

2008 University of Alaska Combined Research and Extension Annual Report of Accomplishments and Results

I. Report Overview

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. The SNRAS, AFES, and CES carry out the land-grant mission for the University of Alaska Fairbanks.

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 public service 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 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 are funded by federal capacity funds. All units 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 FTE's 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 engagement relevant to sustainable management of Alaska's resources and bringing communities' ideas to the university for further development of the state's resources.

In the last three decades of the 20th century, Alaska's economy became 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 and other information sources to meet the needs and interests of Alaskans while providing citizens a way to influence future research and education priorities. CES will be a critical partner for the university as a whole in providing a two-way 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 and vegetables; forages, grains, and manufactured livestock feeds; controlled environment products including 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 cost increase and Alaska population grows, more food will need to be produced locally.

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 state-wide system, federal and state agencies, non-governmental organizations, private industry; and through multi-state 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.

Programs specific to AFES for purposes of this report include Geographic Information, High Latitude Agriculture, High Latitude Soils, Management of Ecosystems, and Natural Resources Use and Allocation.

GEOGRAPHIC INFORMATION

Work in Geographic Information at AFES has concentrated on remotely sensed data. The use of different pre-fire and post-fire remotely sensed data from different dates substantially changed the fire severity estimates, most likely due to changing plant phenology and solar elevation. Therefore the use of Landsat-based fire severity indices to estimate trends in fire severity in either time or across regions requires extensive field data from each burn to calibrate remotely sensed fire severity indices. Our research with cattle has shown us that distribution patterns and activities demonstrated by cattle in Alaska were not significantly different than those patterns and activities shown by cattle in other locations. Cattle displayed actions associated with thermoregulation, ie. seeking shade under trees, even though ambient air temperature was well within the thermoneutral zone delineated by other studies. Alaskan cattle also showed decreased movements during the late night/early morning hours. Our tests with GPS collars on cattle indicate that a GPS unit attached using a collar performs better and is tolerated by the animals better than one attached using a halter. In our reindeer research, we found that the initial GPS collars preformed well but did not fit the animal's neck well. Later models were modified to fit better. Once additional modifications were made, there are now concerns that the collars may be too heavy for animals to wear safely during certain seasons especially late winter when the animal's fat reserves are depleted and the collars weight may unduly handicap them in escaping predators. For this reason, collars will be deployed in late summer/fall on well-nourished female adult animals and removed before late winter arrives. Initial analysis of reindeer data indicates that calculated solar insolation does not correlate closely with measured temperatures at those ecological sites. We are still trying to determine if either data variable is necessary to refine models assessing the suitability of areas for reindeer calving.

HIGH LATITUDE AGRICULTURE

High Latitude Agriculture focused on new crops and new uses for old crops and continued to expand 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 brome grass. Variety trials for tomatoes, potatoes, snap beans, 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. An association of peony growers was formed and currently consists of 35 private growers and 12 businesses. Six rural villages attempted subsistence gardens and produced sufficient output at harvest to distribute food to 30 community elders. Greenhouse, controlled environment, and extended season research identified more than 10 specific varieties for use in commercial production of tomatoes, potatoes, herbs, and beans. AFES researchers have identified new marketable 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. Vegetable, fruit and berries were evaluated in rural villages and road system locations. More than 500 cultivars of ornamentals, vegetables and herbs were grown in trial plots to determine the usefulness in Alaska landscapes. Reindeer calf growth rate was compared when feed different brome grass 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. Based upon project supply and expenditure information, a spreadsheet was

created for small-scale vegetable production to discern suitability for production by rural villages in Alaska (villages without road access). Information from variety trials has been shared with several commercial seed producers looking at Alaska as a potential market. Moosetard, Inc., a gourmet mustard company is working to use information from these trials to develop an all-Alaska product. Grass feed type affected reindeer milk composition and quantity produce and therefore effect calf growth rate.

HIGH LATITUDE SOILS

High Latitude Soils concentrated on forest based soils with particular reference to black-spruce forest with additional work in agricultural soils. Baseline data for soils formed under black spruce forest stands has been collected. This is the first time carbon stock data on a pedon basis from actual field measurements has been done. Construction was completed for all snow-melt exclusion structures and ongoing soil measurements were continued. In addition, data has been collected from three years of fertilizer trials with smooth brome grass and is currently being analyzed. The black-spruce forest team works with USDA-NRCS to compile all soil survey pedon data for Alaska including carbon stores by each map unit with the goal to tie all such data to the USDA-NRCS STATSGO database and compile a carbon map for the entire state. In upland, mid-successional forests drought will have more of an effect on the forest ecosystem and carbon balance than in floodplain, mid-successional forests of interior Alaska.

MANAGEMENT OF ECOSYSTEMS

Researchers in the Management of Ecosystems Planned Program concentrated on development of models related to disturbance in the boreal forest and Alaskan lakes. Models have been created to estimate bark thickness of white spruce in Interior Alaska, to estimate fire severity, creek drainages into an evaporating lake, and a temperature model for climate change in interior Alaska. Information has been made available to the public at <http://www.faculty.uaf.edu/ffj12>; the USFS, state foresters and BLM use the Burn Ratio model to predict fire severity and the climate data temperature model.

NATURAL RESOURCE USE AND ALLOCATION

Work in the Natural Resource Use and Allocation Planned Program ranged from helping peony producers enter national and international markets to critics of state and federal policy on wildlife and land use to helping communities plan their future. 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, 12 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. A 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. The multiple projects concern ways to involve the public in decisions that affect their lives and improve to ability of natural resource policy makers to seek out and facilitate the involvement of all potentially affected stakeholders. These efforts resulted in improved urban/wildlands 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.

Programs specific to CES for the purposes of this report include: Agriculture/Horticulture; Invasive Weeds, Noxious Plants and Pest Management; Youth Development; Sustainable Individuals, Families, and Communities; and, Natural Resource Stewardship.

AGRICULTURE/HORTICULTURE

Agriculture and horticulture outreach includes the areas of 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. Extension supports commercial and consumer stakeholders with classes, newsletters, conferences and publications.

Commercial agriculture and horticulture: A variety of conferences in 2008 provided resources to producers, including the Sustainable Agriculture Conference and Organic Growers School, Alaska Greenhouse and Nursery Conference, Delta Farm Forum, Harvest Wrap Up, Potato and Vegetable Conference and Alaska Livestock Producers 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. Agents also supported producers through phone calls, e-mail and on-site visits. In one case, Extension saved a developer an estimated \$50,000 by advising him to a native Alaska grass that is hardy and could be established on a gravel airstrip. Agent who is knowledgeable about precision agriculture, introduced Alaska farmers to the technology, which is expected to save farmers money on fertilizer costs.

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 148 Master Gardeners in 2008. Home gardeners also attended a variety of composting, seed starting and organic and home gardening classes. An agent taught seed-starting and gardening classes in 12 villages and rural communities. Another agent worked on a grant determining local preferences and crop success for common cold-hardy crops and the viability and winter survivability of certain berry crops in six Interior villages. Through that effort, village residents received garden training and planting supplies and planned community vegetable and berry gardens.

INVASIVE WEEDS, NOXIOUS PLANTS AND PEST MANAGEMENT

The program conducted group and one-on-one educational activities with specific sectors of the pest management industry, the agricultural and horticultural industry 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 97 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. Alaska's

diverse pest management projects include the IPM technician program, the Pesticide Safety Education Program, Western Region IPM and the Western Plants Diagnostics Network.

The IPM program identifies any organism in question and investigates the individual site and situation. Clients are counseled by IPM staff and by agricultural agents. These CES faculty and staff advise green industry professionals, farmers, gardeners and horticulturists about the least toxic pest management practices.

The Alaska Pest Management Program, funded through USDA/CSREES and the Western IPM Center, continues to be the premiere pesticide use resource for Alaska. More than 2,500 visitors used the program's website at www.alaskapestmanagement.com.

Extension provided information to the Alaska Legislature on the need for a statewide management approach and state weed coordinator position. Legislature approved a bill creating the position, which will allow for federal funding of efforts. In November 2007, UAF CES hosted the eighth annual statewide Alaska Noxious and Invasive Plants Management Workshop and Alaska Invasive Species conference, which bring together a variety of partner agencies and citizens.

NATURAL RESOURCE STEWARDSHIP

Natural Resources and Community Development is UAF Extension's newest program area. It 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, program has focused on ways to reduce dependence on petroleum sources. Extension worked with two rural communities to develop biomass projects to heat schools. Extension hosted workshops in Juneau and Sitka about responsible wood burning and continued to develop wood heat website with a wealth of information about locations to harvest wood, efficiency of wood and safety issues.

Youth development: 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.

Resource decision-making: Residents of the lower Kuskokwim River are faced with making decisions regarding a large proposed mine in their area. Extension educated a handful of village elders and leaders about the potential impacts and benefits of large-scale mining by taking them on a tour of two large Interior gold mines and speaking with experts.

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 eight pesticide applicator safety certification trainings in seven Alaska communities. During those trainings, 113 certifications were received.

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, 626 clients applied pesticides and nutrients at the specified rates and were educated in weed identification and soil sampling techniques.

SUSTAINABLE INDIVIDUALS, FAMILIES, AND COMMUNITY

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 shipping costs. Our food preservation program reflects those needs and concerns. Agents taught 65 food preservation and food safety classes in 22 communities, and created the fourth in a 10-part DVD series that focuses on preserving Alaska's foods. Seven online instructional modules with similar information were completed, and Extension ran a food preservation hotline. Seventeen new food products were developed from Alaska grown and gathered foods in the Food Product Development Kitchen. 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 except Nevada. Extension conducts StrongWomen classes in all seven districts and our Soldotna agent has trained 47 new leaders. We also trained 70 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.

Healthy Lifestyle and Human Development: Early childhood development classes are less available in rural areas. Agents also teach early child development and child language and 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, cold climate homebuilding techniques, retrofitting homes and solar energy design. Housing and energy specialist developed a retrofit course and began teaching it around the state in January 2008. Agents also provided energy conservation programs and resources to clients, ranging from maximizing gas mileage to reducing appliance energy consumption. Juneau agent provided resources to Juneau residents after the community power line was interrupted for six weeks and backup electricity more than tripled in price.

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. For instance, 13 youth in the Sitka 4-H Youth First Responders Project have completed their training and are assisting the Sitka Emergency Medical Services staffing stations and emergency and public information booths. Kids who raise and sell market animals learn about showmanship and marketing, and teens who are trained as camp counselors learn leadership skills and management and help run a youth camp. Some kids have started businesses. Altogether, in 2008, more than 13,000 youth

participated in clubs, after-school programs and special activities, including camping and video work.

A few highlights:

- 4-H teens and adults taught ATV safety to youth in Glennallen, Fairbanks and Kenny Lake, and the program is expanding to Bethel
- A community service event in Anchorage led to more than 700 pillowcases being made to donate to a variety of institutions, including foster children and needy families. The event brought together volunteers from diverse groups including residents of a youth center and a shelter for homeless youth
- Youth in the Kenai District learned hunting ethics and safety and field dressed and butchered a moose.
- Youth participating in Speak Out Military Kids have talked to legislators and other youth about how their parents' deployment affected them. Two youth created a DVD highlighting activities at a camp for 140 military kids whose parents had been deployed or would be shortly.