Alaska (University of Alaska Fairbanks) Annual Report - FY2022

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Contributing Organizations

University of Alaska Fairbanks

Executive Summary

Overview

Alaska is recognized for its immense size and sparse 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 the two largest national forests. Alaskans harvest many non-timber forest resources including berries, mushrooms, saps, oils, chaga, roots, wildflowers and more. 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. The vast stretches of boreal forest offer insight into arctic ecology, tree growth trends and the effects of climate change.

Alaska's natural resources have historically been the foundation of the state's economy though resource industries have been mostly extractive in nature. The use and management of these resources continued to be a predominant force in the FY22 planning and delivery of teaching, research, Extension and engagement programs. The University of Alaska Fairbanks (UAF) in general and its Agricultural and Forestry Experiment Station (AFES) and Cooperative Extension Service (CES), in particular, meet the challenges of increasing demands for research, education, outreach and community engagement that are relevant to sustainable management of Alaska's resources and bring community ideas to the university for further development of the state's resources.

Alaska's economy has become dependent upon revenues related to petroleum development. To diversify its economy, the state is moving toward nonpetroleum natural resources for economic opportunities that are cost-effective and sustainable. In FY22, the programs of AFES and CES played a vital role in linking the knowledge generated at the university to meet the needs and interests of Alaskans. Citizens were provided opportunities through engagement to influence future research and education priorities.

While Alaska continued to import a high percentage of foods and other agricultural products, growers in the agricultural sector produced fresh market potatoes, specialty crops and herbs; cut flowers including peonies; vegetables and herbs; forages, grains and manufactured livestock feeds; controlled environment products, and a variety of niche market crops. Livestock enterprises in Alaska are varied in size and species of animal in production. In FY22, producers continued to demonstrate a desire for information specific to northern latitudes that will protect the environment and ensure an abundant and safe food supply for both humans and animals.

The Alaska Department of Labor and Workforce Development projects that Alaska’s population will increase by almost 25,000 people by 2050. As the population grows, more locally and regionally produced food will be needed to provide greater food security. 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, so it is imperative to provide much-needed information on safe preservation of dietary staples. Alaska also has one of the fastest growing senior populations, which faces the challenge of remaining active and healthy in a demanding environment. Other concerns that defined health and nutrition programming in FY22 are continued high rates of child and adult obesity and diabetes. Due to high levels of fine particulate matter that occurs during Alaska’s cold winters, and high levels of radon detected in some areas, indoor air quality remained a particular Alaska concern.

High energy costs remained a critical issue, particularly in rural Alaska, where fuel oil continued to run $8 or $9 a gallon. Research and outreach focused on new and alternative sources of energy, wood and biomass and energy conservation. AFES worked to provide information to manage renewable resources and to improve technology for enhancing the economic well-being and quality of life at high latitudes. When foresters, farmers and land managers use research results, all Alaskans benefit from the wise use of land resources. Research projects responded to requests from producers, industries, and state and federal agencies for information on plant, animal and soil sciences, forest sciences and resources management.

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

The mission of CES is to use research-based knowledge to educate, engage and support the people and communities of Alaska, connecting them with their university. In FY22, CES provided factual and practical information while bringing Alaskans' issues and challenges to the university. CES is committed to promoting the sustainability and economic security of individuals, families and communities by providing practical, nonformal education, including conferences, workshops and cooperative work with community, regional and tribal partners. Outreach was provided through numbered publications, faculty consultations, newsletters, blogs and social media platforms like Instagram, Facebook pages, YouTube channels and Twitter feeds.

CES priorities addressed national priorities by helping families, youth and individuals be physically, mentally and emotionally healthy; enhancing workforce preparation and life skills; strengthening food safety and security; and fostering greater energy independence. Programming respected cultural and ethnic diversity and was responsive to emerging stakeholder needs and interests. Programs resulted from client requests, various regional and subject matter advisory groups, surveys and needs assessments. Collaborations continued with other universities and with other units within UAF, the University of Alaska statewide system, federal and state agencies, nongovernmental organizations and private industry.

Stakeholders included 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. The combined efforts of AFES and CES bring the university to Alaskans while bringing community concerns and issues back to the university. State-defined critical issues linked specific public needs with our broad mission in order to allow the concentration of resources (money and people) that promoted high-quality work. Critical issues were used to provide guidance for faculty, staff and administrators to direct current and new programs and find or retain faculty expertise.

The next section of this summary explains the rationale driving a five-year focus on four critical issues: Agriculture & Food Security; Natural Resources, Ecosystems & Sustainable Energy; Healthy Individuals, Families & Communities; and 4-H & Youth Development. Climate change is not listed separately, as it is woven throughout our work on all four critical issues.

Critical Issue: 4-H & Youth Development

Research shows that youth need sustained, healthy relationships with adults in order to thrive. CES continued to promote positive youth development through education with a focus on leadership skills, using the 4-H mission mandates of science, citizenship and healthy living. Organized 4-H clubs, school enrichment programs, after-school activities and summer camps helped educators and leaders achieve youth development goals.

The focus of Alaska's 4-H program has been supporting the healthy maturation of youth from childhood to adulthood. Training throughout the state, promoting life skills and using the 4-H model of youth development was the foundation of FY22 youth development programming.

Critical Issue: Agriculture & Food Security

Alaska imports over 90 percent of foods and other agricultural products consumed in the state. Growers' products are primarily for in-state consumption and use, including fresh market potatoes, forages, grains and other livestock feeds, greenhouse flowers and vegetables and a variety of "niche market" crops and products. Commercial horticulture includes cut flower and peony production, greenhouse operations, turf management, lawn maintenance and sod production. Proper knowledge and planning of soil-disturbing activities can prevent major impacts on other resources. Rhodiola is a new high-value specialty crop, and faculty have been working with an Alaska growers’ cooperative to develop best practices.

Identification and education of food leaders across Alaska through the Local Food Leader training program, developed at Iowa State University Extension, is a pathway to local food security. Equipping food leaders to work toward equitable, sustainable, and balanced local food structures results in increased food security and healthy food systems. Partnerships continued with the Alaska Food Policy Council, the Alaska Farmers Market Association, and the State of Alaska Division of Public Health to deliver certification courses and outreach throughout Alaska.

Animal enterprises in Alaska include dairy, beef, swine, reindeer, poultry and nontraditional livestock such as muskox, yak and bison. Agriculture research will address areas of animal agriculture, home animal production, agronomic crops including oil seeds and cover crops, and home and commercial vegetable production. Agricultural soils, fertilizer and compost research and outreach are also part of this program area. We provide pesticide applicator certification courses and Master Gardener courses. Alaska Extension's statewide Integrated Pest Management (IPM) education program has operated since 1981 and continues to assist individuals to understand invasive pests and control options.

Agriculture outreach in FY22 included the primary areas of animal agriculture, animal health, horticulture, soil science and agroforestry. As Alaska expands its in-state consumption and export markets, producers will require increasing access to research-derived information specific to northern latitude environments and knowledge applied from research in other states.

Critical Issue: Healthy Individuals, Families & Communities

Concerns for Alaskans in FY22 included high rates of obesity and recurring food safety issues such as botulism. Nutrition outreach addressed childhood obesity with nutrition education in after-school programs and nutritional programs in community venues as well as cooking programs that emphasized preparing healthy foods.

Food safety programming in FY22 encompassed food preservation, safety, and preparation. Food safety education utilized various resources and strategies to ensure that all types of foods, including Indigenous foods, are properly stored, prepared and preserved so that food is safe for consumption. IANRE offered Certified Food Protection Manager courses as well as workshops on preservation methods such as canning, pickling, drying, fermenting, and freezing. Rural locations were supported by the continued maritime Extension program that brought canner gauge testing and preservation education to remote communities by boat.

Home and energy Extension programming addressed indoor air quality, home maintenance and repair, energy use and conservation. Emergency preparedness impacted such areas as families and communities responding to natural and man-made disasters. The state records frequent earthquakes, flooding and other natural disasters, which underscores a need for emergency preparation as well as periodic radon testing related to ground shifts.

Training was conducted with youth, teachers, 4-H leaders, youth group organizers, parents and community partners to provide techniques for working directly with youth in the area of nutrition and physical activity. StrongPeople groups and diabetes education helped community members increase their physical activity and manage chronic illnesses.

Critical Issue: Natural Resources, Ecosystems & Sustainable Energy

Communities increasingly depend on Alaska's natural resources for viable economic development. Policies to sustain this growth that mirror sociological and technological change will be critical. Major Alaska resource development activities have been centered in the oil and gas industries. Headquarters for these industries are located in the urban centers where there is access to transportation and advanced communication systems. However, urban communities still need to build infrastructure to fully engage in value-added activities that would enhance development of nonpetroleum industry. In FY22, Extension offered demonstrations of both solar and biomass options to assist communities in exploring alternative energies.

IANRE continued to reach out to underserved populations in rural areas to support real options for economic development and improved quality of life. Outreach addressed stakeholder needs for unbiased, science-based information about natural resource management issues in forestry, mining, water, recreation and alternative, sustainable energy sources.

The economic potential of Alaska's forests is under-realized in timber and nontimber products. The forest ecosystem and agricultural lands can play a role in diversifying the economy of Alaska. Concern for the health and survival of resource biodiversity continued to be a central issue in resources management in Alaska and elsewhere. As energy continues to become a growing concern throughout the world, the boreal forest has the potential to provide products necessary for fuel alternatives to petroleum and coal. Several Hatch projects in FY22 investigated how best to utilize Alaska’s lands.

Merit and Scientific Peer Review Processes

Updates

None.

Stakeholder Input

Actions to seek stakeholder input that encouraged their participation with a brief explanation

The unit began planning an all-hands summit at the end of FY22 and invited advisory council members.

Methods to identify individuals and groups and brief explanation

Health, Home and Family Development faculty increased efforts to gather stakeholder input in FY22, and results were used to plan programming. In the Interior, stakeholder input has been solicited from the Veterans Administration, school districts, teachers, the State of Alaska Department of Health and Social Services, senior centers (Tok, Nenana, Fairbanks, Anchorage), Alaska’s health fairs, the Alaska Food Bank/Fairbanks Food Bank, the Anchorage Native Tribal Health Consortium, Fairbanks Native Association, Chief Andrew Isaac Medical Center, Tanana Valley Clinic Diabetes Program, Bassett Army Hospital, affiliates of the Alaska Association for Community and Family Education, Raven Landing, Fairbanks Parks and Recreation, Alaska Housing and Finance Corp., and local legislators. Additional input has been solicited from multiple other social service agencies and from individuals who participated in classes.

IANRE has made improvements to making all reasonable efforts to raise awareness about its educational resources to a wide variety of Alaskans. IANRE began redesigning its website in FY22, resulting in improved digital accessibility of pages and documents for stakeholders utilizing assistive technology.

Methods for collecting stakeholder input and brief explanation

A new statewide advisory council for IANRE, meant to provide guidance to research, training and extension, met in FY22. In addition, a researcher from IANRE was a member of the governor's Alaska Food Security and Independence Task Force, which compiled and published a comprehensive report of Alaska's food system needs at https://alaska-food-systems-soa-dnr.hub.arcgis.com/

A statement of how the input will be considered and brief explanation of what you learned from your stakeholders

Input is gathered annually at public events like the Alaska State Fair and Tanana Valley State Fair, where public feedback is recorded by booth sitters and routed to the appropriate employee for a response. Targeted events like the Delta Farm Forum reach audiences in need of faculty and staff expertise in particular program areas such as agriculture and horticulture.

IANRE continued to adapt to the post-pandemic environment and offered "Walkabout Wednesdays" where stakeholders could join conversations on agriculture virtually through the broadcast on Facebook Live. This format gained continued engagement with the public through in-person questions, social media comments, and post-broadcast views.

In FY22, stakeholder requests for specific speakers and topics at conferences continued to guide conference agendas. AFES and CES continued to serve the needs of the people of the state of Alaska. Unit plans reflected ideas and advice given by client user groups, students, expert advisors, state and national peers and collaborators, and UAF administration. The four critical issue areas identified reflected the concerns of major stakeholder groups, and continued to be the highest priorities in workload planning and resource allocation. Stakeholder needs continued to be a driving factor in determining AFES priorities for research and CES priorities for programming.

Highlighted Results by Project or Program

Critical Issue

4-H & Youth Development

Fostering positive youth development through mentoring and culturally relevant education in healthy living, STEM, civic engagement and leadership for Alaskan youth

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Alaska 4-H Addresses Achievement Gaps with STEAM Programming

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

In 2022, Alaska's public school students tested in 4th and 8th grade had lower math and reading scores than their national peers, as documented by the National Assessment of Educational Progress. In addition, The Programme for International Student Assessment (PISA) noted in 2018 that socio-economically disadvantaged teens in the U.S. were outperformed by advantaged students in all three core subjects of reading, math and science. Improving youth engagement in science, technology, engineering, art and mathematics (STEAM) can help close these gaps. As PISA notes, “holding a growth mindset is positively related to better academic performance in almost every education system.” 4-H programming is an ideal match to this effort with the 4-H essential elements of inclusive environments, engagement in learning, opportunities for mastery, and a focus on the future.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

In FY22, Alaska 4-H programming across the state offered many STEAM-focused programs. In the Interior, sessions were held both online and in-person. About 25 afterschool students learned about edible plants, soil profiles and seed starting. A STEAM-focused summer program using the Camp Invention curricula gave four teen instructors leadership experience while helping up to 40 youth in 4th-8th grade work on innovation through design and invention. In another program, 50 youth from around the state toured the veterinary facilities at UAF's Troth Yeddha' campus. Youth around the state, from Fairbanks to Palmer and Kenai, also participated in raising and selling livestock at local fairs. In Sitka, about 20 youth helped three UAF researchers collect data on local berries, and two of the youth presented the findings at an Earth Day symposium. In Kodiak, over 100 at-home kits were sent to youth who learned about and practiced origami, watercolors, leaf collection, birdhouse building and more.

Briefly describe how your target audience benefited from your project's activities.

4-H continued to partner with communities and schools to bring STEAM opportunities to students of all backgrounds across Alaska. Through a variety of opportunities including record books, fair exhibits, quiz bowls, presentations and showmanship, youth were able to demonstrate their changes in knowledge and skills to the public.

Briefly describe how the broader public benefited from your project's activities.

Alaska 4-H helps build community capacity and promote good stewardship practices because of its support of adult and youth connections, community service, and an appreciation for Alaska's natural resources. Alaska 4-H engages youth in STEAM activities to help them be lifelong learners, be more likely to consider STEAM-related careers, and close achievement gaps.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new

details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

4-H faculty and staff continued to engage in professional development related to STEAM by attending events like the Alaska Forum on the Environment, State Farm Bureau Convention and NAE4HYDP sessions, and serving on committees like the Western Regional Animal Science Committee. In the next reporting period, Extension will continue to pursue opportunities for integrated work with researchers to support STEAM-related programming.

Alaska 4-H Celebrates Cultural Connections

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

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, engagement activities for youth are limited. In addition, at full capacity, Alaska houses 170 more children at youth facilities. 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." With its broad array of community partnerships, Alaska 4-H is uniquely positioned to provide culturally relevant opportunities for underserved youth.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Alaska 4-H offered a wide range of programming across the state, including areas with majority Alaska Native populations. A new program coordinator for the Bethel 4-H Program is also a nationally renowned percussion education specialist. The coordinator launched a 4-H Drumbeat of the Tundra Club. Youth from multiple grades learned about and experienced basic techniques, rhythms and cultural approaches related to drumming and percussion. Bethel 4-H was featured in a "Summer of Learning with PBS KIDS and Alaska Public Media" video, where camp activities included learning about traditional foods like berries and salmon. In Dillingham, the 4-H Bristol Bay Club, part of the Federally Recognized Tribes Extension Program, continued offering its popular after school programming with STEAM activities like building machines, playing with Legos and cooking. Youth also had opportunities to participate through take-home kits, and a summer Culture Camp. The Bristol Bay group frequently partners with community organizations to support culturally relevant activities like the Salmon Experience to teach about local fish life cycles, and events celebrating Native American Heritage Month. They also promoted strong relationships between generations through programs like partnering with the Food Bank to distribute potatoes to community elders.

Briefly describe how your target audience benefited from your project's activities.

In the drumming program, materials were provided free of charge to reduce participation barriers. Full and partial camp scholarships were made available in Bethel for families in need. Bethel 4-H partnered with the Summer Food Service Program to ensure free lunches were provided to participants. In the Bristol Bay activities, youth strengthened cultural connections by learning about local plants and their traditional uses. Ongoing for almost eight years, activities for teens at the youth facility, also supported by the Children, Youth and Families at Risk (CYFAR) program, helped 18 participants with life skills.

Briefly describe how the broader public benefited from your project's activities.

Alaska 4-H uses culturally relevant practices to help build community capacity through its support of adult and youth connections. 4-H provides youth engagement in cultural learning, community service and an appreciation for Alaska's natural resources.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

During the next reporting period, Alaska 4-H intends to maintain longstanding partnerships with groups like SNAP-Ed, the Fairbanks Youth Facility, City of Bethel and the Bristol Bay Native Corporation to continue offering culturally relevant programming to diverse communities in the state.

Alaska 4-H Connects Youth with Caring Adults for Community Engagement

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

According to Alaska Children's Trust, 45,000 Alaska children do not have access to an after school program, yet 78 percent of Alaskan parents say such programming helps working families. 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."

Overall, research shows better outcomes for youth who have connections with caring adults. 4-H is uniquely positioned to provide a variety of modalities to forge such connections for Alaska's youth in culturally relevant programming, featuring opportunities for civic engagement and leadership.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

In FY22, Alaskan 4-H volunteers and participants made progress on intended outcomes of applying at least two of the Essential Elements in their interactions during programming, and demonstrating confidence and knowledge gained from opportunities for leadership. Specifically, youth participated in opportunities to lead through roles such as camp counselors, exchange ambassadors, and club officers. Youth also gave public presentations and participated in the Youth in Governance program. In Sitka, a teen club leader wrote a resolution related to food security and food sovereignty. In the Interior, two 4-H teens took on leadership for a new club for younger kids ages 5-7, reaching 12 more members. Six teens in the Interior served as camp counselors, facilitating camp activities for about 30 attendees. Five youth in Kodiak volunteered to help lead camps on the island. Over 50 youth participated in a statewide horse contest, and many youth showed livestock at multiple local fairs statewide, demonstrating their changes in knowledge.

Briefly describe how your target audience benefited from your project's activities.

Alaska 4-H continued to offer youth and their caring adults opportunities to continue to "Learn by Doing." Adults and youth were provided with leadership development activities and networking with other states and countries that they may not have otherwise had access to. Overall, 4-H participants appreciated the continued activities that helped keep them connected to their communities. Individually, they built life skills. At the community level, Alaskans benefitted socially, economically, and environmentally from service projects, livestock sales, and other 4-H related efforts.

Briefly describe how the broader public benefited from your project's activities.

The 2019 Alaska Youth Risk Behavior Survey notes that "since 2007, there have been significant increases in students feeling sad or hopeless, and considering, planning for, and attempting suicide in the past 12 months." In addition, less than half of the high schoolers that responded, or only 48.6 percent "felt comfortable seeking help from three or more adults besides their parents." The community connections offered by Alaska's 4-H programming increase the chances that youth will form bonds with additional caring adults like leaders and mentors, helping mitigate these risks.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Alaska 4-H has many impressive examples of adapting to local needs and keeping youth in the state connected to their communities. The program continued to provide leadership training to both adult and youth volunteers. New personnel have been hired to serve key areas of the state, and the next reporting period, initial results will be available from efforts to expand 4-H programming in Alaska, particularly to underserved groups.

Critical Issue

Agriculture & Food Security

High-latitude agricultural production systems: producer needs assessment and agriculture trials to improve food system resilience and health outcomes for Alaskans

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Annual-High-latitude agricultural production systems: producer needs assessment and agriculture trials to improve food system resilience and health outcomes for Alaskans

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Currently, there are few, if any, publicly funded, scientifically rigorous vegetable variety trials happening in Alaska. This project supports the original mission of the UAF Agriculture and Forestry Experiment Station to provide agricultural research and make it available to the public. This project also builds off of past research efforts to provide up-to-date information on which crops and cultivars are best suited to Alaska's changing growing conditions. This project also seeks to identify the needs of Alaskan producers with regard to research and technical assistance needs, which is critical to understand in order to best serve the growing Alaskan agricultural industry.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

In FY22 (year one of this project), Variety Trials were conducted evaluating 12 crops and over 80 cultivars at the Fairbanks AFES farm. Randomized Complete Block Design (RCBD) as well as un-replicated screening trials were carried out. Data was collected on both standard, "check" crops and varieties as well as crops considered marginal for Alaska's current growing conditions. Local Growing Degree Days (GDD) were calculated for certain crops (e.g. Sweet Corn) in order to monitor how changes in growing season might create new opportunities in Alaskan agriculture. Additionally, a perennial berry trial was initiated with project partners in Anaktuvuk Pass.

Research findings were disseminated to the public through a number of outreach and education opportunities which include: detailed reports with harvest data and which are published and available free to the public through AFES website; multiple field-based outreach events held at the Fairbanks AFES Farm and Georgeson Botanical Garden for research, state agency, and general public stakeholders; four (4) YouTube videos available on the UAF Extension Channel were produced; 2 scientific/ professional presentations, and; 5 virtual workshops/ public presentations were made to share out variety trial results to a broad cross-section of stakeholders.

A survey instrument was developed and IRB approval gained to conduct a Producer Needs Assessment in interior Alaska. However, the survey work was put on pause in FY22 in order to better incorporate state-wide stakeholders and a new collaborative agreement between the US ARS and UAF AFES. This work will be resumed in FY23.

In addition to Variety Trials and needs assessment work, several research collaborations were formed with other researchers at UAF that will broaden the scientific knowledge generated from the variety trials work. Some of these partnerships were formalized, and capitalized on. As a result, a new NSF-funded NNA research project evaluating the interactions between agricultural activities and permafrost was funded, and uses the Variety Trials and AFES farm as a replication site to compare findings from other local farms to.

Briefly describe how your target audience benefited from your project's activities.

Alaskan as well as international (Canada & Greenland) stakeholders were reached in several ways during this period. Target stakeholders of this project include agricultural producers, home gardeners, academic researchers and agency personnel. These stakeholders were reached/ benefited in the following ways in FY22:

Through presentations (professional and informal) at events such as: The Alaska Food Policy Council's annual Conference and Food Festival; the Alaska Sustainable Agriculture Research and Education conference; The Southeast Environmental Conference; Tanana Valley Master Gardener's Club Meetings; the Nenana Agriculture Field Day; Agricultural Field Day with Arctic Education Alliance project participants (Greenland); Creamer's Field Agriculture Field Day, and; the North American Agriculture Summit (UAF and Agriculture Canada).

Through workshops and formal education opportunities for: The AAFECT Farmer Training program on seed starting and plant propagation; UAF Climate Change and Alaska (ENVI 255) on soil health and plant growth; UAF Master Gardener Online Class (NRM 194) on variety selection and plant propagation, and; the Fairbanks Native Association on Seed Starting for Youth.

Research findings were also shared with stakeholders through detailed Technical Notes/ Reports with harvest data from both Fairbanks, and which are published and available free to the public through AFES website; A Cooperative Extension publication entitled, "Recommended Varieties for Interior Alaska"; A total of four (4) YouTube videos which are available on the UAF Extension Channel were produced and have over 4,600 unique views (combined); social media posts on the UAF Extension accounts, and: the following blog articles on the "It Grows in Alaska" blog:

1. https://itgrowsinalaska.community.uaf.edu/2022/08/22/do-artichokes-grow-in-alaska/

2. https://itgrowsinalaska.community.uaf.edu/2022/08/12/growing-winter-squash-in-alaska/

3. https://itgrowsinalaska.community.uaf.edu/2022/04/13/bolting-the-challenge-with-growing-spinach-in-the-land-of-the-midnight-sun

Briefly describe how the broader public benefited from your project's activities.

During FY22, the broader public benefited from the research activities through learning about the project and research findings on several television and radio appearances by both PI Gannon, and Co-I Rader. The general public, especially lower income individuals, also greatly benefited from the research as a result of the variety trials excess produce getting donated to local hunger relief organizations. In Fairbanks over 5,000 pounds of produce was donated in FY22.

During the next reporting period we will continue to trial the crops and varieties tested during the previous reporting period and continue to expand the trials we conduct (by adding new crops/cultivars). Future benefits to the general public include: increased scientific knowledge on agricultural production and well-researched variety selection information and increased food production in Alaska, which imports the majority of fresh-produce for human consumption. It is also anticipated that this project will contribute to a more sustainable and equitable food system through public, education, increased access to fresh food; and research-based data on nutritional content of locally grown produce. During the next reporting period we hope to revitalize the trials at the Palmer AFES sister-farm, and we will also work to incorporate and collaborate with other researchers both at UAF and elsewhere to increase the scope and relevance of the research we are currently preforming in order to reach a wider audience.

Resource Optimization in Controlled Environment Agriculture

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Annual-Resource optimization in controlled environment agriculture

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

To extend crop production beyond traditional field seasons, greenhouse and controlled environments are needed. These intensive production methods demand the most efficient use of resources, technology and management to be economical and locally feasible.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The use and implementation of new technology such as LEDs needs to be evaluated in efforts to support crop production in various climates. High latitude conditions are especially challenging and can significantly contribute to the overall understanding of the most efficient use of supplemental lighting and other required technology for controlled environment production. Findings also contributes to basic scientific plant biology and environmental plant physiology.

Briefly describe how your target audience benefited from your project's activities.

Local growers need information and guidelines to be able to efficiently use and adapt new technology such as LEDs. Since energy and other resources are costly in Alaska, best management practices and strategies are of outermost significance for local production environments. The outcomes and national collaborations in this project are therefore of great value for greenhouse and other controlled environment operations in Alaska.

Briefly describe how the broader public benefited from your project's activities.

Access to affordable locally grown nutritious and safe produce, even in limited quantities and assortments, can be expected to have significant impact on health, quality of life and community wellness. Ability to maintain a healthy life style is especially challenging during the winter half of the year when field and local production is discontinued. Efforts to extend and increase off season local production can therefore be expected to support community development and self-sufficiency.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Technology for greenhouse and controlled environments is fast advancing, while information on location-based implementations is often limited. Research centers and educational programs in greenhouse and controlled environment agriculture are developing throughout the U.S. while access to technical support and information for the Alaska climate continues to be scares.

The skill, aptitude, educational and financial abilities vary greatly among communities and individuals interested in pursuing controlled environment food production. A range of approaches is therefore necessary to provide information and training opportunities throughout the state.

Results and information developed in this project are regularly used in teaching activities at the post-secondary level. The controlled environment agriculture field is fast advancing and up-to-date course material is essential to capture and hold student interest. Graduate and under-graduate students have opportunities to conduct research, pursue specific questions, gain greenhouse experience under high latitude conditions, and develop an interest in greenhouse crop production. Students are mentored to complete research projects for the fulfillment of baccalaureate and master level degree requirements.

Virtual Boundary to Aid in Reindeer Reintroduction on Remote Ranges

Project Director
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In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Reindeer producers on the Seward Peninsula, AK have lost their herds through out-migration with wild caribou. They now wish to reintroduce reindeer to many of the vacant grazing allotments. Grazing allotments in Alaska are large and remote with no roads or trails so monitoring movements of animals is difficult. Introduced reindeer exhibit a strong behavior to return to their home range which will be a location hundreds of miles away and wayward animals will be difficult or impossible to recover. The goal of this project is to investigate the feasibility of a remote monitoring system by placing various GPS satellite radio-collar configurations on reintroduced reindeer and to develop a cost/benefit evaluation of a virtual boundary and a communication system to alert producers if the animals are going off-range.

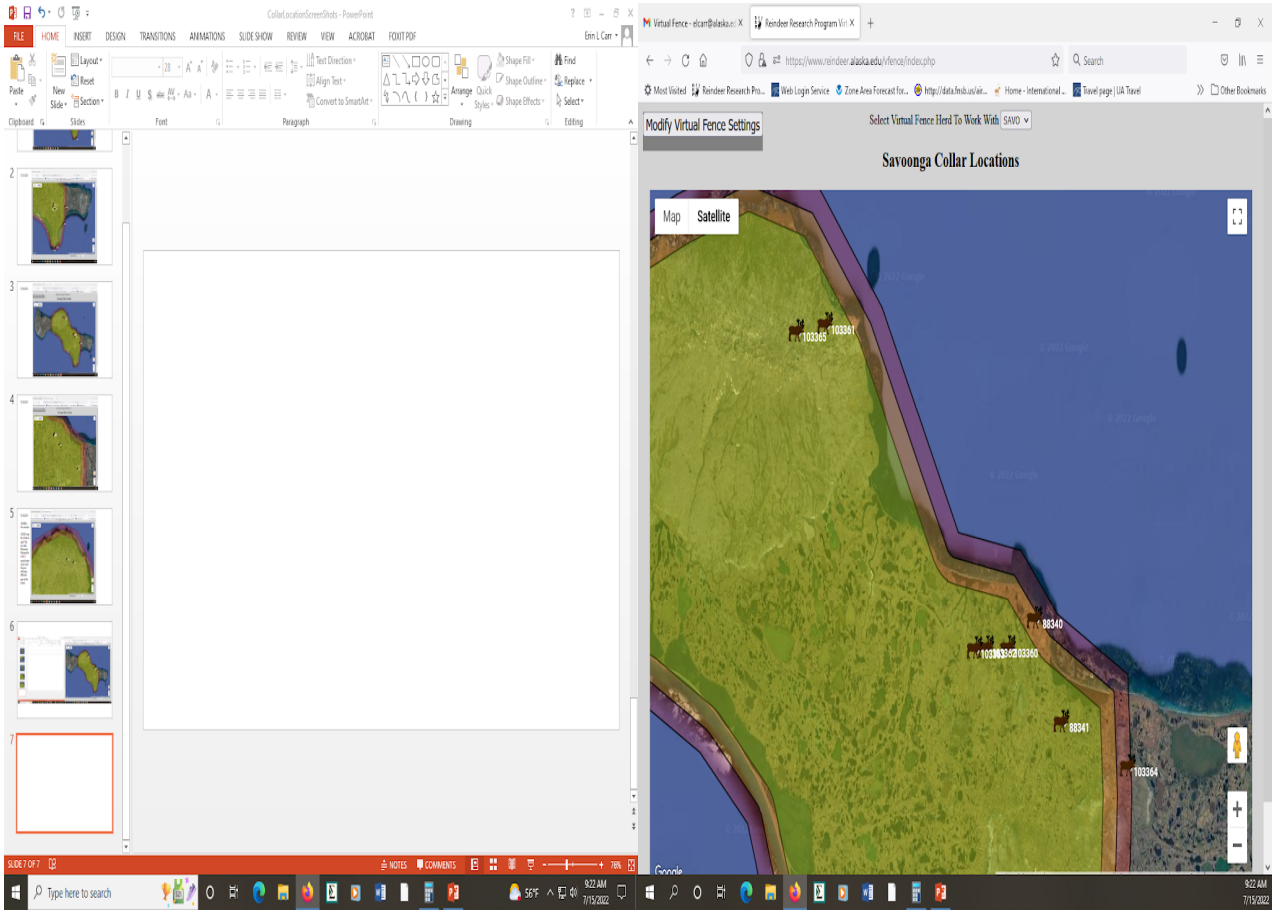
Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

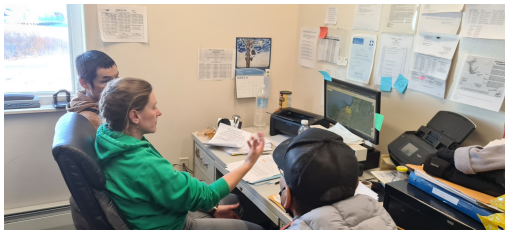
We generated reliabiity, capabilities and cost of each collar configuration. We developed a reindeer location and virtual boundary program that was available to producers online. Workshops were conducted with two producer groups to train users on deployment of GPS radio collars on reindeer and the use of the application to evaluate collar locations in relation to virtual boundary zones and send messages to the producer via text message or email according to the settings in the virtual boundary database program. GPS radio collars were deployed on reindeer on St Lawrence Island and producers implemented and tested the mapping and virtual boundary online program.

LifeCycle Pro 500	GSTrack Pro LU	GSTrack Pro L	LiteTrack Iridium 420
$750	$900	$1250	$1290
$40 activation fee	$40 activation fee	$40 activation fee	$40 activation fee
$313 per year ($109):	$313 per year ($109):	$313 per year ($109):	$228 per year ($202):
4 location attempts per day (1)	4 location attempts per day (1)	4 location attempts per day (1)	4 locations per day (1)
2.5 year battery life (6)	3 year battery life (6)	3 year battery life (6)	4.9 year battery life (10+)

- The above shows the fixed costs, data plan price, and battery life of the collars as currently configured for the virtual fence project. Only the GSTrack Pro L and Litetrack Iridium 420 collars schedules can be changed.

- These are shipped as hazardous materials due to the lithium battery packs.





A simulation of the virtual boundary and alert system has been integrated into the HLRM 201 Range Management Techniques course at the University of Alaska Fairbanks Northwest Campus, Nome. A simulation of the project was presented to the Reindeer Herders Association, the Alaska Reindeer Council (ARC) which is composed of reindeer producers, state and federal agencies that are associated with the reindeer industry and at public forums sponsored by the University of Alaska Fairbanks.

Briefly describe how your target audience benefited from your project's activities.

Reindeer producers in Alaska, by using the project products, can now monitor movements of their animals remotely by using the online mapping program. Additionally, producers will be notified by e-mail and text messages if reindeer are approaching designated boundaries. The project products now give Alaskan reindeer producers a tool to assist with the reintroduction of reindeer to remote grazing allotments.

Briefly describe how the broader public benefited from your project's activities.

The products developed and tested through this project can be implemented with any species of livestock or wildlife. There are Virtual Fence systems available commercially, but we have generated reliability and cost benefit data for a number of configurations that will allow a producer to select the radio collar type and data acquisition system that will best fit his needs and budget. A marine mammal researcher attending in the Alaska Reindeer Council presentation expressed an interest an adapting an on-going Beluga whale GPS satellite collar study to this projects activities.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

The products of this project are based on an internet mapping and cellular phone alert system. At the present time, internet and cell phone service are very unreliable in the rural Alaska villages. Gaps in service may cause delays in tthe mapping and alerting of boundary infringement by animals, thus reducing its effectiveness. However, Congress has recently appropriated substantial funds to greatly increase the capability and reliability of rual Alaska internet service.

The study findings were presented through various venues.

- Presentation of study findings and developed tools at the Reindeer Herders Association Annual Meetings (2021-22).
- Presentation of study findings and developed tools at the Alaska Reindeer Council meetings (2021-22)
- Presentation of results at the Alaska Sustainable Agriculture, Research and Education Annual Meeting.
- Development of a webpage that highlight project products that is hosted on the Reindeer Research Program, UAF website.
- Publication of study findings in an academic journal and Cooperative Extension Bulletin.
- Presentation to forums that focus on Alaska reindeer producers.
- Training workshops on radio collar deployment and sponsored at two rural Alaska villages; (St Michael and Savoonga)

Evaluating cover crop performance and cover crop management on soil fertility, soil health soil water use and soil temperature dynamic in the cold climate conditions of Alaska

Project Director
Mingchu Zhang
Organization
University of Alaska Fairbanks
Accession Number
1022120

Annual report-Cover Crop Performance and Management on Soil in Cold Climate

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The objectives of this project are to evaluate two cover crop mixtures (clover + perennial rygrass, and alfalfa + slender wheat grass) under 2- and 4-year rotations on soil quality and soil nutrient status. Year 2022 was the third year of the project. In this year, in addition to the key objectives, hay yield was determined from alfalfa treatment in response to farmers' request on the instant economic benefit by growing cover crops.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

This is the 3rd year of the field experiments. After cutting two 2-year rotational plots (Denali alfalfa+ Wainwrights slender wheat grass, and Alsike clover + perennial ryegrass) in the fall 2021, soil samples taken in fall 2021 were incubated at 15oC for mineral N release in two weeks in order to determine impact of cover crops on soil N availability in the spring of 2022. Barley were also grown in the two 2-year rotational treatments in order to determine biological N uptake after cutting the cover crops. Weed population was determined in the remaining plots using the line intersection method. Major weed species were lambs quarter and chickweed and the results showed that high seeding rate of cover crops still can't suppress wheat growth. Biomass samples of 2022 were taken in August 21 to determine the forage yield. In addition, the alfalfa + Wainwright slender wheat grass was cut for hay in order to estimate economic benefit from growing cover crop. Because of equipment issues, all samples were not analyzed for their nutrient content.

Briefly describe how your target audience benefited from your project's activities.

The target audiences benefit from the field results in two ways. Growers learn the amount of N that can be fixed and returned as cover crops to soil, and they experience an economic benefit from growing alfalfa cover crops.

Briefly describe how the broader public benefited from your project's activities.

The field experiment was a fenced-in field, outside of the fenced-in trials, people walk their dogs and jog. They can see activities inside fence and learn the objectives of the trials. In addition, the field results of 2022 were presented in the Harvest Wrap up, a farmers meeting held in the winter each year. There were nearly 30 participants online and offline.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

The major change of the project this year was to determine the hay yield from alfalfa treatments, which was in response to the request last year from growers who wanted to know if they cut the cover crop earlier as a hay crop, and still got nitrogen benefit for their land. Alfalfa + wainwright slender wheat grass biomass was cut and baled. There were 11 bales/acre with average of 500 lbs per bale.

The second major changes this year was the inclusion of summer undergraduate student trainees. Two senior undergraduate students were trained in the project. They learned weed survey by use of a line intersection method, randomized biomass sampling, and forage moisture determination.

Due to malfunction of the instrument for NH4+ and NO3- determination, the mineral N released in soil sampled in fall 2021 is still not determined. Hopefully, available funding can be found, and a new instrument can be bought and installed in the lab for such determination.

INSECT PEST MANAGEMENT SOLUTIONS FOR ALASKAN AGRICULTURE

Project Director
Dennis Fielding
Organization
University of Alaska Fairbanks
Accession Number
1021624

Annual-INSECT PEST MANAGEMENT SOLUTIONS FOR ALASKAN AGRICULTURE

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Food insecurity is a real threat to Alaskans because we are dependent to a very large degree on imported commodities. There are many challenges to increasing in-state food production, including certain insect pests. Brassica crops, such as cabbage, broccoli, turnips, rutabagas, grow very well in Alaska, but yields are limited by root maggots.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

It is essential for the management of insect pests to understand their basic life-history and biology, but much of this information is lacking in Alaska. Root maggots were studied in Fairbanks and at Palmer to determine when adult flies emerge in the spring, when egg-laying begins and for how long crops are exposed to egg-laying flies, and to determine whether a second generation is possible.

Objective 1) To determine the timing and duration of major developmental stages of root maggots to improve pest management recommendations.

Degree-day models predicting start of oviposition by root maggot flies and its duration were tested and refined in 2022. Similar to previous years' results, the emergence of flies was spread out over several weeks from late May through June. Oviposition (egg production) continued from June through July. This protracted period during which plants need to be protected limits options for control. Chemical, cultural and mechanical methods would have to be in place and effective over a long period.

The use of trap crops to manage root maggots was explored again in 2022 to refine the timing of planting and spatial arrangement of the trap and main crops in an attempt to increase the effectiveness of this strategy. Radishes were employed as the trap crop and rutabagas were the main crop again in 2022, but this time radishes were planted immediately adjacent to the main crop of rutabagas and at the same time. Radishes were shown to be more attractive to root maggot flies than the initially smaller, slower growing rutabagas. Eggs were counted on both radishes and rutabagas, samples of each were taken to count numbers of maggots in the radishes and rutabagas, damage to the roots were assessed on a scale of 0 to 5. Roots with damage rating of 2 or more were considered unmarketable. Rutabagas grown with radishes had about one-half as many eggs and maggots as rutabagas grown in isolation. Average damage rating for rutabagas grown with the trap crop was 0.92, compared to an average damage of 1.60 for rutabagas in the absence of radishes. Seventy-five percent of the rutabagas grown in the presence of the trap crop were marketable compared to 54% of rutabagas grown in isolation.

Chemical options for control of root maggots were also examined. Two products were tested: the first contained 1.2% azadirachtin, an insect growth regulator and repellant that is OMRI listed for organic farming; and the second product contained 0.115% z-cypermethrin, and 0.06% bifenthrin, both pyrethroid insecticides. Treatments included 2 oz. of solution at the recommended concentration applied as a drench around each plant, applied once (during peak oviposition) or twice (two weeks after the first application), plus a control (2 oz. of plain water applied twice), for a total five treatments. The number of eggs (counted on two occasions) did not differ among treatments, but the number of maggots and damage ratings were lower for both 1 and 2 applications of the 2nd product (bifenthrin+z-cypermethrin) compared to the control and the azadirachtin treatments.

Objective 2) Determine overwintering sites and alternate hosts of aphids found in protected environments and outdoor crops.

Some species of aphids that attack greenhouse crops and carry potato viruses overwinter as eggs on certain woody plants. Species of *Prunus*, including chokecherry *(P. virginiana*) and bird cherry (*P. padus*) are known to be overwintering hosts for the green peach aphid (*Myzus persicae*) and the Oat-Bird Cherry aphid (*Rhopalosiphum padi*), which are vectors of diseases of potatoes and small grains, respectively. Chokecherries and Bird Cherries were surveyed in the Fairbanks area for the presence of aphid eggs in spring of 2022. The species of aphid encountered was R. padi. No specimens of M. persicae were found on the *Prunus,* suggesting this species does not overwinter in the Fairbanks area, but infestations arise from imported plants or immigrating aphids. This information may also indicate which trees to eliminate or to not plant in the vicinity of susceptible crops.

Objective 3) Develop thrips population management recommendations in Alaskan protected environments based knowledge of their biology.

A system for fumigation of plants and cut flowers using ozone (O3) was designed and specifications developed last year. In the summer of 2022, the system was used to determine of levels of O3 needed to kill insect pests, thrips in particular, on peonies while not harming the plants. Preliminary results suggest that levels of O3 necessary to kill thrips will also damage the peony cut flowers.

Briefly describe how your target audience benefited from your project's activities.

The knowledge gained from these studies will inform the work of extension personnel, pest scouts, and researchers. Producers may increase the profitability of Brassica crops by reduced crop losses to insects while preserving beneficial arthropods and the ecosystem services they provide.

Briefly describe how the broader public benefited from your project's activities.

The knowledge gained from these studies will reduce crop losses to insects while preserving beneficial arthropods and the ecosystem services they provide; encourage growth of agricultural industry in Alaska, and ultimately lead to increased food security for the state. Effective and economical means of managing these pests would promote greater profitability for producers and more food security for all Alaskans.

Selecting and Evaluating Wheat, Barley, Oil Seed Crops and Developing Integrated Crop Management System in Alaska

Project Director
Mingchu Zhang
Organization
University of Alaska Fairbanks
Accession Number
1019139

Annual-Selecting and Evaluating Wheat, Barley, Oil Seed Crops and Developing Integrated Crop Management System in Alaska

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The objectives of the project are 1) select short growing season of spring wheat; 2) evaluate feed barley (6- and 2-row) for malting purpose; and 3) develop a Polish canola for Alaska. Year 2022 is the 4th year into the project. A two row barley from Sweeden showed can reach maturity in the season and has large kernel size. Its malting quality is to be tested.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Replicated field experiments were conducted in Fairbanks and Palmer Experiment farms in the growing season of 2022. The field trials included spring wheat (4 varieties and a F9 from crossing of Alaska wheat Ingal and Canadian wheat Intrepid), 6-row feed barley (8 varieties), 2-row feed barley (7 varieties), hulless barley (3 varieties), malting barley (2 varieties), and one open pollinated Polish canola. Data of date of seeding, emergence, heading/flowering, and maturity were collected. In addition, weather data (temperature and precipitation) for both sites were collected.

Field tours were conducted for visitors, farmers, and professionals. Students were trained for small grain research in the summer.

Briefly describe how your target audience benefited from your project's activities.

The target audiences benefit from the progress of the selecting and evaluating the tested varieties and found potential for small grain crops for their future production.

One of the concerns in Alaska is the impact of climate change on Alaska's agriculture sector. To address the concerns, current and past research results were simulated in computer modeling in order to understand climate change impacts on small grain crop growing in Alaska. The simulated results have been publised in the following citations:

Mingyuan Cheng, M. Zhang, R.M. Van Veldhuizen and C.W. Knight. 2021. Growing season and phenological stages of small grain crops in response to climate change in Alaska. American Journal of Climate Change vol 10 (4) (doi:10.4236/ajcc.2021.104025).

Mingyuan Cheng, M. Zhang, R.M. Van Veldhuizen and C.W. Knight. 2022. Temperature and precipitation changes in June and July impacts the yield of small grain cultivars from 1978 to 2012 in Fairbanks and Delta Junction, Alaska. Arctic, Antarctic and Alpine Research 54(1):386-394.

Briefly describe how the broader public benefited from your project's activities.

One of the major public concerns of 2022 in Alaska is food security and food safety. The field trial in Fairbanks is on the fenced field close to road sites where local community members utilize the adjacent trail to walk, jog, and take dogs on walks. Allowing the pubic easy access, provides the general public and users with the awareness that university research is addressing their concerns on food security in Alaska. In addition, information from the project is presented to growers in major farm areas annually in the winter time, which attracts nearly 30 participants in person or online.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

The major changes of the project during this reporting year includes hiring and training of undergraduate students in the research sites. Two undergraduate students were trained as summer students in the project. They learned to conduct field surveys for plant height, number of leaves, booth, heading, flowering, stages of grain filling. In addition, they also learned how to take soil and plant samples. Because of this summer opportunity, the two trained students decided to work in the agriculture field for their career.

The information from this year's results is presented at the annual Harvest Wrap Up, a farmers' meeting held each winter. It was conducted in the major small grain growing area, Delta Junction, and attracted 30ish attendants.

Since experiments in the Fairbanks Experiment Farm are close to peoples' dog walking, walking and jogging trial, people learned the purpose of the research is to find more suitable crops for Alaska to address public concerns on food security.

ALASKA GREENHOUSE AND CONTROLLED ENVIRONMENT PRODUCTION USING LEDs AND OTHER EMERGING TECHNOLOGIES

Project Director

Meriam Karlsson

Organization

University of Alaska Fairbanks

Accession Number

Annual-Alaska Greenhouse and Controlled Environment Production using Emerging Technologies

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

To extend crop production beyond traditional field seasons, greenhouse and controlled environment agriculture systems have been developed. These facilities and methods tend to be energy and labor intense and require the use of recent production findings and advanced technology to be viable. For instance, the use of LEDs is expected to result in improved management of resources while providing an efficient and uniform growing environment.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

To grow and market leafy greens and other fresh produce throughout the year, greenhouses and other controlled environment agriculture techniques are needed. Season extension systems that take advantage of the long daylight hours in the summer and transition into less light demanding crops during the winter can be expected more resource efficient and sustainable in northern climates. Production protocols that are adapted to locally available resources and conditions are likely to be more successful than generalized national guidelines. Evaluation of light qualities and other environmental conditions is therefore essential to select, schedule, and grow crops to most efficiently and economically use controlled environment space.

Opportunities to determine and record the impact of environmental factors on growth habits, developmental patterns and nutritional value for human health, add to our basic understanding of crop development and physiology. These fundamental understandings are needed to support and develop techniques for efficient crop production in various environments including northern seasonal field conditions.

Briefly describe how your target audience benefited from your project's activities.

Local growers need information and guidelines to be able to efficiently use and adapt new technologies and production approaches in greenhouses and other controlled environments. Since energy and other resources are costly in Alaska, best management practices and strategies are of outermost significance for crop production in challenging northern environments. Research findings and outcomes in this project support the efficient use of greenhouses and other environments to manage and increase crop production beyond the annual field season.

Briefly describe how the broader public benefited from your project's activities.

Access to affordable high quality fresh produce throughout the year is desirable. To manage production costs and expand the availability of local harvests beyond traditional field seasons, efficient production methods and techniques are needed. Protocols and guidelines that are developed specifically for northern conditions can be expected to better support opportunities for extending the season to increase local production and availability.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Ability to maintain and manage research facilities to support high quality research is an ongoing challenge. Greenhouse- and controlled environment technology is quickly advancing with requirements for continuous improvements and upgrades. Concentrating local research efforts to specific areas while observing national and international trends for findings that may be used and implemented to improve crop production in northern areas, may be a reasonable best approach.

Training opportunities in topics related to horticultural production are regularly offered and presented to students at secondary and post-secondary levels. The college level greenhouse management course covers substantial information on modern control and management techniques for greenhouses and controlled environments. The undergraduate courses 'applied plant science' and 'sustainable agriculture' also provide a significant emphasis on the sustainable use of various resources for crop production and the management of light and other climatic conditions.

Various communication channels are used to reach and meet the needs for information, education and training to user groups throughout the state. We are continuously communicating with producers and individuals interested in pursuing or already engaged in the use of various production systems such as fields, high tunnels, greenhouses and indoor controlled environments. Presentations are also provided at local, regional, national and international meetings, conferences and workshops on crop production using greenhouses and other production environments.

Alda Norris
Organization
University of Alaska Fairbanks
Accession Number
7000199

Alaska Extension improves pest management practices

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

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. Ecologically disruptive plants and insects can also negatively impact recreation, tourism, and subsistence harvesting. Improving citizen, farmer and land manager ability to assess pest management practices is critical to protecting agriculture, foraging and other Alaska interests.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Seasonal IPM technicians and permanent staff, with support from faculty, provided community education and technical assistance. Agents and IPM staff conducted hundreds of consultations with Alaskans regarding agricultural questions, many 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 Certified Pesticide Applicator trainings. Mediated outreach included "Bug of the Week" posts on Facebook. The public showed continued interest in a series of IPM videos on YouTube that include information on both invasive species like bird cherry and chokecherry trees, and native species like spruce beetles that have caused widespread forest damage.An agriculture agent serving the Kenai Peninsula taught classes covering soils, sustainable agriculture, livestock, range, seed starting, hydroponics, business management, gardening, composting, season extension, high tunnels, integrated pest management, pesticide safety, produce safety, produce storage, fertilizers, fruit tree care, and hay production. The agent maintained partnerships with local garden clubs, municipalities, tribal administrators, soil and water conservation districts, school leaders, and Natural Resources Conservation Service (NRCS) personnel. The agent does integrated work on: soil health projects conducted with the Kenai, Homer, and Kodiak Soil and Water Conservation Districts; for a statewide soil health; for a cover crop research program through the NRCS; and for grants supporting research in agronomy and veterinary science in Alaska in association with the Integrated Pest Management program.

Briefly describe how your target audience benefited from your project's activities.

Responses from 60 attendees of the Alaska Invasive Species Workshop in fall 2021 indicated a high level of satisfaction with the information provided by Extension and its collaborators. Forty-nine rated the amount they learned as either a 4 or 5 on a 5-point scale. Fifty-nine participants indicated they would attend the workshop again (one did not answer). Twenty-one returning attendees said they have already made changes to their practices as a result of attending past workshops (seven did not answer). Examples of behavior changes included modifying invasive management plans, improving data collection, and better assessing application risks. Respondents also provided valuable recommendations regarding information needs and desired speakers for future workshops.

Briefly describe how the broader public benefited from your project's activities.

Alaska communities and landscapes benefit from better pest management practices. Expert consultations, identification services, and collaborative workshops all help to improve knowledge and behaviors applied to reducing the harmful effects of invasive species. Agents maintained partnerships across the state with garden clubs, municipalities, tribal administrators, soil and water conservation districts, school leaders, Natural Resources Conservation Service (NRCS) personnel, and others to leverage knowledge and resources for improving Alaska's communities.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Participants were able to register for online participation in the Alaska Invasive Species Workshop in FY22, which doubled attendance from the prior year of face-to-face only. Extension continued to work with partner agencies to disseminate research-based information through digital newsletters and web pages via the Alaska Invasive Species Partnership site. Alaskans are able to gain knowledge and contribute to statewide tracking by using Extension's IPM portal: https://pestreporter.alaska.edu/ or by downloading the Alaska Weeds ID app: https://apps.bugwood.org/apps/alaska/

Alaska Extension supports sustainable and secure agricultural production

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Alaska imports over 90 percent of its food, and many communities are off the road system. Shortages related to economic effects of the pandemic highlighted Alaska's vulnerability to supply chain disruptions. FY22 also saw increased concerns of the spread of avian influenza, which can spread from wild birds to production flocks. Educators across Alaska reported stakeholders showing continued interest in home gardening, backyard chickens, and other locally grown foods. Alaskans new to small-scale production need guidance in how to efficiently and safely increase their food security.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Alaska Extension's Kenai agriculture agent offered eight different classes focusing on sustainable gardening and crop growing. These events reached over 400 gardeners and local producers. The agent also conducted an avian flu update and poultry biosecurity webinar, and educated the public on sustainable agriculture at a state farm convention and trade show. Another agriculture agent from Southcentral Alaska wrote a news article on avian flu that was carried in two newspapers.

Briefly describe how your target audience benefited from your project's activities.

Of 184 gardeners and local producers responding to a survey of the crop growing and sustainable gardening classes, 96 percent of respondents indicated knowledge gained; 85 percent plan to use the knowledge in the future; 37 percent plan to use the knowledge gained to save money; 60 percent plan to use knowledge gained to grow more food for themselves; 32 percent plan to teach knowledge gained to others; and 53 percent plan to use the knowledge provided by Extension to be more successful or make gardening easier.

After the avian influenza update and poultry biosecurity webinar, all of 24 poultry producers responding to a survey indicated that they had gained knowledge; 88 percent plan to use the knowledge in the future; 75 percent plan to use the knowledge to protect home flocks; about 63 percent plan to use the knowledge to be safer with poultry; and all plan to teach some of the knowledge they gained to others.

Responses from attendees at the State Farm convention and trade show in FY22 indicated that 119 participants gained or increased knowledge, skills and/or attitudes about sustainable agriculture topics, practices, strategies, approaches and 28 agriculture professionals intend to apply the knowledge, skills etc. that they gained.

Briefly describe how the broader public benefited from your project's activities.

Extension's broad reach in providing research-based knowledge, combined with participants' intentions to share the information, helps strengthen awareness of safety precautions and increases the likelihood Alaskans will employ the best growing and production practices applicable to northern contexts.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Information about avian flu and contact information for an Extension expert who could answer questions was provided in two Alaskan newspapers that combined reach thousands of subscribers, the Fairbanks Daily News-Miner and the Delta Wind. Alaska 4-H also disseminated information statewide on avian flu and home flock biosecurity on its website at http://www.alaska4h.org/avian-flu.html

Critical Issue

Healthy Individuals, Families & Communities

Supporting wellness, safe food handling and use of food preservation best practices in Alaskan communities

Project Director

Alda Norris

Organization

University of Alaska Fairbanks

Accession Number

7000201

Alaska Extension brings food safety benefits by the boatload

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

In Southeast Alaska, the communities are spread over hundreds of miles of islands and inlets, with no roads connecting them. Traveling by plane is impractical, due to high costs and the amount of equipment such as canners needed for workshops. The Alaska Marine Highway ferry system also continues to face challenges. Extension faces challenges in finding cost-effective ways for reaching remote villages.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Launched in July of 2021, the Juneau agent continued the successful Maritime Extension Project in FY22 by using a trawler to travel by boat and deliver food safety and preservation classes to communities off the road system. The Extension agent reached eight communities and taught more than 32 classes to over 60 people in communities that were either previously unreachable, or had gone without an in-person workshop for several years. The agent also gave food preservation demonstrations to 20 participants at the Haines fair, taught food entrepreneurship workshops online, and tested canner gauges across the region.

Briefly describe how your target audience benefited from your project's activities.

Extension's efforts improved food safety. Canner gauge tests identify gauges that need to be fixed or replaced, improving the accuracy of important tools for the preservation process. These efforts also improved Extension's reach to underserved audiences, with the majority of class participants being from low income areas or Alaska Native tribes.

Briefly describe how the broader public benefited from your project's activities.

Extension improved food safety knowledge and practices at a regional level by employing creative means to reach remote audiences.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

In FY23 the agent plans to collaborate with a Sitka-based youth and gardening program assistant to visit Edna Bay, Klawock, Hollis, Thorne Bay, Kasaan, Coffman Cove, Craig, Naukati Bay and Point Baker. They will teach a variety of classes to youth and adults on food safety and preservation, food entrepreneurship and gardening, as well as test pressure canner dial gauges. Extension will start off at the Prince of Wales Vocational and Technical Education Center, and partner with the Alaska Department of Environmental Conservation?s statewide produce safety team to work with market gardeners and greenhouse managers across the island.

Alaska Extension creates capacity to manage chronic illness

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Alaska, per capita, has one of the fastest-growing populations of seniors in the nation, and the state expects the number of seniors to double in the next 30 years. Alaska has more baby boomers as a percent of the population than any of the contiguous states, according to a 2015 News-Miner article. All of Alaska is considered medically underserved, and costs to individuals for medical care are higher than the national average. Alaska's senior population faces challenges remaining active and healthy in a remote environment. It is imperative that Alaskans focus on health strategies to maintain health and independence throughout life.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Strong Seniors, 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 across the state. The Tanana District agent solicited stakeholder input from school districts, senior centers in multiple cities, health fairs, food banks, tribal associations and consortiums, medical centers and hospitals, parks and rRecreation, Alaska Housing and Finance Corp., local legislators, and class participants. Overall, stakeholders expressed continued health-related concerns about obesity and disease prevention, limited access to care, food insecurity, and inadequate nutrition knowledge and skills.

A Fairbanks-based Extension agent was able to provide meetings by Zoom. The Extension agent trained 10 participants from the Alaska Literacy Peer Navigator Program as part of the Virtual Diabetes Self-Management Leader Cross-Training. She also trained eight participants in Lifestyle Coach Training for prevention of type 2 diabetes, and 13 participants in a Chronic Disease Self-Management Program Leader Course.

Briefly describe how your target audience benefited from your project's activities.

The Extension agent is creating community capacity through train-the-trainer programs that help embed more program educators in communities. StrongWomen/Strong Seniors groups have provided continuity in access to physical activity instruction and support, with many participants continuing to be active for at least one year. The Kenaitze Indian Tribe group has been meeting since 2004, the Kenai Senior Center group since 2009, and the Homer Senior Center group since 2010. Positive outcomes reported by Interior participants included feeling stronger and happier, reaching a desired weight loss, and increasing bone density. The diabetes management programming provided support otherwise unavailable to participants on Medicaid, who have no reimbursed diabetes education. More than 20 years of national-level research show that the chronic disease and diabetes management curricula used by Extension leads to better quality of life, improved health behaviors and reduced medical care expenses.

Briefly describe how the broader public benefited from your project's activities.

Alaska Extension supports programs that improve community engagement in wellness and can eventually reduce health care costs. The agent reported that if 90 fewer Alaskans develop diabetes, there will be potential savings of $864,000 for each year that they remain diabetes-free. There is also a tremendous amount of value added by the volunteer hours contributed by Extension-trained community volunteer leaders. Independent Sector reports that for 2022, in Alaska an hour of volunteer time is worth $33.60, an increase over the prior year, and slightly above the national average of $31.80.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Extension utilizes many methods of promoting programs with health benefits, including both social and traditional media. The Fairbanks-based Health, Home and Family Development agent has been collaborating with the University of Hawaii Children's Healthy Living Center of Excellence and plans to incorporate efforts to improve food security into future work.

Critical Issue

Natural Resources, Ecosystems & Sustainable Energy

Spruce Response to Beetle Infestation in Alaska: An Evaluation of Tree Ecophysiology Using an Integrated Field and Modeling Approach

Project Director

Jessica Robertson

Organization

University of Alaska Fairbanks

Accession Number

7001661

Annual report

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The goal of this project is to quantify the ecophysiological response of white spruce to bark beetle infestation in Alaska's boreal forest, including the characteristics of the early phase of attack. The characteristics of this phase are unknown for Alaska, and the information can be used for forest management purposes.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

14. Non-technical Summary —

Forests have experienced insect attacks throughout their history, wherein trees and insects or other pathogens often co-evolve together. Attacks that lead to the death of trees can improve forest health because older trees fall, put nutrients into the soil, and make space for new plants to grow. This natural process has become more threatening in recent decades because insects, such as bark beetles, are getting more aggressive and are able to overcome tree defense mechanisms. Certain factors contribute to more threatening beetle attacks, including warmer and drier conditions. As a result, very large areas of healthy forest are dying, which can be observed throughout the western U.S. and Alaska as extensive swaths of brownish/reddish dead trees. This has negative consequences for ecosystem function and other processes like streamflow and snowpack. This may also increase the chance for large, intense wildfires. Places with many dead trees also pose hazards for people because the trees are prone to blow down with wind and are generally hazardous to be near, so some campgrounds and hiking areas have had to close as a result.

This study focuses on white spruce trees in Alaska, which are experiencing an unprecedented beetle outbreak and widespread areas of tree death. This study address some of the fundamental unknown factors about how trees are responding to bark beetle infestation. An area where more research is needed, particularly in Alaska, is how spruce tree physiology responds to beetle infestation, such as how infestation affects trees water use (amount and rate of use), tree stress levels (dehydration), and tree growth and metabolism (photosynthesis). The way a tree's physiology responds to beetle infestation determines if it can fight off the infestation or if it dies (and how it dies). This study will carry out a field study of spruce tree physiology in areas where the beetle infestation is occurring. We will use the data to develop a model that allows us to analyze the data and include factors from the environment, like soil moisture or temperature. The model also allows us to predict how spruce physiology will respond to future environmental conditions. It is important to produce models that can be used for other purposes, and we must do this to meet the mission of our research unit and this funding source. In this case, we will adapt this model to other boreal plant species, including common tree species and some agricultural plants. This will be done by collecting field data (like what we will collect with the beetle kill study) to use in the adaptation of the model to these other species. We will use citizen scientists to assist us with some of the data collection, and we will share our results with the Alaska State Division of Forestry, the public, and other scientists.

Our major activities during this reporting period include:

- Developed a partnership with the Ahtna tribe member who works on bark beetle population changes and spread
- Identified sites on Ahtna land that will be instrumented with tree and environmental monitoring sensors
- Conducted weekly field measurements on white spruce and other boreal tree species to collect control data in order to compare to infested trees in the future
- Weekly field measurements were also used to train project members on equipment use and procedures
- Built sensors that will be installed at field sites to measure water use
- Collected data on tree properties that impact how they use water and are impacted by drought, insects, etc.
- Reviewed and identified model components to guide field and lab measurements
- Collected seasonal fuel moisture data
- Trained on how to identify beetle attack in individual trees
- Developed field safety protocols for remote field work that is relevant to this project

We made progress on our goals through these activities, specifically we have laid the foundation for subsequent years on this project and have achieved our goals as outlined in our timeline.

Briefly describe how your target audience benefited from your project's activities.

- Alaska State Division of Forestry – We met with Forestry personnel to identify research sites and look at movement of beetle infestation and mortality as it moves northward. We were trained by Forestry personnel on how to identify beetle infestation in white spruce. They assisted us in building a partnership with Ahtna, and we identified sites on their land. We have also obtained permits from Ahtna to proceed with site installation.
- OneTree Alaska citizen scientists and education outreach participants – We are not yet in the phase where we incorporate OneTree Alaska into the project.
- Local citizens – We do not yet have results to share with the local citizens.
- Scientists and academics interested in the boreal forest – We do not yet have results to share with scientists and academics but we have made people aware of our project through targeted meetings.

Briefly describe how the broader public benefited from your project's activities.

We do not yet have results to share with the broader public but we have made people aware of our project through targeted meetings. We have garnered interest in this project.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Problems - We were unable to test out a piece of equipment that will be used next summer due to issues with the instrument caused by the company. However, the issues have been rectified, and we will be able to proceed as planned next summer.

Training and Professional development - Project personnel will be attending the American Geophysical Union meeting for professional development. Project personnel were trained on field and lab equipment, and safety protocols.

Outdoor Recreation, Parks and Other Green Environments: Understanding Human and Community Benefits and Mechanisms

Project Director
Peter Fix
Organization
University of Alaska Fairbanks
Accession Number
1025572

Final Annual report for Outdoor Recreation, Parks and Other Green Environments: Understanding Human and Community Benefits and Mechanisms

Final Result

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Outdoor recreation provides positive benefits to people. However, optimizing those benefits requires information about not only current recreationists, but also those who do not use recreation resources (i.e., why do they not utilize those resources?). Further, the legacy of segregation/racism is still impacting social justice as applied to outdoor recreation.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The major activity on this project in 2022 was progress towards an edited book titled: The transformative power of parks. The book is divide into four sections: 1) Community Vitality and Resilience, 2) Diversity Equity and Inclusion, 3) Health and Well-being, and 4) Environmental Literacy and Stewardship. During 2022 peer reviews were sent back to authors and revised manuscripts returned. The revised manuscripts were reviewed by the editorial team. Forty-four chapters have been peer-reviewed, revised, and reviewed by the editorial team.

Briefly describe how your target audience benefited from your project's activities.

The target audience is researchers, educators, and policy makers. While the book is not yet published, it is anticipated the book will provide a resource with up to date evidence of the benefits of recreation, current case studies, and support for recreation-oriented policies.

Briefly describe how the broader public benefited from your project's activities.

The intent of the book is to contribute to the state of knowledge of the recreation management field. This in turn will result in management decisions that optimize positive outcomes for individuals. Of particular note is the section on Diversity Equity and Inclusion. The book hopefully will be used in college courses, contributing to the next generation of resource professionals.

Control of invasive plants at high latitudes using persistent herbicides

Project Director
Gino Graziano
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University of Alaska Fairbanks
Accession Number
1021463

Annual-Control of invasive plants at high latitudes using persistent herbicides

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Invasive plants are a growing problem in Alaska, and the most effective methods including persistent herbicides are needed to manage the species. Some of the most effective persistent herbicides have proven to persist beyond the time frame they are needed for control leading to non-target impacts in wildlands, and preventing rotation of crops to sensitive species. This project seeks to understand the persistence of picolinic acid herbicides in Alaska to benefit invasive plant management in agricultural and wildland settings.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Invasive Chokecherry Management- Wildland plots in forest of Anchorage and Fairbanks were set up and invasive chokecherry (*Prunus padus*) received basal bark treatments with a persistent and non-persistent herbicide. Evaluation of these wildland plots occured during the summer of 2022. We saw increased non-target impacts from higher doses of persistent herbicide, while the differences in efficacy were small though significant. An additional evaluation will be done in 2023.
Certified Weed Free Straw - In 2021 plots treated in a fallow season (2020) had soil samples taken to determine the quantity of herbicide present. Barley was planted to harvest straw and determine if the crop could be certified weed free according to standards set by Alaska and the North American Invasive Species Management Association. Barley was planted again in 2022 and additional soil samples taken. The persistent herbicide increased rate of certification of the plot as weed free by NAISMA standards. Bioassays were also performed on the soils sampled. These show evidence that the persistent herbicide is present in the soil for up to two years after the application.
Sorption experiments- Additional laboratory bench work was completed to determine the soil processes driving the affinity of two herbicides, aminopyralid and clopyralid, for soils in Alaska. We found that the persitent herbicide, aminopyralid, has more affinity to soil particles at a lower pH. Little to no herbicide binds to soil particles at a pH of 5 which is equivalent to the soils natural pH. We see the increase in affinity at ph of 2 and 3.5.. This however is contrary to the observation of continued persistence that we have observed under field conditions.

Briefly describe how your target audience benefited from your project's activities.

Presentations of the current results were prepared and given to the target audience at the Alaska Invasive Species Workshop, Western Society of Weed Sciences, and the Alaska Sustainable Agriculture Conference. These presentations outlined the difficulties of invasive plant management in Alaska and the utility of persistent herbicides. Further, we highlighted how our research will help manage the use of persistent herbicides to prevent non-target impacts and problems with rotating crops to sensitive species.

Briefly describe how the broader public benefited from your project's activities.

The broader public will benefit from this project by increased efficacy of the invasive plant control in both agricultural and forested settings. The agricultural settings are aimed to increase the availability of certified weed free straw products that are used as animal bedding, and in the local manufacturing of erosion control materials. The forested settings are aimed at increased efficacy and management of persistent herbicides in the control of invasive chokecherry trees (*Prunus padus*). As we continue the research to understand the soil properties that drive affinity for aminopyralid and clopyralid to soils we can form additional hypotheses about the potential period of control, and remediation of treated sites with plant material or adjusting soil chemical properties such as pH.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Initially we intended to study the impact of temperature on the ability of aminopyralid to bind to soil particles. However, in our preliminary experiments we were unuable to get any herbicide to bind to the soil at any temperature. When we realized it was likely because of the effect of pH on the charge of the herbicide, we changed our experimental design to compare different pH levels. The ranges used cover a broad area of low pH levels, and provide good insight into potential processes of herbicide binding and ways to manage the herbicide remaining in the soil.

19-06 Hatch Regular: Understanding Human and Community Benefits and Mechanisms

Project Director
Peter Fix
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University of Alaska Fairbanks
Accession Number
1019421

Annual-19-06 Hatch Regular: Understanding Human and Community Benefits and Mechanisms

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Outdoor recreation provides positive benefits to people. However, optimizing those benefits requires information about not only current recreationists, but also those who do not use recreation resources (i.e., why do they not use the resources?). Further, the legacy of segregation/racism is still impacting social justice as applied to outdoor recreation (i.e., research shows outdoor recreation on public lands is not participated in equally across racial and ethnic groups in the United States).

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

1) A survey was administered to residents of communities in southcentral Alaska. The survey was designed to gather information on the relationship among the prevalence and type of recreation facilities, use of those facilities, and total amount of physical activity. The study design also allowed for an examination of whether income influences that relationship. Data from the survey will reveal whether there is a relationship among recreation facilities, use of the facilities, and amount of physical activity. In addition, the survey also asked about constraints that prevented participation in recreation. The resulting information will be provided to policy makers and managers, and can inform decisions on the future development of recreation facilities.

2) Surveys and focus group protocols were developed to be administered at Bureau of Land Management recreation areas and communities surrounding those recreation areas. The survey and focus group protocols were approved by the Office of Management and Budget. The surveys and focus group will examine the beneficial outcomes users hope to achieve through recreation at the site and management actions that can facilitate the realization of those benefits. The focus groups will include a wide diversity of participants, including people who might not currently use the area in question, local businesses, and local government. Data will inform managers on the actions that might optimize desires of the public. Surveys and focus groups were conducted at 4 different areas in FY 2022.

3) A project was initaited to advance diversity, equity, and inclusion (DEI). The major activities have included development of research instruments, building partnerships, gaining UAF Intuitional Review Board approval for the project, capacity building, and, most importantly, relationship building. In partnership with YWCA Alaska, a non-profit community organization headquartered in Anchorage, the recreation equity focus group project has, to date, recruited 18 people of color or Indigenous people living in Anchorage and Fairbanks to collaborate on this project. As review committee members and facilitators, these community partners are helping to guide the research so that it addresses issues relevant to other community members of color or Indigenous people, and uses culturally appropriate methods. We are currently in talks with Native Movement, another Alaska-based non-profit that addresses issues important to Alaska Native people, to partner with them in focus groups with Alaska Native people. Aside from the people formally collaborating on the project, our research team has been in touch with and built relationships with many other people and organizations, especially those identifying as or led by people of color or Indigenous people, in Fairbanks and Anchorage.

Briefly describe how your target audience benefited from your project's activities.

1) (southcentral AK survey) Data is still being analyzed. However, it is anticipated results will contribute to recreation facilities that better meet the needs of the southcentral Alaska communities. This will result in improved health outcomes for those residents (e.g., greater physical activity, which leads to improved health).

2) (BLM survey project) Results have been/will be incorporated into the respective area's Resource Management Plan (RMP). Because of this study, those RMPs will provide a management structure that optimizes benefits to the public, including both users and local communities. This will improve the physical and mental health of recreational users, and desirable community benefits (health care costs, economic diversification, community cohension, etc.)

3) (DEI) YWCA Alaska, a Black-led and majority person of color organization, has benefited by being formally contracted with UAF, offering both monetary benefits and diversifying their work history and community engagement. The five facilitators are in the process of gaining training in research ethics and facilitation techniques, both contributing to their skill sets and helping to build their capacity to continue contributing to research and community development. The contributions of review committee members and other partners will lead the focus groups to be more effective at researching and understanding the perspectives of people of color and Indigenous people about outdoor recreation and relationships to land. As committees meet, the individual members are benefiting by having a context to talk about experiences with outdoor recreation with other people of their race or ethnicity, an activity which is rare in more mainstream recreation industry or institutionally-led meetings and activities (e.g., public comment periods for state or federal agency land management plans). These community partners, as well as members of the research team, are also expanding their level of social and professional connectivity with others in Alaska who care about outdoor recreation and connections to land.

Briefly describe how the broader public benefited from your project's activities.

1) (southcentral AK survey) Data is still being analyzed. However, it is anticipated results might provide insight to other, similar areas, or methods replicated. Survey methodology and results will contribute to the broader understanding of the relationship between recreation facilities, use, and physical activity. In general, this study will inform management decisions, hopefully resulting in recreation facilities that improve the health of society.

2) (BLM survey project) This project developed a cost-effective method to gather data crucial to informed management decisions. Such decisions seek to optimize physical and mental health of users and benefits to the community (e.g., health care costs, economic diversification). As one of the goals is to develop a cost effective method to gather such information, a partnership has resulted in which the Bureau of Land Management conducts trainings on survey and focus group methodology for their field offices. The benefit to the public is the increased number of field offices that gather data to make more informed decisions, optimizing benefits to the public.

3) (DEI) The relationships that are being built in this project could lead to future partnerships, employment, research, and policy work that may benefit many more community members in the future. The project has currently laid the ground work that will allow the focus group research to provide information that will contribute to land managers and community organizations ability to effectively enable safer, more welcoming, more accessible, and more equitable outdoor spaces, activities, and programs in Alaska.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new

details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

(BLM survey project) Project personnel (from UAF and affiliated universiteis) have participated in BLM recreation training. Project personnel explain the survey and focus group protocols and provide insight into how results can inform mangement.

(DEI) The next steps for the focus group project, include continued committee meetings, facilitator training, recruiting focus group participants, holding focus groups, analyzing data from audio recordings of the focus groups, having committees review data interpretations, report writing, and public presentations of findings. Partnering with Native Movement may be another aspect of near-term project activities.

Research, Capacity Building, and Training for Meeting the Climate Change Challenges in Wildfire Management and Indigenous Communities in Alaska

Project Director
Sarah Trainor
Organization
University of Alaska Fairbanks
Accession Number
1018914

Annual-Research, Capacity Building, and Training for Meeting the Climate Change Challenges in Wildfire Management and Indigenous Communities in Alaska

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Alaska and the Arctic are warming twice as fast as lower latitudes with far-reaching consequences for ecosystem management, natural resources, and community development Natural resource managers are struggling to keep up with these changes while working to integrate the best available science into decision making. This research addresses three interrelated aspects of research, management, and training. (1) the need to better understand actions, processes, mechanisms by which actionable science, translational ecology and use-inspired science are conducted, (2) the need to build capacity and advance rural community development, (3) the need to develop integrated student research conducted in partnership with stakeholders. The focal areas of this work include wildfire management, food security, economic and workforce development, and co-production of knowledge with Alaska Native communities.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

(1) Kake Climate Partnership

The Kake Climate Partnership was formed in 2020 between the Organized Village of Kake, Kake Tribal Corporation, the City of Kake, and the Alaska Center for Climate Assessment and Policy. The Tribe and community in Kake are concerned about the impacts of climate change and pollution on the saltwater and freshwater environments surrounding their traditional food harvesting areas. A key aspect of this work is a co-produced a set of Principles and Expectations for research, with the goal of supporting food sovereignty and increasing food security in the Kake area. One of the objectives of the Partnership is to create a local climate workforce in Kake, with emphasis on developing young leaders and scientists. The data collected for the project will help people in Kake document environmental change and adapt to climate changes.

(2) Bridging Wildfire Science and Management

Project activities related to wildfire focus on bridging wildfire science and management. Goals are to make the science accessible, relevant and useful to fire managers in Alaska. Specific activities in this project period include production of a multi-media story map explaining burn severity, development of a publicly accessible interpretive trail, and printing of a highly used and referenced guidebook, *Alaska's Changing Wildfire Environment.*

(3) Graduate Student Project: Healing Through Food and Culture: Using Indigenous Knowledge to Shape Solutions to Food Insecurity and Health Disparities

Hatch funds have been used to support Indigenous M.S. student, Eva Burk, in her research. Historically, local food systems included agriculture and some Alaskan communities are revitalizing these traditions, resulting in improved health and food security. Through examining these processes with communities, this research explores: What is the potential for traditional foods and sustainable agriculture to build community resilience and shape solutions to food insecurity and health disparities in rural Alaska?

The concepts of this research project and its possible outcomes are relevant to the three components of sustainable agriculture: 1) Improve the profitability of food producers and the economic well-being of rural communities; 2) Sustain and improve the environmental quality and natural resource base on which agriculture, including subsistence resources, depends; and 3) Enhance the quality of life for food producers, communities and society as a whole.

(4) Graduate Student Project: Understanding the Role of Boundary Spanning in Knowledge Co-Production and Science/Community Partnerships with Alaska Native Communities

Hatch funds have been used to support Indigenous Ph.D. student, Margaret Rudolf, in her research. Through analysis of two existing research projects, the project develops best practices in co-production of knowledge (CPK) with Alaska Native communities. Pulling from Indigenous methodologies and best practice examples from Indigenous researchers, this work aims to make research methodologies more culturally-inclusive. A CPK project evaluation protocol has been developed. The three papers are planned and in progress from this research.

Briefly describe how your target audience benefited from your project's activities.

(1) Kake Climate Partnership

The Kake Climate Partnership has strengthened community relationships, developed a local workforce, and established a community evaluation process. Between June 2020 and June 2022, more than 30 part- or full-time jobs, including five paid undergraduate research intern positions and two paid research assistantships, were created for youth and adult residents in Kake. Two local field trips were held. Data from stream and ocean water monitoring will be used by the community to help assess impacts of ship traffic that resumed after Covid-19 restrictions were lifted. Local workers received training on social science methods for document knowledge of local elders and experts about salmon in streams near Kake.

(2) Bridging Wildfire Science and Management

The primary audience in our wildfire work are the state and federal agencies that manage fire in Alaska. The Alaska Wildland Fire Coordinating Group (AWFCG) has operated as a collaborative group since 1994 serving to coordinate wildfire management across state and federal fire, land, and resource management jurisdictions.

Burn Severity Explained. The Shovel Creek Storymap has received over 2500 views in less than a year since its release, and was widely shared on Facebook reaching over 17,000 feeds (including being shared by the National Interagency Fire Center). In addition to praise from local researchers and managers, the product received testimonials from educators and researchers from outside of the state of Alaska. The storymap was also popular among a collaborative group of artists and researchers that were a part of the “In a Time of Change’ group at the University of Alaska Fairbanks.

Yankovich Road demonstration site and interpretive trail. In 2021, two field trips were held to the site for artists participating in a local art and science collaborative project. In 2022, joint field trips were led for participants in the Intertribal Timber Council’s annual Indian Timber Symposium and the Alaska Society of American Foresters Annual meeting (about 220 people total), as well as field tours for several visiting scholars and dignitaries, including NOAA’s Senior Advisor for Climate and NOAA’s top Administrator. The site was also used to educate hotshot crews from the lower 48 states about the unique features of the Alaska fire environment. A field trip for 5th graders was also held.

Alaska’s Changing Wildfire Environment Report. State and federal agency staff, including agency administrators and Public Information Officers (PIO), continue to refer to and draw on this publication in their interactions with media and the public. In FY22, the online version has been accessed more than 8000 times, and approximately 1200 printed copies were distributed, many of them to managers for use in public presentations or to share with colleagues.

(3) Graduate Student Project: Healing Through Food and Culture: Using Indigenous Knowledge to Shape Solutions to Food Insecurity and Health Disparities

This project provides support, training, and workforce development benefits to M.S student, E. Burk. She completed her Institutional Review Board (IRB) application, continued with project scoping, and presented at several professional meetings, including Alaska Food Policy Council Festival and Conference. She worked with filmmakers to share her story of working to strengthen Indigenous Food Sovereignty and Security and revitalize cultural activities. She also hosted a sustainable agriculture workshop for Indigenous community members in collaboration with the local Calypso Farm and organized and directed a summer culture camp for youth in her home village of Nenana. Ms. Burk helped host an intertribal moose hide tanning camp in collaboration with her tribe and community organizers.

(4) Graduate Student Project: Understanding the Role of Boundary Spanning in Knowledge Co-Production and Science/Community Partnerships with Alaska Native Communities

This project provides support, training, and workforce development benefits. During this performance period, M. Rudolf completed her qualifying exam, received Institutional Review Board (IRB) approval for her research, conducted preliminary work for data collection, collected and analyzed data, and participated in trainings from the First Alaskans Institute and NSF Arctic Data Center. Rudolf serves as Indigenous liaison for the Indigenous-led Food Sovereignty Working Group (FSWG), and in this performance period she presented 5 oral presentations and 3 posters, including invited keynote presentations at professional meetings and public venues.

Briefly describe how the broader public benefited from your project's activities.

(1) Kake Climate Partnership

This project provides a model for research co-production with Alaska Native communities to address locally identified and defined research and community needs, including workforce development. *Publication*: Figus, E.C., B. K. Jackson, S.F. Trainor. (2022) The Kake Climate Partnership: Implementing a knowledge co-production framework to provide climate services in Southeast Alaska. *Frontiers in Climate*. DOI 10.3389/fclim.2022.885494

(2) Bridging Wildfire Science and Management

Burn Severity Explained

The storymap has provided broad societal benefits in increasing knowledge and understanding of the natural role of fire in the Alaskan environment by reaching diverse audiences and as part of educational lectures. Link to the Storymap: https://storymaps.arcgis.com/stories/ed9018a155af47ab904e5e0db5da3e14

Yankovich Road Demonstration Site and Interpretive Trail

We are collaborating with the International Arctic Research Center's science communications lead and an artist from the local art and science project to develop signage for the demonstration site, which will be installed in the spring of 2023.

(3) Graduate Student Project: Healing Through Food and Culture: Using Indigenous Knowledge to Shape Solutions to Food Insecurity and Health Disparities

This research explores healing through food and culture, focuses on community and cultural resilience, and uses Indigenous knowledge to shape solutions to food insecurity and health disparities. Historically, local food systems included both traditional foods and some form of agriculture. Several Alaskan communities are revitalizing these traditions, resulting in improved health and food security. These community-driven solutions can help shape a framework for better understanding resiliency and measuring efficacy of using existing social and cultural strengths to improve sustainability of local food resources and increase health benefits.

(4) Graduate Student Project: Understanding the Role of Bounary Spanning in Knowledge Co-Production and Science/Community Partnerships with Alaska Native Communities

In terms of the larger project audience, this research provides theoretical, methodological, and evaluative frameworks to legitimize, respect, and include Indigenous knowledge in scientific research. This research project will produce plain-language white papers geared towards Indigenous communities and educational programs, as well as present at conferences well-attended by Alaska Natives, such as the Alaska Forum on the Environment and Alaska Tribal Conference on Environmental Management. As an Alaska Native woman, M. Rudolf is working towards broadening participation by engaging with other women and Indigenous individuals to uplift their voices in developing a more equitable research system. Three publications are in progress.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

This is the 4th year of a 5 year project. Work is on-going.

Partnering to promote sustainable energies and responsible natural resources stewardship for Alaska

Project Director

Alda Norris

Organization

University of Alaska Fairbanks

Accession Number

7000200

Alaska Extension Collaborates with Citizen Scientists on Sustainable Forest Products

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Buy-in from communities is critical to ensuring nontimber forest products are harvested properly and processed safely. Improving awareness and knowledge of good forest stewardship practices is key to ensuring our forest products remain sustainable. Various species of trees and the forest products that can be derived from them are just some of the many renewable natural resources that Alaska has to offer. The faculty and staff of IANRE work together to blend research and outreach to assure stakeholders understand best practices when gathering and preserving locally foraged foods. Helping Alaskans learn to harvest wild foods safely also can improve local food security.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

OneTree Alaska, part of IANRE, is an Alaska Center for Energy and Power (ACEP) partner for science, technology, engineering, art and math programs sponsored by the Office of Naval Research. The state-certified OneTree Alaska kitchen is a production space for local forest products, including birch syrup, caramels and birch sticks made from sap collected by a volunteer cooperative of local families and classrooms. While the integrated team at OneTree conducts outreach primarily in the Interior, an Extension agent in the Southcentral region also provides outreach for foragers and landowners farther south. The agent offered birch tapping and sap processing classes to 104 participants by Zoom, and also continued to sponsor a free online publication about backyard birch tapping and syrup making, with thousands of downloads each year.

Briefly describe how your target audience benefited from your project's activities.

Research at the OneTree lab continued to target greater predictability for when the birch sap season will start, peak and end. The lab collected and contributed seasonal data to researchers working on predictive algorithms. This has the potential to provide greater certainty for producers to know when to set and pull taps.

Briefly describe how the broader public benefited from your project's activities.

The data collected by the OneTree lab is shared across units at the university and contributes to broader knowledge about green-up trends. Natural resources programming helps youth develop a connection with nature. The inclusion of community members as citizen scientists helps Alaskans practice being good forest stewards. The publication on birch tapping has been shared widely, and helps increase awareness and knowledge of Alaska's forest products.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

OneTree co-hosted a webinar with the Alaska Center for Climate Assessment & Policy on “Green-up in Interior Alaska: When and Why it Matters” to disseminate information to the public on green-up history and trends, and distributed a PDF of the presentation. The public continues to show interest in the guidance offered in a free online Extension publication: https://cespubs.uaf.edu/index.php/download_file/1434.

The broader impact potential of OneTree Alaska took a significant step forward in FY22, as three external research projects invited OneTree Alaska to join their teams to lead K12 education/outreach objectives in each project. This partnership will showcase OneTree’s educational methodology and help other sites employ curricula that bring research from the University of Alaska Fairbanks to a wider audience.

Alaska Extension Elevates Alternative Energy Options

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Given the concurrent rise in cost of fossil fuels like heating oil, there is a demand for more information on alternative heating options such as solar, wood gas and cordwood heat. In recent years, Alaska has seen an increased impact on its forests due to pests like spruce beetles. Pest damage affects the availability and viability of firewood and directly increases risks of wildfire (a huge carbon emitter). Many areas in Alaska are off the road system, increasing the cost of arranging delivery of fuels harvested outside the community. Interest in locally based fuels for local energy production is an important ongoing issue for remote communities.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Each year, Alaska Extension's energy specialist helps hundreds of people raise their awareness of cost efficient and carbon efficient energy options. During FY22, the Extension energy specialist hired and mentored an engineering student and covered summer salary for a faculty regarding location sensing, thermal modeling and design per passive solar heat storage to extend the growing season. This work enabled multiple opportunities to create changes in knowledge, including: displaying a traveling prototype greenhouse; answering questions at a Fairbanks farmers market; explaining a biochar pyrolysis kiln rolled into a Delta agricultural workshop; offering a solar display and expertise from multiple faculty for interested Alaskan residents; engaging natural resource related state agencies via a Nenana Agricultural Education day booth; and co-presenting on solar greenhouse heat storage at the Chena Energy Fair. Efforts led toward a tribally designed solar heat box built in an Extension class onto a resident’s home for supplemental home heat. The Extension energy specialist trained a summer student worker on equipment that will help with ongoing biochar work. The same specialist and an Extension agriculture agent in Southeast Alaska also worked for a few months with a remote tribal entity located on a volcanic island to assess how renewables such as geothermal or solar could be used as a nearby resource for greenhouse heat when biomass feedstock is absent.

Briefly describe how your target audience benefited from your project's activities.

According to a biannual, January 2022 report from Alaska's Division of Community and Regional Affairs, the average unsubsidized retail price of heating fuel across 85 surveyed communities was $5.03 per gallon, compared to a national average of only $3.60 per gallon. This difference means that lower-cost substitute fuel options for home and greenhouse heating can result in significant savings for Alaskans.

Briefly describe how the broader public benefited from your project's activities.

Best practices were being shared at the international Biomass Conference presentation in Jacksonville, where over 40 individuals received information on biomass use in Alaska's schools. This work as a whole supports community sustainability. Rather than continued investment in imported, non-renewable fossil fuels, Extension is providing education on how to generate and maintain renewable energy sources like biomass and passive solar energy.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

The Extension energy specialist also produced a conference poster and connected with multiple organizations, some multistate and international, to disseminate the information. The project will continue to offer opportunities for citizen science collaborators and Alaska Native STEM student learning during the next fiscal year.

Not Provided