricultural/horticultural production by 1% annually over five years (in percent change).
6	Outcome Target 6: Mitigate invasive pests to remain under the threshold of economic impact.
7	Outcome Target 7: Adapt and develop production and management techniques suitable for Alaska greenhouse systems. Measure will be technology transferred through workshops,publications, and presentations.
8	Outcome target 8: Identify horticultural crops to help diversify Alaska's economy. Measured are varieties tested.

Outcome #1

1. Outcome Measures

Outcome Target 1: Increase agronomic crop producers' ability to understand and assess optimum production practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	30	70

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Rising oil price and public pressure for reduced greenhouse gas emissions have created a demand for biofuels from agricultural crops. Reliable production information is important for Alaska agricultural producers. Current cropping systems do not include a rotation crop, which protects the land from disease and erosion. Educational opportunities and research-based practical advice offered to farmers will help producers enter this market and improve the economic viability of existing operations. Management of farm nutrients, pest and pesticides will improve financial sustainability of farm operations while making producers cognizant of environmental concerns.

What has been done
Variety trials of barley, spring wheat, winter rye, oilseeds, mustards, and Camelina were selected for testing against the standard Alaska varieties. Delta Extension hosted two annual events to improve production practices of hay and grain farmers. The Delta Farm Forum offered updates on the latest research, production methods, fertilizer recommendations, farm agency updates and farm management information. The Harvest Wrap-Up brought researchers together with farmers to discuss the past season and current and future research planned. Sulfur deficiency trials conducted in the mid-1990s showed deficiency in soils that had received high levels of nitrogen fertilizer. Sulfur amendments were recommended. Extension provided technical assistance associated with EQIP long-term contracts.

Results
Researchers released the final selection of hulless barley in 2009 as "Sunshine." Research indicates that "no tillage" can increase soil organic matter, improve soil quality but decrease soil bulk density. Also nitrogen application beyond 91kg N/ha did not benefit barley yield. Participants at the Harvest Wrap-Up generated a research priority list including: phenology of grass, hay and pasture insects, pre and post-emergence herbicide trials for barley and canola, and initial steps collaborating with Lower 48 researchers for development of Alaska-adapted winter wheat varieties. Canola production research has helped to peak interest in canola as a rotational crop. A producer cooperative is being formed that will own a small canola-to-biofuel processor. Through the EQIP program, 54 participants statewide applied pesticides and nutrients at the specified rates and were educated in weed identification and soil sampling techniques. The addition of sulfur amendments to our original N-P-K fertilizer recommendation has become the standard for 75 percent of the central Kenai Peninsula timothy hay growers. Yields doubled and tripled.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #2

1. Outcome Measures

Outcome Target 2: Increase traditional and alternative livestock producers' ability to understand and assess optimum production practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	20	53

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Muskox and reindeer are natural species for livestock production enterprises in Alaska; providing fiber (qiviut), meat, and antler for commercial markets as well as being highly desirable species for agrotourism enterprises in this state. Both species evolved in the arctic and adapt well to basic husbandry practices, but there is currently little information available on reproductive management. Profitability of reindeer ranching can be increased through reducing imported feed components by using locally produced feed and through the development of reproductive management strategies. Herd health is an important component of a profitable Alaska reindeer operation. Increased education will improve producers' abilities to assess their production practices, improve production capabilities and animal health and well-being.

What has been done
Mineral nutrition will benefit producers by establishing baseline seasonal mineral requirements in the diet of reindeer, reduce costs through least cost ration formulation, improve the energy balance of reindeer in winter and promote herd health. Grass and legume haylage has been shown to be a cost-effective supplement. The livestock specialist continues to develop and update a series of 22 animal-science educational modules that are presented in workshops. Successful application of presented concepts include:
*Direct marketing of bison and elk meat to high-end restaurant
*Artificial insemination of elk
*Beef heifer management
*Improved winter feeding of beef herd
*Improved management of breeding in pastured beef herd
*Improved nutrition and feeding of wild wood bison

Results

Research showed farmed reindeer fed a milled ration have similar serum trace mineral concentrations to free-range reindeer, but lower production. These results suggest that other health factors are influencing reindeer production in farm settings. Analysis can be found at http://reindeer.salrm.uaf.edu. Through multiple contacts with producers, the livestock specialist understands the challenges Alaska livestock producers face. He gives them the understanding and tools to improve their operations. As a result of individual consultations, state and federal agencies that are tending wild wood bison adjusted feed rations to improve the condition of thin cows. Also, ranchers improved bull and heifer management for their herds; a producer now receives nearly double the price for animals direct marketed to a high-end restaurant; and a rancher cleaned up his property to prevent another occurrence of hardware disease. As a result of a livestock conference, elk artificial insemination has been applied for the first time in Alaska. The biggest benefit of the technology is the ability to move genetics between farms in the lower 48 and Alaska without moving the animals.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
401	Structures, Facilities, and General Purpose Farm Supplies
502	New and Improved Food Products
601	Economics of Agricultural Production and Farm Management

Outcome #3

1. Outcome Measures

Outcome Target 3: Increase participants' commercial and home horticulture optimum techniques and improve management practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	50	70

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Alaska imports most of its food and costs are high, particularly in rural Alaska. Dependence on imports poses a food-security risk if supply lines are interrupted. Teaching residents how to increase locally grown food improves the quality and lowers food security risk. Commercial horticulture has been small scale because of climate limitations and poorly developed agriculture infrastructure. However, there is room for the market to grow and the demand for locally produced foods is increasing. The state also seems well placed to benefit from certain high-value horticulture crops.

What has been done

* Several short and longer term composting and gardening classes include hands-on components
* Two Extension conferences relate to industry and home horticulturalists. More than 100 participants in the annual Alaska Greenhouse and Nursery Conference received information on trees and shrubs, pests, invasive plants and marketing opportunities. More than 200 participants in the annual Sustainable Agricultural Conference heard about research, soil fertility, composting and value-added agricultural products. Extension and AFES/SNRAS horticulture faculty also presented research and production information at a peony conference, which focused on the high-value horticulture crop.

Results

Alaska Peony Growers Association, 12 of whom have 500 or more roots in the ground, form the foundation for a new industry in Alaska. Following AFES/Extension presentations at past Alaska Greenhouse and Nursery and peony conferences, more than 33 growers have planted peonies, a high-value export crop. Peonies mature here from July-September - a time they are not available elsewhere in the world. Extension has assisted nine new peony producers in the past year.

* About 250 Master Gardeners completed the Master Gardener course in Alaska during the past year. The hands-on component of the class allowed participants to practice techniques they were taught. Since participants must contribute 40 hours of community service, their work spreads the word and knowledge. Horticulture agent's survey of Master Gardeners, showed that 28 used information they learned during the class, including new plants grown, new varieties, fertilizer practices and pest management.
* Thirty-six participants in the Sustainable Agriculture Conference completed surveys that said they had attended previous conferences and changed their production practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
401	Structures, Facilities, and General Purpose Farm Supplies
405	Drainage and Irrigation Systems and Facilities
502	New and Improved Food Products
601	Economics of Agricultural Production and Farm Management

Outcome #4

1. Outcome Measures

Outcome Target 4: Increase participants' crop and livestock optimum production techniques and management practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	50	59

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Alaska imports more than 95 percent of its food supply and with increasing transportation costs, commercial agriculture may become more viable for small and medium-sized crop producers in the state. Constraints include a short growing season, isolation from other producers and markets and high transportation costs. A need exists for educational support and expertise for producers to help make their operations more economically viable and also to improve home and commercial livestock management. The demand for information on expanding and improving local production systems is increasing with concerns for a continuous and affordable high quality food supply.

What has been done
* A variety of conferences help optimize production and improve farm management. Sustainable Agriculture presenters talked about high tunnels and season extensions, soil fertility, egg and poultry production and direct marketing. The Greenhouse Conference covered loan programs, turf, shrubs and trees, invasives and marketing. Potato, Vegetable and Fruit Growers' provided information on the latest AFES potato research, fertilizer recommendations, pest management and marketing.
* Palmer agent helped establish a precision agriculture cooperative in the Palmer area.
* Agent taught three classes of "Chicken University" with information about raising chickens.

Results
* The vegetable research provides comparative trial information that is useful in developing regional truck farms and expanding produce choices as farmers markets.
* Ten participants in the Potato, Vegetable and Fruit Growers Conference said that pollination information would change how they manage their fruit crops, and five farmers planned to revise their methods of fertilization.
* Farmers in Palmer can now take advantage of precision guidance for one-third less cost than in traditional systems, a savings of $15,000.
* Participants in Chicken University learned bird selection, disease control, nutrition and cold weather techniques. One-quarter intended to sell chicken eggs commercially.
* As a result of information from the Greenhouse and Nursery Conference, a producer received an Innovation Grant to develop a solar-powered irrigation system; USDA Farm Service Agency reports an increase in inquiries and applications from greenhouse growers and an increase of inquiries from potential peony growers.
* The Division of Agriculture hired the featured speaker from the 2009 Alaska Greenhouse & Nursery Conference to assist in developing a voluntary invasive plants certification program for greenhouses and nurseries.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment
404	Instrumentation and Control Systems
405	Drainage and Irrigation Systems and Facilities
502	New and Improved Food Products
504	Home and Commercial Food Service
601	Economics of Agricultural Production and Farm Management

Outcome #5

1. Outcome Measures

Outcome Target 5: Increase targeted agricultural/horticultural production by 1% annually over five years (in percent change).

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	7	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Alaska imports approximately 95 percent of its food. Because of rising transportation costs and food security issues, as well as a desire to support local production, Extension has worked with producers to increase their agriculture production and decrease reliance on imported food. Imported food is particularly costly in rural areas.

What has been done
* National Agricultural Statistics Service keeps statistics of production of produce, grains, barley and other foodstuffs sold for more than $1,000.
* Sustainable Agriculture Conference, Potato, Vegetable and Fruit Growers Conference, Delta Farm Forum and Alaska Greenhouse conferences are aimed to optimizing agricultural and horticultural production and bringing the latest research and trend news to producers as well as enhancing small home horticultural activities.

Results
* Along with traditional greenhouse and controlled environments, high tunnels or hoop houses have been found to enhance field production with higher yields, season extension, reduced production risks, and improved crop

quality and nutritional value.
* Potatoes are the most important Alaska vegetable crop and production increased slightly in 2009, from 135,000 hundredweight in 2008 to 137,000 hundredweight, almost a 1 percent increase. Vegetable production numbers are not available yet for 2009 but in 2008, vegetable acreage increased 70 acres (total 396). Despite poor growing conditions in 2008, the value of vegetables produced, excluding greenhouses vegetables, increased from $3.07 million in 2007 to $3.38 million in 2008.
* Numbers for 2009 production vegetable production have not been finalized but carrot and potato farmers participating in the 2010 Produce Growers Conference indicated that 2009 season was one of the best.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment
404	Instrumentation and Control Systems
405	Drainage and Irrigation Systems and Facilities
502	New and Improved Food Products
601	Economics of Agricultural Production and Farm Management

Outcome #6

1. Outcome Measures

Outcome Target 6: Mitigate invasive pests to remain under the threshold of economic impact.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Alaska supports two major international airports and seaports and hosts thousands of visitors a year. Alaska also

imports most of its food and many horticultural products and agriculture commodities such as hay, straw and field grains, so it remains vulnerable to infestations by imported pests, including invasive plants. Retail sales of plant materials contaminated with a variety of pests continue to challenge the state. Invasive weed infestation can reduce land values and agricultural productivity, and negatively impact recreation, tourism and subsistence harvesting. Improving citizen, farmer and land manager ability to assess pest management practices is critical.

What has been done

* Agents and IPM staff hosted 35 workshops and worked with producers and others to identify pests and reduce impacts. Extension collaborates with state and federal agencies to educate the public about species of concern and to host eradication efforts.
* Two conferences hosted by Extension bring together researchers, agencies and citizens to discuss research and prevention efforts.
* Pest technicians trap for invasive species of concern, including the gypsy moth and the emerald ash borer.
* Extension provides training for pesticide applicator certification and for certification of inspectors doing noxious-weed free forage and straw inspections.

Source of funding: Smith Lever 3b & c and 3d, Alaska Department of Natural Resources

Results

Alaska has not been challenged by invasive plants and pests to the degree that many other states have so far. Extension and other agencies remain vigilant and monitor, detect and identify species. In the past 10 years, three gypsy moths have been trapped in Alaska, but none in 2009. IPM placed approximately 478 delta traps in 13 census districts last year. Fourteen traps for emerald ash borers were placed in trees around Anchorage and none were detected. Raising the awareness of agencies and the public to the threat invasives pose will help contain the errant species. After the 2009 invasive species conferences, many participants agreed to increase efforts to manage and monitor invasive species. There is an increased awareness by general public about invasives spread through hay and straw and because of that people are requesting certified noxious weed-free hay and straw.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #7

1. Outcome Measures

Outcome Target 7: Adapt and develop production and management techniques suitable for Alaska greenhouse systems. Measure will be technology transferred through workshops,publications, and presentations.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	45

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Efforts to cost effectively produce food locally are becoming more urgent as energy, heating and transportation costs are increasing. For communities to become more sustainable and self-reliant in respect to energy and food, greenhouse crop production is an integral system component. Producing food in greenhouses near consumers, using renewable or waste energy resources, is expected to be less vulnerable to outside influences than systems completely dependent on imported food. Controlled Environment Agriculture (CEA) allows extended season crop production, more efficient use of resourcs, reduced production risks, improved crop quality and increased yields compared to tunnel or field crop production. The extreme day lengths and short, variable seasons of Alaska call for using high tunnels and greenhouses.

What has been done
Particular emphasis was placed on the development of plant transpiration simulation models for crops grown under common greenhouse environment conditions to provide decision support tools for growers. Water and nutrient uptake, and yield and crop quality was compared with different environmental conditions and at different locations. Methods and instruments for direct measurement of substrate water status while monitoring plant stress with digital imaging and other non-contact sensing was evaluated. Best management practices were designed for water and nutrient management.

Results
On going technology transfer for greenhouse production management is being shared with individuals and groups in 39 cities or villages in the state. Through partnerships with two local greenhouses training and apprenticeship opportunities are available. Current production approaches, environmental controls, scheduling and management of production greenhouses are evaluated and adjusted as information becomes available. Programs and training opportunities in greenhouse and agriculture topics are offered to students at secondary and post-secondary levels. Presentations were provided at local, regional, national and international meetings, conferences and workshops on crop production under greenhouse, high tunnel and field conditions. A production greenhouse, heated and powered by geothermal energy, at the Chena Hot Springs Resort is now yielding lettuce and tomatoes throughout the year. Daily educational programs on greenhouse operation and management are conducted year round.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment
404	Instrumentation and Control Systems

Outcome #8

1. Outcome Measures

Outcome target 8: Identify horticultural crops to help diversify Alaska's economy. Measured are varieties tested.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	458

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Horticulture is the largest agricultural industry in Alaska amounting to more than 80 percent of cash receipts for all agricultural crops in the state and 40 percent of all agricultural commodities including aquaculture, livestock, and agronomic crops. The value of major horticultural crop plants in the most populated areas of Alaska is estimated at $20 million. Four horticulture specialties are emerging as the most important research focus areas to support commercial enterprises in Alaska: organic and sustainable horticulture; controlled environment horticulture especially season extension and moderation using high tunnels; field-grown cut flower production and Alaska wild berry cultivation and management for food and neutraceutical industries.

What has been done
The annual and perennial flower trial research is used by seed companies, nurseries, growers, landscapers and home gardeners to identify hardy perennials, disease resistant annual flowers for home and commercial production. Specific trial information was requested by Denali Seed (AK),Territorial Seeds (OR), Pan American and Ball Seed Co.(IL), Goldsmith Seeds (CA) and Kieft Seeds (Holland). Researchers working in partnership with ARS have developed and improved compost to enrich soil.

Results
Research providing the foundation for the new peony industry in Alaska continues variety trials. The vegetable research is designed for small market gardeners and homeowners. It provides comparative trial information that is useful in developing regional truck farms and expanding produce choices as farmers markets. The annual and perennial flower trial research is used by seed companies, nurseries, growers, landscapers and home gardeners to identify hardy perennials, disease resistant annual flowers for home and commercial production. Six undergraduate students completed internships in horticulture during the past year. Three Natural Resources Management MS students are working on degrees through research on native plant seed germination/revegetation; pollination biology of Vaccinium uliginosum; and bumble bee biology for crop pollination in Alaska.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment
404	Instrumentation and Control Systems
405	Drainage and Irrigation Systems and Facilities

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Alaska is the harbinger of climate change in the north. The region is already seeing impacts of the changing climate in its sea ice degradation, the ecology of the boreal forest, changing weather patterns, and its ice-impregnated northern soils. This will influence the thrust of agriculture in coming years. Changes in state and federal policy and regulation will affect appropriations to the university and the economy of the state of Alaska. Current energy dialogue in the state centers on oil and gas despite discussions of alternate energy. Should a successful proposal for a gas line be announced, this will inject jobs and dollars into Alaska and most likely change priorities from an increasing focus on using alternative forms of energy that are regionally produced to, once again, export of a raw resource. Within the programs of AFES and CES, this would most likely mean refocusing on this change in public priorities at some detriment to the programs proposed here. A continuing rise in transportation costs will negatively affect the developing new peony industry in the state. The high cost of petroleum products and fertilizers are expected to impact the productivity and the economic viability of horticultural and agricultural operations in the state. The small number of agricultural staff working for Extension, the geographic distances between communities and high transportation costs involved in traveling to communities off the road system all present challenges to Extension, which tries to provide a supporting role for horticultural and agricultural production in the state. Two new Extension agents were hired in 2009, a new ag and hort agent in Juneau and an invasive plant instructor in Anchorage.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

All of our Extension agents used surveys after our major conferences and most agents regularly surveyed following individual classes. Several agents survey participants of workshops or conferences to get participants' responses to particular presentations or overall what they have learned from previous presentations. Participants in the 2009 Invasive Species conferences, for instance, indicated a strong desire to manage and monitor invasive species and collaborate on invasives species projects. Most of our agriculture agents do evaluations after an event for recording impacts but our livestock specialist and a number of agents do pre- and post test surveys to determine what participants in their workshops learn. We

are learning through surveys what areas interest clients for future programming.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Natural Resources and Community Development

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%		0%	
112	Watershed Protection and Management	20%		0%	
122	Management and Control of Forest and Range Fires	10%		0%	
123	Management and Sustainability of Forest Resources	10%		15%	
125	Agroforestry	0%		10%	
131	Alternative Uses of Land	10%		0%	
134	Outdoor Recreation	5%		15%	
605	Natural Resource and Environmental Economics	15%		15%	
608	Community Resource Planning and Development	15%		15%	
610	Domestic Policy Analysis	5%		15%	
805	Community Institutions, Health, and Social Services	0%		15%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	2.0	0.0
Actual	4.9	0.0	3.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
116131	0	169282	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
127095	0	103331	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
882169	0	481915	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research products provided science-based information in resource planning, economic and environmental impact of natural resource use, market and non-market value of resources, and conflict resolution in rural communities and villages along with basic information in agriculture and horticulture, forest sciences, and soil sciences for use by planners, economists, and policy makers. Measurable outcomes will include peer-reviewed publications, lay publications, rural community business/development plans, and citizen participation. Extension activities involve partners from other UAF units including AFES to assure that there is a feedback loop that will continue to make the information provided to stakeholders relevant to their needs. These activities will develop integrated and/or multi-state projects concerning natural resources stewardship within the University of Alaska Fairbanks and with other land grant institutions; develop criteria to broadly define the temporal natural resource interests of stakeholders so the program's activities address the needs of those Alaskans most directly impacted by specific natural resource matters; develop partnerships with government agencies to identify and address stakeholder needs; regularly assess stakeholder needs and emerging natural resources issues impacting stakeholders; conduct literature reviews and review contemporary research relevant to this program; develop culturally and educationally relevant Extension publications (including fact sheets, bulletins, and newsletters) that provide unbiased, scientific information about natural resource issues; develop, review, and revise a web site to be the electronic portal for UAF Extension information on natural resources stewardship matters of concern to stakeholders; develop, plan, deliver, evaluate and revise as needed extension workshops, demonstrations and basic skill trainings; facilitate discussions and other meetings that address stakeholder needs in or near their communities; develop, conduct and review 4-H projects related to the natural resource stewardship program; develop, plan, conduct, evaluate and revise as needed young adult stakeholder workforce readiness trainings that prepare youth for entry-level positions in natural resource management positions; develop, deliver, facilitate and evaluate natural resource stewardship informational discussions with urban populations to increase their awareness of natural resource issues and the values and needs of stakeholders relative to natural resources; coordinate and assist the UAF School of Natural Resources and Agricultural Sciences and other units of the University of Alaska in recruiting and graduating young Alaskans with endorsements, certificates and degrees that result in careers in managing, using and protecting natural resources.

2. Brief description of the target audience

This program will focus on industry and entrepreneurs including communities, families, and newly forming cooperatives and businesses, non-profit and for-profit development corporations. Efforts will be made to address problems of the traditionally underserved rural populations within the limit of resources available. Stakeholders are those directly impacted by contemporary natural resource issues related to forest and land resources, mining resources, water resources, young adults wanting entry level skills needed for employment in natural resource related businesses, agencies or organizations, and persons in natural resource related occupations who wish to increase their skill and/or knowledge level, state and federal agency agents and policy makers.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	250	750	400	900
Actual	5210	21850	26	1150

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	0	5	
Actual	2	9	11

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Output Target 1: Develop formal partnerships with other land grant institutions, government agencies, stakeholder groups and organizations.

Year	Target	Actual
2009	12	69

Output #2

Output Measure

- Output Target 2: Develop and deliver public issues education workshops for stakeholders on locally relevant natural resources and related educational issues.

Year	Target	Actual
2009	20	20

Output #3

Output Measure

- Output Target 3: Develop a web-based platform for discourse and information sharing on relevant areas of interest in natural resource issues that connect people to information.

Year	Target	Actual

2009	1	3

Output #4

Output Measure

- Output Target 4: Conduct at least two formal needs assessments per year of stakeholders with interest in natural resource management.

Year	Target	Actual
2009	2	4

Output #5

Output Measure

- Output Target 5. Develop regional economic models that depict the impact of Alaska resource management scenarios on Alaskan communities. Output will be electronic and written publications.

Year	Target	Actual
2009	2	3

Output #6

Output Measure

- Output Target 6. Develop, adapt, and implement public involvement processes that meet public expectations. Output measure will be public input sessions conducted and publications.

Year	Target	Actual
2009	2	3

Output #7

Output Measure

- Output Target 7. Provide analyses of the effectiveness of natural resource and environmental laws. Output measure will be publications.

Year	Target	Actual
2009	1	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcome Target 1: Increase the number of partnerships with stakeholder groups, government agencies, and other institutions that will enhance the land grant mission.
2	Outcome Target 2: Increase the number of integrated and multi-state research-Extension activities by 5% in the next five years.
3	Outcome Target 3: Increase the recruitment and retention of youth appreciating and considering natural resource management careers.
4	Outcome Target 4. Increase the number of communities participating in public involvement processes that target community economic development and policy and law. Out come measure will be the increase in number of communities.
5	Outcome Target 5. Identify situations in which existing resource management laws with conflicting purposes are reconciled.

Outcome #1

1. Outcome Measures

Outcome Target 1: Increase the number of partnerships with stakeholder groups, government agencies, and other institutions that will enhance the land grant mission.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	12	52

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There are 375 million acres of land in Alaska, 44 million acres are Native lands, 3.2 million acres are in state parks, federal land has 5 national parks, preserves, and monuments covering a total of 54 million acres. In fact, 65 percent of the state's land is federally managed. AFES seeks to provide research that meets the needs of the private, state and federal stakeholders.

Part of the land-grant mission is to disseminate information for the public good. Extension assesses needs expressed by individuals or communities and tries to meet their needs -- or to lead stakeholders to appropriate resources. A need exists, particularly in rural Alaska, for less expensive energy and for economic development. Because of the high cost of fuel oil in rural areas, wood heat is a logical choice for many residents. Also, climate change in Alaska is a threat to coastal communities and communities on riverbanks due to increased melt, rising sea levels, increased storm intensity and frequency of storms.

What has been done
Research involves natural resource economics analysis on crab and dogfish industries, community resource planning assistance through wetland habitat mapping, a watershed land use database, and an invasive species management plan. Research is seeking to understand how natural resource recreation contributes to well-being and resilience in Alaska.
* Extension supported the development of biomass projects. Staff helped sawmill operators form a cooperative with the goal of manufacturing compressed wood bricks. Extension and USFS developed a consumer survey to rate the bricks. Other Extension-assisted biomass projects include proposed projects at Kenny Lake School and a Coast Guard plan to switch to biomass heat. A wood-heating website was updated with resources for residents, wood-heating workshops and information at two energy fairs.

* Extension and the Marine Advisory Program faculty have developed a program to assist coastal and river communities to assess their threat from climate change and to identify alternative courses of action.

Results
Partnerships have been formed with the Alaska Board of Fisheries, the Alaska Department of Fish and Game,the National Marine Fisheries Service and the North Pacific Fisheries Management Agency. In land planning and resource law and recreation partnerships involved the Fish and Wildlife Service, Corp of Engineers, World Wilderness Congress, Marine Mammal Commission, US Forest Service, City of Fairbanks, Fairbanks North Star

Borough, and an international partnership with the Nyarkoa Foundation, Ghana.
The biomass cooperative on Prince of Wales Island formed an corporation in August 2009 and is considering an operation that would employ five people. The cooperative is exploring ways to finance the operation while work is continuing on the consumer survey. The wood heating website provided 24,000 views of accurate information on wood heating focused on Alaska. A biomass project in the community of Craig, which was supported by Extension, is lowering heating costs for the city. Engineering work for two more biomass projects at schools has been completed.

* Climate change planning efforts led to a workshop on climate change adaptation efforts in FY10.

Source of funds: Smith-Lever b and c, RREA grant and Rural Development special grant

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
134	Outdoor Recreation
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis

Outcome #2

1. Outcome Measures

Outcome Target 2: Increase the number of integrated and multi-state research-Extension activities by 5% in the next five years.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	4	8

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Alaska's geographic isolation and the expense of traveling elsewhere present challenges to maintaining multistate relationships. At the same time, many issues, particularly natural resource,energy and climate change, have implications that extend well beyond our borders. Tapping into other states experiences and research will strengthen our ability to assist Alaskans.

What has been done

Our water quality coordinator helped organize the 2009 Regional Water Quality Conference and chaired the poster committee of the 2009 National Water Quality Conference. He and a dozen other water quality coordinator/specialists are developing a web page as part of the Drinking Water and Human Health eXtension CoP. A major Extension multistate activity is hosting the 2010 national Natural Resource Extension Professionals Conference, which will emphasize collaborations to respond to climate change and energy challenges. NRCD faculty members are serving on the planning committee, designing workshop sessions and helping with logistics. Wood products researcher collaborated with scientists at University of Washington and Washington State University to develop and market glulam beams and wood composite products for commercial applications.

Results
The drinking water web page is expected to go live in six to eight months, which will provide good drinking water quality information regionally and nationally. Efforts organizing and participating in regional and national water quality conferences have resulted in valuable networking opportunities and presented ideas the water quality coordinators can import to Alaska. Speakers represent funding agencies, USDA, U.S. Environmental Protection Agency and other associated agencies. The ANREP conference is scheduled for June 2010 and is expected to provide opportunities that result in new multistate activities and will highlight climate change and energy concerns. Entrepreneurs were made aware of commercial market opportunities for wood products.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis

Outcome #3

1. Outcome Measures

Outcome Target 3: Increase the recruitment and retention of youth appreciating and considering natural resource management careers.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	25	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The 4-H Natural Resource and Youth Development Program began in 1991 with the goal of increasing science literacy of rural students through something they understood like salmon and fisheries. Changing issues, including climate change, its impact on fisheries, employment and traditional subsistence lifestyles, have created an urgent

need to prepare youth with the knowledge and skills to address these challenges, particularly in rural areas. A second major source of youth development is through the FFA in Alaska where students work to develop natural resource knowledge.

What has been done
Our 4-H fisheries and natural resource specialist developed a salmon incubation project to be used in rural schools. An in-service training was offered again late this past fall after a two-year hiatus. Rural teachers receive salmon eggs and raise salmon with their students, tying in lessons of ecology, salmon life cycle and science. Scientists and researchers share projects and research they are conducting across the state and offer opportunities to involve students and communities. A newsletter our specialist distributes to 40 school districts in the state lists science opportunities for students and for teachers. Future Farmers of America's new focus is in natural resource management and careers.

Results
Rural K-12 educators are supported with resources to support place-based, culturally relevant programming in their community schools. More than 70 schools receive project information; 25 received assistance with salmon incubation project. While this past year's salmon incubation inservice training was in the 10 fiscal year and was not offered the previous two years, our specialist has continued to support the program in 25 communities as a resource, coordinating the delivery of salmon eggs and in supporting curriculum. Planning for this year's event spanned many months, and involved the U.S. Fish and Wildlife Service and Alaska Sea Grant?s COSEE-Alaska. In past years, teens who participated in the program were employed counting fish on fish weirs on the Yukon River. Data collected was provided to Alaska Department of Fish and Game to determine commercial fisheries open periods. Several other youth received employment at non-profit fish hatchery positions in Southeast. FFA chapters are located in 10 high schools and 27 home school students across Alaska with the state FFA leader housed at UAF and works jointly with SNRAS/AFES and CES. Teachers have said their students are more interested in science and math, but we don't have number of youth considering natural resource careers. Seven former FFA members are majoring in Natural Resources Management at UAF. There are 447 students involved in FFA activities including natural resources, agricultural education, and marine technology.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
134	Outdoor Recreation
608	Community Resource Planning and Development

Outcome #4

1. Outcome Measures

Outcome Target 4. Increase the number of communities participating in public involvement processes that target community economic development and policy and law. Out come measure will be the increase in number of communities.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	2	9

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Natural resource development in rural Alaska is both an economic opportunity and a threat to the way of life of rural Alaskans, especially Native Alaskans. Public policy training such as that done at the Alaska Forum on the Environment provides a means that residents of rural communities can address polarizing topics in an open, structured format. Larger urban areas struggle with management issues pertaining to natural resources and policy.

What has been done
CES faculty and staff modeled public deliberation processes at statewide conferences for Alaska Native Environmental Managers. SNRAS/AFES brought parties together for land planning to assist the City of Fairbanks and the North Star Borough to save money by creating a joint Storm Water Utility. A student worked with the faculty and land planners to develop a new wetland classification system.

Results
Participants rated public deliberation, similar to that used by the Kittering Foundation as a useful tool to address contentious natural resource development issues. A database was created for new wetland classification and includes an interactive map that can be found at http://www.fws.gov/wetlands/data/mapper.html

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis

Outcome #5

1. Outcome Measures

Outcome Target 5. Identify situations in which existing resource management laws with conflicting purposes are reconciled.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Federal land managers are required to act within a prescribed statutory and regulatory framework that guides their decision making. The courts have failed to properly apply the "Best Scientific Data Available" standard, what statistics say about what "scientific" means, and failure to consider whether data is scientific can have significant scientific repercussions.

What has been done
SNRAS researcher conducted research in coordination with the U.S. Fish and Wildlife Service and the Marine Mammal Commission. Conclusions examining the existing legal framework for assisted migration were presented to the George Wright Society. She also presented work examining how the Alaska National Interest Lands Conservation Act and the National Environmental Policy Act are interrelated in the context of BLM agency and predator control.

Results
A manuscript has been accepted for publication by the Stanford Environmental Law Journal. This change of knowledge will assist federal land managers in their decision making. This brought about a better understanding of Alaska's management of its wildlife resources in relation to the National Refuge System.

4. Associated Knowledge Areas

KA Code	Knowledge Area
610	Domestic Policy Analysis

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

The Natural Resources and Community Development Program in Extension is fairly new and is also small. Two faculty in this area are no longer working for Extension. Our forestry specialist died in June 2009 as the result of cancer and has not been replaced. A term employee who completed economic analyses for us has not been funded. An advisory group recommended that our area focus our work on climate change, rural leadership and economic development but it takes time to develop a unified stakeholder base, identify problems we can address, develop and deliver Extension education programs. The economy of rural Alaska continues to be depressed.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

The Natural Resource and Community Development program is new and faculty and staff are identifying ways to target needs and evaluate the success of new initiatives. Evaluations favored Extension's efforts on public deliberation.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Individuals, Families and Communities

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
502	New and Improved Food Products	5%		0%	
504	Home and Commercial Food Service	20%		0%	
703	Nutrition Education and Behavior	15%		0%	
724	Healthy Lifestyle	20%		0%	
801	Individual and Family Resource Management	10%		0%	
802	Human Development and Family Well-Being	15%		0%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	10%		0%	
805	Community Institutions, Health, and Social Services	5%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	0.3	0.0
Actual	9.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
264925	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
289935	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
2539114	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Field faculty conducted workshops and meetings, delivered educational services, provided training and conducted consultations with clientele. Food preservation remains an area of high interest. Agents developed two food preservation DVDs in 2009 and six additional online resources, which will make resources more available to Alaskans. Researchers developed products, curricula and resources, provided training and conducted consultations with clientele.

Educators and researchers conduct needs assessments, worked with the media, partnered with other agencies and organizations, wrote articles, publications and fact sheets, and facilitated events, activities and teachable moments.

2. Brief description of the target audience

The Sustainable Individuals, Families and Communities programming involves parents, caregivers of children,school children (public and private), school teachers (public and private), home and building owners, individuals interested in healthy lifestyles, individuals and families needing assistance managing their finances, low- income individuals and families, especially women with young children, individuals interested in a subsistence lifestyle, individuals interested in food preservation, individuals and professionals interested in emergency preparedness, and human development and social work professionals.

Institutional cooperation will include food banks, housing and energy authorities and organizations, and individuals or families experiencing life transitions.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	7350	82400	700	1020
Actual	8416	1221065	1116	64267

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	2	1	
Actual	4	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Output Target 1: Extension faculty will offer workshops in a wide range of home economics and family and

consumer science topics.

Year	Target	Actual
2009	120	235

Output #2

Output Measure

- Output Target 2: Extension district offices will updated emergency planning for internal operations and constituent communities.

Year	Target	Actual
2009	8	3

Output #3

Output Measure

- Output Target 3: Energy extension workshops and conferences will provide individuals and families with immediate and long-term actions they can implement for energy conservation.

Year	Target	Actual
2009	20	39

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcome Target 1: Participants in food preservation and food safety classes will improve their food preservation and food safety practices.
2	Outcome Target 2: Participants in healthy lifestyle classes and workshops will adopt knowledge gained to maintain healthy lifestyle practices one year after participation.
3	Outcome Target 3: Participants will use knowledge gained in parent education classes to increase their application of developmentally appropriate practices.
4	Outcome Target 4: Awareness gained in workshops and will result in active energy conservation efforts by 20% each year over 2007 levels.
5	Outcome Target 5: Energy efficiency awareness will result in an increase in collaborations for energy conservation by 25% per year over five years.

Outcome #1

1. Outcome Measures

Outcome Target 1: Participants in food preservation and food safety classes will improve their food preservation and food safety practices.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	160	769

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A sizeable percentage of Alaskans live a subsistence lifestyle or supplement their diets with fish and game meat. Alaska also has a large military population, and most have not previously canned or preserved game meat or fish. Our state has the nation's highest rate of botulism, a food-borne illness that occurs in low-acid foods such as fish and game meat. It is particularly important that we teach residents how to safely preserve these Alaska staples.

What has been done
* Agents taught 83 food preservation classes in 33 communities. Sixth-three were hands-on classes in which 769 participants practiced food preservation/safety skills.
* Alaska's Food Safety and Preservation Hotline fielded more than 500 calls.
* Agents and staff created the fifth and sixth DVDs as well as online modules of a how-to series on preserving local foods.
Funding source: Smith-Lever 3 (b) and (c) and USDA grant
* Agents tested 758 pressure canner gauges during the year with a 20 percent failure rate. Nearly 70 percent of tested gauges required adjustment during use.

Results
* Clients who practiced hands-on food preservation skills will be able to continue to preserve foods safely. It is difficult to quantify our impact here, but as more Alaskans learn the proper methods of preserving foods safely the risk of botulism decreases. Clients who learn food preservation skills can be less dependent upon imported, high-cost food.
* Approximately 150 pressure canner gauges were replaced and more than 500 required adjustment, resulting in safely canned foods.
* Our interactive food preservation Flash web modules are another way of reaching users who may not have easy access to food preservation classes. Thirty-four users have filled online surveys since August 2008. Of these, 42 percent said they would change their food preservation techniques. Positive comments include one woman, who said she had been trying to figure out how to use the pressure cooker she inherited from her mother. "I've purchased books and tried to find websites - but nothing compares to what I just read/watched. All of my questions were answered!" An Extension educator from Maryland said, "love the format. I will recommend this website to clients and co-workers."

4. Associated Knowledge Areas

KA Code	Knowledge Area
504	Home and Commercial Food Service
703	Nutrition Education and Behavior

Outcome #2

1. Outcome Measures

Outcome Target 2: Participants in healthy lifestyle classes and workshops will adopt knowledge gained to maintain healthy lifestyle practices one year after participation.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	310	292

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Alaska faces the challenge of our senior population remaining active and healthy in a difficult environment. Another health challenge is that it is almost impossible for Alaskans to get their vitamin D from the sun year-round and most people do not get enough in their diets. Alaskans used to receive much of their vitamin D from traditional diets rich in salmon. Current diets and lifestyles set people up for deficiency. Vitamin D deficiency is linked to several diseases common in our region. Alaska health-care costs are high and a need also exists for self-management of chronic diseases.

What has been done
* Since 2005, one of our agents has trained 121 StrongWomen instructors in Alaska. During the past year, 43 new instructors were trained. Three agents lead StrongWomen classes and host groups.
* Extension's Northwest district office participated in a public education campaign to promote the importance of taking vitamin D by providing classes to 44 community members, consulting with 68 individuals, creating exhibits and doing radio programs.
* Our Anchorage agent trained instructors of Living Well Alaska, a program that teaches individuals how to manage their chronic health condition.

Results
* Most participants in StrongWomen classes report feeling stronger and they lead more active lives. Many who participated for a year or more reported increased bone density and better balance. Physical therapists have commented on the benefits they see in patients who participate. Sponsoring volunteer peer StrongWoman leader courses has helped establish many community programs. According to a recent survey, 300 participants attend two to three times a week in 21 StrongWomen community sites. We do not have complete numbers on participants who continue a year or longer, but agents know of 149.
* A year after the vitamin D campaign began, 204 Nome health fair participants were surveyed. Fifty-five reported they had started taking vitamin D, 39 increased their vitamin D intake, and 19 realized they were taking enough

vitamin D.
* Instructor trainings for Living Well Alaska have resulted in 60 leaders currently leading community classes and 300 community members attending classes. Data collected by the state indicates that participants are using the skills learned in community programs and that they are experiencing improved health and quality of life.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Outcome Target 3: Participants will use knowledge gained in parent education classes to increase their application of developmentally appropriate practices.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	80	93

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
It is sometimes difficult for residents of rural areas to get parent education training. Family service workers in the Nome and Bering Straits region often get training outside of Nome or by trainers brought in from Anchorage or the Lower 48 -- but outside training is limited. Early childhood development classes are also available in more urban areas of Alaska but are less available in rural Alaska. Employment in the field is available in the rural hub areas and the villages.

What has been done
* Our Nome agent became aware of a family development training program used successfully in Alaska. She worked with a community center and a family services center in the region, which sent trainees.
* The Nome agent taught five classes on brain research and child and teen development. Parents received tips on reading to young children and the Nome library staff received training on how to conduct a preschool story time.
* Juneau agent taught a 3-credit child nutrition course, by distance delivery, to 16 students around the state. This prepares students to earn child-care certification.

Results
Impacts from these activities are not documented yet. Counting our Nome agent, three received training in family development. They hope to make the training available to family services workers throughout the region this year. Reading programs were aimed at encouraging parents' approach encouraging literacy. The high school students in the brain research and child development classes had a chance to learn about child development and their own

development as teens. The nutrition education course provided an opportunity for individuals around the state to work on child-care certification.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Outcome Target 4: Awareness gained in workshops and will result in active energy conservation efforts by 20% each year over 2007 levels.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	450	989

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Alaska historically has had high energy prices. Interest in energy conservation remains high. It is a pocketbook issue, particularly in rural areas, where energy costs are the highest.

What has been done
The state offered a $300 million program aimed at energy conservation and efficiency in 2008. That acted as a great stimulus for information and the program has continued.
* Energy specialist has promoted energy conservation through a variety of media, including a quarterly newsletter aimed at homebuilders.
* The specialist promoted energy conservation through three classes taught to 943 residents in 11 communities. Altogether, 358 people attended his retrofit class; 205, solar design; and 380, cold climate homebuilding. Another agent provided energy saving tips and resources to 46 clients.
* Specialist coordinated energy conservation and sustainability training for 20 Extension faculty and professionals.

Results
The state's energy rebate program and increased funding to support our education efforts has had a huge impact on promoting awareness of energy conservation as did high energy prices. Energy ratings on more than 21,000 homes statewide show an intent to retrofit those homes with insulation and various energy conservation technologies. The energy rebate program, begun last year, has now been fully encumbered and, at least for the rebate side of the funding, more is being invested in energy conservation than we could have imagined two years ago. In addition, federal stimulus funding may become available soon. Because of the state funding and doubling of Extension's energy conservation efforts with state support, we will far exceed the original goals in this area. Training of Extension faculty and staff is geared to providing information to residents of their communities. That was accomplished this past spring with a weeklong training of staff for energy conservation referrals and

community sustainability.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #5

1. Outcome Measures

Outcome Target 5: Energy efficiency awareness will result in an increase in collaborations for energy conservation by 25% per year over five years.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	5	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Weatherization and retrofit education efforts help to ensure that energy conservation, weatherization and rebate funds are well-invested in Alaska's homes and citizens.

What has been done
In addition to teaching his regular classes on weatherization and retrofit, Extension's energy and housing specialist entered into two additional collaborations this year -- teaching home retrofit classes to clients who use the Cold Climate Housing Research Center/Fairbanks North Star Borough's "Energy Portal." About 160 homeowners and technicians were taught through these courses. About 80 low-income people were reached through six classes taught through Interior Weatherization, the nonprofit that distribute weatherization funds to low-income clients. These classes centered on how to prepare for an energy rater.

Results
These classes taught individuals how to weatherize their home and increase their home energy efficiency. The Weatherization Program is available to Alaskans, either homeowners or renters, who meet certain income guidelines and it provides weatherization services at no cost to qualified applicants. The Home Energy Rebate Program is for homeowners who do not qualify for the weatherization program, but want to make their own energy -efficiency home improvements. These classes also showed people how to benefit from Alaska Housing Finance Corp. home energy rebate and weatherization programs. Through the weatherization program, the agent was able to help low-income clients prepare successfully for the weatherization program.

4. Associated Knowledge Areas

KA Code	Knowledge Area

801	Individual and Family Resource Management
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

We have made strides this year to evaluate our programs better. A pop-up survey has yielded results for the online food preservation modules and surveys have been included in the food preservation DVDs. The survey was created after staff brainstormed with an evaluation specialist. Respondents on the web module surveys reported that they found the modules very valuable (4 on a scale of 1 to 4). One respondent was an Extension agent in Maryland who said she would recommend the modules to her clientele. Agents have done a better job of doing pre- and post-tests and evaluations following classes. As new programs are created, evaluations for outcomes are planned with the program.

Key Items of Evaluation

Evaluation for outcomes is an ongoing challenge. Additional training is always welcome.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Youth Development

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
607	Consumer Economics	5%		0%	
801	Individual and Family Resource Management	5%		0%	
806	Youth Development	90%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	9.0	0.0	0.0	0.0
Actual	7.4	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
259481	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
283977	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1019358	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

With the use of a 4-H Volunteer Leaders Training Manual, CDROM and accompanying web-based tutorials that incorporate Essential Elements training , various methods of delivery will be developed including district workshops, the development of a CDROM, teleconference trainings, highlights for newsletters and web-based tutorials. In addition to redefining the Alaska State 4-H Leaders Training Manual, portions of 4-H 101 will also be added to the training.

Many youth enter the workforce without the key skills needed to advance in the workplace. By creating collaborations with local district schools, area businesses, federal, state and tribal agencies and other civic organizations, training programs will be made available for youth and opportunities for employment can be achieved. More programming was developed in the science, engineering and technology area.

Ideals of entrepreneurship will be presented at the 4-H club level by conducting trainings with local volunteer leaders, junior. leaders, and youth of the 4-H clubs. District agents will assist in promoting the ideals of youth-based enterprises through additional leader and junior leader trainings, providing enterprise opportunities, and collaborate with organizations that can aid such enterprises.

Collaborations with local schools and other youth programs across the state will lead to new volunteer opportunities for 11-18 year olds. Though there are many opportunities for youth of this age, a key to success in this program will be though developing cross-over collaborations with local schools, other youth programs, and area University of Alaska campuses.

2. Brief description of the target audience

Grades k&ndash12
Parents of school-age children

Adults interested in positive youth development

4-H Extension educators

Other Extension educators

4-H Adult volunteers

Military youth educators

Community leaders

Federal and state agency representatives

Native corporations and tribal representatives

Youth-serving organizations and their representatives

University of Alaska faculty

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	550	2200	1140	16000
Actual	7043	132665	23070	56366

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	0	0	
Actual	2	0	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Output Target 1: 4-H educators will train volunteer organizational leaders in the Essential Elements of Youth Development

Year	Target	Actual
2009	1	118

Output #2

Output Measure

- Output Target 2: Extension will develop relevant workforce skill development projects for youth 15-18.

Year	Target	Actual
2009	3	2

Output #3

Output Measure

- Output Target 3: 4-H will create opportunities for membership or involvement for underserved and minority youth.

Year	Target	Actual
2009	5	14

Output #4

Output Measure

- Output Target 4: Youth Development will create initiative programming in science, engineering and technology.

Year	Target	Actual
2009	5	13

Output #5

Output Measure

- Output Target 5: 4-H educators will create inter and intra-district educational and service collaborations.

Year	Target	Actual
2009	5	13

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcome Target 1: 100% of faculty and staff associated within the program area will understand the Essential Elements of Youth Development
2	Outcome Target 2: After receiving training in the Essential Elements of Youth Development, volunteer leaders and youth will apply at least two of the Essential Elements in their interactions during programming.
3	Outcome Target 3: 4-H educators will expand programming to underserved and minority youth by 5% in each year of the five-year plan of work.

Outcome #1

1. Outcome Measures

Outcome Target 1: 100% of faculty and staff associated within the program area will understand the Essential Elements of Youth Development

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	9	13

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Positive youth development through 4-H is made possible through a strong cadre of caring adult volunteers. Creating supportive environments in which youth have a sense of belonging, experience independence, master skills, and give back to others and the community through generosity becomes more complex each year with changing environments and demographics. It is essential that staff and volunteers increase their knowledge and understanding of positive youth development and the Essential Elements of 4-H in order to deliver quality programs. The Essential Elements are what sets 4-H apart from other youth-serving organizations.

What has been done
All Alaska 4-H staff members and others with 4-H responsibilities have been trained in Essential Elements. The Alaska 4-H youth development program uses four primary delivery modes in fostering positive youth development -- clubs, special interest classes, school enrichment and camping. All are designed using the Essential Elements. Agents and leaders participate in district trainings that emphasize delivery of the subject matter within the context of the Essential Elements. A biannual state volunteer leader forum and audio conferences on various issues include Essential Elements.

Results
All of the 4-H staff in the Alaska program trained and presented information to their constituents about the Essential Elements of 4-H. Training has been given in these areas and they are part of everyday 4-H language. All 4-H activities are grounded in the Essential Elements. As a result of her commitment to 4-H within its framework of the Essential Elements, a club leader in the Tanana District received the National 4-H Salute to Excellence. She has made a difference in the lives of youth in her community and has been recognized among her peers and CES staff across the nation for her leadership. The experience has energized those around her as well as across the state. A second club leader recently received the regional Salute to Excellence and is in the running for national recognition.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Outcome Target 2: After receiving training in the Essential Elements of Youth Development, volunteer leaders and youth will apply at least two of the Essential Elements in their interactions during programming.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	200	119

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Applying the Essential Elements in program development and delivery is what makes 4-H unique from other youth programs. These four elements define volunteer roles in the lives of 4-H members as mentors, role models and coaches.

What has been done
Leaders are asked to provide information on events throughout the 4-H year for their clubs and also to show how activities will incorporate at least two Essential Elements. Evaluation tools have been used at the beginning and end of a project to see whether projects incorporate Essential Elements. A step in the new club chartering form includes the identification of Essential Elements in club activity planning, making it an intentional step in the planning of club activities. This process is being done all across the state as well as on military installations.

Results
We know youth are benefiting from the intentional application of the Essential Elements. Of the 39 newly chartered clubs, 73 percent planned programs that included belonging; 54 percent, generosity; 71 percent, independence; and 73 percent, mastery. One application involved a 4-H'er who, when she heard of the need for help with school bullying, developed and delivered a program for the students in a village. Another example is that of youth at the teen forum who used their skills in sewing curtains for the 4-H building at the district fair. A profound example involves five youth who enrolled in their local First Responder training as a result of experiencing the death of a young 4-H'er during the district fair.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Outcome Target 3: 4-H educators will expand programming to underserved and minority youth by 5% in each year of the five-year plan of work.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	5	15

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In many rural communities, activities for youth are limited. Special opportunities are also needed for minority youth. Youth in Bethel have nowhere to go after school or at night, except the Bethel 4-H Youth Center program, church or school activities. Activities are also needed for youth in larger communities. The Anchorage school population is nearly 50,000. The current white population is 49 percent. It is crucial to reach the majority populations that consist of underserved ethnic and minorities. In order to keep the program viable and current, 4-H must reach out to these populations.

What has been done
* Volunteer leaders have been trained in Eagle on the Yukon River and in Nenana, 60 miles south of Fairbanks.
* A two-day summer program was conducted in Tok near the Canadian border.
* New day camps targeted 4-H youth of National Guard parents.
* A 4-H'er conducted a bullying workshop in the village of Tyonek.
* A multidistrict service project brought together youth from many organizations, including at-risk youth who sewed hundreds of pillowcases for children of need.
* 4-H and the City of Bethel operate a youth center
* With deployments in rural Alaska, workshops brought youth and adults together.

Results
* The Eagle 4-H school club holds 4-H Friday every week and every student is a member of 4-H. The Tok program reached 25 youth and about half were Alaska Native. The agent is working with the school district on incorporating 4-H into their program and community. With the help of a volunteer in Nenana, a club has started.
* Due to rising costs and a decline in adult volunteers for a residential camp, one district experimented with a series of eight themed day camps. The majority of youth participating in these outdoor skills day camps were new to 4-H.
* Youth attending the Bethel 4-H Youth Center program have a safe haven, something to eat and drink, and caring youth and adults interact with them.
* Since 2006, approximately 250 youth and 100 adults participating in the Anchorage service project have learned how to operate a sewing machine. Four at-risk youth gave the pillowcase they made to someone they knew (one to his mom) or donated them to the community. In this case, youth who are generally seen as beneficiaries of service were given the opportunity to provide service and feel good about themselves while doing good for others.
* As a result of the bullying presentation, 10 kids (out of 30) in the village signed an anti-bullying pledge.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Vast geographic distances between communities and communities that are available only by air or boat are a challenge for program delivery and development and maintenance of relationships between club leaders and 4-H staff. It also presents challenges for groups of 4-H youth from different communities getting together. All of the state school districts are on different calendars so arranging programs during breaks or in-service times so everyone can get together is not possible. Travel time is a factor in being able to meet face to face also. Another challenge is that the demographics of the state are rapidly changing particularly in the Anchorage area. The economic downtown has also affected 4-H with more two-part or single-parent families working and unable to volunteer or support the program. Alaska experiences some of the highest energy costs in the nation, along with increased costs of food and basic supplies for many communities off the road system. Many communities lack resources and capacity for youth opportunities. At the same time, we see increasing need for out-of-school time activities, especially for teens. Many areas of the state lack sufficient job opportunities for youth to demonstrate job readiness skills. In response to an identified need to collect and analyze data more effectively to package program outcomes for stakeholders, we have purchased an online evaluation system from Washington State University and are beginning to incorporate this component in programming.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

4-H offers post-activity surveys for almost all of our programs. For example, the Tanana District periodically conducts evaluations on programs with the public, such as buyers in the market livestock program. Buyers are asked to evaluate the meat quality they are buying and their interaction with the youth.The club chartering process can also be an evaluation tool. Our state lacks in guidance in evaluation procedures. One agent noted that all agents are on their feet teaching kids or teaching parents so it's hard for them to come up with a one-size-fits-all evaluation. 4-H has attempted to implement some of the recommendations based on a 2006 program review. Communication has been improved between agents in different communities. Beginning in January 2008, agents started a weekly audio. An increase in the number of activities involving multiple districts reflects increasing interchange between the districts. The State Horse Development Committee felt a need to update and redo the State Horse Rule Book. A committee was put together and has been working on it for the past year. The rule book will be finished in spring of 2010 in time for the riding/show season.

Key Items of Evaluation

Kids want opportunities to be able to meet each other across the state. Alaska 4-H has difficulty participating in multistate programs because of the sheer cost of travel but Tanana District 4-Hers did participate in an exchange with Hawaii 4-H'ers. Some 4-H'ers also hosted Japanese youth in an international exchange last summer and two went to Japan. Travel is also expensive in state but a group of seven teens from two districts traveled to Juneau with the Youth in Governance program to attend legislative committee meetings, be pages for the day and meet with legislators. Our state horse contest brings on average 50 youth from multiple districts together.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Management of Ecosystems

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	0%		10%	
121	Management of Range Resources	0%		10%	
122	Management and Control of Forest and Range Fires	0%		10%	
123	Management and Sustainability of Forest Resources	0%		45%	
132	Weather and Climate	0%		10%	
315	Animal Welfare/Well-Being and Protection	0%		5%	
404	Instrumentation and Control Systems	0%		5%	
605	Natural Resource and Environmental Economics	0%		5%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	12.0	0.0
Actual	0.0	0.0	14.3	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	267610	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	219800	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	1196411	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research and outreach strategies will include a data base and data management system necessary for:

- Forest stand characterization and growth and yield for the Alaska northern forest.
- Long-term ecosystem monitoring and GIS modeling of the Taiga forest dynamics.
- Remote sensing to investigate landscape level responses in response to burn severity within black spruce ecosystems in Alaska
- Land-based data sets to correlate animal distributions on the landscape with remote images.

- Explorations of evaporation process in the boreal forest hydrologic environment .

High latitude soil research over the next five years will center on the following research topics and activities:

- Characterization of northern forest soils in boreal regions of Alaska in terms of the organic carbon pool and relationship with forest management practices.
- Soil carbon balance and nitrogen dynamics following disturbance by wildfire and logging.
- Soil respiration following wildfire in lowland black spruce, upland black spruce and mixed hardwoods.
- Wetland protection and hydric soils

- Evaluation of the relationship between local climate and soil carbon balance.

Research, education and outreach activities include:

- Correlating land-based information with remotely sensed images
- Geographic Information Systems
- Maps and spatial data sets of long-term value

Product development activities includes:

- Providing standards for Alaska woods.
- Developing non-timber forest products with business entrpreneours.
- Investigating the fuel potential of Alaska's forests
- Investigating recreation opportunities and impacts in Alaska's forest ecosystems.

2. Brief description of the target audience

The target audiences include producers and consumers, communities and small business entrepreneurs,individuals and groups concerned about the quality of the Alaska environment, and public resource agencies, public and private resource managers, other faculty and researchers, and undergraduate and graduate students. Our efforts will be directed toward environmentally and economically sustainable development and conservation of our natural resources that will benefit all citizens and help them adapt and become resilient as the climate changes. Advisors and the target audience include: Statewide Board of Advisors, Alaska Forest Association, Society of American Foresters, Alaska Farm Bureau, and the Alaska Northern Forest Cooperative. Specifically, this program will provide new information on soil properties and classification to the USDA natural Resource Conservation Service, the USDA Forest Service, the Alaska Department of Natural Resources, and borough, governments, and Alaska Native Corporations. Information on impact of fires on soil organic matter will assist the Department of Natural Resource's Division of Forestry and private land owners and managers.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	60	1200	0	0
Actual	108	1200	0	0

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

Patent Applications Submitted

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	0	12	
Actual	0	17	17

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Output Target 1. Soils research will concentrate on the classification of permafrost soils, soil carbon properties in relation to climate change, and soil disturbance dynamics in upland and lowland forest ecosystems. Publications are output measures.

Year	Target	Actual
2009	6	6

Output #2

Output Measure

- Output Target 2. Long-term forest productivity data sets will be converted to formats compatible with existing megadata systems for compatibility with long term ecological research, fire management, and forest disturbance dynamics. Outputs measured will be publications and data sets converted.

Year	Target	Actual
2009	4	6

Output #3

Output Measure

- Output Target 3. Development of data sets providing information on wildlife and domestic (traditional and alternative) livestock impact on rangelands will continue. Output measures will be data sets developed and publications.

Year	Target	Actual
2009	3	3

Output #4

Output Measure

- Output target 4. Curricula that train future and present land managers in ecosystem stability and geospatial technology will be developed and implemented. Output measure will be curricula implemented.

Year	Target	Actual
2009	2	8

Output #5

Output Measure

- Output Targe 5. Climate change will affect northern forest ecosystems that will impact economic development of communities and will have cultural implications as well on communities and individuals. Causes and effects of change on ecosystems and reverberations felt by communities and individuals will be investigated. The measured output will be publications.

Year	Target	Actual
2009	4	5

Output #6

Output Measure

- Output Target 6. Research related to product development to include timber products and non-timber products including energy will continue. Forest management specific to fuel/energy demand will be initiated. Measureable outputs will be publications and business starts.

Year	Target	Actual
2009	4	8

Output #7

Output Measure

- Output Target 7. Recreation opportunities are important in urban and rural forests and are a part of ecosystem services. Recreation management in northern ecosystems is a part of management of ecosystems research. Measurable outputs are publications.

Year	Target	Actual
2009	3	2

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcome Target 1. Increase knowledge of arctic and subarctic soils and forest productivity among peer scientists, managers, and governments. Knowledge outcome measures will be publications, conferences, and workshops.
2	Outcome Target 2. Increase animal producer and wildlife manager knowledge on range use and animal impact. Measurable outcomes are publications, workshops, and conferences.
3	Outcome Target 3. Increase knowledge through classroom and field course delivery. The outcome measures will be curricula delivered and number of students reached.
4	Outcome Target 4. Increase community and individual knowledge on the impact of climate change in northern ecosystems and affects on cultural lifeways, economies, and individual well-being. Outcome measures will be publications, workshops, and conferences.
5	Outcome Target 5. Provide research information that leads to product development and recreational opportunities. Outcome measures will be publications, business starts, conferences, and workshops.
6	Outcome Target 6: Biomass to biofuel for energy assistance. Outcome measure will be products and publications.

Outcome #1

1. Outcome Measures

Outcome Target 1. Increase knowledge of arctic and subarctic soils and forest productivity among peer scientists, managers, and governments. Knowledge outcome measures will be publications, conferences, and workshops.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	12	29

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In relation to climate change researchers are investigating how drought impacts tree growth. The relationship between seasonal precipitation and ecosystem processes has broad implications for understanding forest growth. A growing body of literature and our own results suggest that moisture plays a much larger role than previously supposed. The consequences of summer drought on ecosystem processes other than above ground tree growth, such as within tree carbon allocation, litter decomposition, and nutrient availability, are unclear because very little biogeochemical research has been conducted in the treated stands.

What has been done
Construction of snowmelt removal treatments were finished in both the upland and floodplain sites. The first year of treatment on the upland sites was initiated in the fall 2008 and resulted in measurements of year one growth in the fall of 2009. This will lead to a detailed understanding of ecosystem dynamics that are tied to the timing of soil moisture recharge in the interior Alaska boreal forest. The long-term forest growth monitoring program (LTER), started in 1968, and tied to a number of thinning and fertilization treatments in white spruce, aspen and birch stands in a variety of age classes within interior Alaska continued. Annual sampling of the log decomposition monitoring was accomplished. All data being collected from these projects will be entered into the BNZ-LTER data catalog.

Results
This monitoring is being used to address long term impacts of thinning and fertilization treatments on the growth of trees in stands of various age classes. A presentation on the log decomposition study was given at the North American Forest Ecology Workshop held in Logan, Utah. A change in knowledge resulted when we learned that in upland, mid-successional forests of Interior Alaska patterns reported earlier continue. Moisture stress has little net effect on ecosystem carbon balance because decreased tree production is offset by slowed decomposition. Our first field season of soil respiration measurements in snowmelt exclusion sites were both intermediate between untreated sites but also became more similar to control sites later in the growing season. This is partially counter to expectations. We learned that in floodplain, mid-successional forests of Interior Alaska patterns reported earlier continue. Throughfall exclusion has little impact on overall aboveground productivity, likely owing to the availability of groundwater. Throughfall continues to slow respiration and decomposition in the forest floor. A graduate student is working on separating soil respiration into heterotrophic and autotropic components. An undergraduate research project was completed on how long-term exclusion impacts in vitro rates of soil respiration and nitrogen mineralization in flood plain and upland sites.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
132	Weather and Climate

Outcome #2

1. Outcome Measures

Outcome Target 2. Increase animal producer and wildlife manager knowledge on range use and animal impact. Measurable outcomes are publications, workshops, and conferences.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	6	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In order for Alaskan beef ranchers and reindeer herders to be successful they need good animal management practices to enhance production, promote sustainability, decrease predation and out-migration, and address ecological concerns. An animal distribution model that accurately predicts animal use patterns on the landscape would be a valuable addition to the land manager's toolbox. Employing this model would offer economic benefits through increased production, sustainability, and also allow ranchers/herders to efficiently and effectively plan year-round grazing strategies.

What has been done
For the cattle model, videotaped observations were used for the collection of model validation data. We collected data for six, composited 24-hour periods for use in testing our cattle distribution model. Data was converted into an electronic, spatially-referenced format. We also tested two prototype, low-cost, GPS tracking devices and achieved mixed results in our testing which helped us modify the design for future tests. For the reindeer model, a graduate student finished the data analysis of his two year study and produced a thesis. Using a one-time match of funds and in cooperation with Dr. Pat Clark of the USDA Agricultural Research Service out of Boise Idaho, six prototype GPS tracking collars for reindeer were designed and constructed. These collars collect data at a rapid acquisition rate (one-second readings) and also have the capability of downloading positional data on schedule using a satellite phone modem. The collars were tested for fit and performance using reindeer from the RRP herd at the Fairbanks Experiment Farm.

Results
Information about cattle and reindeer activities gained from this project has been integrated into the NRM 312 class "Introduction to Range Management" to better inform students on the current state of knowledge concerning

animal behavior especially in Alaska. Part of the cattle dataset is used in the class GIS A370/NRM F369 "GIS and Remote Sensing for Natural Resources." The dataset is used to teach analysis of animal movements as a laboratory exercise. Information from this project was used in "Ag in the Classroom" and the Alaska Livestock Producers meeting and guest lectures at the University of Alaska Fairbanks and at Oregon State University. The results from this project were used to further develop and refine the KRESS (Kinetic Resource and Environmental Spatial System) software developed in conjunction with Oregon State University. Information is currently being incorporated into the Alaska Rangelands website (http://www.uaf.edu/snras/AGNIC web/) the Alaska site for the Western Rangelands Partnership (WERA 1008). The information will be available to the public as part of the Agriculture Network Information Center. The Western Rangelands Partnership is ready to launch a related project the "Rangelands" community of practice for the eXtension program. Information gained in this study was used as an initial starting point for a Masters-level project on reindeer movements and subgroup structure that is currently being conducted on the Seward Peninsula. Our work with reindeer focused on calving site selection. The initial work indicates that south-facing areas sheltered from the wind with a minimum snow depth are actively selected. This work is of value to reindeer producers who might be able to increase calving rates by actively moving herds to areas which supply these conditions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
315	Animal Welfare/Well-Being and Protection
404	Instrumentation and Control Systems

Outcome #3

1. Outcome Measures

Outcome Target 3. Increase knowledge through classroom and field course delivery. The outcome measures will be curricula delivered and number of students reached.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	20	144

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In a state with 375 million acres of with 3.2 million acres are in state parks, and federal land comprises 5 national parks, preserves, and monuments covering a total of 54 million acres land management issues are in the forefront. The School of Natural Resources & Agricultural Sciences (SNRAS) along with the Agricultural & Forestry Experiment Station offer a world-class learning and research environment to both undergraduate and graduate students.

What has been done
Undergraduate courses are augmented by such learning experiences as the field course in resource management, internships, and the senior thesis project. The school provides leadership in research, education and outreach

emphasizing natural resources management to benefit Alaskan's and their environment. Our research, education, and outreach programs reflect the interest of our diverse clientele: Native people, rural communities, industry, environmental organizations, state and federal agencies, farmers, foresters, tourists, fishers, and sports enthusiasts.

Results
In the 2009 academic year, faculty taught 18 credited courses in resource or forestry related classes. One example of knowledge transferred is through the field course Resources Management Issues at High Latitudes, NRM 290, a required course for Natural Resource Management majors. This gives students a close-up look at specific natural resources in Alaska during a 10-day field course around the state, with stops and activities at significant resource locales. During their stops, students participate in on-site analysis of resource management needs, opportunities, and conflicts in various industries: agriculture, forestry, mining, seafood, petroleum, recreation and tourism.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
132	Weather and Climate
315	Animal Welfare/Well-Being and Protection
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

Outcome Target 4. Increase community and individual knowledge on the impact of climate change in northern ecosystems and affects on cultural lifeways, economies, and individual well-being. Outcome measures will be publications, workshops, and conferences.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	6	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
It has long been expected that the Earth's high latitudes, but especially the Arctic and Subarctic regions, would experience climate warming from greenhouse gas processes. Recent syntheses confirm widespread, although not universal, warming effects across the Arctic and Subarctic in the last 30 years. But change in Alaska is happening at a rapid rate, and coherent and consistent evidence of warming is seen in changes in hydrology, permafrost, forests, disturbances, and other features. In recent decades, the Arctic and Subarctic regions have experienced

the greatest warming on earth. Everyone--from engineers to wildlife managers to farmers--will need to take economic change, social change, and climate change into account when planning for the future, in order to avoid costly mistakes.

What has been done
The Scenarios Network for Alaska Planning (SNAP) is a network linking university researchers with communities and resource managers. Through collaborative partnerships involving data sharing, research, modeling, and interpretation of model results, SNAP addresses some of the complex challenges of adapting to future conditions. As a starting point, SNAP offers statewide maps of temperature and precipitation projections, and basic data for 353 communities. These projections are based on global models used by the Intergovernmental Panel on Climate Change (IPCC), using a moderate scenario.

Results
Results from five scenario models in Alaska and other northern regions predict that in general, temperatures and precipitation are expected to increase across all regions. For some coastal communities, expected erosion is by far the most pressing issue. In central Alaska, changes in fire patterns are likely to have significant impacts on ecosystems. Fires may become more frequent and more intense due to drying soils. In southcentral Alaska, warming temperatures and associated drought stress may increase invasive species and other species shifts, including the incidence of insect outbreaks. Warmer weather, drying, and insect killed trees may also increase the incidence and severity of forest fire. Changing ocean temperature, invasive species, erosion and storms may impact the fishing industry in southeast Alaska. Increased incidence and severity of storms are likely to be of concern in Southwest Alaska. Tree line will continue to move westward as wet tundra areas dry and become occupied by the westward movement of the boreal forest. Warming ocean temperatures are altering the Bering Sea ecosystem, impacting fish, marine mammals, and birds.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
132	Weather and Climate
605	Natural Resource and Environmental Economics

Outcome #5

1. Outcome Measures

Outcome Target 5. Provide research information that leads to product development and recreational opportunities. Outcome measures will be publications, business starts, conferences, and workshops.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	9	14

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Heavy restrictions on harvesting in the Tongass National Forest has caused the closing of lumber mills and forestry related industries and has had a major negative impact on communities in Southeast Alaska. The Forest Products Research (FPP) and Education program in Alaska conducts research to assist with the restructuring of the Forest Products Industry in Alaska.

What has been done
The Forest Products Program has reclassified strength ratios for Alaska wood, investigated markets for glulam beams, pursued research on non-timber forest products for nutraceutical properties, conducted log building classes that demonstrate new greener construction techniques, and initiated the One-Tree curriculum. One Tree brings together artisans, teachers and students to teach concepts while utilizing every part of a birch tree.

Results
The most significant output of the Alaskan Timber Resources for Wood Plastic Composites (WPC) project was demonstration of potential to produce commercially viable wood-plastic composites for local markets using low-value woody biomass in Alaska. A MS thesis was completed and results will be presented at the Forest Products Society's International Convention in 2010. Eighty community members, artisans, scientists, and K-12 teachers were involved in the One-Tree project. A variety of products are being made from the tree's bark, leaves, twigs, and wood, and the first K-12 teacher meeting will be held to plan for introduction of the project into area schools.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #6

1. Outcome Measures

Outcome Target 6: Biomass to biofuel for energy assistance. Outcome measure will be products and publications.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Energy costs in Alaska are the highest in the nation, with native and remote communities being the most affected. Alaska's 180 remote villages are paying 10% of their annual income for diesel fuel at $8/per gal. The available forest resources include small diameter, non merchantable species, including fire killed and beetle killed biomass that have no commercial value. Most rural communities in Alaska lack transportation infrastructure that most of the states enjoy which results in energy costs being prohibitively expensive. This biofuel program is providing urgently needed research support and educational outreach to find alternatives to fossil fuels.

What has been done
A pyrolysis unit was designed and built with the University of Idaho and installed at UAF Palmer Research Center for evaluating woody biomass for producing bio-oil and bio-char. This is the first reactor of its kind in Alaska and will enable for a baseline determination of the characteristics of bio-oil, bio-char and its products. Also, a GEK downdraft gasifier was installed at the UAF Palmer Research Center for evaluating local biomass in the production of combustible syngas. This on-going work will serve as a start to evaluating upgrading options for local biomass in a biorefinery setting to produce high-grade fuels and chemicals.

Results
Presentations have been given at regional and national conferences dealing with the conversion and potential uses of Alaska species into chemical feedstocks.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Alaska is the harbinger of climate change in the north. The region is already seeing impacts of the changing climate in its sea ice degradation, the ecology of the boreal forest, changing weather patterns, and its ice-impregnated northern soils. This will influence the thrust of agriculture in coming years. Changes in state and federal policy and regulation will affect appropriations to the university and the economy of the state of Alaska. Current energy dialogue in the state centers on oil and gas despite discussions of alternate energy. Should a successful proposal for a gas line be announced, this will inject jobs and dollars into Alaska and most likely change priorities from an increasing focus on using alternative forms of energy that are regionally produced to, once again, export of a raw resource.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}