ALASKA'S AGRICULTURAL EXPERIMENT STATION: seeds from the past, into the future

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The story of the Alaska Agricultural Experiment Station cannot be told without first presenting the history of the land grant institutions in the United States and Alaska. It is in the land grant colleges and universities that the agricultural experiment stations have their roots. This year, 2017, we celebrate the 100th anniversary of the land-grant concept coming to the Territory of Alaska. We will celebrate the opening of the College of Agriculture and School of Mines in 2022. It opened its doors in 1922 on land provided to it by the Alaska Agricultural Experiment Station.

The history of the Alaska Agricultural Experiment Station began 1898 in Sitka, Alaska, after land surveys showed there was agricultural potential throughout the territory. During its first century, new plant varieties were developed, new livestock concepts introduced and information provided that led to improved cultivation practices and livestock feed components to assist producers throughout the territory and state. Since its 100th anniversary, it has continued to serve its constituents. With continuing research, it delves into the potential for new crops, new markets, and augmented production techniques appropriate to the arctic and subarctic in the context of changes in climate. As its clientele broadened their interests, the station added research in natural resources management, forest sciences, and the social sciences including economics, policy and law, and recreation management. Below is its story from inception to present. Readers will notice no references in this text. Rather, I have chosen to provide a source list for your reading pleasure. The materials in this treatise are taken from the source list.

THE BEGINNING

The thirteen colonies saw the beginning of governance in North America, albeit under British rule. A landed gentry rose rapidly; slavery a part of it particularly in the southern regions. A wealthy mercantile class also rose thanks to vigorous trade across the Atlantic Ocean. Representatives to governing bodies came from this elite who had access to institutions of higher learning: education was focused on law and the humanities for the most part, with science dedicated to human biology and botany. The makeup of governing bodies began to change in the late 1700s as the colonies began their march toward independence. The 'common man' began to move into governing circles, much to the consternation of the elite and mercantile classes. Although this group of common folks participated in governance, education beyond a rudimentary level was, in general, not available to them. The Revolutionary War began in 1774; the Declaration of Independence was signed in 1776. Yet it would be nearly a century before higher education would be available to the majority of citizens of the United States of America.

The Creation of the Land Grant Universities

Abraham Lincoln was elected president of the United States of America in 1860. The Civil War began in 186l. Lincoln led the charge in a war to unite a divided North and South. One issue was certainly slavery. But another was industrialization in the North versus a plantation based economy in the South. Yet another spoke to the need to expand the fledgling nation west. Lincoln knew the largest effort to unite the North and South and foster expansion westward was not to come from the landed gentry and mercantile class. They were few in number compared to the burgeoning number of laborers, farmers, and adventurers. Because strength was to come from these ranks, educational opportunities appropriate to their pursuits were necessary.

The Morrill Act of 1862

The Morrill Act of l862 was known as the Land Grant College Act. Justin Smith Morrill envisioned financing agricultural and mechanical education as well as education in the military arts to bring opportunities to all. The bill was signed by President Lincoln on July 2, 1862 and gave each state 30,000 acres of public land for each senator and representative based on the census of 1860. This land, on its sale, would support the colleges in each state. Although land grant institutions were established in the territories, they did not necessarily receive a land grant. They were left to negotiate subsequent land transfers and grants with the federal government or with state governments when the territories attained statehood. The Morrill Act and subsequent amendments have become a major educational resource for our nation.

The Morrill Act was meant to make applied studies with real world applications available to all. This was not the case in the former Confederate states in the South, however, where blacks were not allowed to attend the original land grant institutions; the exceptions, Mississippi and Kentucky, set up separate institutions for blacks. The Second Morrill Act of 1890 expanded the original Morrill Act to provide separate institutions in all the southern states for black students. However, these institutions were not given a grant of land as were the original 1862 schools. All other provisions of the l862 Act applied to ‘the 1890s’.

The Hatch Act of 1887

It was soon realized that education without new information, research, is vacuous. As pioneers settled the West, they needed new knowledge directed toward growing crops, recognizing new plant varieties and their uses, and cultivation techniques that were adapted to soils and climate unfamiliar to them. Indeed, it was directed that all exploratory expeditions to the west collect botanical, animal, and insect samples and bring them back for study in eastern institutions. Additionally, as people returned from the Civil War, they needed new knowledge to grow greater amounts of plants and animals to feed a growing population and increasingly industrialized urban centers.

Demonstration farms became early additions at the land-grants and slowly began to do crude agricultural experiments. The first farm was established in Connecticut in 1857. William Hatch was the namesake of The Hatch Act of 1887 that created the administrative unit for the farms. It was designated the Agricultural Experiment Station and was headed by a director. Each state was given federal funds totaling $15,000 to fund research efforts. These funds were only given to the original 1862 land grants. Agricultural Experiment Stations in the territories were again left to negotiations with the federal government. Funding was on an ad hoc basis. In 1955, a formula that uses rural and farm population factors as a basis for appropriations was put in place, rather than use a ‘to be determined’ approach. It wasn’t until 1977 when Congress passed the 1977 Farm Bill, P.L., 95-113, referred to as Evans-Allen, that research funds for the 1890 land grants were made available.

Research performed under the Hatch Act and later with Evans-Allen funds was far reaching and broad, ranging from developing new cultivars of plants and creating a more versatile livestock base to soil science and human nutrition. Researchers were encouraged to address local needs rather than national needs resulting, at times, in overlap and gaps in knowledge. It wasn't until November 2, 1953, when the federal Agricultural Research Service was formed that more continuity was achieved. It now serves as the United States Department of Agriculture's research arm addressing national issues in agriculture. States were and are encouraged to follow national guidelines for research, albeit applicable at the regional and local level.

The Smith-Lever Act of 1914

Researchers at the agricultural experiment farms increasingly found themselves in one-on-one and small group discussions with local farmers. It was evident that something other than formal classroom education was needed to extend information to those who were working the land. The Smith-Lever Act of 1914 created the Cooperative Extension Service. It is an independent entity, generally housed on the land-grant campus. Working in cooperation with states and territories, Extension serves to interpret research for local farmers and ranchers and works with them on a one-to-one basis or in informal instructional groups. Specifically, the Cooperative Extension Service was tasked with developing practical applications of research and giving instruction and practical demonstrations including agriculture, home economics, and rural energy to people who do not attend the land-grant colleges and universities. This included publication of printed material for those who could not attend instructional activities and demonstrations or were not reachable by 'cooperative extension agents' employed by the Cooperative Extension Service.

The Completion of the Triangle

The year 1914 saw the completion of the triangle that was started by the educational land-grant institutions under the Morrill Acts, continued with the addition of research under the Hatch Act, and was culminated by the addition of the Cooperative Extension Service. It is now an extensive network connected through the Association of Public and Land Grant Universities (APLU) that was founded in 1887 as the National Association of State Universities and Land-Grant Colleges (NASULGC). It is a research, policy, and advocacy organization that unites the three arms of the triangle centered in the land-grant institutions. This is the essence of agricultural industry support in the United States. It, along with the USDA network, are the backbone of the world leadership the United States has taken in agricultural education, research, and dissemination of new, ground-breaking information to its farmers, ranchers, households, homemakers, and individuals in the United States and throughout the world.

ALASKA: 100 YEARS

In 1917, territorial governor John Strong accepted the land grant on behalf of the territory of Alaska. This acceptance would lead to the establishment of the College of Agriculture and School of Mines in 1922; the beginning of the land grant college in the territory of Alaska. The land grant included approximately 1,400 acres of land occupied by the Alaska Agricultural Experiment Station and a grant of $50,000 to develop the 'college on the hill' in College, Alaska. This land grant and the acceptance of John Strong of that agreement is the base from which the University of Alaska Fairbanks was developed.

Twenty years prior to this acceptance, the Alaska Agricultural Experiment Station was established in 1898 in Sitka, Alaska. Russian colonists, who arrived in southern coastal Alaska in 1742, established the

headquarters for Russian Alaska in Sitka. After the United States purchased Alaska in 1867, there was interest in the ability to produce food in the vast territory.

In 1897, an Office of Experiment Stations expedition identified 15 million acres with agricultural potential. The selection of sites for trading posts and fur trapping colonies by the Russians was in a large part based on their ability to produce food. Sitka proved to be a poor choice. The cold marine climate and thin and rocky soils would only support roots and tubers. Thus, food was imported from California. It was an equally poor choice made by early agriculturalists as history and future soil surveys would show.

The earliest formal agricultural soil survey was done in 1916. As reported by Samuel Rieger and others in 1979 in 'Exploratory Soil Survey of Alaska', approximately 18 million acres were suitable for production of grasses, small grains, potatoes, and vegetables; all would need to be cleared of native vegetation, with an additional 20 million acres in native grasses suitable for grazing but not necessarily by traditional livestock. The acreages most favorable to crop production were in the largely inaccessible interior of the territory accessible only by river navigation and arduous land expeditions.

Establishment of the Experiment Farms

Between 1898 and 1917, seven major stations (what we now call farms) were established. Five farms were closed including Sitka in 1932, the two remaining were in Fairbanks and in the Matanuska Valley. Each of the farms contributed uniquely to the area in which they were established. Of the seven, only Fairbanks was really a 'demonstration farm'. It served a large population of miners and settlers, among them farmers who had to supply a diverse diet to the population. Annual reports of the Alaska Agricultural Experiment Station's early research are published in the Annual Reports of the Agricultural Experiment Stations released by the U.S. Department of Interior beginning in 1894 and continuing through 1997 and are well documented in publications from the Alaska Agricultural Experiment Station.

Movement of the Headquarters of the Experiment Station

With the closure of Sitka in 1932, the Alaska Agricultural Experiment Station headquarters were moved to the farm established in 1906 in Fairbanks. The Station was turned over to the University of Alaska (now the University of Alaska Fairbanks) in 1935. Subsequently, outlying research sites that specialized in research specific to their location were operated by the Alaska Agricultural Experiment Station. Examples are the fur farm in Petersburg that looked at raising mink and fox in controlled environments in southeast Alaska, beef cattle range research in Homer in southcentral Alaska, reindeer research on the Seward Peninsula in southwest Alaska, and small grain and oilseed work in Delta in the interior. Of these remote research sites, only the operations in Delta and on the Seward Peninsula remain.

Sitka (1898 – 1932)

Most of the research at the Sitka farm involved vegetable and fruit production. Lawns and ornamentals were another concentration. As on most of these early farms, Sitka also produced animals but they were not a subject of research projects.

Kodiak (1898 – 1931)

Kodiak Island has a maritime climate and contains rich range land. Therefore, concentration was on the use of these rangelands to determine the practicality of raising cattle on the open range. This effort was narrowly thwarted after the eruption of Mt. Katmai deposited nearly 18 inches of ash on the island.

Kenai (1899 – 1931)

The objective of the Kenai farm was commercial dairy production including the manufacture of butter and cheese. Thus, cattle breeding was a goal starting with a mixed herd of dairy animals and the Galloway beef breed.

Rampart (1900 – 1925)

Rampart was the northernmost experiment farm. It was located on the Yukon River. It was also the site of extensive gold mining contributing to a substantial population. Its climate is semi-arid and ideal for breeding varieties of grain. Ironically, no new grain cultivars came from Rampart. Legumes were produced as were grasses and potatoes.

Copper Center (1903 – 1908)

Although Copper Center looked promising as an agricultural production area due to success of local gardens, transportation of equipment to this farm from the port of Valdez proved quite expensive. Crops fared poorly and it was closed a short five years after its opening.

Fairbanks (1906 – present)

The Fairbanks Experiment Farm was located on approximately 1,400 acres chosen for its good soils and proximity to transportation corridors. It was a multiple purpose demonstration farm with animals ranging from Yaks, beef and dairy cattle to sheep, goats, and poultry. A full range of crops including grains, grasses, legumes, potatoes, vegetables and florals in the field and horticultural crops in greenhouses were subjects of research projects. At the close of 1998, it occupied approximately 250 acres and is the home of diverse research ranging from traditional agricultural science work to forestry and recreation management and is the site of the Georgeson Botanical Gardens, the Controlled Environment Agriculture Laboratory and the Reindeer Research Program.

Matanuska (1915 – present)

Similar to the Fairbanks Experiment Farm, Matanuska was an all-purpose farm but its research was concentrated on dairy and vegetables (field and greenhouse) and potatoes. The climate, influenced by Cook Inlet to the west, was not particularly conducive to grain production. Further, the area was sparsely populated although population was increasing because of railroad construction. In 1935 that changed when the federal government sponsored 202 farm families that made up the Matanuska Colony. In 1948, the USDA Agricultural Research Service was established at the Matanuska farm bringing crop breeding expertise to Alaska. This greatly increased new cultivars available for the subarctic climate of Alaska and cultivars were developed not only in the Matanuska Valley but also the Tanana Valley in which Fairbanks and Delta are located. In the mid-1990s, the dairy herd was sold to satisfy budget deficits in part, but also because it was more expeditious to apply research from other states dominant in support of milk production in controlled environments. The greatest concentration was in field horticulture to support the growing number of commercial vegetable producers in the Matanuska Valley. Primary work was in lettuce, cabbage, and the cole crops that are well adapted to the cool growing seasons dominant in the Valley. Additionally, work began with the Alyeska Pipeline to develop turf grasses for revegetation and cooperative work with Usibelli Coal Mine in interior Alaska helped revegetate this open pit coal mine.

Conclusion of 100 Years

During the 100 years from 1898 and 1998, the Alaska Agricultural Experiment Station experienced many changes. Its research expanded from a strictly agricultural emphasis to include the social sciences; economics, environmental law, recreation management, as well as human and animal nutrition, forest management and forest ecology. The School of Agriculture and Land Resources Management was opened in

1975 forming a much needed concentration in education and expanded definition of agriculture in the state. The name of the station was changed to the Agricultural and Forestry Experiment Station to recognize the inclusion of forest science research. The Agricultural Research Service left Alaska in 1995 after nearly 50 years in the territory and state. During the service of the Agricultural Research Service, the Experiment station introduced close to 70 new cultivars appropriate to subarctic climates with the cooperation of the Agricultural Research Service. These were primarily potatoes, grasses and barley though wheat, clover, strawberries, cabbage, tomatoes, oats, alfalfa, corn and raspberries were among them.

The impact of the 100 years of research is felt today in the expanding number of farmer entrepreneurs, farmers' markets, and commercial enterprises producing secondary agricultural products under the label 'Alaska Grown'. The Agricultural and Forestry Experiment Station has continued to produce research that is helping these entrepreneurs to bring Alaskan grown produce and products manufactured from 'Alaska Grown' ingredients to residents of the state and beyond its borders.

ALASKA: WHAT'S HAPPENED SINCE 1998?

The Agricultural and Forestry Experiment Station as well as the School of Natural Resources and Agricultural Sciences came under new management in 2000. At that time, the Station was operating a swine research facility and a limited beef herd in Fairbanks. Agronomic research, including variety trials for barley, oats, wheat, oilseeds, legumes and wood biomass, was concentrated in Fairbanks and Delta. Greenhouse research, primarily in salad vegetables, poinsettias, and some flowering houseplants, was conducted in a greenhouse dating to the 1960s on the University of Alaska Fairbanks west ridge. In Matanuska, research focused on field horticulture.

The new administration made a decision to eliminate swine research; controlled environment production of hogs in an outdated facility was not necessary. As with dairy, this research could be imported from research operations in the 48 states. Better pasture was available at the Matanuska Experiment Farm and the beef herd was moved to increase the potential to look at efficient use of small pastures. However, it was necessary to continue research with Alaska produced products for rations for hogs and dairy and beef cattle. The reindeer industry showed promise. Therefore, the Reindeer Research Program headquarters were moved from the Seward Peninsula to Fairbanks and the reindeer herd was increased with a goal of 80 animals. Also, it was realized that horticultural enterprises on a commercial scale, village scale, and home scale could be enhanced by using controlled environments ranging from simple hoop construction of plastic covered 'greenhouses' to fully automated controlled environments. The outdated greenhouse was closed and construction was completed in 2010 on a modern teaching and research greenhouse. There was also the need to satisfy the growing demand for turf research. Thus, in Matanuska, a turf grass program was started. Also in Matanuska, the research laboratory building was dedicated as 'Kerttula Hall' to recognize Senator Jelmar Kerttula, who was a strong supporter of local agriculture during his many years in the Alaska legislature. The USDA Agricultural Research Service returned to Fairbanks in 2004 only to leave again in 2011.

A complete compendium of annual reports on research by the Agricultural and Forestry Experiment Station can be found at http://www.uaf.edu/snre/research/publications/. The annual reports provide a snapshot of research projects. Topics are grouped into five broad themes: geographic information, high-latitude agriculture, high-latitude soils, management of ecosystems, and natural resources use and allocation. The popular magazine *Agroborealis,* begun in 1969, contains stories about research by the Agricultural and Forestry Experiment Station. A complete listing of issues is also available at http://www.uaf.edu/snre/research/publications/. A few of

the major undertakings in research since 1998 and perhaps some of the least known, at least to residents of the state, are highlighted here.

Climate & Tree-Ring Laboratory

The CTRL conducts state-of-the-art tree ring studies. Much of the scientific consensus about climate change is based on tree ring data. With their annual or seasonal resolution, widespread occurrence, and multiple measurable properties, tree rings are one of the best sources of information about past climates and ecosystem conditions. The CTRL was one of the first academic institutions to develop a focus on climate change and has contributed important and widely recognized results in climate and tree-ring research. Many challenging questions remain in the far north in this time of rapid environmental change, such as net boreal forest uptake or release of carbon, reconstruction of past climates, and forest growth

Controlled Environment Agriculture Laboratory

Simple to highly advanced controlled environment system, from temporary cold frames and high tunnel to facilities using technology developed for space exploration and missions to Mars, can be adapted to Alaska's regional conditions to improve production of vegetables, berries, and floral crops. Ongoing research at the Controlled Environment Agriculture Laboratory (CEAL) investigates plant requirements, varieties, and treatments to maximize productivity for growers. Unlike a greenhouse, the closed laboratory allows for precise control of lighting, temperature, humidity, and nutrients, so that different varieties and various treatments can be tested.

Georgeson Botanical Garden

The Georgeson Botanical Garden is a nationally recognized botanical garden and a member of a national network of botanical gardens. Its mission is to discover and share knowledge, and inspire people about high-latitude horticulture through research, education, and outreach in order to provide deeper understanding and appreciation of the role of plants in our lives and environment.

Alaska Resident Statistics Program

The Alaska Residents Statistics Program seeks to identify common recreation management information needs among federal and state agencies in Alaska and to develop a survey to gather such information. The program is an ongoing effort, with a core set of questions remaining consistent over time and additional questions regarding specific issues asked on a rotating basis. The goals are to decrease redundancy in data gathering efforts and develop a shared database for which to monitor future recreation trends in Alaska.

Subsistence Sharing Networks and Cooperation

This ongoing study documents and analysis social networks of sharing and cooperation that are part of Alaska Native subsistence-cash economies It explores the potential vulnerability and resilience of Alaska rural communities to conditions of social and ecological change.

Science, Technology, Engineering, Art, and Mathematics (STEAM)

STEAM education is a K-20 program and is a means of exciting students, teachers, and the public, motivating them to become learners for life. Classroom activities range from studies of germination and tree growth experiments, to investigating competition among maternally related lineages in Alaska white birch. A major field experience is 'Tapping Into Spring' during which elementary school students extract birch sap from

Alaska birch and convert it to syrup in a modern laboratory designed for this purpose. The STEAM education mission is to improve STEM teaching and learning outcomes by developing model integrated K-12 curricula based on hands-on experiences with the Alaska boreal forest through inquiry science and art.

Reindeer Research Program

The program is dedicated to the development and promotion of the reindeer industry throughout Alaska. It began in 1981 to support a growing population of reindeer on the Seward Peninsula that were brought to Alaska in 1892 from Siberia to assist native Alaskans in procuring food. There were initially 171 head and five herders to teach local residents about managing domestic herds. Today, the main areas of research are range management and nutrition, animal health, meat quality, and radio and satellite telemetry. An elementary level curriculum has been developed and kits are prepared and sent to teachers who use reindeer to assist students in learning biology.

Peony Research

The Agricultural and Forestry Experiment Station began peony research in 2000 with an eye toward expanding cut flower production in the state. Alaska's peonies bloom late when the cut flowers are not available from traditional peony production areas. The Alaska Peony Growers Association provides support to growers and works with researchers at the station.

ALASKA: WHAT'S NEXT?

The look of the Agricultural and Forestry Experiment Station has changed over the years. In 2015, the Cooperative Extension Service, separate administratively from the station, was combined with the station and the school and the name of the school was changed to School of Natural Resources and Extension. Because of personnel changes and budget drops, research also changed. There are no more horticultural field trials in Matanuska. Kertulla Hall is open but the research laboratory has been closed. Turf grass worked ceased when a leading agronomist and associate director of the experiment station retired and the professional working with grasses and their use on golf courses changed positions. Biomass trials were curtailed when those associated with them retired. In the forest sciences, there were changes as well. Tree ring work, closely associated with predicting changes in climate, stopped when the faculty in charge retired. Another retirement will curtail work in forest soils, work that began in the late 1960s.

Is it time for another shift in direction for the Agricultural and Forestry Experiment Station? *Agroborealis* Vol. 42, No. 1, Winter 2011–2012 is a special edition dedicated to food. The issue is very interesting reading and points to not only what Alaskans are worried about, but also what they are doing about it. The fairly new Alaska Food Policy Council addresses issues directed at the question: "How will Alaskans feed themselves?" We have not determined what percentage of food is imported into Alaska – some estimate between 90% and 95%. We do know that the number of grocery stores in Fairbanks is decreasing and now truly deserve the name 'supermarket'. However, the number of farmers' markets across the state is increasing and a food cooperative emphasizing locally produced food has opened a store in Fairbanks. The farmers who supply these outlets, including the supermarkets, is diverse and range from a barley flour producer in Delta, reindeer and yak and buffalo producers, controlled environment growing of microgreens, to large scale hay and potato producers. Local organizations are beginning to address seed production, cut floral production, and fiber production. Perhaps it's time to look to one of the remaining two experiment farms and ask the question "is there a place for a demonstration modern and diverse farm?"

SUGGESTED READING

Science, Technology, Engineering, Art, and Mathematics. http://www.uaf.edu/files/snre/publications/misc/MP-14-13.pdf

Association of Public and Land Grant Universities: http://www.aplu.org/about-us/

Smith Lever Act of 1914: https://www.archivesfoundation.org/documents/smith-lever-act-1914/

Hatch Act of 1887: http://www.lsuagcenter.com/portals/communications/publications/agmag/archive/2012/spring/history-of-the-hatch-act-of-1887

Hatch Act of 1887: https://nifa.usda.gov/program.hatch-act-1887

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Morrill Act of 1862: https://nifa.usda.gov/1890-land-grant-institutions-programs

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