

## 2019 Annual Report of Accomplishments and Results

### I. Report Overview

The NIFA reviewer will refer to the executive summary submitted in your Plan of Work. Use this space to provide updates to your state or institutions as needed.

Merit and Scientific Peer Review Processes

## II. Stakeholder Input

The NIFA reviewer will refer to your Plan of Work. Use this space to provide updates as needed or activities that you would like to bring to NIFA's attention.

Stakeholder Input Aspects	Updates
<p>1. Actions taken to seek stakeholder input that encouraged their participation with a brief explanation</p>	<p>In addition to providing traditional feedback options including email, surveys, open houses and discussions, IANRE has increasingly utilized citizen science activities to engage stakeholders in local agriculture topics. Such activities make use of faculty-designed phone applications to enhance the experience, such as Grow &amp; Tell and Alaska Weeds ID. Smartphone apps are a contemporary way to</p>

### III. Planned Program Table of Contents

No.	Program Name in order of appearance
1.	Agriculture & Food Security
2.	Natural Resources, Ecosystems & Sustainable Energy
3.	Healthy Individuals, Families & Communities
4.	4-H & Youth Development

### V. Planned Program Activities and Accomplishments

Please provide information for activities that represent the best work of your institution(s). See Section V of the Guidance for information on what to include in the qualitative outcomes or impact statements. Add additional rows to convey additional accomplishments. You may expand each row as needed.

No.	Title or Activity Description	Outcome/Impact Statement	Planned Program Name/No.
1.	IANRE increases Alaskan agronomic crop producers' ability to understand and assess best management practices of cereal crop producti		

		<p>were all compared to standard test varieties. Field experiments were carried out at Palmer and Fairbanks experiment farms, with weather data collected at a Delta site. The research team compared six machine learning algorithms and used the Decision Supporting System for Agrotechnology Transfer (DSSAT) to enhance their understanding of the impact of climate change on cereal crops in Alaska. Presentations of results were made at workshops for small grain growers in Alaska, disseminated through mass and social media, presented at conferences, published in journals and shared with regional collaborators like Washington State University.</p> <p><b>Results</b></p> <p>Research suggests some imported varieties of spring wheat have the potential to grow in Alaska. The DSSAT data predicts that climate change will advance the growth stages of current cultivars of cereals, but yield will be reduced. The 2019 season was cooler than the long-term average, with greater precipitation, at the Fairbanks location. The Palmer location was warmer than the long-term average, resulting in more growing degree days, but with 3.14 inches less precipitation by the end of the season. Average yields for all spring grain and oilseed varieties at both farms were roughly equal to the standard test varieties.</p>	
2.	<p>IANRE increases Alaskan growers' ability to understand and assess optimum production practices.</p>	<p><b>Issue (Who cares and Why)</b></p> <p>Horticulture is the largest agricultural industry in Alaska, amounting to more than 50%</p> <p><b>Impact</b></p> <p>Increased production of horticultural products in Alaska</p> <p><b>Outcomes</b></p> <p>Increased production of horticultural products in Alaska</p>	

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		<p>and more. Extension provided 485 soil test interpretations. Three conferences coordinated by Extension brought together more than 300 agents, researchers, agency representatives, farmers and other stakeholders to share the latest information about sustainable agriculture and invasive species.</p> <p><b>Results</b> Extension continues to be a trusted source of research-based agricultural and horticultural advice. Three attendees of the FYbu mof</p>	

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		<p>weed pulls, camps and Master Gardener classes. A YouTube video on Prunus padus (Bird Cherry) and Prunus virginiana (Chokecherry) invasion in Alaska has had 1741 hits over the last two years. By request, an invasive plants instructor presented information on invasive species at several meetings of an alliancee</p>	

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		<p>A natural resource economist and the reindeer research program manager worked with remote communities interested in building capacity for reindeer production. The economist analyzed multiple scenarios, including field and government-inspected slaughter, and sales of whole carcasses or cuts of meat. The calculations considered amounts and costs of fuel needed by workers on snowmachine to locate herds, slaughter and process animals, as well as labor costs. The program manager consulted stakeholders on animal care and demonstrated slaughter methods that help retain the meat's market value.</p> <p><b>Results</b></p> <p>Four residents with a reindeer operation in Savoonga slaughtered reindeer three times in the field using the university's USDA mobile processing unit, and the cuts of meat sold out almost immediately. The economist was able to determine what prices reindeer meat must sell at in multiple slaughter method scenarios for a business to break even. Results were shared with Savoonga so that the community can make informed decisions about future business plans. Some of the communities assisted by the reindeer program manager intend to apply for reindeer grazing permits on state and Bureau of Land Management lands along the Yukon River, which had historic reindeer herds over 70 years ago. Large commercial reindeer operations are also being proposed and developed in Delta and a few Yukon River communities. These new businesses have the potential to improve food security and cash employment.</p>	
6.	IANRE tests new lighting technologies to improve controlled environment vegetable production	<p><b>Issue (Who cares and Why)</b></p> <p>Enhancing local vegetable production is desirable due to Alaska's short field seasons and vulnerable delivery systems. Controlled environments extend the short Alaska growing season, but challenges exist when growing in-demand crops, such as spinach, which may bolt quickly and flower under the long Alaska summer days. Such crops may respond to altered lighting schemes. In particular, LEDs have shown promise as a replacement for current supplemental greenhouse lighting options. Light and lighting systems are a significant investment and ongoing expense in controlled environments, and determining the most effective LED configurations, wavelength compositions, durations and intensities will improve production advice and save money for Alaskan growers.</p> <p><b>What has been done</b></p>	1. Agriculture & Food Security



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		<p>A horticulture researcher evaluated the nutritional content of fresh store-bought produce in Interior Alaska in comparison to locally grown produce, including tomatoes, colored bell peppers, English cucumbers, kale, and butterhead and romaine lettuce. The produce was tested for mineral nutrition, with Brix analysis used to determine levels of soluble solids and sugar content. Three cultivars of the culinary herb basil were grown from seed over 50 days in six light qualities and evaluated for mineral and sugar content; six light treatments included blue LEDs, red LEDs, blue/red LEDs, white LEDs, T5 fluorescentC</p>	

		<p>What has been done An agricultural instructor facilitated grower meetings, met with a farmers cooperative board, and researched appropriate z a</p>	



		<p>experiment farm and conferences. Faculty consulted with communities and organizations regarding the use of biomass and with individuals interested in biomass production. An interdisciplinary researcher evaluated the market readiness of four types of small-scale, combined heat and power (CHP) generators. Biomass samples were sent to a vendor of the single gasifier on the market considered “turnkey,” and the researcher observed the performance. While the generator’s efficiency was acceptable, the level of labor and expertise needed to keep it properly running made it a poor candidate for deployment in a rural setting.</p> <p><b>Results</b>                  Research and outreach efforts addressed public education on the sustainability of biomass harvesting, new technologies and community planning. 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. Research will inform decision-making for cold-region, electrically islanded communities with biomass resources for potential heat and power generation. An academic paper and public briefing are planned.</p>	
10.	<p>IANRE helps Alaskan communities become adaptable to climate change</p>	<p><b>Issue (Who cares and Why)</b>                  NOAA states that July of 2019 was Alaska’s warmest month on record. Alaska has seen retreating sea ice, melting permafrost, increased wildfires and other signs over the last several decades of a warming trend. While these changes have had negative effects on wildlife, the warmer weather has also extended the growing season. Research is needed on how best to navigate projected changes to Alaska’s average temperatures and the subsequent effect on growing degree days. IANRE’s experiment farms are well-suited for trials and observations that will help Alaska’s farmers prepare to adapt their varieties and practices.</p> <p><b>What has been done</b>                  A researcher evaluated crosses of an Alaska local hard red spring wheat variety “Ingal” with three Canadian hard red spring wheat varieties. Field experiments were carried out at Palmer and Fairbanks experiment farms, with weather data collected for comparison in Delta Junction. Three plant physiologic growth stages were used along with weather data to measure crop adaptability, emergence,</p>	<p>2. Natural Resources, Ecosystems &amp; Sustainable Energy</p>

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		<p>heading/flowering and maturity. Presentations of results were made at workshops for small grain growers in Alaska. Poster presentations were made at national conferences. The researcher presented FY19 results to 20 attendees at the Harvest We</p>	

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		<p><b>Results</b>                  The reliable weather data provided by IANRE's long-term collection site has been used by researchers across multiple disciplines to move scientific knowledge forward. A climate scientist with the International Arctic Research Center (IARC) is using the weather record to study changes in snow cover, while a climate specialist with IARC is looking at changes in the growing season statewide, including at the station. An emeritus forest ecologist is using the data to study [REDACTED] allowing insights into everything from agriculture and forest management to community adaptation.</p>	
12.	IANRE improves national recreation data analysis for public lands managers	<p><b>Issue (Who cares and Why)</b>                  Public lands in the United States provide an opportunity for Americans to realize the benefits from outdoor recreation. A lack of a standardized, efficient approach to measure these beneficial outcomes has hampered management. Likewise, recreation management frameworks to explicitly manage for beneficial outcomes have been developed, but are in early stages of adoption by federal agencies. Research is needed to provide a framework linking these beneficial outcomes to management. Such a framework can informhicial</p>	

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		future endeavors. This expanded their knowledge of data management. Information from this project was incorporated into recreation management training sessions conducted by the BLM. Continued meta analysis has the potential to add to the understanding of the relationship between recreation	






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		<p>"I go to the doc far less often now" and " this class has helped build my strength and stamina and get me back to full health."</p>	
<p>16.</p>	<p>IANRE trains Alaskans to prepare food more safely</p>	<p><b>Issue (Who cares and Why)</b>                  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, with the most recent occurring in 2019. It is particularly important to teach people how to safely preserve local</p>	

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		knowledge and confidence. Clients had 590 canner gauges tested with many needing adjustment and some needing replacement, highlighting the importance of this service. ParticipP	

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		<p><b>Results</b></p> <p>Two of the 4 buildings tested in Grayling came back with radon levels exceeding<sup>2</sup> the federal action level of 4 picocuries/liter. Once the elevated results were discovered, the Bethel agent was able to save homeowners money by guiding them to appropriate and cost-effective mitigation responses. The agent also gave a presentation on radon at the community center, and set up more test devices in public buildings and homes in the area. The agent also worked with homeowners and the Bethel Extension in Yogoire to better understand the construction methods that were common in that community, informing plans to expand radon testing and education. In December 2019, the Extension radon site had 6</p>	





		<p>prior season, there were almost 60 more adult volunteers enrolled in FY19. Volunteers were trained and assistance was provided to teachers and afterschool 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. As the Alaska Afterschool Network notes, afterschool educators "connect kids to their culture, empower teens, create collaborative team approaches, support families in crises, and expand STEM learning in afterschool."</p> <p><b>Results</b>                  An Alaska 4-H volunteer leader in the small gold rush-era town of Hope was one of five recipients of the 2019 Afterschool Superheroes Awards from the Alaska Afterschool Network. She introduced youth to new topics like robotics and archery. The leader stated, "I went from being a stay-at-home mom, to now I'm an afterschool educator. I realized there's so much more I can do so that I can help improve STEM and afterschool programs in rural Alaska." The leader says she has observed improvements in parent-child relationships and family stress management inspired by 4-H participation.</p>	
21.	IANRE improves the nutrition knowledge and behaviors of Alaskan youth	<p><b>Issue (Who cares and Why)</b>                  Childhood obesity continues to be a major concern in Alaska. Alaska Department of Health and Social Services, 2017-2018 data from students in grades K, 1, 3, 5 and 7 in two Southcentral school districts documented an obesity rate of over 18 percent, which means the state's Healthy Alaskans 2020 objective of 15 percent or less has not been met. Helping caretakers and students learn about better nutrition and eating habits is essential to combating obesity in Alaska's youth and reducing the negative health outcomes associated with obesity.</p> <p><b>What has been done</b>                  Nutrition educators based in Anchorage, Bethel, Fairbanks, Palmer and Soldotna presented USDA-approved curricula and activities in one-time and multipart programs at public schools, Head Start programs, shelters, WIC</p>	4. 4-H & Youth Development

		<p>programs, community centers, public housing and libraries that reached a combined total of 1,644 youth. 4-H'ers completed 194 foods and nutrition projects. Nutrition lessons paired with cooking lessons taught life skills to teens at a shelter for homeless youth. SNAP-Ed educators partnered with 4-H Healthy Habits through a Walmart grant to provide nutrition programming and healthy camp experiences to 118 youth. Teens as well as school district teachers helped lead the camp. A tribes Extension agent offered programming through the Alaska Summer Research Academy (ASRA) which was supported by a grant from the Women and Minorities in Science, Technology, Engineering and Mathematics Fields Program.</p> <p><b>Results</b>                  Through ASRA, Alaska Native high schoolers attended "What's for dinner: Why we eat what we eat in Alaska and what it means for our health."                  Three teens responded to a survey about their ASRA experience, rating the Alaska food program as high quality. Comments included that it was fun, educational, and they enjoyed the cooking portion. Responses to retrospective pre-post questions showed that after attending, the teens felt they could better identify food that is healthy, find information about Alaska food policy, and were more likely to consider helping change food policy. Teens in a 4-H afterschool program chose cooking and baking as their favorite activity. Through the course of making recipes, they were observed to have improvements in positivity and confidence, and some asked to come back as mentors after graduation.</p>	
22.	IANRE increases youth civic engagement in Alaska	<p><b>Issue (Who cares and Why)</b>                  Research has long noted.</p>	



		<p>schooling and employers. But youth need caring adults to provide opportunities to build such skills and get real-life experience.</p> <p><b>What has been done</b> Nine 4-H'ers and their chaperones from Interior and Southeast Alaska went to Juneau for the annual Youth in Governance (YIG) program in February 2019. Students met with legislators, attended committee meetings, learned how bills become law and acted as pages for a day. Five teens from Kodiak's 4-H Club gave presentations on healthy relationships, cyberbullying, natural gas and other issues in Washington, D.C., at the 4-H National Conference. The teens met with Alaska's legislators to advocate for public circulation of a 2020 comci4.er</p>	
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