

Alaska's Natural Resources and Extension (SNRE) Report

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Executive Summary

Introduction

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

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- 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)

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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

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- 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

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 haroups

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.

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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.

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| 2 | Natural Resources and Community Development |
| 3 | Healthy Individuals, Families and Communities |
| 4 | Climate Change |
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| 6 | Sustainable Energy |

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Agriculture and Food Security

Reporting on this Program

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1. Program Knowledge Areas and Percentage

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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.

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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.

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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.

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

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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.

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

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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.

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

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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.

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| 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 |

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

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Change in Action Outcome Measure

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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 s Li

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.

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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."

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| 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 |

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

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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.

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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.

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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.

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| 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 |

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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.

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

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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.

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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.

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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.

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| 302 | Nutrient Utilization in Animals |
| 305 | Animal Physiological Processes |
| 601 | Economics of Agricultural Production and Farm Management |

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- 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.)

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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.

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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.

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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.

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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

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| &\$%, | 8]fYWh'7 cbhUWhg 5Xi`hg | -bX]fYWh'7 cbhUWhg 5Xi`hg | 8]fYWh'7 cbhUWhg Mci h\ | -bX]fYWh'7 cbhUWhg Mci h\ |
|------------------|------------------------------------|--------------------------------------|------------------------------------|--------------------------------------|
| 5Wh i U' | 1904 | 15675 | 565 | 825 |

**&"B i a VYf'cZ' DUhYbh'5 dd']WUh]cbg'G i V a]hhYX'flGhUbXUfX' FYgYUfW\`C i h d i h k
DUhYbh'5 dd']WUh]cbg'G i V a]hhYX**

Year: 2018

Actual: 0

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'""DiV']WUh]cbg'flGhUbXUfX' ; YbYfU`C i h d i h' AYUg i fYl

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

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| 2018 | 55 |

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

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| 2018 | 36 |

Jfl ; L" GhUhy' 8YZ]bYX' C i hWc a Yg

J" GhUhy' 8YZ]bYX' C i hWc a Yg' HUV' Y' cZ' 7 cbhYbh

| C" Bc' | CIH7CA9'B5A9 |
|---------------|---|
| 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. |

Outcome 3: Increase the recruitment and retention of youth and college-age students appreciating and considering natural resource management '

C i h W c a Y' %

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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.

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1862 Extension

1862 Research

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Change in Action Outcome Measure

' V'' E i U b h j h U h j j Y' C i h W c a Y

MYUf 5WhiU'

2018 55

' W'' E i U' j h U h j j Y' C i h W c a Y' c f' = a d U W h' G h U h Y a Y b h

= g g i Y' ~ U h j X Y G

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.

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?5`7cXY ?bc k`YX[Y' 5fYU

- 111 Conservation and Efficient Use of Water
- 112 Watershed Protection and Management
- 123 Management and Sustainability of Forest Resources
- 134 Outdoor Recreation

CihWcaY` &

%"" CihWcaY`AYUgifyg

Outcome 2: Increase and maintain the number of integrated and multistate research-Extension activities. Measure will be number of activities.

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- 1862 Extension
- 1862 Research

'U"" CihWcaY`HmdY.

Change in Action Outcome Measure

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| MYUf | 5Wh i U` |
|------|----------|
| 2018 | 15 |

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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.

K \Uh` \Ug`VYYb`XcbY

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.

FYg i`hg

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.

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| 111 | Conservation and Efficient Use of Water |
| 112 | Watershed Protection and Management |
| 123 | Management and Sustainability of Forest Resources |
| 134 | Outdoor Recreation |

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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.

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- 1862 Research

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Change in Action Outcome Measure

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| MYUf | 5Wh i U` |
| 2018 | 1042 |

'W`` E i U`]h U h]j Y`C i h W c a Y`c f`= a d U W h`G h U h Y a Y b h

=gg i Y`f i K`c`WUfYg`UbX`K`m k

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.

K \Uh \Ug VYYb XcbY

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.

FYg i`hg

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.

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| 112 | Watershed Protection and Management |
| 123 | Management and Sustainability of Forest Resources |
| 134 | Outdoor Recreation |

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

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- 1862 Extension
- 1862 Research

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Change in Action Outcome Measure

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| MYUf | 5Wh i U` |
| 2018 | 171 |

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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.

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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.

FYg i`hg

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 of 103 trees.

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| 111 | Conservation and Efficient Use of Water |
| 112 | Watershed Protection and Management |
| 123 | Management and Sustainability of Forest Resources |
| 134 | Outdoor Recreation |

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

Not Reporting on this Outcome Measure

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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.)

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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

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DUhYbh'5 dd']WUh]cbg'G i V a]hhYX**

Year: 2018

Actual: 0

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'""DiV']WUh]cbg'flGhUbXUfX' ; YbYfU`C i h d i h' AYUg i fYl

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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.

| MYUf | 5Wh i U' |
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| 2018 | 105 |

C i h d i h' &

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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.

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| 2018 | 9 |

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

MYUf
2018

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62

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J" GhUhY' 8YZ]bYX' C i hWc a Yg' HUV' Y' cZ' 7 cbhYbh

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|---------------|--|
| 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. |

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

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| 703 | Nutrition Education and Behavior |
| 724 | Healthy Lifestyle |

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Outcome 2: Increase consumer knowledge about home energy efficiencies.

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

FYg i`hg

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 intramuscular lead fragmentation, resulting in an heretofore unconsidered source of dietary lead consumption among subsistence hunters and their families.

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| 502 | New and Improved Food Products |
| 504 | Home and Commercial Food Service |
| 723 | Hazards to Human Health and Safety |

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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.

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1862 Extension

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Change in Action Outcome Measure

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| 2018 | 7 |

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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.

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

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 and 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.

FYgihg

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.

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| 703 | Nutrition Education and Behavior |
| 724 | Healthy Lifestyle |

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Outcome 6: Youth and families have a more positive attitude toward healthful foods and/or willing to try new foods. Counting number of families.

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Change in Action Outcome Measure

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| 2018 | 50 |

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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.

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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.

FYg i`hg

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.

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| ?5`7cXY | ?bc k`YX[Y`5fYU |
| 504 | Home and Commercial Food Service |
| 703 | Nutrition Education and Behavior |
| 724 | Healthy Lifestyle |
| 801 | Individual and Family Resource Management |

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

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Change in Knowledge Outcome Measure

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| 2018 | 4012 |

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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.

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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.

FYg i`hg

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

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.

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9 jU` i Uh]cb'FYg i`hg

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

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.

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.

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The target audience included producers and consumers, communities and small business entrepreneurs, individuals and groups concerned about the quality of the Alaska environment, public

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

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2018

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J" GhUhY' 8YZ]bYX' C i hWc a Yg' HUV' Y' cZ' 7 cbhYbh

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|---------------|--|
| 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. |

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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.

arctic transitions and sustainability modeling.

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?5`7cXY ?bc k`YX[Y`5fYU
132 Weather and Climate

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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.

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1862 Extension
1862 Research

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Change in Knowledge Outcome Measure

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MYUf 5Wh i U`
2018 5

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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.

K`Uh`Ug`VYb`XcbY

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.

FYg i`hg

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."

?Ym'=:hY a g'cZ'9 jU' iUh]cb

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.

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Dfc [fUa ')

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Youth Development

Reporting on this Program

Jf6L''Dfc [fUa ' ?bck`YX [Y'5fYUflgŁ

1. Program Knowledge Areas and Percentage

| ?5 7cXY | ?bck`YX [Y'5fYU | 1%, *& 9lhYbg]cb | 1%, -\$ 9lhYbg]cb | 1%, *& FYgYUfW\ | 1%, -\$ FYgYUfW\ |
|--------------------|---|---------------------------------|------------------------------|--------------------------------|-----------------------------|
| 802 | Human Development and Family Well-Being | 10% | | 0% | |
| 806 | Youth Development | 80% | | 0% | |
| 903 | | | | 0% | |

2018 University of Alaska Combined Research and Extension Annual Report of Accomplishments and Results

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|------------------|-------------------|-----------------|--------------|
| &\$%, | 9 lhYbg]cb | FYgYUfW\ | HchU' |
| 5Wh i U' | 0 | 0 | 0 |

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C i h d i h' H U f [Y h

C i h d i h' %

C i h d i h' A Y U g i f Y

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

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| MYUf | 5Wh i U' |
| 2018 | 534 |

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C i h d i h' A Y U g i f Y

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

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|-------------|-----------------|
| MYUf | 5Wh i U' |
| 2018 | 150 |

C i h d i h' '

C i h d i h' A Y U g i f Y

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.

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| MYUf | 5Wh i U' |
| 2018 | 41 |

C i h d i h' (

C i h d i h' A Y U g i f Y

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

| | |
|-------------|-----------------|
| MYUf | 5Wh i U' |
| 2018 | 37 |

C i h d i h')

C i h d i h' A Y U g i f Y

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.

MYUf
2018

5WhiU
59

C i h d i h *

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J" GhUhY' 8YZ]bYX' C i hWc a Yg' HUV' Y' cZ' 7 cbhYbh

| C" Bc' | CIH7CA9'B5A9 |
|---------------|---|
| 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. |

programming.

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? 5`7cXY ?bc k`YX[Y` 5fYU
806 Youth Development

CihWcaY`

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

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1862 Extension

'U"" CihWcaY`HmdY.

Change in Action Outcome Measure

'V"" E i Ubh]hUh]jY`CihWcaY

| MYUf | 5Wh i U` |
|-------------|-----------------|
| 2018 | 2 |

'W"" E i U`]hUh]jY`CihWcaY`cf`= a dUWh`GhUhY a Ybh

=gg i Y`flK\c`WUfYg`UbX` K \mł

Alaska is a uniquely diverse state. For example, CNN reported in 2015 that Alaska has the top three most diverse census tracts 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.

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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.

FYg i`hg

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.

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? 5`7cXY ?bc k`YX[Y' 5fYU

802 Human Development and Family Well-Being

806 Youth Development

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9 IhYfbU`ZUWhcfg' k \]W\ 'UZZYWhYX'c i hWc a Yg

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.

?Ym`hY a g`cZ`9 jU` i Uh]cb

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.

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Dfc [fUa ' '*

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Sustainable Energy

Reporting on this Program

Jf16L''Dfc [fUa ' ?bck'YX [Y'5fYUflg

1. Program Knowledge Areas and Percentage

| 7cXY | ?bck'YX [Y'5fYU | 1%, *& 9lhYbg]cb | 1%, -\$ 9lhYbg]cb | 1%, *& FYgYUfW\ | 1%, -\$ FYgYUfW\ |
|------|---|------------------|-------------------|-----------------|------------------|
| 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% | |
| | HchU' | 100% | | 0% | |

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| MYUf.'&\$%, | 9lhYbg]cb | | FYgYUfW\ | |
|--------------------|-----------|--------|----------|--------|
| | %, *& | %, -\$ | %, *& | %, -\$ |
| D'Ub | 1.0 | 0.0 | 0.0 | 0.0 |
| 5WhiU''DU]X | 1.1 | 0.0 | 0.0 | 0.0 |
| 5WhiU''Jc' i bhYYf | 0.0 | 0.0 | 0.0 | 0.0 |

&''5WhiU''Xc''Ufg'YIdYbXYX']b'h\]g'Dfc [fUa 'fl]bW' iXYg'7Uffmc jYf' : i bXg'Zfc a'dfY]j]c i g'mYUfg

| 9lhYbg]cb | | FYgYUfW\ | |
|--------------------|------------------|-----------------|------------------|
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| 79867 | 0 | 0 | 0 |
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| 76966 | 0 | 0 | 0 |
| %, *& 5''Ch\Yf | %, -\$ 5''Ch\Yf | %, *& 5''Ch\Yf | %, -\$ 5''Ch\Yf |
| 0 | 0 | 0 | 0 |

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6fjYZ'XYgWf]dh]cb'cZ'h\Y'5Wh]j]hm

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.

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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.

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eXtension was not used in this program.

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| &\$%, | 8]fYWh'7'cbhUWhg 5Xi'hg | =bX]fYWh'7'cbhUWhg 5Xi'hg | 8]fYWh'7'cbhUWhg Mc'ih\ | =bX]fYWh'7'cbhUWhg Mc'ih\ |
|---------|----------------------------|------------------------------|----------------------------|------------------------------|
| 5Wh'iU' | 251 | 1140 | 78 | 60 |

**&'B'ia'VYf'cZ'DUhYbh'5dd']WUh]cbg'G'iv'a]hhYX'fiGhUbXUfX'FYgYUfW\ 'C'ihd'ihl
DUhYbh'5dd']WUh]cbg'G'iv'a]hhYX**

Year: 2018
Actual: 0

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| 5Wh'iU' | 0 | 0 | 0 |

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

| MYUf | 5Wh i U' |
|-------------|-----------------|
| 2018 | 19 |

C i h d i h ' &

C i h d i h ' A Y U g i f Y

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

| MYUf | 5Wh i U' |
|-------------|-----------------|
| 2018 | 53 |

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J" GhUhY' 8YZ]bYX' C i hWc a Yg' HUV' Y' cZ' 7 cbhYbh

| C" Bc' | CIH7CA9'B5A9 |
|---------------|--|
| 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. |

C i h W c a Y' %

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Outcome 1: Maintain a forestry biomass database.

Not Reporting on this Outcome Measure

C i h W c a Y' &

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Outcome 2: Monitor adoption of bioenergy technologies.

Not Reporting on this Outcome Measure

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

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1862 Extension

' U'' C i h W c a Y' H m d Y.

Change in Knowledge Outcome Measure

' V'' E i U b h j h U h j j Y' C i h W c a Y

| MYUf | 5Wh i U' |
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| 2018 | 231 |

' W'' E i U' j h U h j j Y' C i h W c a Y' c f' = a d U W h' G h U h Y a Y b h

= g g i Y' f i K \ c' W U f Y g' U b X' K \ m k

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.

K \ U h' \ U g' V Y Y b' X c b Y

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.

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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.

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125 Agroforestry

511 New and Improved Non-Food Products and Processes

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9 IhYfbU`ZUWhcfg`k \]W\`UZZYWhYX`c i hWc a Yg

Economy

Appropriations changes

Public Policy changes

Government Regulations

Competing Public priorities

Competing Programmatic Challenges

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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.

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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.

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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.

