2018 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 half century, 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 extending the knowledge generated at the university to meet the needs and interests of Alaskans. Citizens are provided engagement opportunities to influence future research and education priorities. SNRE is a critical partner for the university, providing a linkage among researchers, Extension personnel and Alaskans to deliver the latest research findings, education and outreach opportunities.

Planned programs for the 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. Harvests of peonies and Rhodiola rosea, in particular, have continued to expand.

Many Alaskans live a subsistence lifestyle or supplement their diets with local fish and game meat. Alaska also has a large military population, most of whom have not previously preserved game meat or fish. The state has one of the nation's highest rates of botulism, with the most recent suspected case in 2018, making it imperative to provide much needed information on safe preservation of dietary staples. Food safety is also a concern for small food business entrepreneurs and of food industry workers, who need state-required training.

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. Alaskans need help managing chronic conditions and planning healthy meals in food-insecure environments. High energy costs remain a critical issue, particularly in rural Alaska. Research and outreach have focused on new and alternative sources of energy, woody biomass and energy conservation. There is a consistent need for research based cold climate building and maintenance information. Homes are tightly built to try and reduce heating costs; however, this leads to other consequences, such as indoor air quality concerns.

The aim 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 are primarily the audiences putting our research results into practice, 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 resource management.

Alaska's 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 other miscellaneous publications. Scientists also disseminate their findings through conferences, public presentations, workshops, consultations 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. Researchers also collaborate with Extension faculty by inviting them for guest lectures and collaborating on integrated grant projects.

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 useful 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, 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.

Extension will continue to work with researchers to support agriculture, horticulture, forestry, and rural and economic development. Collaborations continue 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. 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: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	45.0	0.0	15.0	0.0
Actual	30.6	0.0	15.4	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 required to report activities related to the Plan of Work. 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. Various program partners sometimes provide survey instruments or facilitate data collection as well. In FY18, outreach faculty were again required to include hours dedicated to evaluation in their workloads. Feedback is gathered for many workshops and all conferences.

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, Facebook pages, Twitter feeds, YouTube channels and interactive citizen science based smartphone applications)

Brief explanation.

AFES is in the process of reestablishing an advisory council 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:

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

State stakeholders include:

- AHTNA Native Corporation
- Afognak Native Corporation
- Alaska Natural Fiber Business Association
- Chena Hot Springs Resort
- Department of Environmental Conservation
- Department of Natural Resources
- Diversified Livestock Association
- Division of Agriculture
- Division of Forestry
- Fairbanks Economic Development Corporation

- Fairbanks North Star Borough
- Farmers markets around the state
- Matanuska-Susitna Borough
- North Slope Borough
- Pike's Waterfront Hotel & Greenhouse
- School districts around the state

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

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

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. Advisory groups like the 4-H leaders' organization 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 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 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

Brief explanation.

SNRE joint research and outreach planned programs are directly related to the workload 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 FY18 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 needs 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.

CES and AFES will continue to build on 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' planned workloads reflect district community issues. Stakeholder needs will continue to be a driving factor in determining Extension priorities and programming.

Stakeholder input in FY18 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. Agents use stakeholder input to identify programming needs and work to offer programs and information that meet those needs. For example, stakeholder involvement on conference planning committees and input at conferences leads 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 use. Interest continues in 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 improving communities 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
{No Data Entered}	{No Data Entered}	{No Data Entered}	{No Data Entered}

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1076907	0	976333	0
Actual Matching	643879	0	1221150	0
Actual All Other	1871316	0	1021562	0
Total Actual Expended	3592102	0	3219045	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

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%	
202	Plant Genetic Resources	0%		5%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		5%	
205	Plant Management Systems	20%		20%	
213	Weeds Affecting Plants	15%		0%	
216	Integrated Pest Management Systems	23%		0%	
301	Reproductive Performance of Animals	5%		15%	
302	Nutrient Utilization in Animals	5%		10%	
305	Animal Physiological Processes	2%		10%	
307	Animal Management Systems	0%		5%	
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	10%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	8.0	0.0	10.0	0.0
Actual Paid	3.6	0.0	10.7	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**
262090	0	872141	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
223653	0	1046824	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
181898	0	1001339	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?

In FY18, faculty and staff answered 68 agriculture and horticulture related questions through eXtension's Ask an Expert interface. Topics included tree and lawn care, pest management, home gardening, fruit crops, flower growth, small and large livestock care and plant and insect identification. Several personnel attended an eXtension webinar on weed management in gardens and landscapes. Agent and educator memberships in eXtension's communities of practice (CoPs) included Citizen Science, Invasive Species, Homepage Authors, Big Data, Innovation Partners and Urban Integrated Pest Management.

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	10318	184761	2337	9724

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	1	2	3

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
2018	135

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
2018	3402

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
2018	10

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
2018	2

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
2018	11

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: Demonstrate effective collaboration between research and Extension to resolve agriculture and horticulture issues.
7	Outcome 7: Increase reindeer producers' ability to understand and assess optimum production practices. Measure will be communities consulted.

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 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	62

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food security and climate change are serious issues in Alaska. With over 90% of food imported, transportation costs adds considerably to prices. If transportation were interrupted, it is widely acknowledged that Alaska has three days of food on grocery shelves. Thus, it is critical that Alaska is able to produce more local food crops. A challenge to increased production is changes to the landscape due to variations in water and soil temperatures. Growers see 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 crop adaptability in changing climates.

What has been done

Adapted cultivars of feed barley, hulless barley, red spring wheat, common oat and Polish canola were all compared to standard test varieties. Field experiments were carried out at Palmer and Fairbanks experiment farms. Three plant physiologic growth stages were used along with weather data to measure crop adaptability, emergence, heading/flowering and maturity. Presentations of results were made at workshops for small grain growers in Alaska. Poster presentations were made at national conferences.

Results

The 2018 season was cooler than the long-term average in Fairbanks, and both the Fairbanks and Palmer locations had more precipitation than the long-term average. Average yields for all spring grain and oilseed varieties at both farms were roughly equal to the standard test varieties. The average Fairbanks location yield for feed barley were 1567 lbs/acre and Palmer yields were 2350 lbs/acre. Hulless barley yields were 1687 lbs/acre in Fairbanks and 2033 lbs/acre in Palmer. Hard red spring wheat yields were 1051 lbs/acre in Fairbanks and 2028 lbs/acre in Palmer. Common oat yields were 716 lbs/acre in Fairbanks and 1949 lbs/acre in Palmer. Average yields

for Polish canola were 1669 lbs/acre in Fairbanks and 740 lbs/acre in Palmer. A student completing a master's thesis is using data from this project in DSSAT modeling to predict potential impacts of climate change on wheat growth.

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
601	Economics of Agricultural Production and Farm Management

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
2018	362

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, when 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

Two agents offered six workshops in five locations around the state related to chickens. One hundred sixty-seven adults and 92 youth learned about livestock topics, including backyard chickens, egg productivity and poultry butchering.

Results
The Kenai agent gathered feedback from 103 attendees at livestock judging workshops and a livestock seminar. Across the three events, 97 percent agreed they had gained knowledge and 96 percent agreed they had gained skills.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes

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
2018	169

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 Alaskans research-based methods for gardening or growing crops increases food quality and can lower the risk of food insecurity. Demand for support is on the rise, with the latest agricultural census data showing 990 farms in Alaska in 2017, a 30 percent increase from 2012.

What has been done

Eight workshops in multiple locations, including rural areas, helped inform the public of developments on high tunnels as an option to augment the growing season. Extension trained 130 Master Gardeners. In sum, there were 1793 contacts with the public through gardening workshops including interpreting soil sample reports, seed starting and basic gardening, weed-free forage and pesticide safety trainings, greenhouse design and more.

Results

All of the 39 participants in high tunnel workshops at five different locations indicated they gained both knowledge and skills. All of the 75 participants responding to surveys of three different workshops on gardening and seed starting agreed they gained knowledge, with 96 percent gaining skills. A series of 35 YouTube videos called In the Alaska Garden allowed viewers insights from many local growers. The passive solar video alone has over 28,000 views. On another video, a view commented "we tried soil blocks for the first time this year and I am extremely impressed with the health of the plants." Many viewers showed enthusiasm for the topics through upvotes and compliments such as "another great video" and "liked and favored, cool lumber construction of greenhouse."

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
401	Structures, Facilities, and General Purpose Farm Supplies
405	Drainage and Irrigation Systems and Facilities
601	Economics of Agricultural Production and Farm Management

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	1167

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 crop issues in real-time, sharing observations from experienced growers, and watching demonstrations of best practices for managing animal and plant production. Exposure to new technology and practices increases the possibility Alaskans will adopt such tools.

What has been done

The Alaska Weeds Identification app continued to be offered, with new species added. An agent provided trainings on first detection of invasive species and how to use the Alaska Weeds ID mobile app to identify and report the location of invasive plants. The Grow & Tell app was utilized in conjunction with university variety trials, and invited gardeners to act as citizen scientists and rate the varieties they have grown for taste, yield and reliability. The Kenai agent continued to offer an online soil test calculator that has augmented soil test results reporting, allowing users to estimate soil fertility needs and understand soil amendment scenarios.

Results

The Grow & Tell app has seen 3465 installations on iOS and 536 on Android systems since its launch in 2017. The Alaska Weeds Identification app had 444 new downloads and has seen over 5700 downloads since its launch. Comments include "Nice app, great ID pics." The app is now featured online in the U.S. Climate Resilience Toolkit. Natural Resource Conservation Service offices use the soil calculator for each high tunnel program soil analysis they work on, and in FY18 the tool had 368 unique pageviews.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
216	Integrated Pest Management Systems
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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	60

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

Seasonal IPM technicians and permanent staff, with support from faculty, provided community education and technical assistance. Agents and IPM staff had 806 consultations, most of which were requests for plant and insect identification. IPM technicians maintained a reporting web portal where the public submitted digital photos. They also assisted with community weed pulls, camps, Master Gardener classes and the Certified Pesticide Applicator conference. Four YouTube videos on submitting plant and insect samples and managing spruce beetles and invasive cherry trees had a combined 1653 hits.

Results

The Alaska Invasive Species Workshop in October 2017 had 112 participants. Most respondents rated the speakers and knowledge gained as excellent, with 94 percent agreeing they would attend again, and the remaining 5 percent stating it depended on location. Sixty-seven percent of participants said they planned to use information from the conference in their management practices, including public messaging, herbicide application timing, plant identification and adopting survey protocols. Seventy-five percent of the 28 returning attendees who responded reported they have made changes to their practices already, including adoption of monitoring tactics, increased agency collaboration, modification of research designs and changes to timing of herbicide applications.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

305 Animal Physiological Processes

Outcome #6

1. Outcome Measures

Outcome 6: Demonstrate effective collaboration between research and Extension to resolve agriculture and horticulture issues.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	59

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Variety trials are time-consuming. Seed companies tend to develop their products for the market at-large in the Lower 48. Though varieties described as cold-tolerant may be offered, they are rarely tested in growing seasons as extreme as Alaska's. As a result, Alaskan growers struggle with the trial and error of identifying viable crop varieties in their growing zones, and some tried-and-true varieties are no longer available. Publicly funded variety trials reduce the expense, time and effort gardeners and farmers need to put in to figure out which cultivars will be successful.

What has been done

An Extension agent utilized Experiment Farm facilities to grow and assess cultivars. In 2018, beets, carrots and celery were grown in replicated randomized complete block trials, while Brussels sprouts, beans, corn and watermelon were grown in preliminary trials. Each cultivar was evaluated at least once for plant vigor, susceptibility to bolt, uniformity, and pest and disease resistance. Trials were labeled and viewable at a local botanical garden, where the research team engaged with the public about the plots. Results were published online and disseminated through three workshops to 40 attendees.

Results

The top two yielding corn varieties were Cafe and Sugar Pearl, with at least 1 lb per row foot. Carrot yields were not significantly different, and results for beans were mixed due to vandalism. For celery, Tango OG had the highest yield at 4.9 lbs per row foot and scored 4 out of 5 (high) on both taste and texture. For Brussels sprouts, Hestia was the high-yielding variety with the most uniform growth. For beets, Boro had significantly better uniformity and bolting sensitivity, and

rated highly (4) on taste and texture.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
903	Communication, Education, and Information Delivery

Outcome #7

1. Outcome Measures

Outcome 7: Increase reindeer producers' ability to understand and assess optimum production practices. Measure will be communities consulted.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Remote areas face challenges to economic development and food security. Alaska has the range and forage resources to produce substantial quantities of red meat through reindeer production, but current processing requirements compromise entrepreneurial efforts to bring quality meat to market. The regulations allowing in-state sale of field-slaughtered, non-inspected reindeer meat require carcasses to be immediately frozen. The meat consequently becomes cold shortened, or very tough, lowering its market value.

What has been done

Reindeer program personnel investigated altering current field slaughter methods while monitoring for food safety. Three rural Alaska communities with productive reindeer herds were consulted about their desire to produce and sell field-slaughtered reindeer meat. Researchers

collected and tested reindeer blood samples for disease. A draft uniform field slaughter protocol was reviewed by the state veterinarian. Seven steers were processed at a USDA-approved facility and evaluated for post-slaughter temperature effects.

Results

Samples sent to the University of Illinois Meat Science Lab were evaluated for moisture and lipid content, cooking loss, tenderness and other attributes. There was no significant difference in tenderness between the 16-hour and 7-day chilled and stored sample conditions. Meat from reindeer chilled for 16 hours after slaughter was found to be significantly tenderer than meat frozen immediately after slaughter. Subsequently, 16 reindeer were field slaughtered using the researcher-developed protocol, with carcass temperature held at a constant 7C for 16 hours, then swabbed for aerobic bacteria after 25 hours. All samples tested negative for pathogenic bacteria, suggesting reindeer can be slaughtered hygienically in the field and allowed to undergo complete rigor before freezing.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
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 continues to be 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. About 40 percent of SNRE funding comes from the state. Between 2014 and 2017, the university system's budget dropped from $378 million to $325 million, resulting in 50 discontinued or suspended academic degree and certificate programs and 933 fewer faculty and staff. In FY18, the budget was further reduced to $317 million. SNRE, in particular, has faced difficulties with the combination of budget cuts and fixed-cost increases restricting hiring for vacant positions. In FY18, key agriculture personnel departed. The Delta district lost administrative support, and an associate professor of range management retired. One of the Experiment Farms experienced director turnover. The merger between AFES and CES has 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

The Kenai agriculture agent surveyed 399 participants in 19 classes in FY18 to assess changes in knowledge and skills on topics including seed starting, high tunnels, livestock judging, lawn care, produce safety and soil health. Ninety-eight percent of the participants indicated they had gained knowledge and 96 percent gained skills from the classes. In six classes behavior was assessed, with 96 percent of 56 participants able to apply new skills.

Twelve participants completed a survey about the gardening workshops and YouTube videos offered by a Fairbanks agent. All participants rated their experience as good or excellent. Results of retrospective pre-post questions indicated gains in average knowledge regarding how to save money by gardening, how to garden successfully in Alaska, and choosing the right vegetable and flower varieties. After the workshop, 83 percent agreed they felt confident in applying the skills learned. Respondents indicated they planned to apply learned skills by making data-informed decisions and trying new varieties, group planting and production timing.

The Alaska Invasive Species Workshop in October 2017 had 112 participants, with 54 responding to a post-conference Qualtrics survey. Most respondents rated the speakers and knowledge gained as excellent, with 94 percent agreeing they would attend again, and the remaining 5 percent stating it depended on location. Sixty-seven percent of participants said they planned to use information from the conference in their management practices, including public messaging, herbicide application timing, plant identification and adopting survey protocols. Seventy-five percent of the 28 returning attendees who responded reported they have made changes to their practices already, including adoption of monitoring tactics, increased agency collaboration, modification of research designs and changes to timing of herbicide applications.

To inform Integrated Pest Management (IPM) efforts regarding the peony industry, a survey was conducted of local growers who had attended outreach events in the past three years. Responses were gathered from 20 individuals, 18 of whom had attended events such as peony farm tours, a peony growers conference or peony consultations with Integrated Pest Management technicians. Nineteen respondents indicated they considered themselves a "peony producer." Seventeen respondents said participation in those events improved their awareness of insect pests affecting peonies. Fifteen said they gained new skills for pest recognition and management, and 10 changed their attitudes about peony pests. Sixteen respondents planned adopt one or more of the practices learned, and 15 felt their experience would help them increase their networking with other producers.

Key Items of Evaluation

Extension brought research to the public and increased stakeholder knowledge and skills on a variety of agriculture and horticulture topics. Stakeholder groups such as pesticide applicators, agricultural educators, farmers, and home gardeners are using better practices.

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
102	Soil, Plant, Water, Nutrient Relationships	5%		0%	
111	Conservation and Efficient Use of Water	10%		0%	
112	Watershed Protection and Management	20%		0%	
123	Management and Sustainability of Forest Resources	15%		0%	
134	Outdoor Recreation	15%		100%	
135	Aquatic and Terrestrial Wildlife	10%		0%	
136	Conservation of Biological Diversity	10%		0%	
206	Basic Plant Biology	10%		0%	
605	Natural Resource and Environmental Economics	5%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	3.0	0.0
Actual Paid	0.4	0.0	2.4	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**
64376	0	65393	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
52986	0	164558	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
355657	0	20223	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Researchers provided science-based information in resource planning, economic and environmental impact of natural resource use involving market and nonmarket value of resources, and strategies for addressing 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 resource 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?

Use of eXtension resources in FY18 has been valuable to outreach in Alaska. Several employees maintained memberships in natural resources and community development-related Communities of Practice (CoPs). The urban extension director was a member of the Tourism and eXtension and Creating Healthy Communities CoPs. An agent was a member of the Climate, Forests and Woodlands CoP. Agents answered four natural resource-related questions through the Ask an Expert interface.

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1904	15675	565	825

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	0	8	8

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
2018	55

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
2018	36

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
2018	5

Output #4

Output Measure

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

Year	Actual
2018	6

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
2018	2

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.
5	Outcome Measure #5: Demonstrate effective collaboration between research and Extension to resolve issues.

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	55

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 and the National Park Service. The Division of Forestry supports CES forest stewardship outreach and coordination of Project Learning Tree program. Partners included conservation groups, cities and boroughs, tribal organizations and other stakeholders. Faculty worked with local organizations like the Sitka Conservation Society, Eagle River Nature Center and Fairbanks Climate Action Coalition as well as national organizations like NOAA, BLM and Bureau of Indian Affairs.

Results

A new website, Spruce Beetle in Alaska's Forests, was launched in 2018. This website is maintained by cooperation among the UAF Cooperative Extension Service, USDA Forest Service, and the Alaska Division of Forestry. An agent led a successful multi-year effort with community and international partners to highlight the achievements of Jujiro Wada, also known as the Samurai Musher. Through film and print promotion, the historical figure has become a tourism selling point. In FY18, updates were given to groups like the Iditarod Historic Trail Alliance. The Fairbanks Experiment Farm contains the longest continuously running weather observation station in Alaska. Recording weather since 1911, the station was one of four long-term observing

stations in the U.S. honored by the World Meteorological Organization. Partners have noted the value of the long-term data for understanding environmental change.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
134	Outdoor Recreation

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
2018	15

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 nonpetroleum resources, including fish, fiber and timber. At the state level, the administration 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 W3004, Marketing, Trade and Management of Aquaculture and Fishery Resources; and NE1962, Outdoor Recreation, Parks and Other Green Environments: Understanding Human and Community Benefits and Mechanisms. The researcher who chaired the NE1962 project also collaborated with Colorado, Montana and New Mexico on the pilot creation of a national center for recreation research that has been endorsed by the Bureau of Land Management (BLM) and co-authored several project reports for the BLM Las Cruces and

Missoula field offices.

Results

Extension personnel worked with a researcher on creating and maintaining a website for the BLM project efforts. There was joint coordination of the field trip and guest lectures for NRM 290: Resource Management Issues at High Latitudes. Researchers assisted with Project Learning Tree and the Alaska Master Naturalist series. Researchers from Texas and Wyoming worked with the soils researcher and the Natural Resources Conservation Service to conduct the Alaska Soils Geography Field trip that included a visit to the Matanuska Experiment Farm.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
134	Outdoor Recreation

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
2018	1042

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

4-H offered natural resource-related activities including 20 environmental stewardship projects and 92 outdoor education projects. Junior Master Naturalist programming garnered 823 projects. Workshops and presentations on natural resources issues were attended by 219 youth. Among the 182 students enrolled in NRM classes for fall semester 2018, faculty also supported several undergraduate and graduate research projects that can lead to long-lasting engagement in natural resource work.

Results

Researchers kept students engaged in natural resources activities through events like the Forest Fest, where former students volunteered to help faculty and staff put on logging events. For the third year, the School of Natural Resources and Extension hosted a 10-day Alaska Natural Resources Sustainability Field Seminar with two professors and six students visiting from Hokkaido University. Former NRM students apply their knowledge gained to real world problems. One former student works at Disney World and uses GIS to study traffic patterns. Another is mapping routes for mountain bikers. Others work for natural resource agencies.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
134	Outdoor Recreation

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
2018	171

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

The Alaska Master Naturalist certification program had 49 participants take part in a series about mushroom ecology. 4-H Junior Master Naturalist programming brought in 37 youth and 25 adults during spring break, with participants from Anchorage, Chugiak, Eagle River and Wasilla. A Facebook page was maintained that currently has 466 followers. Master Naturalist volunteers teach a wide variety of natural resource and ecology classes that include instruction on environmental education pedagogy and interpretation techniques. A researcher continued to involve the public in birch sap collection.

Results

Participants who completed the entire 45 class hours of the master naturalist course also planned a final teaching project and pledged 40 volunteer hours, which ensured engagement with the community building local conservation literacy and capacity from Willow to Seward. Two certified master naturalists have become 4-H Leaders to support year-round programming. Many 4-H Clubs offer Jr. Naturalist programs for youth ages 5-18, including new groups formed by homeschool parents. Eight participants certified by the program now have jobs as naturalists, working at science centers, botanical gardens, and parks. Community involvement in collecting birch sap continued with 47 households and 13 classrooms contributing to a tapping cooperative. Three households installed tubing installations for tapping a total of103 trees.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
134	Outdoor Recreation

Outcome #5

1. Outcome Measures

Outcome Measure #5: Demonstrate effective collaboration between research and Extension to resolve issues.

Not Reporting on this Outcome Measure

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 continues to be 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. About 40 percent of SNRE funding comes from the state. Between 2014 and 2018, the university system's state appropriation dropped from $378 million to $317 million. In FY18, key natural resource personnel departed including an economist working with the tourism industry, a research professor of resource management, and a program assistant that assisted with recreation surveys. The merger between AFES and CES 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

Seventeen participants in a Project Learning Tree (PLT) training rated the workshop highly, with comments such as "Just wonderful!" Attendees were teachers planning to adopt the forestry and ecosystem information into their classroom curricula. On a scale where 1 is disagree and 5 is agree, the average respondent highly agreed (4.43) that the guides provided met the academic standards important to the teachers, that the facilitator provided adequate time for them to plan how to integrate the project materials into their curriculum (4.29). The teachers felt prepared to use PLT activities with their students (4.36) and planned to do so within the next three months (4.07).

A survey of youth at local fairs asked about interest in learning more about forests, and what previous experience they may have with forestry education. Of the 22 respondents, 17 agreed they were interested in learning more about forests, with four unsure. Two had never had instruction about forests before, and of the 20 who had, only 14 had learned about forests in school, with the rest receiving information from books, websites, parents and other sources like camps. Comments included wanting to learn about spruce trees, animals and a request to come to a local school to "teach us about forests."

Key Items of Evaluation

Youth in natural resource activities increased their knowledge of natural resources and earth sciences. Youth members of the public who had not yet received natural resource information in school expressed an interest in learning more about Alaska's forests.

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	5%		0%	
702	Requirements and Function of Nutrients and Other Food Components	5%		0%	
703	Nutrition Education and Behavior	20%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	15%		0%	
723	Hazards to Human Health and Safety	15%		0%	
724	Healthy Lifestyle	15%		0%	
801	Individual and Family Resource Management	5%		0%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	10%		0%	
805	Community Institutions and Social Services	5%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	7.9	0.0	0.0	0.0
Actual Paid	8.1	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**
310897	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
254320	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1032221	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:

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

3. How was eXtension used?

Continued use of eXtension resources has been valuable to Extension outreach in Alaska. In FY18 faculty answered 31 food and home-related questions through eXtension's Ask an Expert interface. Topics included canning, cheese-making, food safety, water wells and snow loads,. Agent memberships in eXtension's communities of practice (CoPs) included Diversity & Inclusion, Famlies, Food and Fitness, Food Safety, Home Energy and Just in Time Parenting. An agent attended an eXtension webinar on communicating risks.

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	10001	554895	2280	29205

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	1	0	1

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
2018	105

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
2018	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
2018	8

Output #4

Output Measure

- Output 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
2018	634

Output #5

Output Measure

- Output 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
2018	433

Output #6

Output Measure

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

Year	Actual
2018	58

Output #7

Output Measure

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

Year	Actual
2018	7

Output #8

Output Measure

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

Year	Actual
2018	62

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: Increase consumer knowledge about home energy efficiencies.
3	Outcome 3: Participants in food preservation and food safety classes will improve their food preservation and food safety practices.
4	Outcome 4: 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.
5	Outcome 5: Increase youth and parents' understanding of healthy food choices. Counting contacts with youth and parents.
6	Outcome 6: Youth and families have a more positive attitude toward healthful foods and/or willing to try new foods. Counting number of families.
7	Outcome 7: Increase knowledge, attitudes, skills and aspirations to increase physical activity habits. Counting number of youth.

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
2018	410

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

StrongWomen, Chronic Disease Self-Management and Diabetes Self-Management are high demand, evidence-based programs that have increased community capacity through train-the-trainer opportunities. Volunteer leaders received support from Extension in Anchorage, Big Lake, Bethel, Chugiak, Delta, Fairbanks, Homer, Ketchikan, Kodiak, Meadow Lake, Palmer, Seward, Soldotna, Sutton, Talkeetna, Wasilla and Willow. An agent trained 25 representatives from clinics, agencies and tribal organizations to offer chronic disease or diabetes self-management programs.

Results

Over 300 participants in Wasilla area StrongWomen groups are estimated to have continued over a year, with 62 continuing for five years, 31 for seven years and seven for 11 years. 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. Ten participants in Bethel have continued over a year. Thirty-three participants in Fairbanks have continued over a year, including a few involved for almost a decade. In Anchorage, at least 20 participants have continued over a decade. A few years ago, a self-described "unhealthy" participant tried a spinning activity organized by a change club that included the Kenai agent. It resulted in a lifestyle change, and the client has continued to exercise

going on three years. He told one of the organizers of the original activity, "you saved my life."

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Outcome 2: Increase consumer knowledge about home energy efficiencies.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	399

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

To manage costs, Alaskans want to keep winter heat loss to a minimum in their homes. This is a challenge, particularly in rural areas where some Alaskans rely on diesel generators. Natural gas is not yet available statewide, and wood burning has caused concerns about air quality. Many look for ways to make their home "tighter," which can be more energy efficient. But tight homes allow for less clean air circulation and higher concentrations of radon, a rare radioactive gas that can cause lung cancer over time. Thus, homeowners should be educated about radon and air quality in conjunction with building efficiency.

What has been done

The energy specialist maintained an energy blog with periodic posts about energy efficiency. Extension maintained a wood energy website that covers topics like BTUs and stove choice and offers an online heating cost calculator. Two agents held 16 workshops on radon, four workshops on wood energy, one on nanogrid energy and two workshops on indoor air quality with a combined total of 399 public contacts. Awareness of radon was raised through outreach at builder's and sports shows, energy fairs, health fairs, science fairs and state fair booths.

Results

Participants learned about what potential sources of energy they might use to lower heating costs and how to balance those choices with protecting their health. The Alaska wood energy website received 52,976 hits and there were 239 visits to the Alaska Wood Energy Conference website. Clients performed tests in their homes and shared the results with the energy specialist, who continued to track levels across the state and offer mitigation advice. Further information on classes such as biochar 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 #3

1. Outcome Measures

Outcome 3: 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
2018	914

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. The state has an average of at least one death every three years, and multiple cases were documented in 2018. 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

Agents delivered 62 food preservation and food safety workshops with 914 client contacts in 21 communities from Nome to Sitka. Topics covered everything from canning salmon to pickling fireweed shoots. The Bethel agent continued researching possible causes of lead exposure in his region, which resulted in multiple presentations about lead ammunition and game meat.

Results

Participants in food preservation classes immediately build skills through hands-on training with equipment. The majority of respondents surveyed after food preservation and safety classes indicated increased knowledge and confidence. Clients had 450 canner gauges tested with many needing adjustment and some needing replacement, highlighting the importance of this service. X-rays of muscles from animals killed using lead ammunition demonstrated a high degree of intra-muscular lead fragmentation, resulting in an heretofore unconsidered source of dietary lead consumption among subsistence hunters and their families.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
504	Home and Commercial Food Service
723	Hazards to Human Health and Safety

Outcome #4

1. Outcome Measures

Outcome 4: 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
2018	7

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

Extension maintains a DEC-certified test kitchen in Fairbanks that is open to the public for

hourly rental for events, catering or small food production. This allows producers access to a permitted kitchen while they get their businesses off the ground. Five entrepreneurs in FY18 rented Extension's test kitchen to increase production capacity for their local food businesses. The kitchen was used for everything from nut and coffee roasting to catering preparations.

Results

Use of the kitchen allows the client to continue to prepare and market both food and non-food products made with locally harvested ingredients put into grab-and-go meals, teas, coffees, trail mixes, chocolate bars, tinctures and soap. One business owner wrote that use of the DEC-approved kitchen is "allowing us to maximize both quality and safety for our customers." Two of the kitchen users have their products for sale right down the road in the "Alaska Made" food section of a local feed store. Another entrepreneur using the kitchen recently bought a food truck. Demand for small food business information continued across the state; a Juneau agent also had 21 consultations with food entrepreneurs.

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 5: 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
2018	2108

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 one-time and multipart programs at public schools, Head Start programs, shelters, WIC programs, community centers, public housing an libraries that reached a combined total of 1957 adults and youth. Agents provided six workshops for 151 contacts on menu planning, 15-minute meals, vegetables, beans and more.

Results

Nutrition educators delivered 80 single-session courses and 93 series-based sessions. A total of 657 youth and 35 adults involved in series completed pre-post surveys in FY18. Among youth, almost a third of students in grades 3-5 and more than half of students in grades 6-8 reported increased vegetable consumption as a result of their participation. Fruit consumption rose 28 percent in the grades 3-5 group and 40 percent in the grades 6-8 group. Adults also showed a moderate increase in healthy food choices, with about 30 percent increasing vegetable intake and 40 percent reporting increased fruit consumption.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Outcome 6: 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
2018	50

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

The nutrition educator in Anchorage managed community gardens with several housing sites, where garden produce is shared with facility residents. In addition to nutrition lessons and food demonstrations, the educator used a tasting "passport" system to incentivize youth to try new vegetables. 4-H leaders also assisted 39 youth with nutrition projects, and nutritious food preparation was modeled at camps and after school activities. The Juneau agent led four "wild kitchen" sessions, and the recipes and walks helped 80 adults and youth increase their ability to identify and prepare foraged foods.

Results

The Bethel nutrition educator provided direct education to a learning academy and farm-to-meal program at a 4-H garden, including a 10-session nutrition course with a youth cooking club. Feedback included that "After planting pea seeds, some kids requested peas over corn, which had never happened before." Community partnerships in Bethel led to new locations for a food bank and summer meal program, as well as increased fruit and vegetable access for shelter residents. Half of youth encouraged to try radishes at a tasting passport event ate more than one. Comments from adult participants in nutrition education with positive attitude change included,"It's been very helpful to understand what's good for us and why we need it, to feel better, think better." A grandmother in the Mat-Su area who cooks for a family of 10 said she was excited to introduce new vegetables to her grandkids.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Outcome 7: Increase knowledge, attitudes, skills and aspirations to increase physical activity habits. Counting number of youth.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	4012

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 percent compared to a national average of 29 percent reporting physical activity for at least 60 minutes on each of the past seven 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 1468 youth. Educators also worked with teachers and staff to encourage activity among youth at eligible low-income sites. The Alaska 4-H program offered 2544 youth across the state in clubs, camps and afterschool programs a number of projects that emphasized physical activity, including fitness and sports skills and healthy living. Activities included hiking, dance, shooting sports, rock climbing, skiing, camping, martial arts, dog mushing, yoga and more.

Results

Nutrition educators delivered 80 single-session courses and 93 series-based sessions using an evidence-based curricula with a physical activity component. A total of 657 youth and 35 adults involved in series completed pre-post surveys in FY18. Among youth in grades 3-8, 21 percent reported an increase in their physical activity as a result of their participation in direct education. About a quarter of adult participants saw an increase as well. Nutrition educators also partnered with parks and recreation centers, city or regional planning groups, nonprofits and more, and helped communities identify needs for improved access and supports for physical activity opportunities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Alaska continues to be 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. About 40 percent of SNRE funding comes from the

state. Between 2014 and 2018, the university system's budget dropped from $378 million to $317 million. SNRE, in particular, has faced difficulties with the combination of budget cuts and fixed-cost increases. Services like nutrition labeling and recipe development remain discontinued. FY18 saw the retirement of a home economist that had been with the program for decades, and the departure of the Nome agent who had provided outreach on issues of family safety and diversity. Neither position was replaced.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Of the nine participants in a fall food preservation basics workshop, eight responded and rated the instructor's approach as engaging and feedback as useful (4.43 and 4.71 on a 5-point scale with 5 as strong agreement). Feedback from respondents included that several were new to canning and felt they had gained skills and confidence. Six stated an intent to do more canning after the class. There was a positive change in knowledge on all five stated objectives including how to create a safe product, correct temperatures and processing time, steps for boiling water canner use, jar storage and confidence in using a canner.

Of eight participants responding to another post-workshop survey on food preservation, seven rated themselves as quite or very confident about preserving food safely after the hands-on class, with the other participant indicating they were somewhat confident. Six of the participants reported using a boiling water canner to preserve food during the year, and five used a pressure canner. Food preserved after the class by participants included home grown vegetables, fish, game and wild and garden-grown berries. Changes to practices reported after the class included keeping better records, being more cautious with recipes, and starting or continuing food preservation with more confidence.

Twelve out of 13 attendees in a jarred fish workshop responded to a survey and all rated the workshop as very good or excellent. Eight stated an intention to use the information within the next few weeks or months. Twelve of 14 attendees in a canning fruits and tomatoes workshop responded to a survey in which they all rated the workshop as very good or excellent and all stated an intention to continue canning after the class. They also expressed an interest in attending future classes. Several indicated a beneficial change in knowledge about the acidity levels of tomatoes.

A total of 657 youth and 35 adults involved in series completed pre-post surveys in FY18. Among youth, almost a third of students in grades 3-5 and more than half of students in grades 6-8 reported increased vegetable consumption as a result of their participation. Fruit consumption rose 28 percent in the grades 3-5 group and 40 percent in the grades 6-8 group. Adults also showed a moderate increase in healthy food choices, with about 30 percent increasing vegetable intake and 40 percent reporting increased fruit consumption. Among youth in grades 3-8, 21 percent reported an increase in their physical activity as a result of their participation in direct education. About a quarter of adult participants saw an increase as well.

Four trainees in the Certified Food Protection Manager program responded to a follow-up survey about changes to their job and practices. Respondents indicated an estimated cost savings of a thousand dollars by being able to take the training via video conference instead of face-to-face. One respondent indicated the training allowed them to keep their job. Comments included that the class was a good option for people who are new to food service and not previously certified, but may be too heavy on basic concepts for people merely renewing a certification.

Key Items of Evaluation

Attendees continue to improve job prospects through food safety trainings. Nutrition educators reached out to underserved groups and improved the physical activity frequency and vegetable and fruit consumption of clients. Extension continues to provide resources that allow small foods businesses to flourish.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Climate Change

☑ 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%		50%	
132	Weather and Climate	10%		50%	
807	Disaster Preparedness, Mitigation, Response, and Recovery	80%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	4.0	0.0
Actual Paid	0.7	0.0	0.2	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**
9802	0	38799	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
8124	0	9768	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	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 focused on climate change adaptation as it relates to communities, including emergency preparedness in the face of extreme weather events.

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 to help all citizens adapt and become resilient as the climate changes. Advisors and the target audience included various emergency planning organizations, USDA Natural Resource Conservation Service, the Alaska Department of Natural Resources, borough governments and Alaska Native corporations.

3. How was eXtension used?

The use of eXtension resources in FY18 has been valuable to Extension outreach in Alaska. Three agents were members of the Extension Disaster Education Network Delegates Community of Practice (CoP). Another agent was a member of the Climate, Forests and Woodlands CoP.

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	512	0	244	0

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Output 1. Soils research will concentrate on the 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
2018	3

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.

Year	Actual
2018	1

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
2018	6

Output #5

Output Measure

- Output 5. Research providing base line data for modeling timber availability will continue. Forest management specific to fuel/energy demand drives the research. Measurable outputs will be publications and presentations.
  Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Output 6. Recreation opportunities are important in urban and rural forests. Recreation

management in Alaska are primarily tied to national and state parks and forest. Measurable outputs are publications and presentations.

Year	Actual
2018	8

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 knowledge through classroom and field course delivery. The outcome measures will be curricula delivered and number of students reached.
3	Outcome 3. Respond to community and individual knowledge needs 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.
4	Outcome Measure #4: Demonstrate effective collaboration between research and Extension to resolve issues.

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
2018	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Water quality is increasingly threatened as human populations grow, industrial and agricultural activities expand, and climate change threatens to significantly alter water flow and distribution. With climate change deteriorating Alaska's ice and permafrost, soil and groundwater contamination is emerging as a great concern. Non-Newtonian fluids, or those with non-constant viscosity, present a possible avenue for better addressing soil contaminants. However, the flow of such fluids like Guar gum solution has not been well studied in cold temperatures.

What has been done

Viscosity differences and other characteristics of various concentrations of Guar gum and Xantham gum were tested at five different temperatures. Equipment including an OFITE model 900 viscometer and Tantec contact angle meter were used to record changes. Based on initial results, three temperatures were chosen to study flow characteristics of both Newtonian and non-Newtonian fluids, and those flow experiments are in progress.

Results

Interdisciplinary collaboration and sharing of results with the winder scientific community will better inform soil remediation efforts. In terms of viscosity change, Xantham gum was found to be more insensitive to temperature than Guar gum. Progress and results were presented to audiences at a university Water and Environmental Research Center seminar and an American Geophysical Union fall meeting. A graduate student in Geological Engineering is producing a thesis from this project.

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 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
2018	153

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 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 FY18, there were 33 students in NRM 101, and 21 students in NRM 210. There were 12 students in NRM 111, an introduction to sustainability science. There were 15 students in NRM 277, an introduction to conservation biology that covered ecological developments and the status of important habitats and endangered species. There were 22 students in NRM 375, natural resource ecology. There were 28 students in NRM 403 on environmental decision making. Five students completed NRM 595 on signs of arctic change. Seven students completed NRM 647 on global to local sustainability, and 10 students completed NRM 697 on resilience and citizen science. One student was recognized for a dean's choice award for a research poster on changes to shrub cover and consequences for wildlife. Another student completed their dissertation on

arctic transitions and sustainability modeling.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate

Outcome #3

1. Outcome Measures

Outcome 3. Respond to community and individual knowledge needs 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
2018	5

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

Extension kept abreast of research-based best practices through its relationship with the Extension Disaster Education Network. 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. Another researcher has taken on grant work to create climate change educator trainings in Alaska.

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. A publication on how to prepare and respond to a natural disaster in Alaska saw 95 new downloads in FY18. The energy specialist maintained a blog that addresses issues like climigration and energy effects on climate, and helped communities better connect with their Local Emergency Planning Committees. Workshops covered topics like emergency energy, emergency food, and disaster preparation for seniors.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
807	Disaster Preparedness, Mitigation, Response, and Recovery

Outcome #4

1. Outcome Measures

Outcome Measure #4: Demonstrate effective collaboration between research and Extension to resolve issues.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities

Brief Explanation

Alaska continues to be 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. About 40 percent of SNRE funding comes from the state. Between 2014 and 2018, the university system's budget dropped from $378 million to $317 million. SNRE, in particular, has faced difficulties with the combination of budget cuts and fixed-cost increases.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Attendees were surveyed at a two-part training on climate change education. The morning session covered climate change basics and asked respondents use a retrospective pre-post instrument to rate their knowledge of climate change in Alaska before and after the session. Three of the 11 respondents indicated a change in knowledge; the majority of respondents already had a basic understanding of climate change and were interested in networking. Comments on how they planned to use the information included facilitating dialogue with skeptics and highlighting scenario planning. The afternoon session covered

communicating about climate change efforts. Of the nine respondents, five who did not previously have an elevator pitch about climate change agreed they had one after the workshop, and three improved their confidence about getting others involved in climate change efforts.

Public feedback was collected at three fairs to assess the general interest of adults in receiving more forestry-related information from Extension. Of the 61 adult responses, the majority (40) indicated an interest in foraging information, such as how to identify and harvest berries or mushrooms from local forests. The next most popular topic was climate, with 27 respondents indicating an interest in learning the effects of climate change on Alaska's forests. Thirty-three respondents indicated they had not previously used Extension to gather forest-related information, with many noting that they either had not heard of Extension or did not know it was a resource for forestry information. While 14 were not interested in a future forestry workshop or training, 36 did indicate they would be interested in expanding their general knowledge about forestry, such as judging the health of trees. Feedback included "great service" and "additional public information about wildfire prevention would benefit Alaskans."

Key Items of Evaluation

Climate change is affecting Alaska's forest health and wildfire risk. Members of the public have indicated an interest in receiving more information about climate change effects from Extension and research. Grassroots efforts to increase climate literacy are gaining momentum.

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
802	Human Development and Family Well-Being	10%		0%	
806	Youth Development	80%		0%	
903	Communication, Education, and Information Delivery	10%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	8.5	0.0	0.0	0.0
Actual Paid	13.7	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**
349875	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
27830	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
301540	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

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

3. How was eXtension used?

The use of eXtension resources in FY18 has been valuable to Extension outreach in Alaska. 4-H agents maintained memberships in communities of practice (CoPs) including Diversity & Inclusion Issue Corps, Horsequest, Makers and Internationalizing Extension.

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	11309	45086	10935	19322

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2018	534

Output #2

Output Measure

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

Year	Actual
2018	150

Output #3

Output Measure

- Output 3: 4-H will offer opportunities for engagement with underserved and minority youth. Measure will be the number of opportunities offered in underserved areas and number of culturally responsive programs.

Year	Actual
2018	41

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
2018	37

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
2018	59

Output #6

Output Measure

- Output 6. Integrated activity on childhood obesity will lead to new knowledge. Measure will be databases and publications.

Year	Actual
2018	1

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 demographic parity.

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
2018	23

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. Volunteer forums and audio conferences also include Essential Elements.

Results

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. Staff and program assistants with the Alaska 4-H program received information on the Essential Elements and incorporated that information into their program designs in order to facilitate belonging, generosity, independence and mastery for their constituents. Throughout the year, faculty, staff and volunteers have access to resources on the state 4-H website on related topics such as life skills and positive youth development research from Tufts.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development
903	Communication, Education, and Information Delivery

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
2018	534

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 use of 4-H Common Measures to assess whether youth are being effectively engaged, and oversaw 34 projects on community service, service learning and volunteerism.

Results

4-H'ers across districts 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, 440 adult volunteers and 94 youth volunteers in FY18 provided opportunities for engagement of all kinds, from dance to gardening to science

programming.

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 demographic parity.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Alaska is a uniquely diverse state. For example, CNN reported in 2015 that Alaska has the top three most diverse census tracks in all of the U.S. 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 guidance from caring adults in underserved locations like Dillingham and Bethel. 4-H offered programming to 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

The most recent ES237 showed that representation of 4-H youth in Alaska exceeded parity in the areas of Hispanic or Latino youth and Native Hawaiian or other Pacific Islander youth. Approximately 59 percent of the youth enrolled in Alaska 4-H identify as white only, which is

within 2 percent of parity for youth ages 5 to 19 in the state. Culturally relevant programming such as fur trapping, dog mushing, skin sewing, birding and culture camps allows youth to celebrate cultural traditions and build a stronger community identity.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

Alaska continues to be 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. About 40 percent of SNRE funding comes from the state. Between 2014 and 2018, the university system's budget dropped from $378 million to $317 million. SNRE, in particular, has faced difficulties with the combination of budget cuts and fixed-cost increases. FY18 saw the retirement of the state 4-H program leader. The position was not replaced, with responsibilities taken on by a district agent.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A survey of participants at a session for military educators garnered 54 responses. Trainees rated the instruction highly, with an average score of 4.9 on a 5-point scale where 5 indicates the instructor was knowledgable. Responses also indicated instructor explanations added value to the lecture materials. The majority of respondents rated their learning as "more than expected" and indicated the training will be "very useful" to their daily job. In an open-ended question about what participants will take away from the training, several educators mentioned that they improved their lesson planning skills. Other take-aways included better time management, teamwork/partnerships, new ideas for healthy living activities, and ability to relate classroom activities to 4-H life skills. One attendee wrote that they learned "how awesome 4-H is!" and another said they will encourage more staff to join 4-H.

Volunteer leaders were surveyed for program planners to gain an updated understanding of leaders' training needs. Of the 38 responses, 14 indicated they would be willing to travel anywhere in state to receive training, while 10 preferred to stay within their own town and village. This indicated that continued use of videoconferencing is necessary. The majority of respondents, 32, indicated they would have reliable access to attend via web if they could not make the training in person. Over half, or 22 respondents, prefer annual training, while 36 percent felt biennial would be sufficient. Most respondents preferred early spring (January, February or March) for trainings, which corresponds to a

less busy time for those who facilitate livestock projects. When asked about the educational areas related to 4-H they would be interested in learning about, the most popular responses were livestock, outdoor sports and record books.

Key Items of Evaluation

Agents facilitated positive youth development and trained caring adults to provide a supportive environment for 4-H participants. Youth developed valuable peer relationships and built leadership skills. Educators learned how to build life skills into lesson plans, and partnerships with military installations were strengthened.

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	10%		0%	
125	Agroforestry	5%		0%	
131	Alternative Uses of Land	5%		0%	
511	New and Improved Non-Food Products and Processes	80%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	0.0	0.0
Actual Paid	1.1	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**
79867	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
76966	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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 researchers, and undergraduate and graduate students. Efforts were directed toward environmentally, economically sustainable development and conservation of our natural resources that benefit citizens and help them adapt and become resilient as the climate changes. Advisors and stakeholders included various forestry organizations, greenhouse managers, Alaska Farm Bureau, the Alaska Wood Energy Task Force, Alaska Energy Authority, the Alaska Department of Natural Resources, borough governments and Alaska Native corporations.

3. How was eXtension used?

eXtension was not used in this program.

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	251	1140	78	60

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2018	19

Output #2

Output Measure

- Output 2: Community, organizations and one-on-one consultation concerning bio-based energy opportunities conducted.

Year	Actual
2018	53

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Outcome 1: Maintain a forestry biomass database.
2	Outcome 2: Monitor adoption of bioenergy technologies.
3	Outcome 3: Increase community awareness about the use of biomass and other sustainable energies.

Outcome #1

1. **Outcome Measures**

Outcome 1: Maintain a forestry biomass database.

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

Outcome 2: Monitor adoption of bioenergy technologies.

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Outcome 3: Increase community awareness about the use of biomass and other sustainable energies.

2. **Associated Institution Types**

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	231

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. 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

The energy specialist held biomass, biochar and greenhouse-heating presentations for contacts at venues like the experiment farm and conferences. The energy specialist also conducted workshops for 231 participants on wood burning, greenhouse heat, gasification, solar energy and biochar in five different Alaska communities. The energy specialist and two research engineers from the Alaska Center for Energy and Power revised an Alaska-specific solar design manual. The manual was originally created in 1981 by a former extension agent and is in its fifth edition.

Results

An interdisciplinary partner provided preliminary information to interested community members, including tribal leaders and decision-makers at the Alaska Village Cooperative (AVEC). Required social capital will be evaluated for AVEC to determine what is needed for their viability as a candidate for use of a biomass-fired combined heat-and-power system. Applications of these findings have the potential to contribute to energy self-sufficiency, job creation, local food production, student learning and engagement, and climate change mitigation. The updated solar guide was made available to the public for a nominal fee and includes information on solar design, components, current standards and codes, solar economics and financing, solar heating technologies, passive solar heating, and active solar water heating.

4. Associated Knowledge Areas

KA Code	Knowledge Area
125	Agroforestry
511	New and Improved Non-Food Products and Processes

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

Brief Explanation

Alaska continues to be 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. About 40 percent of SNRE funding comes from the state. Between 2014 and 2018, the university system's budget dropped from $378 million to $317 million. SNRE, in particular, has faced difficulties with the combination of budget cuts and fixed-cost increases. In FY18, there were no research FTEs allocated to the sustainable energy area.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Workshop attendees were able to gain hands-on experience enhancing greenhouse heating options. Demonstrations were held at public events with a Gasification

Experimenter's Kit (GEK) biomass gasifier. Results of sustainable energy outreach efforts came primarily in the form of capacity building, as connections were made with multiple community organizations that can help further the awareness of biomass potential in the state.

A needs assessment survey of landowners was conducted and 17 landowners responded, with 15 indicating they were interested in a workshop or training about forestry to help them expand their knowledge, process firewood, learn management practices, or develop in their career. Eleven indicated they had not previously used Extension for forestry resources, with many mentioning that they had not heard of Extension before or did not know it offered forest-related information. Respondents rated fire risk and pest damage as their greatest concerns, and most were interested in better managing their lands for firewood productivity and sustainability. Twelve provided contact information to receive follow-up information on wood energy-related topics.

Key Items of Evaluation

Public awareness was raised of biomass uses in Alaska. Landowners indicated increased awareness of Extension forestry and wood energy resources and plan to seek more information on sustainable forest management.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
193	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
3	Number of new crop varieties, animal breeds, and genotypes whit 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.