

2016 University of Alaska Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

Alaska is recognized for its immense size, dispersed population and its cultural, geographic and environmental diversity. The state represents a major region of renewable and nonrenewable natural resources in the United States. Its 365 million acres include the nation's largest oil reserves, coal deposits and two largest national forests. The state also contains an array of mineral deposits, including gold, zinc, boron, molybdenum and rare earth minerals. Alaska has a diverse geography that offers soils for production of food, fiber and biomass fuels 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, herring, crab and shrimp that support thriving commercial, sport and subsistence fisheries.

Alaska's natural resources have historically been the foundation of the state's economy, though resource industries have been mostly extractive in nature. 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 use and management of these resources is a predominant force in the planning and delivery of teaching, research, Extension and engagement programs.

Our combined unit has been known as the School of Natural Resources and Extension (SNRE) since July 1, 2014, after the formal merger of the School of Natural Resources and Agricultural Sciences (SNRAS) and the Agricultural and Forestry Experiment Station (AFES) with the Cooperative Extension Service (CES). The programs of AFES and CES play a vital role in linking the knowledge generated at the university to meet the needs and interests of Alaskans. Citizens are provided opportunities through engagement to influence future research and education priorities. SNRE is a critical partner for the university, providing a linkage among researchers, Extension and Alaskans to deliver the latest research findings, educational and outreach opportunities.

Planned programs for purposes of this report include Agriculture and Food Security; Natural Resources and Community Development; Healthy Individuals, Families and Communities; Climate Change and Ecosystem Management; Youth Development; and Sustainable Energy. Climate change, while addressed primarily in one planned program, affects all the program areas.

Alaska imports over 90 percent of foods and other agricultural products. As the population grows and transportation costs increase, more locally and regionally produced food will be needed to provide greater food security. To this end, growers in the agricultural sector produce fresh market potatoes, vegetables and herbs; forages, grains and manufactured livestock feeds; controlled environment products, which include bedding plants, florals, landscape ornamentals, and short season vegetables; and a variety of niche market crops. One such crop, peonies, has been one of our success stories and *Rhodiola rosea* also continues to show potential.

Many Alaskans live a subsistence lifestyle or supplement their diets with local fish

and game meat. Alaska also has a large military population, and most have not previously preserved game meat or fish. Our state has one of the nation's highest rates of botulism, making it imperative to provide much needed information on safe preservation of these staples. Food safety is also a concern for food industry workers, who need required training, and small food business entrepreneurs.

Alaska also has one of the fastest growing senior populations, who face the challenge of remaining active and healthy in a demanding environment. Other concerns that define health and nutrition programming are the high rates of child and adult obesity and diabetes. Indoor air quality is a particular Alaska concern.

High energy costs remain a critical issue, particularly in rural Alaska. Research and outreach have focused on new and alternative sources of energy, wood and biomass and energy conservation.

The mission of SNRE is to provide new information to manage renewable resources and to improve technology for enhancing the economic well-being and quality of life at high latitudes. While foresters, farmers and land managers use our research results, all Alaskans benefit from the wise use of land resources. Our research projects are in response to requests from producers, industries, and state and federal agencies for information in plant, animal and soil sciences; forest sciences; and resources management.

AFES priorities, like national priorities, are to enhance sustainability of food and agricultural systems; adapt to and mitigate the impacts of climate change; support energy security through the development of renewable natural resources; ensure a safe, secure and abundant food supply; improve human health, nutrition and wellness; support environmental stewardship through the development of sustainable management practices; and strengthen individual, family, and community development and resilience. Experiment station scientists publish their research in scientific journals, conference proceedings, books, and in experiment station bulletins, circulars, newsletters, research progress reports and miscellaneous publications. Scientists also disseminate their findings through conferences, public presentations, workshops and other public information programs like websites and blogs.

Administratively, AFES is an integral part of SNRE. This association provides direct links between research, teaching and outreach. Scientists who conduct research at the experiment station also teach, sharing their expertise with undergraduate and graduate students, adult learners and Extension faculty and staff.

Cooperative Extension's mission is to educate, engage and support the people and communities of Alaska, connecting them with their university. Extension provides factual and practical information while bringing Alaskans' issues and challenges to the university. CES is committed to promoting the sustainability and economic security of individuals, families and communities by providing practical, non-formal education, including conferences, workshops and cooperative work with community, regional and tribal partners. Outreach is also provided through publications, consultations, newsletters and social media outreach dedicated to district information and locally useful subject matter. CES programs address national priorities by helping families, youth and individuals be physically, mentally and emotionally healthy; enhancing workforce preparation and life skills; strengthening the profitability of animal and plant production systems; protecting our rich natural resources and environment; ensuring an abundant and safe food supply through horticulture and food preservation education; preparing for and responding to natural disasters; and fostering greater energy independence.

Programming respects cultural and ethnic diversity and is responsive to emerging stakeholder needs and interests. Programs result from client requests, an active state advisory council, various regional and subject matter advisory groups, surveys and needs assessments. Our national partnership with eXtension has also helped with reaching stakeholders.

Agents answer stakeholder questions through eXtension Ask an Expert, participate in communities of practice, and incorporate eXtension resources into their programming. The eXtension provision of Qualtrics access has been critical in maintaining our evaluation efforts.

The merger has allowed SNRE to provide more unified support for agriculture, horticulture, forestry, and rural and economic development. Collaborations with other universities and with other units within the University of Alaska Fairbanks, the University of Alaska statewide system, federal and state agencies, nongovernmental organizations and private industry continue. Stakeholders include K-12 students, higher education students, researchers, individuals, businesses, industry, government, nongovernmental organizations, and families and communities throughout Alaska, the circumpolar North and the nation. SNRE brings the university to Alaskans while bringing community concerns and issues back to the university.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	45.0	0.0	16.5	0.0
Actual	57.6	0.0	20.7	0.0

II. Merit Review Process

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

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

2. Brief Explanation

The Agricultural and Forestry Experiment Station (AFES) uses the scientific peer review process to review and evaluate proposals, publications and specific annual reports that include the annual narratives that are required to report activities related to the POW. Extension uses the merit review process and the general review process for this joint annual report and Plan of Work. 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.

All new and revised Hatch (and McIntire-Stennis) project proposals undergo scientific peer review. The blind peer review panel is composed of a minimum of three members and consists of competent authorities in the discipline of the proposal/publication/annual report or related disciplines. 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 author(s) for revision if needed. The director reviews all comments and recommendations from the reviewers, along with the revised proposal/publication/report. Scientific peer review of multistate research projects are carried out for individual projects under the aegis of the Multistate Review Committee (MRC- formerly RCIC). The director of research is a member of the MRC. All faculty 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 multistate project.

SNRE has an evaluation specialist who helps design outcome and impact evaluations, working with faculty to evaluate individual programs. In FY16, outreach faculty were again required to include hours dedicated to evaluation in their workloads. Many workshops and all conferences are evaluated.

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 non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public
- Other (SNRE Website, Newsletter & Blog, CES Facebook and Twitter)

Brief explanation.

AFES's Advisory Council has nine members drawn from agriculture, natural resources, forestry, mine engineering and economic development. SNRE interacts with regional audiences around the state in both formal and informal settings each year. Examples of these include:

- Regional and Statewide Farm Bureaus
- Delta Farm Forum
- Alaska Produce and Greenhouse Growers
- Kawerak Native Association
- Reindeer Owners and Breeders Association
- Alaska Livestock Producers
- Alaska Peony Growers Association
- Alaska Food Policy Council
- On-demand meetings at the request of stakeholders
- Delta Harvest Wrap-Up

Since much of Alaska land is under federal and state agency control, natural resource stakeholders include government land managers. Federal stakeholders for SNRE include:

- National Park Service
- USDA/NRCS, ARS, Forest Service
- Bureau of Land Management
- Bureau of Indian Affairs
- U.S. Fish and Wildlife
- U.S. Geological Survey

State stakeholders include:

- Fairbanks North Star Borough
- Matanuska-Susitna Borough
- North Slope Borough
- Fairbanks Economic Development Corporation

- Department of Natural Resources
- Division of Agriculture
- Division of Forestry
- Department of Environmental Conservation
- School districts around the state
- AHTNA Native Corporation
- Afognak Native Corporation
- Chena Hot Springs Resort
- Pike's Waterfront Hotel and Greenhouse
- Diversified Livestock Association
- Alaska Food Policy Council
- Tanana Valley Farmers Market
- Alaska Natural Fiber Business Association

Extension sponsors agricultural and horticultural conferences and outreach activities. Formal and informal stakeholder input is gathered there. Stakeholders are also invited to serve on various conference planning committees. Outreach events in FY16 included the Delta Farm Forum, Alaska Sustainable Agriculture Conference, the Alaska Invasive Species Conference and the Harvest Wrap-Up.

Extension has a 13-seat Statewide Advisory Council, which provides guidance about programming across the state. Representatives are drawn from all regions of the state. The State Advisory Council meets face to face once a year as well as through four audio conferences. Local advisory committees provide community input related to local program needs and interests. Additionally, advisory councils provide guidance on mining and 4-H programming.

Extension faculty members gather stakeholder input as part of their program planning and development process as well as surveys following instructional activities. 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. 4-H has programmatic audios with stakeholders that generate suggestions. Forestry, sustainable agriculture, 4-H, home economics, and Master Gardener newsletters, and the backyard chickens, Master Gardener, and energy blogs also provide outlets for stakeholders. CES further invites stakeholder participation through social media via a statewide and two district Twitter feeds, an overall Facebook page and 15 district, 4-H and subject matter Facebook pages.

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.

Stakeholders include individuals and groups who would logically benefit from Extension's services. Other stakeholders are partner agencies organizations and related stakeholder organizations. Examples include the Farm Bureau, Grange and Farmers Union, as well as Master Gardener associations and food banks. Additional stakeholder groups are Alaska Native tribal organizations,

school districts and village governments who request services to help build community educational and development capacity. A number of stakeholders identify themselves by calling or e-mailing Extension faculty or staff. Individuals and groups have been identified through advisory committees, working with agencies that have similar missions, and work with community, religious and workforce groups and other units of the university. Subject area advisory groups, the 4-H leaders' organization and the State CES Advisory Council provide stakeholder input.

AFES stakeholders are research collaborators, partners in federal or state agencies who approach us with funding or needs, the public who often call and solicit assistance, graduate and undergraduate students, public schools that connect through reindeer programs or the OneTree program, K-12 teachers, and agriculturalists, forest land owners, entrepreneurs and other end user groups.

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

Brief explanation.

SNRE relies on stakeholder input from advisory groups, collaborators, federal and state agencies, colleagues, faculty, students and other appropriate constituencies for assistance in establishing priorities and developing program direction. Current major stakeholders include the Fairbanks North Star Borough, Matanuska-Susitna Borough, Reindeer Herders Association, Northern Forest Cooperative, Peony Growers Association, Fairbanks Economic Development Corporation, and industries involved in food, fiber and fuel/energy production. Feedback from the Georgeson Botanical Garden Society, local community supported agriculture groups, local restaurants and resorts provide research direction.

Other significant stakeholder groups include state and federal and private organizations that have professional and programmatic relationships or direct interest in the unit's programming. Some of Extension's major stakeholder organizations include but are not limited to the Farm Bureau, Grange, Alaska Energy Authority, greenhouse growers, food banks, Boys and Girls Clubs, school districts and research units of the university. Additional stakeholder groups are Alaska Native tribal organizations, school districts and village governments that request services to help build community, educational and development capacity. Input is collected from workshop participants through surveys following conferences, classes and workshops, either immediately through paper and/or guided discussion, or as follow-ups by electronic or mail-in surveys. Input is also collected individually by agents, through needs assessments and through programmatic advisory groups and memberships on relevant partner committees.

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.

SNRE joint research and outreach planned programs are directly related to the strategic plans produced by faculty as well as the direction set by administrative leadership. The AFES plan reflects ideas and advice given by client user groups, students, expert advisors, state and national peers and cooperators, and UAF administration. During the FY16 reporting period, the focus areas of sustainable energy, local and regional food production and food safety, and the need for adult and youth education and training to fill Alaska job and career demands were addressed. These focus areas were used to set priorities in meeting the need for knowledge about Alaska and circumpolar resources. Input was considered in the budget process. Capacity funds were used in response to research needs based on the emerging focus areas.

An updated SNRE strategic plan is in development with input planned from stakeholders, advisory councils and the public. It builds on the past focus areas of food safety and security, health, climate, energy, youth, families and communities, and economic development by adding emphasis on strengthening SNRE's relevancy, capacity and collaboration in those areas. Agents' work reflects the strategic plan. Stakeholder needs will continue to be a driving factor in determining Extension priorities and programming. Agents use stakeholder input to identify programming needs and work to offer programs and information that meet those needs. Stakeholder input in FY16 continues to support the need for youth outreach in rural Alaska, health and nutrition programming, pest management and programs on biomass and responsible wood burning. Interest in locally raised agricultural animals and food production continues to be high. Stakeholder involvement on conference planning committees and input at conferences led to specific topics and speakers at subsequent conferences.

Brief Explanation of what you learned from your Stakeholders

Alaskans continue to desire information necessary to make decisions related to a healthy lifestyle and a healthy economy. Food security, energy, climate change, obesity, chronic health issues and youth development have risen to the forefront as areas of particular importance and are therefore leading to development of research and Extension programming, particularly in subsistence, small farm agriculture and energy. Interest continues for research on animal reproduction and quality meat production techniques. There is also strong interest in culturally relevant programming, local food production, health and nutrition programming, family finance, budgeting and estate planning, and programs that focus on reducing violence and reducing energy consumption.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1193757	0	1262554	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1161721	0	1141084	0
Actual Matching	1270869	0	1228138	0
Actual All Other	5971739	0	767889	0
Total Actual Expended	8404329	0	3137111	0

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

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Agriculture and Food Security
2	Natural Resources and Community Development
3	Healthy Individuals, Families and Communities
4	Climate Change and Ecosystem Management
5	Youth Development
6	Sustainable Energy

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Agriculture and Food Security

Reporting on this Program

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	10%		20%	
205	Plant Management Systems	25%		22%	
212	Diseases and Nematodes Affecting Plants	0%		3%	
213	Weeds Affecting Plants	15%		0%	
216	Integrated Pest Management Systems	28%		0%	
301	Reproductive Performance of Animals	5%		10%	
302	Nutrient Utilization in Animals	5%		10%	
305	Animal Physiological Processes	2%		10%	
401	Structures, Facilities, and General Purpose Farm Supplies	5%		5%	
405	Drainage and Irrigation Systems and Facilities	0%		5%	
601	Economics of Agricultural Production and Farm Management	5%		0%	
903	Communication, Education, and Information Delivery	0%		15%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	8.0	0.0	11.0	0.0
Actual Paid	8.6	0.0	9.0	0.0
Actual Volunteer	0.0	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
418220	0	950855	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
457513	0	507629	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2149826	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research and outreach continued to assure that best management practices appropriate to Alaska are provided to target audiences. Growing trials provided new directions on the resilience and adaptability of crops as changes in the subarctic and arctic climate occur. Research and Extension programs continued to be revitalized to remain relevant to regional and local agricultural production. Group and one-on-one educational activities with specific sectors of the pest management industry, the agricultural community and the horticultural industry provided individuals and businesses with important information. Increased reliance on the Internet and technology enhanced communication with more people, as faculty and staff utilized distance education platforms. Increasing and maintaining partnerships was an important strategy in keeping pest species below threshold levels. Outreach included conferences, workshops, forums, tours and consultations with stakeholders.

2. Brief description of the target audience

The target audiences included producers and consumers, communities, entrepreneurs, agribusinesses, industry leaders, individuals and groups concerned about the quality of the Alaska environment, public resource agencies, public and private resource managers, other faculty and researchers, and undergraduate and graduate students. Others consulted included arborists, farmers, garden and plant associations, public and commercial greenhouses, homeowner associations, landscapers, state and federal park employees, gardeners, museums, military base personnel, boroughs and urban municipalities, pest control operators, property managers, public health organizations, public and private schools, recreational facilities, resorts and hotels, rural residents, youth groups and school districts. Advisors and the target audience included the Alaska Farm Bureau, USDA Natural Resource Conservation Service, the USDA Forest Service, the Alaska Department of Natural Resources, borough governments and Alaska Native corporations.

3. How was eXtension used?

Increased use of eXtension resources in FY16 has been very valuable to Extension outreach in Alaska. In FY16, five agriculture faculty and staff answered a total of 86 questions submitted through eXtension's Ask an Expert interface. Eighty-eight percent of the questions were asked by Alaskans. Question topics ranged from lawn care, tree and pest IDs to hydroponics, agribusiness and cattle vaccination. A member of the communications unit now serves as a question wrangler for the state to assist in assigning the inquiries. Agent and educator memberships in communities of practice included Citizen Science, Invasive Species, Farm Bill Education Learning Network, Community, Local and Regional Food Systems, and Extension Master Gardener Coordinators. Agents have used eXtension-provided Qualtrics access for needs assessments and documenting changes in knowledge and behavior. The Extension veterinarian was a

2016 i-Three Issue Corps member. A tribes Extension educator is an Innovation Partner developing a mobile app for citizen scientists to contribute to crop variety research.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	14373	208324	2059	10964

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

Patent Applications Submitted

Year: 2016
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	5	5

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Output 1: Faculty will provide agricultural and horticultural workshops, short courses, classes, field days and conferences, including IPM.

Year	Actual
2016	126

Output #2

Output Measure

- Output 2: Faculty will provide agricultural, horticultural and pest management information through one-on-one consultations and consultations with other organizations. Output measure will be contact hours.

Year	Actual
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2016 4821

Output #3

Output Measure

- Output 3. Horticultural crop research will concentrate on home and commercial varieties appropriate to Alaska. Publications and presentations are the output measures.

Year	Actual
2016	23

Output #4

Output Measure

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

Year	Actual
2016	6

Output #5

Output Measure

- Output 5. Focus will be on best management practices for livestock management and production. Output measures will be publications and presentations.

Year	Actual
2016	25

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcome 1: Increase agronomic crop producers' ability to understand and assess best management practices of crop production. Measure will be number of producers who adopt practices.
2	Outcome 2: Increase livestock producers' ability to understand and assess optimum production practices. Measure will be number of producers.
3	Outcome 3: Increase participants' commercial and home horticulture best management practices. Measure will be number of individuals who adopt better management practices.
4	Outcome 4: Increase the number of adopters of new technology and management practices.
5	Outcome 5: Increase the number of activities that monitor and control invasive species and pests. Measure will be the number of outreach activities and publications.
6	Outcome 6: Increase reindeer producers' ability to understand and assess optimum production practices. Measure will be number of producers.
7	Outcome 7: Increase the number of youth appreciating agriculture and considering agricultural careers. Measure is number of youth contacts.
8	Outcome 8: Provide support for emerging agricultural industries. Measure will be number of presentations and consultations.

Outcome #1

1. Outcome Measures

Outcome 1: Increase agronomic crop producers' ability to understand and assess best management practices of crop production. Measure will be number of producers who adopt practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	20

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Alaska, with 6,640 miles of coastline, is already seeing changes in its landscape due to variations in water and soil temperatures. Climate change is an important issue to growers because of the impact of climate on agricultural performance. Planning for crop and animal management is highly influenced by climate predictions. Research and outreach is needed regarding adaptability during climate variability. Strengthening our ability to observe, report, and promote climate adaptation options is key to supporting continued crop and livestock production in Alaska.

What has been done

In 2016, barley, oats, wheat and oilseeds were grown and evaluated at both the Matanuska Experiment Farm and Fairbanks Experiment Farm. In addition, in cooperation with Washington State University Mount Vernon Research and Extension, globally collected wheat lines were compared to six standard Alaska varieties at the Fairbanks Experiment Farm. Climate data for both sites was collected during the growing season as well as comparisons of crop yields.

Results

Warmer temperatures than the long-term average were observed at both farms, and more precipitation than the long-term average was observed in Fairbanks. This resulted in more Growing Degree Days (GDD) available for the crops. However, a majority of the 73 wheat lines could not reach maturity. The 17 wheat lines that did reach maturity had yields similar to the standard variety. Researchers tracked which breeding selections fared best, as well as crop responses to dryland farming and harvest methods. In sum, researchers were able to observe GDD limitations for varieties in Alaska and identify better-adapted crop varieties. Results were disseminated to 20 adults at an annual Harvest Wrap-Up meeting in the fall. The climate and variety tracking can provide a comparison point for local producers to assess the economic

viability of the recommended crops. Future work is planned to use the results to run crop model simulations.

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
405	Drainage and Irrigation Systems and Facilities

Outcome #2

1. Outcome Measures

Outcome 2: Increase livestock producers' ability to understand and assess optimum production practices. Measure will be number of producers.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	235

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many Alaskans do not live near easily accessible services. Those involved in farming and ranching have a need for information on how to best monitor the health of their flock and herd so that they can identify problems early, where there will be time for navigating the logistics of getting veterinarian and other expert help in more remote areas. There are also concerns over food security and high costs of living. Livestock raised in Alaska also provides food products for both home and commercial use. There is continued interest in raising chickens for backyard flocks as a source of both meat and eggs.

What has been done

In the second year of a pest scouting and mapping project, 13 livestock farms received an on-site visit from a trained IPM scout. The program Chicken University was held four times in two different locations and was successful in educating 150 adults and two youth about protecting

chickens from frostbite. An animal health workshop in Soldotna reached 27 adults and 20 youth. The Extension veterinarian presented to 23 people on issues regarding small ruminants and camelids.

Results

The scouts oversaw the inspection of 549 cattle, sheep and goats for signs of parasitism and helped with fecal sampling of about 10% of each farm's herd, and trained producers to perform a "5-point check" to score body conditioning and monitor for the presence of gastrointestinal parasites. Producers reported high agreement on measures of feeling prepared to do checks on their own and intent to adopt the practices. Qualitative fecal analysis was performed on 59 composite samples from the farms as well, and results were reported back to the producer. Educational information was provided regarding strategic deworming strategies and legal use of anthelmintics. Before the Chicken University, approximately a third of small flock owners in the Mat-Su Valley area had cases of chickens losing toes to frostbite. Now in its seventh year, the program has helped reduce such loss in the area to a rarity.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
401	Structures, Facilities, and General Purpose Farm Supplies

Outcome #3

1. Outcome Measures

Outcome 3: Increase participants' commercial and home horticulture best management practices. Measure will be number of individuals who adopt better management practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	858

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Horticulture is the largest agricultural industry in Alaska amounting to more than 50 percent of cash receipts for all agricultural crops. Alaska imports most of its food and costs are high, particularly in rural areas. Dependence on imports poses a food security risk if supply lines are interrupted. Teaching more residents how to garden or grow horticultural crops increases the quality of food available to consumers and can lower the risk of food insecurity.

What has been done

Extension agents trained 146 Master Gardeners in Anchorage, Big Lake, Fairbanks, Juneau and online. The Kenai agent held a hay producer's workshop for 35 participants, and distance delivered an agricultural training program series to five Kodiak villages with 14 attendees. The Alaska Growers School for Alaska Native-owned farms and ranches was taught to 17 students through distance education. Introductory classes on gardening and soils were offered by multiple agents in Big Lake, Sutton, Palmer, and Soldotna reaching 210 people. Four classes on managing weeds and invasive species reached 80 people. Pesticide Safety education courses were completed by 114 people statewide. Seven classes on soil fertility, testing, and results interpretation reached 242 participants.

Results

Master Gardeners contribute greatly to community capacity; they agree to 40 hours of service in their communities, and some of them have continued volunteering for 20 years or more. Thirteen of 16 respondents to an Advanced Master Gardener entomology course agreed the course helped make them more aware of insects in their environment and five developed and used IPM plans. Fifty-one respondents at the Master Gardener conference rated their overall impression of the conference as 4.7 on a five-point scale. Post-workshop surveys in Kenai indicated overall increases in participant ability to understand and/or follow best management practices. All participants in the Alaska Growers School rated their knowledge as moderate or considerable and the majority of 11 respondents indicated an intention to start, continue, or increase using the skills they learned. Five participants stated an intention within a year to write a business plan or start a farm or ranch in Alaska.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
212	Diseases 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
601	Economics of Agricultural Production and Farm Management
903	Communication, Education, and Information Delivery

Outcome #4

1. Outcome Measures

Outcome 4: Increase the number of adopters of new technology and management practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	2989

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

New technologies help everyone in the agriculture field stay up-to-date through information sharing, diagnostics, and other improvements and efficiencies related to growing and managing crops. Alaskans need more opportunities for reporting and identifying invasive plants or pests in real-time, sharing observations from experienced growers, and watching demonstrations of best practices for managing animal and plant production. Increased exposure to new technology and practices raises the possibility Alaskans will adopt such tools.

What has been done

A researcher also made presentations at a renewable energy fair on LED lighting for greenhouses and light quality impacts on transplants. The Extension invasive plants instructor worked with the University of Georgia in FY15 to develop the Alaska Weeds Identification application, which continued to be offered for both iPhone and Android devices in FY16. The tribes extension educator did development work in FY16 on an application to allow a citizen science approach to tracking the success of agricultural varieties in Alaska gardens. The tribes educator also published a guide on growing garlic in Alaska, supplemented by a YouTube video demonstration and explanatory web page.

Results

The horticulture researcher maintained a partnership with a local greenhouse that has helped managers identify appropriate crops, production techniques and scheduling. A partnership with a local lodge has provided opportunities for students to receive hands-on training and summer jobs. Sixty people attended the presentations on lighting. The YouTube video on garlic has received 434 views. The garlic web page had over 1400 unique views, with the publication downloaded by 259 people. The grower app was piloted with 30 people. The invasive plants instructor consulted with about 125 people through presenting a plan to increase usage of the application's reporting

function at the Alaska Invasive Species Conference, and working with relevant state and federal agencies to get buy-in of statewide field staff regarding the application's utility for invasive plants inventory. The weed identification application had 681 new downloads in FY16.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
305	Animal Physiological Processes
401	Structures, Facilities, and General Purpose Farm Supplies
405	Drainage and Irrigation Systems and Facilities
903	Communication, Education, and Information Delivery

Outcome #5

1. Outcome Measures

Outcome 5: Increase the number of activities that monitor and control invasive species and pests. Measure will be the number of outreach activities and publications.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	82

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Alaska hosts thousands of visitors every year. The state also imports most of its food and many horticultural products, so it remains vulnerable to imported pests. 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

Integrated pest management (IPM) staff conducted 30 workshops and 30 presentations and worked with producers, agencies and individuals to identify or diagnose insect, plant and disease specimens. Other SNRE personnel conducted 11 workshops and presented 7 times on topics including pesticides, herbicides and weeds, and an invasive species conference was hosted in Fairbanks. Extension provided training through the pesticide safety education program (PSEP) to 114 individuals.

Results

Seasonal IPM technicians and permanent staff, with support from faculty, provided community education and technical assistance in five district offices across Alaska. The IPM program answered over 900 requests for plant and insect identification and maintained and reporting web portal where the public submitted digital photos. A new outreach publication on the control of orange hawkweed was made available for download online in May 2016 and provides color photos for identification and research-based management strategies.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Outcome 6: Increase reindeer producers' ability to understand and assess optimum production practices. Measure will be number of producers.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	59

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Livestock raised in Alaska provides food products for both home and commercial use. Educating livestock producers facilitates the development of sustainable, high-latitude livestock production. Alaska only produces 5% of its red meat food supply, leaving residents vulnerable to high prices,

shortages, and product demands in other markets. Some villages in Alaska have seen their subsistence harvests decline, and are looking for more reliable ways to feed their communities. Domestic reindeer (*Rangifer Tarandus tarandus*) are very well adapted to cold climate and have the potential to become a commercial red meat source for Alaskans.

What has been done

Research continues on best management practices of reindeer herds, including feed ration development, herd health management and meat production. Collaborations continue with the Kawerak Reindeer Herders Association, the Reindeer Breeders and Owners Association, and others that reached at least 50 producers. The manager of the reindeer research program spent over 20 hours consulting three members of Alaska's Department of Environmental Conservation on reindeer health and the slaughtering process. In May 2016, the Reindeer Research Program offered an intensive animal husbandry course to six residents of Stevens Village, whose tribal council is considering adding reindeer to their existing buffalo farm because they see a higher demand for reindeer meat than buffalo meat in their area. Attendees were given the opportunity to observe herding, weighing and hoof trimming on site.

Results

Reindeer meat continues to be sought for use in restaurants and grocery stores, and SNRE expertise has been key to its safe supply. There are roughly 3,000 reindeer on St. Lawrence island and about 500 on St. Paul island. The reindeer research program is working with tribal entities on the islands to increase their skills to hygienically field slaughter and process meats into steaks and other cuts that can be sold through the local store. With this help the tribes are applying for state certification for processing operations. The program manager says wholesalers buy reindeer meat for \$5 a pound and sell it retail for triple the price. It will benefit local economies to have the retail processing done in rural villages. In Stevens Village, the attendees increased their knowledge of reindeer feed and nutrition, first aid, tagging, calving, halter training, handling, record keeping, and meat production. This will allow them to make a more informed decision about adding to their farm.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
305	Animal Physiological Processes
401	Structures, Facilities, and General Purpose Farm Supplies
601	Economics of Agricultural Production and Farm Management

Outcome #7

1. Outcome Measures

Outcome 7: Increase the number of youth appreciating agriculture and considering agricultural careers. Measure is number of youth contacts.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	1812

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A graying population combined with increases in new technologies make outreach to younger generations critical to maintaining agricultural infrastructure. Farmers on average are over a decade older than other work groups in America. We need ongoing engagement with young people to inspire the next generation of growers, stewards and scientists. SNRE is in a position to reach out to youth of all age ranges to communicate the value of agricultural careers.

What has been done

An Alaska Agriculture Appreciation Day was held at the experiment farm with several activities that gave around 600 youth an opportunity to interact with plants and animals. SNRE faculty and staff speak at events like high school meetings and camps about opportunities in agriculture, and promote education about agriculture through farm tours, state fairs and other public venues. The Extension veterinarian assisted the FFA program and wrote two chapters for the American Youth Horse Council's manual. A researcher presented on careers in agriculture to a group of 14 on campus. A reindeer research professional gave presentations, tours and virtual tours to over 270 youth.

Results

SNRE not only shared knowledge that raise awareness of agriculture, it also provided research-based information that was put into practice. The Extension veterinarian developed a comprehensive FFA/4-H study guide that was used for the veterinary medicine contest. SNRE facilitated livestock auctions at local fairs. Many youth attending the agriculture appreciation activities got hands-on experience harvesting potatoes, beets and broccoli. Tours of farms allowed campers, conference attendees, and high school students to see operations firsthand, which increased engagement. Through 4-H, six youth participated in Agriculture in the Classroom activities. There were also 912 animal projects that allowed youth to gain firsthand knowledge and experience of raising livestock in Alaska. Several school gardens continue to thrive with support from SNRE faculty and staff or trained volunteers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
903	Communication, Education, and Information Delivery

Outcome #8

1. Outcome Measures

Outcome 8: Provide support for emerging agricultural industries. Measure will be number of presentations and consultations.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	189

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Commercial and home growers face many production challenges including a short growing season, cold soils and limited soil fertility. Some crops also need several years of growth before they become harvestable. Rhodiola rosea and peonies are two such crops. Rhodiola rosea, harvested for the compound rosavin found in its roots, is a viable high value crop for Alaska, with dried roots selling for \$25/pound. Peonies also continue to be in demand from Alaska growers. It is important that growers receive support for the longevity of these newer industries.

What has been done

Extension provided ongoing support to rhodiola growers and peony growers. There were 130 hours of estimated consultations with members of Alaska Rhodiola Products and 89.5 hours of consultation with the Alaska Peony Growers Association, peony farmers and other interested members of the public. Integrated Pest Management (IPM) technicians visited farms to provide pest identification and recommendations. Seven presentations included advice on varieties and nutrient management. Peony growers participated in events like the state Master Gardener Conference.

Results

Peony growers continued to have successful harvests, selling flowers at local farmers markets and shipping orders to wholesalers in the Lower 48. The Fairbanks area 4-H agent presented to a national audience regarding a peony root sale that raised funds for youth programming, and a researcher presented at the annual Alaska Peony Growers Conference. There are about 100 peony farms in Alaska. Rhodiola has proven to be hardy in Alaska but may take up to a decade to prove profitable. Extension estimates that rhodiola is growing on about 25 to 30 acres of land from up in Nome down to the Mat-Su Valley and the Kenai Peninsula. A Delta Junction farmer planted 2,600 plants in 2009 for a first harvest in 2014. Another farmer has 50,000 plants over

five acres on Anchor Point.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
212	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management

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 has been severely impacted by the falling price of crude oil. The state provides a significant portion of the university's funds, and the university has experienced several consecutive years of reductions. Almost half of SNRE funding comes from the state. The overall university budget gap of \$20 million in FY16 dramatically affected programs. SNRE, in particular, has faced difficulties with the combination of budget cuts and fixed cost increases. The merger between AFES and CES and the addition of an agriculture agent in Soldotna have helped maintain research and service, but both units have heavy workloads as we try to keep our productivity high in challenging times.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Post-event surveys for the annual Sustainable Agriculture Conference showed overall satisfaction with the sessions offered. Of 29 returning attendees responding, 24 said they have made changes to their practices as a result of the conferences, including their gardening and water collection practices, weed management approaches, cover cropping practices, and more proactive use of fertilization. Sixteen of 17 returning agricultural educators said they had shared information from a past conference with others. Over 89% rated the speakers as good or excellent. Eight-one percent said they would attend a future conference, with the other 19% saying it depended on factors like content, location and funding. Feedback was gathered on desired topics, speakers and scheduling will be used to

improve future conferences. Comments mentioned a desire for discussion of more innovative technologies and techniques. Many respondents were interested in the emerging fiber industry.

A post-course survey for the Alaska Growers School indicated a noticeable shift in participant knowledge. Respondents rated their understanding before and after of items like how to develop a business plan, how to evaluate start-up risk, what assistance programs are available to help socially disadvantaged farmers, and how to determine eligibility and navigate regulations. The majority of ratings of "before" knowledge were at "non-existent" and "minimal" for all eight questions, while the "after" ratings showed a shift to a majority of the ratings being in the "moderate" and "considerable" column. In fact, five out of eight items had no ratings left in the "non-existent" or "minimal" columns after the school. For example, when retrospectively rating their knowledge before the program on a four-point scale, seven of 10 respondents indicated their ability to manage production risks associated with vegetables, fruits etc. was "non-existent." After the program, all the respondents rated their knowledge as either "moderate" or "considerable." The majority of 11 respondents also indicated an intention to start, continue, or increase skill use. This included five participants who intend, within a year, to write a whole farm business plan, incorporate risk management into it, and/or start a farm or ranch in Alaska.

The Kenai agent collected feedback from participants in five soil and vegetation workshops taking place between Homer and Soldotna. The delivery equipment was unchanged across locations, but instruction happened either in-person or via distance. Post-workshop surveys rated the quality of the presentations and information learned. Although both methods were found to be effective, there was a statistically significant difference ($p < .001$) on all five rated factors such that in-person workshops received higher ratings. Thirteen miles was the average round-trip distance that participants traveled to attend; clients who have to travel farther may show different preferences. The agent plans to make improvements to audio and video technology to see if ratings become more similar across delivery methods.

Key Items of Evaluation

Conferences continue to provide high value, with the majority of returning attendees indicating a change in practices since the last conference due to information or skills gained.

A post-course survey for the Alaska Growers School indicated a noticeable shift in participant knowledge, and the majority of participants indicated intent to use the information to write business plans or start farms or ranches.

Agents continue to evaluate new technology use to best meet client needs. Stakeholders are, on average, satisfied with distance education but tended to rate in-person delivery higher when asked about preferences.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Natural Resources and Community Development

Reporting on this Program

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	5%		0%	
112	Watershed Protection and Management	10%		0%	
122	Management and Control of Forest and Range Fires	30%		50%	
123	Management and Sustainability of Forest Resources	10%		0%	
131	Alternative Uses of Land	10%		0%	
134	Outdoor Recreation	0%		30%	
605	Natural Resource and Environmental Economics	5%		0%	
608	Community Resource Planning and Development	30%		0%	
610	Domestic Policy Analysis	0%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	3.0	0.0
Actual Paid	2.2	0.0	0.6	0.0
Actual Volunteer	0.0	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
104555	0	15440	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
114378	0	482046	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
537457	0	748782	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 involving market and nonmarket value of resources, and land planning issues in urban and rural communities. Measurable outcomes were peer-reviewed publications, educational opportunities and citizen participation.

Partnerships were developed and maintained that addressed emerging natural resources issues. Multi-institution and interdisciplinary collaboration continued in research, education and outreach. Integrated and multistate projects concerning natural resources stewardship provided collaboration and engagement with other land-grant institutions, extension and federal partners. Activities also involved partners from other UAF units to assure engagement that continued to make the information provided to stakeholders relevant to their needs, especially Alaskans most directly impacted by natural resource matters.

Activities included reviews of contemporary research relevant to the program; lay publications that provided unbiased, scientific information about natural resource issues; website development for natural resources issues; Extension workshops, demonstrations and basic skill trainings; public meetings and discussions; and 4-H and FFA projects that can help prepare youth for work in natural resource related fields.

2. Brief description of the target audience

This program focused on industry professionals, entrepreneurs, communities, families, cooperatives and businesses, and both nonprofit and for-profit development corporations. Efforts were made to address problems of the traditionally underserved rural populations within the limit of resources available. Stakeholders were 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, persons in natural resource-related occupations who wish to increase their skills and/or knowledge levels, and federal and state agencies.

3. How was eXtension used?

Increased use of eXtension resources in FY16 has been valuable to Extension outreach in Alaska. Several Extension employees maintained memberships in natural resources and community development-related Communities of Practice (CoPs). Program assistants were members of eXtension CoPs for Cooperatives, Drinking Water and Human Health, and Forest Health and Stewardship. A program assistant and another agent were members of the CoP for Entrepreneurs and their Communities. Qualtrics training provided by eXtension helped the evaluation specialist assist with a multi-state land management survey project.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4829	31920	1149	1680

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

Patent Applications Submitted

Year: 2016
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	4	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2016	80

Output #2

Output Measure

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

Year	Actual
2016	64

Output #3

Output Measure

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

Year	Actual
2016	4

Output #4

Output Measure

- Output 4: Conduct needs assessments of natural resource management stakeholders.

Year	Actual
2016	5

Output #5

Output Measure

- Output 5. Develop regional economic models for Alaska resource management scenarios. Output will be models, presentations and publications.
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Output 6. Develop and implement public involvement in natural resource issues. Output measure will be public input sessions and publications.

Year	Actual
2016	10

Output #7

Output Measure

- Output 7. Provide analysis of natural resource and environmental laws. Output measure will be presentations, workshops and publications.
Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcome 1: Increase and maintain partnerships with stakeholder groups, government agencies and other institutions that will enhance the land-grant mission. Measure will be number of partnerships.
2	Outcome 2: Increase and maintain the number of integrated and multistate research-Extension activities. Measure will be number of activities.
3	Outcome 3: Increase the recruitment and retention of youth and college-age students appreciating and considering natural resource management careers. Measure will be number of graduate and undergraduate students enrolled and number of youth participating in natural resource management activities.
4	Outcome 4. Increase public involvement in natural resource and community development issues. Outcome measure will be the number of participants.

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	80

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Of the 375 million acres of land in Alaska, 44 million are Native lands, about 100 million acres are state lands and 218 million are federally managed. AFES provides research that meets the needs of the private, state and federal stakeholders and with Extension assures that stakeholders are engaged with UAF in the application of research. Extension promotes economic development and meets other community and rural needs. Partnerships are critical to ensuring this happens. There is a mutual benefit when partners assist SNRE with research and outreach efforts.

What has been done

Key partnerships included the Alaska Energy Authority, the U.S. Forest Service, Alaska Department of Fish and Game, National Park Service and the Cold Climate Housing Research Center. The Division of Forestry supports CES forest stewardship outreach and coordination of Project Learning Tree program. Community development is augmented by Extension partnerships with the Alaska Department of Commerce, Community and Economic Development, the Fairbanks Chamber of Commerce, the Alaska Geotourism Collaboration, the Alaska Municipal League, the Small Business Development Center, and the Western Rural Development Center.

Results

An Extension agent coordinated the Alaska Wood Energy Task Group and surveyed members on the effectiveness of the group and its processes to improve future collaborations. The economic development specialist supervised a VISTA program serving groups like the Interior Gas Utility, and partnered with the UAF Community and Technical College and Delta Career Advancement Center to host a series of eight small business workshops. The economist co-chaired the International Green Energy Conference and co-authored reports on sustainability for the North Slope Borough.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
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 2: Increase and maintain the number of integrated and multistate research-Extension activities. Measure will be number of activities.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	22

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The need for economic diversification in times of state budget constraints has renewed interest in Alaska's non-petroleum resources including fish, fiber, and timber. At the state level the new state administration led by Governor Bill Walker has indicated support for natural resource management that exemplifies the core values of stewardship, transparency, integrity and science-based decision-making. The combined efforts of research and outreach personnel can help Alaska overcome challenges to effective natural resource management.

What has been done

Research efforts included the NE-1962 Outdoor Recreation, Parks and Other Green Environments: Understanding Human and Community Benefits and Mechanisms. A researcher

collaborated with colleagues at Arizona State University, Colorado Mesa University, and University of Montana on project for the Bureau of Land Management (BLM) regarding outcomes focused land management. CES multistate activity included participation in the Western Regional Development Center's Extension Sustainability Summit. Extension faculty worked with a researcher on the BLM Collaborative Visitor Transportation Project.

Results

Students benefitted from joint teaching in a graduate seminar, NRM 692 on outdoor recreation, forest health, and economic diversity. The economic development specialist worked with a researcher on projects regarding feasibility, marketing, and production of a commercial reindeer meat industry. The specialist was also named a Western Rural Development Center fellow.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
134	Outdoor Recreation
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis

Outcome #3

1. Outcome Measures

Outcome 3: Increase the recruitment and retention of youth and college-age students appreciating and considering natural resource management careers. Measure will be number of graduate and undergraduate students enrolled and number of youth participating in natural resource management activities.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	1587

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Alaska is a great natural classroom that attracts students who love the outdoors. To reverse the effects of climate change, it is essential to educate youth to care for the environment. We must communicate the need for sustainable management. Alaska's educators need support in engaging youth in natural resource management activities that inspire good stewardship and career paths that will build state capacity to manage natural resources well.

What has been done

A 4-H instructor co-led a youth track at the Alaska Forum on the Environment. The OneTree Alaska program, with its recently renovated studio, helps enhance STEAM learning and teaching outcomes by collaborating closely with teachers in K-12 classrooms and offering university students service-learning opportunities. An AFES researcher reached 400 youth in a presentation about jobs in natural resources management to all five middle schools in the Matanuska-Susitna School District. An Extension agent reached 19 middle school youth with a presentation on salmon-related careers. 4-H saw continued success with youth participation in natural resource-related activities including 1714 in forests, rangeland and wildlife projects.

Results

The researcher facilitating OneTree Alaska reports that several young adults who were elementary or middle school students at the beginning of the program are now college students at UAF; one said OneTree was the best part of her K-12 career and that it is largely responsible for her now choosing to go into natural resource management. At the annual UAF research day, the Undergraduate Research and Scholarly Activity office awarded an overall 2nd place award to a poster on hydroelectricity created by Kirsten Williams, the outstanding Natural Resource Management student for 2016. Information from that poster was then used by Extension in the Alaska Master Naturalist class to help community members understand alternative energy options in Alaska. Faculty also support undergraduate and graduate research that leads to long-lasting engagement in natural resource work.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
134	Outdoor Recreation
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis

Outcome #4

1. Outcome Measures

Outcome 4. Increase public involvement in natural resource and community development issues. Outcome measure will be the number of participants.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	71

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Alaska's rich natural resources require ongoing management. Public understanding and support is key to progress on implementing best practices. Research and outreach personnel must communicate the need to manage sustainably. Alaska's educators, in particular, need support in engaging youth in natural resource management activities that inspire good stewardship and career paths that will build state capacity to manage natural resources.

What has been done

An agent in the Soldotna area researched several Extension Master Naturalist programs and created one for Alaska. The Alaska Master Naturalist certification program had 52 participants at the Eagle River Nature Center. An Alaska Master Naturalist Southeast teacher training was held in Seward for eight participants. Eleven participants completed an Alaska Master Naturalist eco-retreat, held for teachers who are unable to schedule time for the longer certification course. A Facebook page was posted that has gained 185 followers.

Results

Participants who completed the entire course also pledged 40 volunteer hours. Over 30 Alaska Master Naturalists served communities from Willow to Seward, and helped teach for multiple projects that reached 250 students during the Anchorage Watershed project, 850 students at Water Discovery Days, and 1700 students during Outdoor Week at the Campbell Creek Science Center. The naturalist program is an excellent example of how partnerships build capacity. New workshops are being planned for Delta Junction as well as Junior Master Naturalist programs in Whittier and Seward.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
134	Outdoor Recreation
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
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

Alaska has been severely impacted by the falling price of crude oil. The university is funded largely through the state legislature, and UAF has experienced several consecutive years of reductions. Almost half of SNRE funding comes from the state. The overall university budget gap of \$20 million in FY16 dramatically affected programs. UAF is also experiencing falling enrollment, with an overall credit hour loss of 3.6% estimated between Fall 2015 and Fall 2016. SNRE has faced difficulties with the combination of budget cuts and fixed cost increases. There was a loss of accreditation for forestry in FY15, along with the departure of the faculty member directing the forest products program. A longtime silviculture professor began phased retirement in FY16. Reduced FTEs have meant less research and teaching in some areas.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Participants in a birch-tapping class reported increased confidence in retrieving sap. After the class, 14 of 22 respondents said they did tap trees for sap and made products including birch wine, soft drinks, or birch syrup. Twenty shared information from the class with an average of four other people. They reported being able to demonstrate techniques to others, sharing products, and sharing handouts.

Youth attending STEM presentations on energy, salmon, and water circled their level of interest in the topic on a three-point scale and were asked to write what they learned that

was new. Of the 75 respondents, 51 said yes it was interesting, 15 said kind of, and only nine stating it was not interesting. Youth noted that they learned about filtration and pollution. One of the respondents who circled "no" said they would have liked the presentation to go into more depth.

The economic development specialist surveyed small businesses and entrepreneurs in Alaska to get a better sense of their needs and motivations. Industries represented included agriculture, manufacturing, automotive, art, photography, consulting, baking, publishing, fishing, technology and tourism. Owners cited themes like wanting to be creative, contribute to the community and create jobs as well as generate additional long-term income. When asked about technical support needed to grow their business, 166 of the 308 respondents checked marketing/sales, with the next most popular at 130 for social media. Only nine saw a need for disaster planning, indicating a need for education if they do not have current mitigation and recovery plans. When asked if they had ever taken a class on running a business, 144 said no. Of the 164 that had, 52 indicated the class had been sponsored by Extension.

Key Items of Evaluation

SNRE continued to show excellent engagement with the public. Agents conducted needs assessments to gather stakeholder input and incorporated the results into program planning.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Healthy Individuals, Families and Communities

Reporting on this Program

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%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%		0%	
724	Healthy Lifestyle	20%		0%	
801	Individual and Family Resource Management	5%		0%	
802	Human Development and Family Well-Being	15%		0%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	10%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	7.9	0.0	0.0	0.0
Actual Paid	5.8	0.0	0.0	0.0
Actual Volunteer	0.0	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
278813	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
305009	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1433217	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Faculty and staff developed and delivered curriculum through conducting workshops and meetings and providing training. They consulted with clients to develop products, and partnered with other agencies and organizations for capacity-building. Outreach was augmented by videos, fact sheets and articles written for public consumption, through working with the media. Personnel facilitated events, activities and teachable moments.

2. Brief description of the target audience

Outreach activities targeted the following stakeholders:

- Parents and caregivers of children
- Schoolchildren
- School teachers
- Individuals interested in healthy lifestyles
- Low income individuals and families
- Clients interested in food preservation
- Clients interested in local foods or subsistence lifestyle
- Clients who need assistance with finances
- Human development and social work professionals
- Individuals and professions interested in emergency preparedness
- Food banks
- Housing and energy authorities and organizations
- Home and building owners

3. How was eXtension used?

Increased use of eXtension resources in FY16 has been valuable to Extension outreach in Alaska. In FY16, six health, home and family faculty answered 21 questions about topics important to Alaskans like canning moose and salmon, making sourdough, managing well water, home heating and air quality, and dealing with debt. Agents maintained memberships in other communities of practice including Families, Foods and Fitness, Food Safety, Home Energy, Just in Time Parenting, and Financial Security for All. Seven agents continued as invited members of the Health Insurance Literacy Ask an Expert group. Agents have used eXtension-provided Qualtrics access to assess client satisfaction and changes in knowledge. The energy specialist presented two Learn webinars as part of the multistate Healthy Homes Partnership.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12168	734256	1731	38645

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

Patent Applications Submitted

Year: 2016

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	2	0	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Output 1: Extension faculty will offer workshops in a wide range of home economics and family and consumer science topics. Measure will be the number of workshops.

Year	Actual
2016	192

Output #2

Output Measure

- Output 2: Extension district offices will update emergency planning for internal operations and constituent communities. Measure will be the number of offices and constituent communities who have updated plans.

Year	Actual
2016	9

Output #3

Output Measure

- Output 3: Home energy extension workshops and conferences will provide individuals and families with immediate and long-term actions they can implement for energy conservation. Measure will be the number of workshops and conferences.

Year	Actual
2016	14

Output #4

Output Measure

- Output Target 4: Field faculty will provide physical activity and nutrition programming for teachers and parents. Measure will be the number of teachers and parents who are trained.

Year	Actual
2016	4405

Output #5

Output Measure

- Output Target 5: Field faculty will provide physical activity and nutrition programming through one-on-one consultations and consultations with other organizations. Measure will be the number of consultations.

Year	Actual
2016	708

Output #6

Output Measure

- Output Target 6: Extension faculty will offer workshops in harvesting and food preservation techniques. Measure will be the number of workshops.

Year	Actual
2016	79

Output #7

Output Measure

- Output Target 7: New food products will be developed using Alaska-produced ingredients. Measure will be the number of food products developed.

Year	Actual
2016	20

Output #8

Output Measure

- Output Target 8: Extension faculty will offer workshops in food safety. Counting number of workshops.

Year	Actual
2016	82

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcome 1: Participants in healthy lifestyle classes and workshops will adopt knowledge gained to maintain healthy lifestyle practices one year after participation.
2	Outcome 2: Participants will use knowledge gained in parent education classes to increase their application of developmentally appropriate practices.
3	Outcome 3: Increase consumer knowledge about energy conservation.
4	Outcome Target 4: Participants in food preservation and food safety classes will improve their food preservation and food safety practices.
5	Outcome Target 5: New varieties and new uses of animal and plant products will result in increased production of Alaska-based products. Counting number of products and publications.
6	Outcome Target 6: Increase youth and parents' understanding of healthy food choices. Counting contacts with youth and parents.
7	Outcome Target 7: Youth and families have a more positive attitude toward healthful foods and/or willing to try new foods. Counting number of families.
8	Outcome Target 8: Increase knowledge, attitudes, skills and aspirations to increase physical activity habits. Counting number of youth.
9	Outcome 9: Promote healthy families and communities. Counting number of people reached through violence prevention classes.
10	Outcome 10: Provide partners with information needed for improving family resource management in Alaska. Counting number of consultations conducted.
11	Outcome 11: Assist Alaskans in addressing the increase in bed bug infestations. Counting number of resources provided including publications, kits, and consultations.

Outcome #1

1. Outcome Measures

Outcome 1: 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	Actual
2016	300

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Alaska's senior population must remain active and healthy in a difficult environment. Alaska, per capita, has one of the fastest-growing population of seniors in the nation, and the state expects the number of seniors to double in the next 30 years. All of Alaska is considered medically underserved, and costs to individuals for medical care are higher than the national average. It is imperative that Alaskans focus on health strategies to maintain health and independence throughout life.

What has been done

Stakeholder request led to a StrongWomen Leader course held for the Wasilla Senior Activity Center and a six-day Chronic Disease Self-Management/Diabetes Self-Management Leader Course. These high-demand research based self-management programs have volunteer leaders receiving support from Extension in Ketchikan, Kodiak, Soldotna, Bethel, Homer, Seward, Anchorage, Chugiak and Wasilla. An estimated 220 participants in Anchorage and Wasilla StrongWomen groups have continued over a year. The Kenaitze Indian Tribe group has been meeting since 2004 and has 20 participants, the Kenai Senior Center group since 2009 with 15, and the Homer Senior Center group since 2010 with 12 participants.

Results

Post-training surveys indicate a high level of satisfaction by attendees. The success of past courses has led to new requests for leader courses from stakeholders in Talkeetna, Kodiak and Fairbanks. The Anchorage agent's National Diabetes Prevention Program recently received recognition from the Centers for Disease Control and Prevention for being a program that prevents or delays type 2 diabetes. Participants successfully lost weight, increased their physical activity levels and reduced their risks of developing diabetes through their participation in the year-long program. The self-reports by participants of their blood lab results confirmed these benefits with most lowering their hemoglobin A1C levels. The program will be continued in

Fairbanks in FY17.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Outcome 2: 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	Actual
2016	350

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Alaska is a dangerous place for women and children with high rates for violence and abuse. Opportunities for parent education and training for child-care providers are lacking in many communities, particularly in rural Alaska, where many communities are accessible only by air. Transportation costs to deliver programs also limit what is offered. Because Alaska communities often suffer from high rates of substance abuse and related violence, education that promotes community wellness is a desperate need in order to provide healthier environments for youth.

What has been done

The Nome agent delivered workshops on historical trauma and decolonization, facilitating community conversations, the Knowing Who You Are cultural curriculum, and brain development in teens and tweens reaching a total of 266 adults in Nome, Anchorage and Fairbanks. A presentation on literacy and young children reached 16. Three agents also provided consultations to 68 adults on parenting, daycare and child development questions, including child nutrition and feeding infants. The Nome agent worked with the Alaska Association for Infant and Early Childhood Mental Health.

Results

Trainees have taken ownership of the programs and planned trainings in their own communities. The Knowing Who You Are curricula helps youth develop and maintain a healthy racial and ethnic identity, and trainees gain tools needed to advocate for racial equity. It has been offered successfully in Nome for 4 years now and demand remains high, with more requests than facilitators can fill.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Outcome 3: Increase consumer knowledge about energy conservation.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	1022

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Alaska historically has some of the highest energy prices in the country, and interest in energy conservation remains high. It is a pocketbook issue, particularly in rural areas, where energy costs are the highest and some Alaskans rely on diesel generators. Natural gas is not yet available statewide, and the energy infrastructure differs from the contiguous states. Though wind farms have been introduced, the U.S. Energy Information Administration notes that less than 3% of Alaska's electric power generation came from wind in 2014.

What has been done

The energy specialist offered twelve workshops on energy efficiency in four different communities reaching 69 people. The specialist maintains an energy blog with periodic posts about energy efficiency. Extension also maintains a wood energy website that covers topics like BTUs and stove choice and offers an online heating cost calculator. The website garnered 953 visits from April through September 2016.

Results

Participants learned about what potential sources of energy they might use to lower heating costs. The wood heating website received several hundred hits a month, and interest changed with the seasons, with the number of pages and files accessed peaking in the colder months of October through February. Further information on classes offered by the energy specialist, including rocket stoves and greenhouse heat, are reported in the sustainable energy section.

4. Associated Knowledge Areas

KA Code	Knowledge Area
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #4

1. Outcome Measures

Outcome Target 4: 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	Actual
2016	1278

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many 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 preserved game meat or fish. Alaska has one of the nation's highest rates of botulism, which occurs in low-acid foods. It is particularly important to teach people how to safely preserve local staples. Over 90 percent of Alaska's food is imported, so food preservation training can also improve food security.

What has been done

Extension agents taught 82 food preservation and food safety classes to 1278 people in 25 communities and two military installations. With travel support from the Southeast Alaska Regional Health Consortium, the Juneau agent visited 12 communities to test canner gauges, teach food preservation, and discuss state requirements for establishing a cottage foods business.

Results

Participants in food preservation classes immediately build skills through hands-on training with equipment. Extension also trained people to be able to work safely with others. Certified Food Protection Managers trained by Extension passed national exams. Participants in Safe Home Food Preservation series completed web lessons on canning, dehydrating and freezing foods, attended a two-day workshop and took an exam to be certified as a home food preserver. Extension now has 35 certified food preservers that increase Extension's capacity; some have already offered classes and tested canner gauges in communities the agent was unable to travel to. The majority of canners tested required adjustment or replacement, highlighting the importance of this service.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
504	Home and Commercial Food Service

Outcome #5

1. Outcome Measures

Outcome Target 5: New varieties and new uses of animal and plant products will result in increased production of Alaska-based products. Counting number of products and publications.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	20

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Alaskans are demanding more locally grown and sourced options. Advocacy for local foods has led to state incentives such as farmers market vouchers for SNAP participants and a program that assists school districts in purchasing local products. The state budget crisis has highlighted the need for economic diversification. However, the cost of shipping supplies to Alaska is expensive and can be cost prohibitive to entrepreneurs. Ventures like small farms and small foods businesses deserve increased support if we hope to improve food security in the state.

What has been done

The small food business program coordinator completed a cooperative consolidated shipping project with interior entrepreneurs. The project was developed with the Interior Alaska Food Entrepreneurs Advisory Group. The coordinator also oversaw rental of the DEC-certified test kitchen and discussed product testing and nutrition labeling with clients. A class on starting and operating a specialty food business had 18 participants and a class on social media metrics for food businesses reached eight. Two workshops on cottage foods had 14 participants.

Results

A participant in past Extension small foods business classes contacted the coordinator in FY16 to report that a year later, the participant and two other classmates each have better developed small food businesses that led them to participate in the Alaska Food Festival and Conference in March 2016. One business sells products such as fermented salads, sauerkrauts and kimchi, while another sells ice cream with locally source ingredients like carrots or birch syrup. The third provides services such as fresh produce deliveries. The entrepreneur thanked the coordinator for the "help along the way." For the shipping project, through work with Alaska Traffic Company, significant shipping savings were achieved: one entrepreneur saved at least 20%, another saved 60% and the third saved 80%. Two food truck owners who had taken a food preservation class from Extension and worked with the coordinator on production and sales plans had their specialty salsa sold at bazaars and farmers markets, and the duo recently opened a restaurant.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
504	Home and Commercial Food Service

Outcome #6

1. Outcome Measures

Outcome Target 6: Increase youth and parents' understanding of healthy food choices. Counting contacts with youth and parents.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	5268

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Childhood obesity is a major concern in Alaska, as elsewhere. In 2011, 65 percent of Alaskan adults were overweight or obese. A 2013 State of Alaska report says that 26 percent of Alaska high school students were overweight or obese. Helping parents and students learn about better nutrition and eating habits is essential to combating obesity in youth and in adults.

What has been done

Six nutrition educators based in Anchorage, Bethel, Fairbanks, Palmer, Soldotna and Tok presented USDA-approved curricula and activities in single and multipart programs at public schools, Head Start programs, shelters, WIC programs, community centers, public housing and libraries that reached a combined total of 5268 adults and youth. Agents provided information on healthy eating to children's agencies, schools and other community audiences. Other activities emphasized adding vegetables, smart shopping and making healthy foods such as whole wheat bread and yogurt.

Results

Nutrition educators with the SNAP-Ed Program presented nutrition education programs through both series and one-time classes. Surveys were given to grade school participants asking about healthy food choices. At the K-2 level, seven out of 10 respondents improved their ability to identify healthy snacks and two improved on identifying vegetables. In grades 3-5, eight of 44 respondents improved on measures of asking someone to buy fruits, vegetables, or low-fat milk and to have fruits and juices within reach. Thirteen of 48 respondents improved on a measure about asking to have vegetables within reach. In grades 6-8, 13 of 35 respondents improved on both the reported number of vegetables consumed yesterday and their frequency of eating whole grains.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Outcome Target 7: Youth and families have a more positive attitude toward healthful foods and/or willing to try new foods. Counting number of families.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	33

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Aside from an increased likelihood of becoming overweight adults, children and adolescents who are overweight or obese are at increased risk for a variety of negative physical, social and emotional problems. According to one survey, 77 percent of Alaska elementary students eat breakfast every day. Families have an important influence on making healthy food choices available and enticing to youth.

What has been done

Agents provided training on healthy food choices and nutrition in hands-on food preparation classes. SNAP-Ed worked with 33 families on hands-on cooking skills on how to prepare nutritious meals on a lean budget. Our SNAP-Ed program teaches individuals and addresses policy, systems and environmental factors. Staff also serve on coalitions and wellness councils. 4-H leaders also assisted 438 youth with food and nutrition projects, and nutritious food preparation was modeled at camps. Extension collaborated with the Children's Healthy Living Program on a series of seven healthy recipe videos published to YouTube.

Results

Nutrition educators demonstrated recipes and offered opportunities to try new healthy snacks like smoothies. Gradeschool children were given measures of behavior change that looked at consumption of fruits and vegetables, whole grains, and low-fat foods. Of 35 respondents in grades 6-8, 13 improved on their consumption of vegetables, fruits and frequency of eating whole grains. Of 33 respondents in grades 3-5, only two improved on eating breakfast, while six decreased, showing that this area remains a challenge. One of the YouTube videos featured a youth assistant, and the set of seven videos had a combined total of 1451 views.

4. Associated Knowledge Areas

KA Code	Knowledge Area
504	Home and Commercial Food Service
703	Nutrition Education and Behavior
801	Individual and Family Resource Management

Outcome #8

1. Outcome Measures

Outcome Target 8: Increase knowledge, attitudes, skills and aspirations to increase physical activity habits. Counting number of youth.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	2588

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The 2015 Youth Risk Behavior Survey published by the Department of Health and Social Services found that Alaska youth are less active than their peers, with only about 21% compared to a national average of 29% reporting physical activity for at least 60 minutes on each of the past 7 days. There has also been a significant increase since 2007 in the time spent on gaming or other non-school computer use for three or more hours a day. Alaskan youth are in need of education and encouragement regarding physical activity to combat these trends.

What has been done

Nutrition educators discussed the importance of being active every day as well as led physical activity demonstrations, reaching 868 youth. Educators also worked with teachers and staff to encourage activity among youth at eligible low-income sites. The Alaska 4-H program offered youth across the state a number of projects that emphasized physical activity, including fitness and sports skills and outdoor education. Activities included hiking, dance, shooting sports, rock climbing, skiing, camping, martial arts, dog mushing, sailing, luge, yoga and more.

Results

The 579 youth in 4-H camps had opportunities for physical activity as part of the programming. There were 1141 health related projects that had a physical activity component, including fitness and sports, healthy lifestyle education, and physical health. The 432 foods and nutrition projects had a physical activity component as well. For SNAP-Ed youth in grades K-2, 11% of the 9 respondents improved their ability to circle depictions of kids being active. For grades 3-5, 12% of the 34 respondents increased physical activities. For 6-8th grade, 26% of 35 respondents improved the number of days they were active at least one hour and 29% improved the number of days they were "very" active.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #9

1. Outcome Measures

Outcome 9: Promote healthy families and communities. Counting number of people reached through violence prevention classes.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The National Coalition Against Domestic Violence reports that 1 in 3 women and 1 in 4 men have experienced some sort of violence by an intimate partner, and 59% of adult Alaskan women experience intimate partner or sexual violence in their lifetimes. The National Center for Education Statistics reports that roughly a third of youth ages 12-18 reported being bullied in school or online in 2013. It is likely that each of us will at some point be a bystander in a situation that calls for an act of intervention to prevent verbal or physical violence. Training can help ensure such interventions occur safely.

What has been done

Extension's Nome agent has been a member of the Community Alcohol Safety Team (CAST) since 2010. This cross agency group works to reduce violence related to alcohol, and promotes Green Dot, an intervention program that addresses child abuse, domestic violence, dating violence, sexual assault, and bullying. This program focuses on bystander training, which emphasizes that every community member can contribute to ending violence. The Nome agent worked with a community adaptation committee to revise the curriculum to be a better fit for the community. A planning meeting reached 8 people. Four trainings in FY16 reached 42 people.

Results

Green Dot training is evidence-based, and it contributes to a critical mass of bystanders willing to help prevent violence. The awareness raised by these trainings contributes to a gradual shift in individual willingness to help others. By attending to the cultural relevance of the training, the Nome agent has increased community buy-in of the programming.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #10

1. Outcome Measures

Outcome 10: Provide partners with information needed for improving family resource management in Alaska. Counting number of consultations conducted.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	41

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Commodities cost more in Alaska, a state ranked fourth highest in cost of living by USA Today. For example, as of March 2016, the weekly food costs for a family of four in Valdez are estimated at \$276. High food prices can be an impediment to food security. It is important for researchers to track food cost trends to inform local, state and federal agencies about accessibility and areas of need. One way to do this is to periodically gather food cost data from around the state to compare costs of commonly purchased food items including WIC items and added sales tax.

What has been done

CES has conducted a quarterly state wide food cost survey (FCS) since 1983 based on the USDA food plan for low-income individuals. Along with food prices, a few non-food item prices have been collected, primarily fuels, but also lumber, water and sewage utility rates. Surveyors collect data on over 100 food items, with a list of substitutes if the target item is not available in a given area. An archive of survey data is available on the web from 1996 through 2016. Any member of the public can view quarterly results and download an Excel dataset to run their own comparisons.

Results

The FCS continues to be a widely utilized data set that informs local and statewide efforts surrounding nutrition. Legislators have used information from the FCS when making policy statements to the media, including the Juneau Empire, about energy and grocery costs in rural areas. The Alaska Department of Health and Social Services also links to the FCS as a commonly used data source. The Municipality of Anchorage's Office of Economic and Community Development has included FCS data in their neighborhood sourcebook. Groups like the Alaska Food Coalition and Sitka Local Foods Network have cited the FCS in their arguments for increased attention to food insecurity and access to locally grown food. The FCS is a prime

example of how Extension fulfills its mission to interpret and extend relevant university, research-based knowledge in an understandable and usable form to the public.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #11

1. Outcome Measures

Outcome 11: Assist Alaskans in addressing the increase in bed bug infestations. Counting number of resources provided including publications, kits, and consultations.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	104

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In recent years there has been a nationwide resurgence in bed bug infestation. Alaska has not been immune to this trend; health agencies and pest control companies across the state are receiving increasing reports of bed bug infestations. These insects commonly live in blankets, mattresses, furniture, floors and walls near sleeping areas. They survive by using specialized piercing mouthparts to bite humans and feed on their blood. While they are large enough to see, they are very good at hiding in seams and crevices. Alaskans need training in identifying and safely eradicating these pests.

What has been done

The Bethel district office provided advice and referrals. The agent has also updated a Bed Bugs publication, available for free online, that discusses identification, prevention, and eradication. The agent is a charter member of an advisory board for a tribal bed bug outreach grant. Through the grant, 100 toolkits have been distributed statewide including educational materials and caulk, traps and mattress encasements. During a site visit, the Bethel agent advised a federal facility on treatment of bunk houses, a common site for infestations due to seasonal, traveling staff.

Results

Extension expertise has been influential in community decisions on safe, affordable treatments. The Bethel agent assisted staff in finding a heat treatment option that avoids repeated chemical

treatments. The purpose-built heaters, purchased for about \$2,000, can be loaned to other federal facilities. This represents a savings from having a certified pesticide applicator fly into a remote area to spray, estimated to cost \$1000 a year. The grant advisory board identified a commercially available alternative to Diatomaceous earth (DE), Cimexa, commonly used as low-risk non-chemical pesticide. The advisory board was able to work with the state DEC to get it approved. Now all Alaskans have access to a new tool to address bed bugs. This is particularly significant to rural Alaska because Cimexa is non-hazmat, thus easier to ship to all parts of the state.

4. Associated Knowledge Areas

KA Code	Knowledge Area
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Alaska has been severely impacted by the falling price of crude oil. The university is funded largely through the state legislature, and UAF has experienced several consecutive years of reductions. Almost half of SNRE funding comes from the state. The overall university budget gap of \$20 million in FY16 dramatically affected programs. SNRE, in particular, has faced difficulties with the combination of budget cuts and fixed cost increases. The small food business coordinator and the food research assistant departed in FY16 and no replacements are planned. The work on cottage foods and nutrition labeling was taking on by remaining faculty, but some projects like recipe development have not continued, and demanding workloads remain a challenge to maintaining services.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Eleven respondents in a class on using a pressure canner to process fish indicated that low confidence in canning and limited knowledge of the difference between low and high acid foods. Retrospective ratings showed noticeable change, with scores in the 2s before and in the high 4s after (scale out of 5 as high point of agreement). One participant called the class "canning de-mystified!"

Seven YouTube videos were published and garnered a combined total of 1451 views in FY16. YouTube allows users to use a thumbs-up or thumbs-down icon to indicate satisfaction with videos. So far, the videos have received 28 thumbs up and only 1 thumbs down. The Preserving Alaska's Bounty online modules also saw continued interest. Of the

42 users who rated the classes, two agreed and 40 strongly agreed they will use the information, with 36 strongly agreeing they plan to share it.

Fifteen participants responded to a post-training survey for the Chronic Disease Self-Management Program leader trainings across multiple sites. On a scale where 1 was not at all confident and 10 was totally confident, no scores lower than a 7 were reported on individual questions and the average for most items was about 9, indicating a high level of confidence in using knowledge gained. When asked which portions of the training were most valuable, comments included the expert modeling, practice teaching with feedback, time for brainstorming, and information on balancing nutrition and understanding blood sugar ranges. Participants also complimented the supportiveness and professionalism of the instructors and the high quality of the educational materials provided. Ten trainees indicated they planned to lead their own workshop in the next six months.

Twelve of the 18 participants returned evaluations for a five-day workshop in Nov. 2015 on starting and operating a specialty food business. Overall satisfaction was 4.58 on a 5-point scale where 5 was the highest level of satisfaction. All respondents agreed that the information would be useful in starting his or her own business. Eight participants agreed that they gained information from the class necessary to make informed business decisions, and eight indicated a gain in understanding of the process to carry out a feasibility analysis for their business (three already understood the process coming in, and one still did not understand). After the workshop, all respondents agreed that they now know how to make an FDA-compliant label for their products, whereas before the workshop self-assessments had ranged from "not really" to "sort of." Past iterations of the class had faced technical difficulties with an existing videoconference system, so Zoom was used instead and the video and sound clarity were greatly improved and students had more interaction.

For a workshop on social media metrics for food businesses, five of the seven respondents were satisfied with the class (one was neutral and one was dissatisfied). Three respondents agreed that the information will be useful in their food business (two were neutral and one disagreed).

In Aniak, community members had not had canner gauge testing in years and were made aware that it should be done annually. Half of the 26 canners tested were unusable. In the Soldotna area, of 302 gauges tested, 68 percent required adjustment and 16 percent needed replacement.

Key Items of Evaluation

Clients increased their knowledge about canner gauge maintenance. Participants in canning classes indicated increased knowledge, confidence and intent to use skills gained. Healthy lifestyle class trainees reported high confidence and intent to share knowledge. Participants reported improved health. The diabetes programming received recognition for its success from the Centers for Disease Control and Prevention. Small food business class participants reported increasing their knowledge of labeling, compliance, and social media use. One year after the class, several are maintaining successful businesses.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Climate Change and Ecosystem Management

Reporting on this Program

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	10%		10%	
122	Management and Control of Forest and Range Fires	10%		0%	
123	Management and Sustainability of Forest Resources	0%		70%	
132	Weather and Climate	70%		20%	
605	Natural Resource and Environmental Economics	10%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	5.0	0.0
Actual Paid	0.4	0.0	1.7	0.0
Actual Volunteer	0.0	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
23234	0	174789	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
25417	0	238463	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
119435	0	19107	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research documented weather factors and agricultural land characterization including soils and crop types. High latitude soil research centered on the evaluation of the relationship between local climate and soil carbon balance. Research, education and outreach activities included geographic information systems, maps and spatial data sets, and climate change adaptation as it relates to communities.

2. Brief description of the target audience

The target audience included producers and consumers, communities and small business entrepreneurs, individuals and groups concerned about the quality of the Alaska environment, public resource agencies, public and private resource managers, other faculty and researchers, and undergraduate and graduate students. Efforts were directed toward environmentally and economically sustainable development and conservation of our natural resources for the benefit all citizens to help them adapt and become resilient as the climate changes. Advisors and the target audience included various forestry organizations, USDA Natural Resource Conservation Service, the Alaska Department of Natural Resources, borough governments and Alaska Native corporations.

3. How was eXtension used?

Increased use of eXtension resources in FY16 has been valuable to Extension outreach in Alaska. Two agents continued as members of the Extension Disaster Education Network Delegates community. A program assistant had membership in the Extension Wildfire Information Network and the Climate, Forests and Woodlands. The access to Qualtrics provided through eXtension increased the online survey skills of the program assistant working on the Renewable Resources Extension Act and allowed for gathering input from stakeholders on their views of state priorities on issues like ensuring a healthy ecosystem and the effects of climate variability on resource management.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	842	17765	192	935

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

Patent Applications Submitted

Year: 2016
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	1	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Output 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 and presentations are output measures.

Year	Actual
2016	10

Output #2

Output Measure

- Output 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.
Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Output 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.
Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Output 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 and updated.

Year	Actual
2016	9

Output #5

Output Measure

- Output 5. Research related to product development to include timber products and nontimber products including energy will continue. Forest management specific to fuel/energy demand will be initiated. Measurable outputs will be publications and presentations.

Year	Actual
2016	4

Output #6

Output Measure

- Output 6. 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 and presentations.

Year	Actual
2016	5

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcome 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 2. Increase animal producer and wildlife manager knowledge on range use and animal impact. Measurable outcomes are publications, workshops and conferences.
3	Outcome 3. Increase knowledge through classroom and field course delivery. The outcome measures will be curricula delivered and number of students reached.
4	Outcome 4. Increase community and individual knowledge on the impact of climate change in northern ecosystems and effects on cultural lifeways, economies and individual well-being. Outcome measures will be publications, workshops and conferences.
5	Outcome 5. Provide research information that leads to product development and recreational opportunities. Outcome measures will be publications, conferences and workshops.

Outcome #1

1. Outcome Measures

Outcome 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	Actual
2016	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Climate warming is projected to continue. The Alaska Public Lands Information Centers notes that permafrost can be found in various thicknesses in up to eighty-five percent of Alaska's surface. Also making Alaska's soils complex are multiple historically active volcanoes. Soil warmth, moisture and stability will impact agriculture, homeowners and forest land managers. Basic research provides information about weather, soil nutrients, moisture stress and insect predation.

What has been done

Researchers have collected data on permafrost, volcanic and farmed soils. Climate parameters have been collected from NOAA, and databases have been maintained on the Arctic Long Term Ecological Research website. The weather station at the Matanuska Experiment Farm has collected National Weather Service data since 1917, providing the longest available weather record from a single location in Alaska. A soils researcher was an author on a February 2016 paper on soil fertility after volcanic eruption on Alaskan's Aleutian islands, an August 2016 paper on technologies for scanning frozen soils, and was interviewed for an article on permafrost carbon published in CSA news, a crop and soil science magazine.

Results

Instruction on soils has led to increased dissemination of the soils research. There were 24 students enrolled in the Alaska soil geography field trip one-credit class in later summer 2015, and four enrolled in a special topics class on volcanic ash-derived soils in 2016. A documentary on arctic soils that was filmed in FY15 related to the field trip has been shown to limited audiences and is planned for release on public television in 2017. The researcher leading the classes also contributed to the Northern Circumpolar Soil Carbon Database. Another researcher gave a tour of the Georgeson Botanical Garden to the Pacific Northwest Soil Science Society

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
132	Weather and Climate

Outcome #2

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Outcome 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	Actual
2016	207

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nationwide, there is an increased interest in local and sustainable production and interdisciplinary approaches to managing ecosystems and combatting the effects of climate change. Alaska is a great natural classroom and attracts students who love the outdoors. To reverse the effects of man-made climate change it is essential to educate youth to care for the environment.

What has been done

Researchers teach a wide variety of classes for the natural resource majors and minors that include instruction on issues of climate change, ecology and sustainable management of resources. SNRE introduced a new sustainable agriculture minor in 2016. Two of the required classes are NRM 101, Natural Resources Conservation and Policy and NRM 210, Principles of Sustainable Agriculture. Students also need a class on natural resource economics and must

complete three additional classes from a list that includes introductory plant and animal science, soils and the environment, environmental ethics and environmental decision making.

Results

In FY16, there were 61 students in NRM 101, and 21 students in NRM 201. There were 31 students in NRM 111, an introduction to sustainability science. There were 18 students in NRM 277, an introduction to conservation biology that covered ecological developments and the status of important habitats and endangered species. There were 7 students in NRM 375, natural resource ecology. There were 32 students in NRM 403 on environmental decision making. Twenty-four students received credit for a soil geography field trip, NRM 489/689 and five students were enrolled in NRM 480, a class on soil management for quality and conservation.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	22

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Over the past 50 years, Alaska has warmed at over twice the rate of the rest of the United States. Alaska continues to see hundreds of wildfires each summer that result in millions of acres burned. Alaska has also seen substantial flooding in populated areas, and the state experiences earthquakes on a frequent basis. As the climate warms, Alaska's coastlines recede and

permafrost melts. Extreme weather events may increase in both frequency and severity, hence a need for continuing emergency and disaster preparedness training for the public to mitigate potential damages to property and life.

What has been done

Twenty-two workshops covered topics like emergency cooking, food safety in an emergency, emergency energy, wildfire defensible space and emergency preparation at both the individual and community levels. Extension kept abreast of research-based best practices through its relationship with the Extension Disaster Education Network. The energy specialist raised awareness of 85 people with a presentation on climate change in Alaska at the Extension Climate Science Conference.

Results

Extension personnel across program areas helped Alaskans plan for the aftermath of extreme weather events such as floods and fires with research-based information to help people prepare for emergencies. AFES maintained important community connections. A researcher has been the director of Alaska Center for Climate Assessment and Policy since 2006, director of the Alaska Fire Science Consortium since 2009, and is the stakeholder liaison for the Scenarios Network for Alaska and Arctic Planning.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Outcome 5. Provide research information that leads to product development and recreational opportunities. 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	Actual
2016	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Alaska, federal agencies control 65% of the land. It is necessary for the Bureau of Land Management (BLM) to assess user demand for and satisfaction with recreation areas. However, without the necessary staffing and expertise in survey methodologies, data collection will be difficult. Developing partnerships can augment federal capacity to assess recreational opportunities and challenges.

What has been done

SNRE partnered with the BLM, National Park Service, Fish and Wildlife Service, and Forest Service on a collaborative visitor transportation project. Surveyors trained by SNRE collected 3,039 surveys and the results can be used to refine the methodology for other states interested in surveying land use. The researcher is partnering with colleagues at Arizona State and Colorado Mesa University to develop a research center that can lead more survey efforts for the BLM. A pilot project was set up with colleagues at the University of Montana.

Results

The BLM has benefitted from the researcher's work developing and disseminating surveys of land use for over a decade. A project report was submitted to the National Park Service regarding the recreation study that assessed characteristics of recreation trips in the Interior. Presentations were also made at a multistate annual meeting, to Bureau of Land Management personnel in Washington D.C. In addition to promoting recreation, AFES researchers continued to investigate the best ways to manage Alaska's natural resources and published papers in FY16 on products including sablefish, grouse, and the trapping industry..

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Alaska has been severely impacted by the falling price of crude oil. The university is funded largely through the state legislature, and UAF has experienced several consecutive years of reductions. Almost half of SNRE funding comes from the state. The overall university budget gap of \$20 million in FY16 dramatically affected programs. In FY16 the university president called for a freeze on all unnecessary travel and hiring. The faculty member studying the effects of climate change on arctic soils retired in FY16 and no replacement is planned. .

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A program assistant with the Renewable Resources Extension Act (RREA) surveyed stakeholders about how they would rank the importance of cross-cutting issues, including invasive species, urbanization, wetlands, wildlife and fisheries, and rangeland services. Results will assist Extension in setting goals and prioritizing efforts to ensure healthy ecosystems in Alaska. The 35 respondents included federal and state agency partners, tribal organizations, private landowners, natural resource professionals, and natural resource users.

Key Items of Evaluation

SNRE continued to show excellent engagement with the public. Agents conducted needs assessments to gather stakeholder input and incorporated the results into program planning.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Youth Development

Reporting on this Program

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 FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	8.5	0.0	0.0	0.0
Actual Paid	5.9	0.0	0.0	0.0
Actual Volunteer	0.0	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
278813	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
305009	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1433217	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Agents and program assistants collaborated with other youth-serving agencies and organizations, including Alaska Native associations, military installations, schools, and National Guard and Reserve. Volunteers were trained and assistance was provided to teachers and after-school providers. Programming and promotion utilized distance technology and social media. Activities supported life skill development of youth through experiential learning in science, healthy living and citizenship. Experiential learning activities were offered at the local, state, regional and national levels

2. Brief description of the target audience

Opportunities were offered to the following stakeholder groups:

- Grades K-12
- Parents of school-age children
- Adults interested in positive youth development
- 4-H Extension educators
- Other Extension educators
- 4-H volunteers
- Military youth educators
- Community leaders
- Federal and state agency representatives
- Native corporations and tribal representatives
- Youth-serving organizations, including FFA

3. How was eXtension used?

Increased use of eXtension resources in FY16 has been valuable to Extension outreach in Alaska. 4-H agents maintained memberships in communities including Horsequest, Makers, For Youth, For Life, and Diversity, Equity & Inclusion. Agents have used eXtension-provided Qualtrics access to survey 4-H members and leaders about fair planning. Civil rights compliance efforts have been bolstered by Learn sessions; the program leader shared the video on Developing Safe 4-H Youth Development Programs: Bridging Connections to the LGBTQ+ Communities.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12603	63784	21967	27336

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

Patent Applications Submitted

Year: 2016
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Output 1: Volunteers will complete youth development training. Measure will be the number of volunteers trained.

Year	Actual
2016	317

Output #2

Output Measure

- Output 2: Extension will offer relevant workforce skill development projects for youth 15-18. Measure will be the number of workforce and skill development projects.

Year	Actual
2016	90

Output #3

Output Measure

- Output 3: 4-H will offer opportunities for membership or involvement for underserved and minority youth. Measure will be the number of opportunities for underserved and minority youth.

Year	Actual
2016	49

Output #4

Output Measure

- Output 4: Youth Development will offer programming in science, engineering and technology. Measure will be the number of programs offered in this area.

Year	Actual
2016	44

Output #5

Output Measure

- Output 5: 4-H educators will offer inter and intra-district educational and service collaborations. Measure will be the number of education and service collaborations.

Year	Actual
2016	46

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcome 1: 100% of faculty and staff associated within the program area will understand the Essential Elements of Youth Development
2	Outcome 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 3: 4-H educators will offer opportunities for membership or involvement for underserved and minority youth. Measure will be number of opportunities.
4	Outcome 4: To improve youth outcomes, 4-H will facilitate mentorship programs. Measure will be number of mentors and mentees.

Outcome #1

1. Outcome Measures

Outcome 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	Actual
2016	20

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Positive youth development through 4-H is made possible through a cadre of caring adult leaders. Creating environments in which youth have a sense of belonging, experience independence, master skills and give back to the community through generosity becomes more complex each year with changing environments and demographics. Faculty and staff must increase their understanding of positive youth development and the Essential Elements of 4-H in order to deliver quality programs and train volunteer leaders.

What has been done

All Alaska 4-H agents and others with 4-H responsibilities have been trained in Essential Elements. The Alaska 4-H 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, staff and leaders participate in trainings that emphasize delivery of the subject matter within the context of the Essential Elements. An annual state volunteer forum and audio conferences also include Essential Elements.

Results

All 20 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. One agent instituted an incentive program for youth attending a certain number of district activities, and noted it improved attendance, which assisted in building the element of belonging.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

Outcome 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	Actual
2016	1300

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The 4-H Essential Elements of belonging, mastery, independence and generosity are based on research that the youth development field recognizes as a source for best practices in fostering positive development. Applying the Essential Elements in program development and delivery is what makes 4-H unique from other programs. The elements define volunteer roles in the lives of 4-H members as mentors, role models and coaches.

What has been done

Leaders were trained through both online programs and face-to-face workshops. Leaders are asked to provide information on events throughout the 4-H year for their clubs showing connections to Essential Elements. A step in the club chartering form includes the identification of Essential Elements in club activity planning, making it an intentional step in the planning of club activities. Agents discussed how to increase the use of 4-H Common Measures to assist clubs in assessing whether youth are being effectively engaged in the areas of belonging, mastery, independence and generosity.

Results

A number of service projects reflect the application of the element of generosity, including cleaning up trash and putting on a community dinner. 4-H'ers across districts also engage in livestock projects that foster mastery and independence, culminating in exhibits at various local and state fairs. 4-H'ers volunteer in many ways that build responsibility and a sense of belonging in their community and state, and attend camps that encourage an appreciation of Alaska. Overall, 1175 adult volunteers and 125 youth volunteers in FY16 provided opportunities for engagement of all kinds, from gardening to science programming. One agent reported that for the State Horse Contest, an individual that had been a participant a decade before returned as a leader to help with the contest. Two volunteer leaders received the Western Region's top

volunteer awards.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

Outcome 3: 4-H educators will offer opportunities for membership or involvement for underserved and minority youth. Measure will be number of opportunities.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	49

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Alaska is a uniquely diverse state. For example, CNN reported in 2015 that Anchorage, Alaska has the top three most diverse census tracks in all of America. Outside of cities, there are many areas with minority youth that can only be reached by boat or plane. Thus, in many rural communities, activities for youth are limited. As the 4-H Essential Elements note, the youth development field recognizes that positive development requires structure, support, skill-building, and "strong links between families, schools, and broader community resources." 4-H is uniquely positioned in Alaska to provide such opportunities to underserved youth.

What has been done

4-H harnessed the power of carefully screened volunteers and evidence-based curricula to provide mentorship and guidance from caring adults in underserved locations like Dillingham and Bethel. 4-H offered programming to underserved groups including youth in foster care or youth facilities. A dog mushing club is held at a local charter school. 4-H also maintains partnerships with Title 1 schools to deliver after-school programming.

Results

For all minority groups, enrollment is at or above parity levels relative to state demographics. Fairbanks hosted the Western Regional Leaders Forum in 2016, which offered an excellent opportunity for 4-H professionals, volunteers and youth from a variety of backgrounds to learn

about the rich cultures of Alaska. Agents seek professional opportunities to develop their support of diverse audiences such as serving on the NAE4-HA diversity, LGBTQ+ and differently abled youth committees. About 140 students were served by 4-H after-school programs in Fairbanks North Star Borough Title 1 schools.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Outcome 4: To improve youth outcomes, 4-H will facilitate mentorship programs. Measure will be number of mentors and mentees.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	233

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A 2015 Youth Risk Behavior Survey published by the Department of Health and Social Services found that since the last biannual survey, Alaskan high schoolers had increased feelings of sadness and contemplation of suicide and decreased physical activity. 4-H is based on youth development research that shows youth who have positive relationships with adults are more likely to make healthier choices. Mentoring programs are one of many ways to intervene early so youth can build relationships of respect and trust with adults who model healthy behaviors and encourage the development of life skills.

What has been done

4-H, with its network of trusted volunteers and youth development agents, is in a key position to facilitate mentoring programs. 4-H faculty and staff members partnered with resource centers, youth facilities, after-school programs, nonprofits, and tribal and state organizations to facilitate meetings between 49 mentors and 184 mentees in FY16. Mentees spent time in skill building and community service activities and had opportunities to participate in events like the Yukon Quest

sled dog race, the Western Region Leaders Forum, and Native Youth Olympics.

Results

Some mentees are as young as six, so mentor and teacher observations and face-to-face discussions were used to assess progress in lieu of paper surveys. Parents also provided valuable feedback on progress observed. Seven of the eight participants in a stress management activity said they learned something about coping with change. Students participating in yoga activities reported feeling more calm, with increased ability to deal with stress. Individual participants have reported positive life skill development and credited 4-H with increased communication skills and improved grades. Mentors report observing better manners, problem-solving, and behaviors that indicated increased self-worth.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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

Alaska has been severely impacted by the falling price of crude oil. The university is funded largely through the state legislature, and UAF has experienced several consecutive years of reductions. Almost half of SNRE funding comes from the state. The overall university budget gap of \$20 million in FY16 dramatically affected programs. SNRE, in particular, has faced difficulties with the combination of budget cuts and fixed cost increases. The Anchorage 4-H agent retired and no replacement is planned, as the office there has been changed from a fully staffed district office to an outreach center that hosts traveling faculty.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The Kenai Peninsula district surveyed parents, leaders and members on their needs regarding the annual state fair. The agent gathered feedback on experience with perishable and non-perishable entries, scheduling, and award preferences. The majority of respondents indicated satisfaction with the judging experience at the fair. Open-ended questions on requests for improving the fair suggested having senior leaders assigned to help younger entrants and having a single entry day for all products.

An evaluation on the Mat-Su/Copper River district's summer 4-H camp garnered 24 responses from campers and counselors. Games and evening events were rated as an average of 4.7, while workshops were rated as a 3.3 with feedback that camp should be longer with more participants. The district also documented changes in knowledge on market livestock participant ability to identify appropriate feed, common breeds, desirable traits, grooming techniques, quality assurance concepts, and more. The percentage of 58 respondents who answered "yes" at the start of the year versus the end of the year changed in a positive direction for all 12 items measured, with an average improvement of 13 percent. For example, 65.5 percent agreed they were aware of basic health concerns for their project animal species from the start, while the percentage rose to 93.1 percent at the end of the year.

4-H continued to improve opportunities for underserved youth. The Bristol Bay Club expanded and in two years added 28 leaders, seven communities, and 29 clubs, including one that offers college credit. The agent reports that this expansion is due to strong partnerships built between 4-H and agencies serving Bristol Bay, and community confidence that 4-H makes a difference. Partner agencies provide volunteers, leaders, supplies, office and meeting space, and support for travel. Outcomes of such partnerships include the 4-H and Food Bank of Alaska collaborating to serve 3105 meals between December 2015 and August 2016. As part of a Garden to Table grant, 60 youth created a strawberry garden, learning how to plant and maintain the garden. The Migrant Education program teamed with 4-H to bring activities to local fish camps. 4-H leaders provided Culture Camps to three fish camps. A culture camp was held in Dillingham and youth campers hosted the annual Elder and Youth Celebration.

Key Items of Evaluation

4-H programming provided multiple culturally relevant programs to increase opportunities for the sustained engagement of underserved youth. 4-H in Alaska results in sustained engagement. One agent reported that for the State Horse Contest, an individual that had been a participant a decade before returned as a leader to help with the contest. Two volunteer leaders received the Western Region's top volunteer awards.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Sustainable Energy

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
123	Management and Sustainability of Forest Resources	20%		0%	
125	Agroforestry	10%		0%	
131	Alternative Uses of Land	10%		0%	
205	Plant Management Systems	10%		0%	
511	New and Improved Non-Food Products and Processes	10%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	40%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.0	0.0
Actual Paid	1.2	0.0	0.0	0.0
Actual Volunteer	0.0	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
58086	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
63543	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
298587	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

AFES continued work on oilseed crops, reported in the agriculture outcomes. Extension assisted communities on use of biomass products and worked with producers to develop value-added forest products. Outreach helped educate the public on using biomass and biofuels. Faculty worked with communities and organizations regarding the use of biomass and with producers interested in biomass production. Research and outreach efforts addressed public education on the sustainability of biomass harvesting, new technologies and community planning.

2. Brief description of the target audience

The target audiences included producers and consumers, communities, agriculture and forestry businesses, industry leaders, entrepreneurs, individuals and groups concerned about the quality of the Alaska environment, public resource agencies, public and private resource managers, other faculty and researchers, and undergraduate and graduate students. Efforts were directed toward environmentally and economically sustainable development and conservation of our natural resources that benefit all citizens and help them adapt and become resilient as the climate changes. Advisors and the target audience included various forestry organizations, Alaska Farm Bureau, the Alaska Northern Forest Cooperative, Alaska Energy Authority, the Alaska Department of Natural Resources, borough governments and Alaska Native corporations.

3. How was eXtension used?

Increased use of eXtension resources in FY16 has been valuable to Extension outreach in Alaska. A program assistant maintained membership in the Wood Energy community. The access to Qualtrics provided through eXtension increased the online survey skills of the agent working with partners on renewable resource projects and allowed for feedback from biomass tour participants and the Alaska Wood Energy Development Task Group.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	992	14440	149	760

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

Year: 2016
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	1	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Output 1: Workshops, demonstrations, short courses, classes, field days and conferences organized and conducted.

Year	Actual
2016	37

Output #2

Output Measure

- Output 3: Bioenergy research projects conducted.
 Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Output 4: Bioenergy crop and technology publications submitted.

Year	Actual
2016	3

Output #4

Output Measure

- Output 5: Community, organizations and one-on-one consultation concerning bio-based energy opportunities conducted.

Year	Actual
2016	485

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcome 1: Identify crops suitable for sustainable production of bio-based energy in Alaska.
2	Outcome 2: Identify new value-added by-products from bio-based energy crops and woody species.
3	Outcome 3: Compile a forestry biomass database.
4	Outcome 4: Monitor adoption of bioenergy technologies.
5	Outcome 5. Increase community awareness about the use of biomass and other sustainable energies. Measure is number of people participating in relevant workshops and presentations.
6	Outcome 6. Encourage adoption of do-it-yourself sustainable energy solutions. Measure is number of participants completing hands-on workshops.

Outcome #1

1. Outcome Measures

Outcome 1: Identify crops suitable for sustainable production of bio-based energy in Alaska.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Outcome 2: Identify new value-added by-products from bio-based energy crops and woody species.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Outcome 3: Compile a forestry biomass database.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Outcome 4: Monitor adoption of bioenergy technologies.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	30

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Energy costs remain high, particularly in rural communities. According to the Alaska Energy Authority (AEA), over 200 remote villages are not connected to grids or roads, which means paying \$10 a gallon for diesel delivered by boat or plane. Oil production in Alaska is slowing. Biomass can offer a lower-cost source of heat in areas where the forest supply is plentiful. Alaska communities want to see investment in local resources that are renewable, and that harvest and management of resources is compatible with local lifestyles and traditions. The AEA reports that in addition to the 30 communities currently heating with biomass, at least 50 more have expressed interest in pursuing biomass.

What has been done

The Extension agent in Thorne Bay chairs the Alaska Wood Energy Development Task Group (AWEDTG), which facilitates monitoring of biomass boiler adoption. In FY16, the agent collaborated with the Alaska Energy Authority and U.S. Forest Service to organize a three-day Interior Biomass Tour that allowed 21 decision makers to view installed biomass systems within Alaska including pellet, chip, and cordwood boilers. The agent also reviewed prefeasibility studies for the Cordova Pool Biomass Installation and the Kodiak School District and consulted tribes and engineers on biomass projects, and published a case study on the first five years of a biomass system in Craig, Alaska.

Results

The task group facilitated by an Extension agent has funded over 70 prefeasibility studies since 2006, resulting in over 30 wood heat installations across the state, which represents a significant displacement of fossil fuels and costs savings to the entities adopting the technology. For example, the Southeast Island School District has seen its heating costs drop from \$40,000 per year to \$25,000 per year. The local economy also benefitted with the hire of a student to stoke the boiler and payments to residents for salvaged wood deliveries. The district has installed a third cordwood boiler and greenhouse in Kasaan, a greenhouse in Naukati, and is preparing to install a greenhouse at the school in Coffman Cove. Greenhouses are positioned next to the boilers to utilize excess heat, and provide jobs for local youth who tend to plants and grow food used in school lunch programs and a local restaurant.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
511	New and Improved Non-Food Products and Processes

Outcome #5

1. Outcome Measures

Outcome 5. Increase community awareness about the use of biomass and other sustainable energies. Measure is number of people participating in relevant workshops and presentations.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	488

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In the face of declining oil prices and production, there is a need for Alaska to invest in alternative energies. A fundamental shift in the state's energy focus requires constituent support to gain momentum. Community-level change begins with improving knowledge and awareness at the individual level, and Extension is uniquely situated as source of research-based information that can provide outreach across Alaska on relevant energy topics.

What has been done

Twenty-one workshops and presentations reaching 266 people were conducted covering topics including greenhouse heating, firewood, chainsaw use, timber harvesting, and biomass case studies. The energy specialist revised a publication on using sustainable energy to extend the growing season, with information about options like passive solar boxes, burning cordwood, and capturing waste heat off of existing installations. Extension led a biomass tour in collaboration with the Alaska Energy Authority and U.S. Forest Service.

Results

All 15 people responding to a survey on the biomass tour said it was likely or very likely they would recommend the biomass tour to a friend or colleague. When asked about their interests before the tour, attendees said they wanted to learn about community and technology needed to use bioenergy in remote areas. Interests expressed after the tour included utilizing wood fuel for heating large buildings or multiple spaces, including pellet and chipped wood options. Four respondents indicated an interest in manufacturing pellets or other biomass products as a result of the tour. No respondents chose cordwood as an interest before the tour, but two rated it as "most interested in" after the tour, showing a change in awareness of that option.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
511	New and Improved Non-Food Products and Processes
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #6

1. Outcome Measures

Outcome 6. Encourage adoption of do-it-yourself sustainable energy solutions. Measure is number of participants completing hands-on workshops.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	168

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sustainable energy is an increasingly popular issue in Alaska where transportation and heating costs are prohibitive. Camping is a popular activity in Alaska, and there is always a need for alternative heat sources in emergency situations. Rocket stoves are a portable, efficient technology that make use of wood. Increasing knowledge and adoption of this technology will help address needs in Alaska for sustainable energy use.

What has been done

The Extension energy specialist held seven workshops in two different areas reaching 45 adults and 123 youth on building rocket stoves for off grid, home or emergency heat. They are built out of inexpensive materials and burn small diameter or waste wood.

Results

Participants built their own rocket stoves in the workshops, immediately increasing their skills. Participants reported an intent to use rocket stoves for camping and even teaching the technique as a 4-H project.

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

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 has been severely impacted by the falling price of crude oil. The university is funded largely through the state legislature, and UAF has experienced several consecutive years of reductions. Almost half of SNRE funding comes from the state. The overall university budget gap of \$20 million in FY16 dramatically affected programs. The loss of administrative staff impacted the ability to collect and process course evaluations of some workshops.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

All 15 people responding to a survey on the biomass tour said it was likely or very likely they would recommend the biomass tour to a friend or colleague. When asked about their interests before the tour, attendees said they wanted to learn about community and technology needed to use bioenergy in remote areas. Interests expressed after the tour included utilizing wood fuel for heating large buildings or multiple spaces, including pellet and chipped wood options. Four respondents indicated an interest in manufacturing pellets or other biomass products as a result of the tour. No respondents chose cordwood as an interest before the tour, but two rated it as "most interested in" after the tour, showing a change in awareness of that option.

Members of the Alaska Wood Energy Development Task Group were surveyed on the effectiveness of the group and its processes to improve future collaborations. A primary function of the group is to solicit and review proposals for wood energy projects. The group helps develop prefeasibility studies for such projects. According to the survey, of eight respondents, members ranged in participation from one year to over seven years. Seven rated themselves as somewhat or very active in the group's meetings and proposal evaluations. Seven rated the prefeasibility studies produced by the group as effective or very effective (one rated it "somewhat effective") at helping communities decide on whether to install a wood heating system. Seven rated the current application document for projects as somewhat effective or effective on a 7-point scale where none rated it as the highest point of very effective and one member rated the document as somewhat ineffective.

The coordinator received helpful feedback about improving the solicitation process by holding seminars during popular events like the Alaska Forum on the Environment or Alaska Native Federation meetings where people from remote areas are already traveling to a central location. Most respondents felt the evaluation process the groups applied to the proposals were effective and one member commented that over time, the quality of the

reports produced by the group has improved. A preview of a new website in development was pitched to survey respondents, and comments were positive. One said it looked modern and had a lot of tools and resources that will be useful for communities. Overall, when asked to "grade" the group on an A (highest) through F (lowest) scale, four members gave it an A while two members gave it a B (two members did not respond).

Key Items of Evaluation

Extension continues to facilitate the progress of biomass projects in Alaska through coordinating the Alaska Wood Energy Task Development Task Group, which has advised 30 projects already and anticipates up to 50 more in the future. Communities installing wood heating systems have seen their energy costs drop.

Extension solicited feedback from advisory groups. Members of a wood energy task force indicated satisfaction with the processes and outputs of the group. Group members recommended expanding the number of venues they use to reach the public, indicating confidence in the group's efficacy.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
0	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes with climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.