



# IANRE Research Summary

## Horticulture and Crops

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### **Stephen Brown**

- *Rhodiola rosea* as a new crop for Alaska (primary use is as a nontoxic substitute for caffeine)
- Best practices for growing, harvesting, processing and marketing *rhodiola*
- Determining the extent of non-native earthworms in rural Alaska

### **Meriam Karlsson**

- Sugar and mineral nutrient content of Alaska-grown vegetables
- Greenhouse production methods for growing bell peppers
- Effects of LED lights, including possible delayed flowering of spinach to avoid bolting
- Water, nutrient and energy management guidelines for greenhouse crop production

### **Casey Matney**

- Soil improvement for agriculture and forage production using cover crops on the Kenai Peninsula
- Use of “beach peat” on the Kodiak Archipelago for farm and garden
- Soil testing and implications for soil test interpretation in Alaska

### **Heidi Rader**

- Vegetable variety trials in Fairbanks and Palmer to look at which varieties grow best and update variety recommendations. Results will be compared to past trials to see if there are linkages to climate change.

### **Mingchu Zhang**

- Field testing of feed and hullless barley, oat, Polish canola and early-maturing spring wheat varieties
- Testing barley varieties for suitability for craft malting

## Forestry

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### **Jan Dawe**

- Conducting participatory research with K-12 teachers and university experts to develop a formal/informal education framework to improve K-12 STEM teaching and learning outcomes
  - Evaluating STEAM learning outcomes through multimodal analysis of student work
- Monitoring the impact of increasing growing season length on the phenology and growth of Alaska white birch (a K-20 citizen science project)
- Working with the Fairbanks Birch Sap Cooperative as a mechanism to support new business ventures and develop an entrepreneurial mindset among K-20 learners
- Alaska Climate Adapters: coordinating climate change findings to improve outreach and adaptation response

# IANRE Research Summary

## Forestry (continued)

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### *Glenn Juday (professor emeritus)*

- Climate sensitivity and growth measurements of major Alaska tree species
- Monitoring forest health, survival and growth in the Bonanza Creek Experiment Forest
- Interaction of science, faith and the environment

### *Miho Morimoto*

- Developing protocols for estimating biomass and inventorying forests through the use of UAV photogrammetry and LIDAR, which is less expensive and more flexible than other methods

### *Jessie Young-Robertson*

- Monitoring boreal forest tree growth, water use and water content that will be correlated to climate change. These studies document the response of the boreal forest to the environment, including changes in water availability and warming.

### *Dave Valentine*

- Developing projects to examine environmental constraints on tree growth, ecosystem function and soil development in several boreal forest stands. An integrated database will be developed to track soil and carbon dynamics of the University Forest.

## Animal Management/Meat Production

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### *Greg Finstad*

- Evaluating practices for field slaughter of reindeer that produces a high-quality and hygienic end product and collaborating with producers to help adopt these practices in a uniform processing protocol

### *Milan Shipka*

- Biologic changes in reindeer as result of a hormonal treatment to reduce aggressive rutting behavior and loss of weight, and the effects the treatment has on semen quality and breeding behavior

## Ecosystem Management and Climate Change

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### *Gino Graziano*

- Invasive species management strategies with an emphasis on invasive *Prunus* species and the impacts of management to site restoration
- Herbicide fate following invasive species management and direct treatments to minimize impacts of herbicides in the environment
- Weed management strategies for the production of certified weed-free straw

### *Debu Misra, Institute of Northern Engineering/AFES*

- Developing a methodology for using non-Newtonian fluids for effective remediation of adsorbed contaminants in soil and sediments under different thermal flow regimes

### *Elena Sparrow*

- GLOBE (Global Learning and Observations to Benefit the Environment) observation and measurement protocols and learning activities to engage students in environmental/earth system science investigations
- Arctic and Earth SIGNs braids Western (GLOBE and NASA resources) and indigenous science to work with educators, community members and youth in climate change education and address local climate change issues through stewardship projects in their communities
- Arctic Harvest: Public Participation in Scientific Research or Winterberry citizen science project in which UAF scientists and community volunteers investigate how shifting seasons affect the fate of subsistence berries



# IANRE Research Summary

## Ecosystem Management and Climate Change (continued)

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### *Sarah Trainor*

- Climate adaptation planning, including best practices, barriers to both planning and implementation, needs assessment and building capacity for tribal training
- Best practices for partnerships between scientists and practitioners, specifically in relation to wildfire management and climate change in Alaska

## Community, Family and Youth Development

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### *Mara Bacsujlaky*

- Identify culturally responsive 4-H programming for Alaska Native and other youth in remote rural and urban Alaska
- Develop and deliver life skills programming for youth aging out of the Alaska state foster system and youth incarcerated at the Fairbanks Youth Facility
- Develop program design and delivery focusing on engaging youth as active participants in bringing about positive change in themselves, their families and their communities
- Develop and implement indoor gardening projects in Alaska schools in conjunction with Alaska Agriculture in the Classroom, the Fairbanks Soil and Water Conservation District and other community partners

### *Candi Dierenfield*

- Provide training and support for 4-H Military Partnerships (Alaska and OCONUS Air Force; OCONUS means outside the contiguous U.S.)
- Develop and deliver 4-H life skills development through the National Mentoring Project, a 4-H mentorship program

## Human Impacts on the Environment

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### *Pete Fix*

- Examining the relationship between management actions and the attainment of desired recreation benefits. Research will also look at how management decisions might affect change at the community level. Goals are increased effectiveness of recreation management and enhanced beneficial outcomes to individuals and communities.

## Energy

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### *Art Nash*

- Radon test value distributions from the last quarter century in Alaska
- Biochar optimization and viability
- Greenhouse thermal mass heating
- Tribal healthy homes

### *Daisy Huang, Institute of Northern Engineering/AFES*

- Feasibility of using local biomass feedstock for generation of electricity and heat in islanded microgrid Arctic settings
- Evaluating existing feedstocks and technologies for small-scale use

# IANRE Research Summary



*Jessie Young-Robertson is researching the seasonal variation of water content in trees to determine the best time to harvest firewood. She demonstrates a device for measuring moisture content. UAF photo by J. R. Ancheta.*

## **Facilities: Agricultural and Forestry Experiment Station**

- Research, including climate change research, is ongoing in the areas of animal science, horticulture, agronomy and crop science, soil science, forest and ecosystem management, plant pathology related to forest health and agricultural crops, and integrated pest management.
- Natural resources and environment graduate and undergraduate students work with scientists of national and international reputation in one or more of the above disciplines.
- AFES includes the Fairbanks Experiment Farm, the Matanuska Experiment Farm and the Delta Junction field research site. The Georgeson Botanical Garden and the Reindeer Research Program are parts of the Fairbanks Experiment Farm.
- AFES forestry research is undertaken at the Bonanza Experimental Forest and at plot sites throughout the Alaska boreal forest and coastal rainforest.