Alaska Plant Materials Center

2006 - 2007
Annual Report

Division of Agriculture
Alaska Department of Natural Resources

Table of Contents

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Conservation Plant Technology
Foundation Seed
Alaska Seed Growers'Assistance
Ethnobotany Research
Cold Regions Plot Evaluation
High Latitude Germplasm
Education
Native Plant Evaluation
Certified Seed Laboratory
Revegetation
Plant Material Technology
Potatoes

This report is a brief summary of 2006 - 2007 activities at the PMC. For additional information on the studies, please contact us at the PMC.

Director's Letter

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DEPARTMENT OF NATURAL RESOURCES

DIVISION OF AGRICULTURE

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February 5, 2008

PMC Annual Report Letter

The PMC has maintained excellent service levels. Additionally, changes in methods of operation and efficiency improvements have allowed the PMC to continue providing a multitude of services to the agricultural industry and the State of Alaska.

During this reporting period the PMC has continued the tradition of producing quality plant material and new varieties for commercial production. Expansions of the PMC's physical structures and the addition of several new buildings have greatly enhanced its capabilities.

Further improvements and efficiency changes promise to keep the PMC on the leading edge of innovation in crop science and plant development. New horizons in land issues and erosion control will augment the PMC's role and purpose in Alaska.

The PMC is a strong asset to the State of Alaska and the Agricultural industry.

Sincerely,

Franci Havemeister

Franci Havemeister
Director

"Develop, Conserve, and Enhance Natural Resources for Present and Future Alaskans."

Introduction

The Alaska Plant Materials Center (PMC) is a section of the Division of Agriculture within the Department of Natural Resources. The Plant Materials Center's work advances applied plant research for northern latitudes through five major programs: (1) Revegetation and Native Seed Production, (2) Alaska Ethnobotany Research Project, (3) Foundation Seed Program, (4) Seed Growers Assistance Project, (5) Potato Seed Program. Each of these programs will be addressed in this report.

Often in late July or early August, the Plant Materials Center hosts an open house. The PMC staff is available to answer questions about the projects and give tours of the facilities. Over 300 people attended the last open house. Scheduling conflicts and construction activities have precluded an open house in recent years. However, in the near future the PMC's open house program will resume.

The majority of the Plant Materials Center's funding has come from non-state sources. In recent years, USDA has become the major funding source. The majority of the remaining operating monies have been allocated from the Agriculture Revolving Loan Fund (ARLF). In 2007 the PMC started getting General Fund monies to replace the ARLF as a funding source. That change reversed the fiscal year 1997 move to fund the division's activity with ARLF monies. Additionally, the center brings in small amounts of revenue through cooperative projects with other agencies, the private sector, and through the sale of plant materials. All funds derived from outside sources can be used for direct operations of the Plant Materials Center.

History

Early attempts to establish a federal Plant Materials Center in Alaska were unsuccessful because the U. S. Department of Agriculture believed that the centers at Pullman, Washington and Corvallis, Oregon could serve the needs of Alaska.

The Alaska Legislature was not discouraged, and at the urging of the University of Alaska, conservation groups, and farmers, prepared legislation that would establish the Alaska Plant Materials Center.

In 1972, Governor Bill Egan signed into law a bill creating the Alaska Plant Materials Center. This legislation directed the Plant Materials Center to fulfill several traditional agricultural responsibilities and to develop plant varieties and techniques for revegetation and erosion control and provide technical reclamation assistance to industry.

Soon after the Plant Materials Center bill was enacted, a 285-acre tract near Palmer was selected for the center's site. An additional 120-acre parcel adjacent to the PMC was acquired through a land exchange with the Matanuska-Susitna Borough in 1982. This gave the PMC a total of 405 acres to accomplish its mandated duties which then included revegetation work, horticultural development, foundation seed production, and disease-free potato seed stock production.

In 1987, the PMC's programs were consolidated into two programs: the North Latitude Revegetation and Seed Production Project and the North Latitude Vegetable and Landscape Crop Improvement Project.

In 1994, the PMC assumed responsibility for the maintenance and production of breeder class seed of all University of Alaska developed grass varieties. The transfer of responsibility has placed the PMC in the position of being the repository and maintainer for Alaska-developed germplasm.

In November 1997, the PMC was notified that the U.S. Department of Agriculture granted the PMC the operation of the Arctic Genetic Resources Unit, which included an operating and capital funds grant. In 1998, the Germplasm Repository became a reality. The first USDA employee was hired and the state initiated the design of a screen house. The screen house was completed in 2001. The Arctic Genetic Resources Unit currently holds accessions of alpine, arctic and polar plants with a special emphasis on wetland species. The site also became instrumental at increasing germplasm held at other USDA repositories. A new short-term specific cooperative agreement was implemented in 2003.

In 1999, a grant from USDA Natural Resources Conservation Service (NRCS) allowed the PMC to expand its program in native seed production and commercialization.

In the year 2000, an additional grant from NRCS allowed the PMC to expand a cold regions program. The program not only allows for the establishment of a supplemental plot network throughout Alaska, it funds additional circumpolar seed exploration/collection projects.

The Cooperative State Research, Education, and Extension Service Program of the USDA funds the research programs (channeled through Alaska's Land Grant University of Fairbanks). The funding for the Alaska Seed Grower's Research Project started in 2003. The funds for the Alaska Ethnobotany Research Project started in 2004.

The major construction ranging from new buildings to laboratory remodeling and safety upgrades have been the norm at the PMC since 2003. In 2006 both greenhouses located on Trunk Road were moved to the PMC property near the Bodenburg Butte.

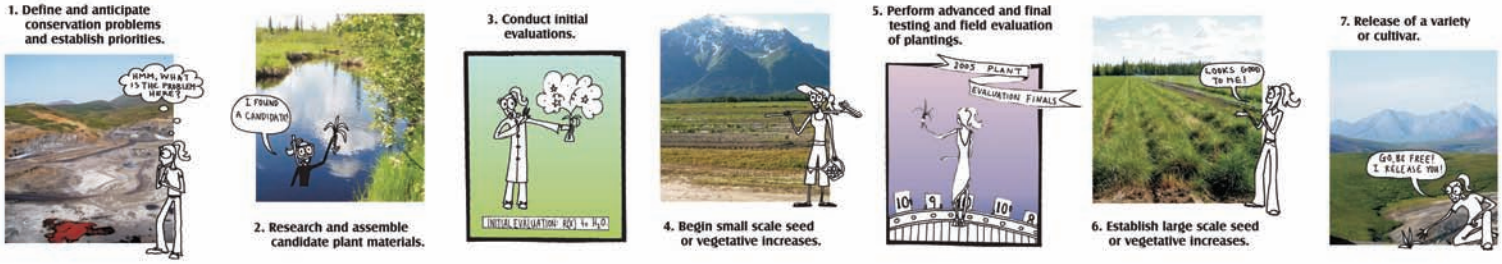
The PMC has been very aggressive in securing grants and federal funds. This trend is not expected to decline; in fact, the level of non-state funding is expected to increase.

Dean Brown, Deputy Director of Forestry leading the parade for the incredible greenhouse move. Photo by Erica Moore, DOT.

North Latitude Revegetation & Seed Production Program

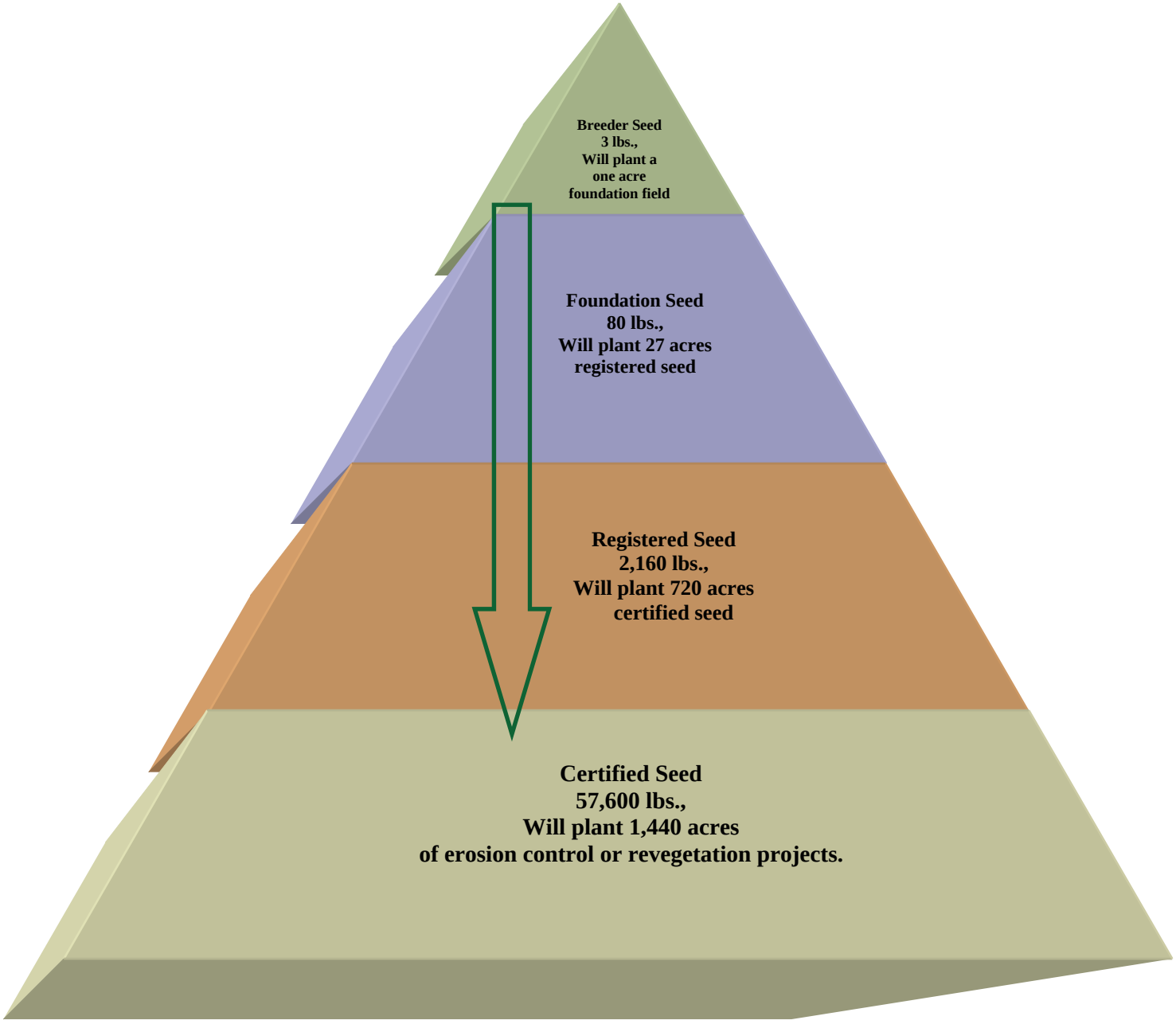
The Revegetation and Native Seed Production Program's products and methods are used to encourage a healthy seed industry and develop new plant materials and methods for land reclamation and erosion control. These two functions are complementary and are intended to promote an in-state seed industry while providing state-of-the-art revegetation and erosion control information to the public.

Plant Material Acquisition, Evaluation, Increase, and Release



Design by Domo Colburg, PMC Intern

Seed Increase Pyramid



This diagram illustrates the increase of three pounds of breeder seed to a commercially useable quantity. Clean seed yield is based on 80 lbs./acre. The planting rate is based on 3 lbs./acre for seed production and 40 lbs./acre for reclamation purposes.

Foundation Seed Program

Producing foundation class seed is of primary importance to the PMC. These plants and seed form the core plant materials for farmers, agencies, and private companies in Alaska. Foundation seed, as well as other newer selections of plants goes through the seven basic steps to establish a resource of conservation plants. They are: 1) define and anticipate conservation problems and establish priorities; 2) research and assemble candidate plant materials; 3) conduct initial evaluations; 4) establish small scale seed or vegetative increases; 5) perform advanced and final testing and field evaluation plantings; 6) establish large scale seed or vegetative increases; and, 7) release of a variety or cultivar.

The Alaska Plant Materials Center conducts initial evaluations at Palmer. Thousands of collections have been evaluated since the Plant Materials Center's establishment in 1973.

A major activity during the summers and falls of 2006-2007, was the weeding, harvesting, cleaning, and storage of this valuable seed. The picture on the right shows how we are using annual rye as a cover crop in between rows.

Annual rye, spread at approximately 20 pounds per acre seems to have an allelopathic effect on weeds.

Native Plant Evaluation Project

Tall Jacob's Ladder

The Native Plant Evaluation Project, once called the Alaska Native Plant Nursery, started in 1999 at the Trunk Road facility. This project has evaluated 204 species of native plants. Many short protocols were established to enable landscape and specialty growers to have success with these plants. During 2006 and 2007, the PMC focused on evaluating and increasing those plants that are more suitable for revegetation. During this time period the facility at Trunk Road was completely moved to the Butte facility. 2006 and 2007 have seen production of many promising species at scales previously unrealized. Through these efforts, the PMC is achieving the goal of making available a broad range of native plants for conservation and landscape purposes.

Alpine Sweetvetch

Plant Material Acquisition

Chugach Forest

Chugach National Forest requested the PMC to collect and increase native plant material from their lands for spot revegetation within the Forest. In 2006 three wild grasses were collected. In 2007 these grasses were increased, harvested, cleaned, and over two pounds of seed returned to Chugach. The harvest of wild seed continued in 2007 (nine species of grass, one species of sedge, and four forb species). These seeds were cleaned and germination tests performed. They will be planted in the fields in 2008.

One of the most interesting plants collected was *Picea glauca* (Krummholz Spruce). Approximately 20 samples of the dwarf trees with shoot and roots were collected. The samples were planted in three different soil mixtures and some cuttings were taken and placed in a mist bed with rooting hormone.

Krummholz Spruce

Increase planting of 2006 collections

Granite Creek Collection Location

Agropyron violaceum cleaning with an air-screen cleaner

Agropyron violaceum coming out at clean seed discharge

Subarctic - Arctic Germplasm Collection Project

Iceland and Faroe Islands

As a part of the Cold Regions Vegetation Project, the PMC initiated a seed collection project on Iceland and the Faroe Islands in 2001. The 123 accessions were first planted in the green house and then the seedlings were field planted on the PMC land in 2002. Between 2003 and 2007 these plantings were evaluated three times per year. Those accessions showing good to excellent performance were harvested of seed. In September 2007 these plots were removed. Seed from the best performing accessions has been placed in storage. Advanced screening and comparisons will be scheduled in the near future.

Svalbard (Spitzbergen)

All the 212 accessions of seed from Svalbard were imported to the U.S. under a Norwegian phytosanitary permit and the general USDA import permit. No problems were encountered on return to the U.S. This seed was field planted at the PMC in June 2003. Evaluation of the plantings continued through 2006 and 2007 and will terminate after the 2008 growing season.

West and South Greenland

In 2003 a seed collection project was conducted in west and south Greenland between September 5 and October 8, 2003. The seed collection project was very successful resulting in 403 collections, and included 31 species. This was at the time the largest collection the Plant Materials Center had ever made during a federally funded germplasm collection project. The volume (weight) and number of species exceeded the initial goal by at least sixty percent. This was in part due to the fact that grazing animals, primarily sheep, are well-managed and restricted in Greenland. Therefore, no competition for the resource existed. But more importantly, the suggested time of the collection project was perfect for the availability of the maximum amount of seed. This combined with the previous summer's weather contributed to very high quality seed. The collection conditions were nearly ideal with only a few days of rain.

The seed was planted at the PMC in June 2004 and evaluated by traditional techniques. The evaluations continued through 2005, 2006 and 2007 with termination scheduled for 2008.

Canada - Nunavut, Nunavik, Newfoundland and Labrador

The seed collection project conducted from 2004 to 2005, in the Canada High Arctic (Nunavut) and Canada Sub-Arctic (Nunavik, Newfoundland and Labrador) was very successful. The collection consists of 424 and 451 accessions respectively and includes a total of 27 species. The material collected will continue to be evaluated until the end of the 2009 season.

The Nunavik/Labrador collection along with the material from Nunavut, Greenland, Spitzbergen, Norway, Iceland, the Faroe Islands and of course Alaska, puts the Alaska Plant Materials Center in the unique position of having the largest Nordic or Arctic Germplasm collection under evaluation in North America.

U.S. Cold Regions Plot Evaluation

A national systematic and uniform trial program did not previously exist for cold region plants. The sites in Alaska allow for this. Until now, material collected in the Arctic and Antarctic was evaluated under temperate conditions or in growth chambers. The Alaska sites allow for evaluation under confined natural conditions. The plot network transects the state and the resulting data will be incorporated into ongoing global warming studies. The network is jointly operated by the PMC and NRCS.

Plots are visited at least once annually to evaluate plant growth. Plots are rated on percent stand and vigor. Each plot has approximately 52 different accessions ranging from turf and forage grasses to revegetation grasses and forbs. The 2006 - 2007 plots are in Homer, Willow, Delta Junction, North Pole, 7 Mile Camp Dalton Highway, Jim River Camp Dalton Highway, Talkeetna, Trapper Creek, Cascade Camp Glenn Highway, Nome, Kodiak, Red Dog Mine, Juneau, Sitka, Ketchikan, Petersburg, Glennallen, Valdez, Tok, Lake Creek, McGrath, Prudhoe Bay, and Franklin Bluffs. In most cases growth is good. A few locations have been overgrown by vegetation previously existing on the sites. In a few cases plots have needed to be resown.

Plant Materials Operation and Management System (POMS)

The POMS Inventory is a new data base system designed by the National Plant Materials Center to put all the data about the seed - how much is available, how it was cleaned, where it is stored, etc. - in one place. In 2007 the PMC converted our inventory system to POMS. Over 3,800 lots were entered! This streamlines our inventory management.

Revegetation and Reclamation Studies and Accomplishments

The construction of the Trans Alaska Pipeline in the 1970s triggered the current reclamation research activity in Alaska. However, since the pipeline, ideas associated with revegetation have changed. Continued oil development, renewed interest in surface and placer mining, as well as new federal, state, and local regulations have caused applied research activities to address "reclamation" as defined by regulations, which in some cases has precluded the use of "traditional" plant material and planting technology.

The Alaska Plant Materials Center continues to lead Alaska in reclamation, erosion control, research, and technology transfer and revegetation. The use of dormant seedlings to extend planting seasons, cost-effective and successful methods in willow planting, and wetland and coastal restorations are research priorities for the Plant Materials Center.

This program has gathered at least 275 plot years of information collected from sites around the state, developed 11 new cultivars and 34 new natural “Selected Class” germplasms for revegetation and reclamation, and assisted scores of agencies and private companies in reclamation, erosion control, and revegetation.

Vegetated Rip Rap Study

The Plant Materials Center, in collaboration with the Alaska Department of Transportation and Public Facilities (DOT & PF), conducted an initial survey and developed a report that documents and presents the results of a site study of riprap armored stream banks along Alaskan highways.

The research indicated that further studies need to be done to evaluate site specific hydrologic and hydraulic characteristics necessary for a riprap armored stream bank to allow and sustain vegetative growth. In addition, given a vegetative friendly riprap structure, this study found that Alaska’s diverse regional climate influences species composition. This report was completed in 2006.

Richardson Highway Vegetation Survey

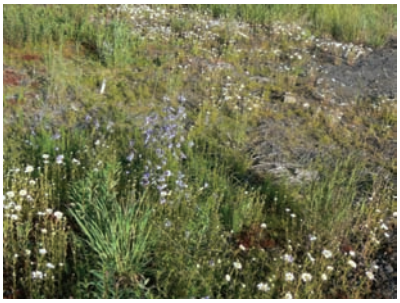
This vegetation survey of the Richardson Highway from Valdez to Delta Junction was completed in July 2006 by the PMC agronomists as part of the effort by the ADOT & PF to develop an Integrated Right-of-Way (ROW) Vegetation Management program. Vegetation management issues were the primary consideration during the survey.

Undesirable ROW vegetation consists generally of woody plants that grow tall enough to reduce sighting distance along roadways. These include several species of willow as well as balsam poplar, aspen, and alder. The most desired management conditions exist where thick stands of turf grasses are established, the hydrology of an area creates a wetland, or higher elevations limit plant growth. Native wildflowers contribute greatly to the desirable vegetation in the ROW for aesthetic purposes.

Plant populations observed in this survey were highly diverse and varied due to geographic location, elevation, soil type, slope aspect, and proximity to population centers. Undesirable woody vegetation appeared to be rather consistent along the route except where elevation, wetlands, or established turf grasses dictate species composition. Non-native plants were intermixed with native invasive species in these zones with higher concentrations observed near population centers. The information gathered was incorporated into DOT's GIS ROW database.

Red Dog Mine Revegetation and Demonstration Plots

This project grew out of a mutual need for information. The PMC required revegetation data from northwestern Alaska, and Teck Cominco Alaska, Inc. needed information on species that would perform well in future mine revegetation programs. Three different sites were established in 1987 at Red Dog Mine - each with different soil compositions, but with the same plants. A demonstration planting to showcase the different plants was established in 1988. Results have been previously published and further sites and revegetation efforts have been made since the beginning.



Site monitoring continues. In 2006 the weather conditions precluded site visits many times. The 2007 site visits showed that, as can be expected, some places have a high diversity of plants. Other places are continuously disturbed, which means that the plants have not been given the chance to survive. In many other places, natural revegetation is occurring.

Abandoned Mine Lands Reclamation (AML)

The "Abandoned Mine Lands Program" is a program of the Division of Mining, Land, and Water (DMLW). The Alaska Plant Materials Center has collaborated with DMLW on many of their projects over the past 15 years. The PMC is responsible for the revegetation planning aspects of the reclamation effort, supervision of the installation of plants and fertilization, and follow-up monitoring and maintenance.

Upper Knob Creek and Jonesville Mine

In 2006 and 2007, the PMC continued to work with the DMLW and their abandoned mine land program to monitor the revegetation progress on Upper Knob Creek and Jonesville Mine Phase 3, 4, and 5. Upper Knob Creek is divided into several pits of varying size totaling over 40 acres. The Jonesville Mine is across the valley from Upper Knob Creek. These sites were characterized by gravelly, rocky material mixed with finer particles of clay, silt or sand. When wet the substrate was slippery, sticky and easily eroded. When dry the substrate was crusty with cracks that formed as it dried.

Many trials, errors, and accomplishments accompany this revegetation project. Combinations of willow brush layers, bundles and live stakes along with transplants and seedings with native grasses and forbs were found to be the most appropriate techniques for revegetating sites with steep slopes and erosive soils. Timing, contour scarification, top soil, fertilizer, straw logs, availability of tractors with broadcast spreaders or an airplane - all of these need to be planned ahead of time, if possible, and adjusted as conditions change.


Before in 1997


Same place in 2006

Monitoring of Phase V was completed in 2005 and is described in the report Abandon Mine Land Reclamation, Phase 5 Jonesville Mine, Sutton Alaska Revegetation Implementation and Monitoring. Monitoring of Phase III and IV continued in 2005 and 2006 and the report Abandon Mine Land Reclamation: Jonesville Mine, Sutton Alaska Phases 3 and 4 was completed in 2007. Both projects were presented at the May 2007 Northern Latitude Mining Reclamation Conference in Juneau.

Kanuti Pit

The PMC, in cooperation with the DOT&PF, has overseen the implementation and monitoring of the revegetation of the Kanuti pit (material site 65-9-031-2) located at Milepost 105 of the Dalton Highway. Installation of the revegetation materials occurred in 2003. The site was contoured to create littoral wetlands fed from natural springs within the pit. Topsoil from another site was spread to improve the growing conditions. Seed and fertilizer applications were also applied as part of the reclamation plan. Monitoring has occurred during 2004-2007 and will continue until 2013. Information gleaned from this project will aid in the planning and implementation of future projects in the region.

Stewart River


Before

Starting in 2003, the PMC, through an agreement with the Alaska Army National Guard Environmental Section, developed the revegetation plan and performed post-restoration monitoring for a disturbance along the route to the Stewart River Training Area near Nome, AK. Damage to the tundra and erosion resulted from off road vehicle traffic traversing a new route due to the impassability of the traditional trail. Four levels of treatment were prescribed in the revegetation plan including eliminating traffic, seed and fertilizer applications, filling large gullies to reduce thermal erosion, and live staking willow cuttings. The revegetation efforts occurred during the summers of 2004 and 2005. Though there were some difficulties with willow cutting survival and introduction of a few undesirable plants, the restoration effort was generally successful and stability appears to be returning to the site. The efforts are described in the report Revegetation and Monitoring of the Closed Section of Access Trail Stewart River Training Area Nome, Alaska, 2006.


After

Chistochina River Wetland Restoration

Tok Cutoff 30E Project

Revegetation of three newly created wetlands along the Chistochina River was implemented by the PMC as part of the Tok Cutoff 30E project for DOT&PF. The wetlands were created in conjunction with the roadway realignment and bridge replacement aspects of the project.

Revegetation treatments including seed and fertilizer applications, dormant willow cuttings, and transplants of wild collected grasses and sedges were selected as suitable methods for achieving the restoration goals of the project. Streambank Revegetation and Protection: a Guide for Alaska (2005) provided the restoration techniques utilized for willow live stake and bundle preparation and installation. Two special treatment areas were also included to evaluate performance of a few different restoration techniques.

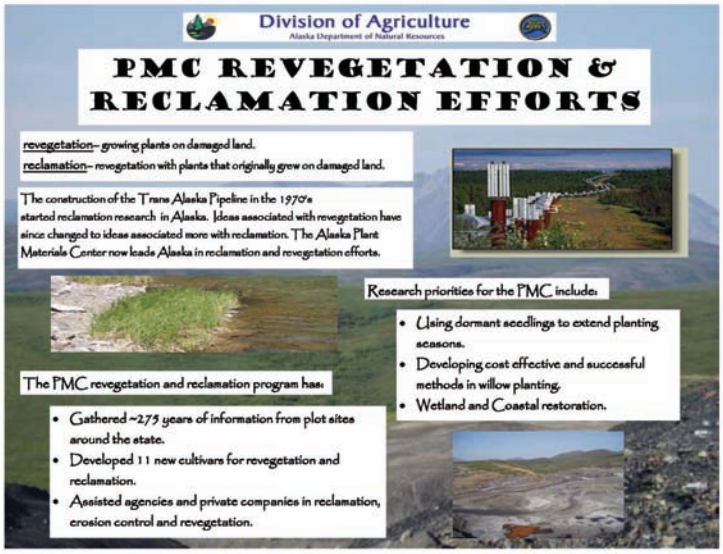


Exhibit by Domo Colberg, Intern

Plant materials necessary to complete the goals of the project were acquired through commercial sources as well as wild collections. Collection of seed occurred in the fall of 2004 and 2005. Willow cuttings were collected in March of 2006. Revegetation treatments were installed at the site June 19–21, 2006. Photo point pictures were taken for monitoring purposes during the installation and on a return visit July 27, 2006.

Initial establishment of the revegetation plant material installed on this project has progressed as expected. Seeded and transplanted grasses and sedges appear to be thriving. Willow bundle and live stake installations also appear successful, although the true level of survival will not be able to be judged until follow up monitoring occurs in the summer of 2008.

Two agronomists from the PMC conducted a site visit on August 20, 2007 to the revegetated wetlands at the Chistochina River near mile 35 of the Tok Cutoff. Photo documentation of established photo points and installation of a permanent transect were completed as part of the ongoing revegetation monitoring of the treated site.

Other Studies

Red Dog Soils Growth Trial

In March of 2006, the PMC initiated a plant growth trial using three soils from the Red Dog Mine site and 25 species of conservation plants with proven or potential value for revegetation of mined lands.

Seed from 25 species of plants with proven or potential revegetation value were sown into each of the three soils. Plants were evaluated for germination and vigor.

Laboratory analyses of the three soils clearly indicate that Soil K has chemical and physical properties that limit plant growth. Soils O and S, while having low fertility, have properties more conducive to plant growth. Results from the growth trial backed up these conclusions.

As a result of these growth trials, revegetation and soils management recommendations were made to Red Dog Mine personnel.

State of Alaska Forestry

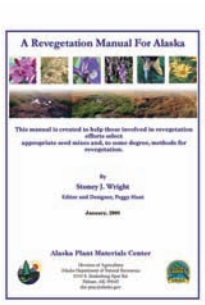
The PMC has had a long standing cooperative relationship with the Division of Forestry. The PMC cleans, tests, and stores tree seed for Forestry and also has worked with several experimental viability upgrade efforts. These ongoing efforts are mutually beneficial.

Alaska Seed Growers Research Project

Alaska native seed growers benefit from this project economically by learning which native plants are needed for commercial projects and how to produce them - thus growers can practically plan for the future. By growing native plants which can out-compete invasive, non-native weeds, Alaska will be fulfilling a national mandate to revegetate with native plants. The educational component of this project reaches throughout Alaska, infusing commercial, agency, and individuals with the capacity to make a difference in the environment.

Outreach, Training, Tours

Education and extension during 2006 - 2007 was widespread. Forty-five plant flyers detailing the use and cultivation of Alaska native plant seeds were published to the Plant Materials Center's (PMC) website and disseminated to hundreds of potential growers (http://www.dnr.state.ak.us/ag/ag_pmc.htm). They are attractive, professional, and interpretive. Each publication describes a different plant species – its background information, distribution, growth, uses, production, and characteristics. The information comes from the 35 years worth of evaluation by the PMC. These publications foster a visible way for the agriculture community to determine whether they would want to grow these plants on a commercial basis. For the purposes of education and extension these publications provide information that only a few people in the past have known about.

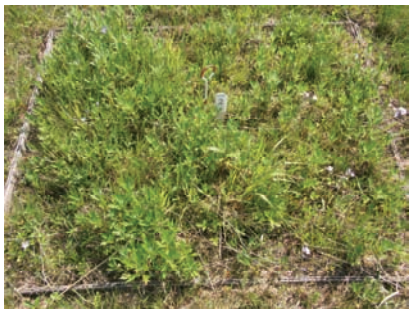


The Interactive Revegetation Manual for Alaska is on line. This manual is firmly founded on Stoney Wright's 29 years of experience with revegetation with native seed at the PMC. The result is being used by many agencies - especially DOT. The Revegetation Manual, as well as the flyers and research papers (over 70 PMC publications and flyers), is monitored statistically to evaluate whether changes need to be made to either the web site or to the metatags embedded in the papers. Statistics on the number of times this information has been accessed show extreme interest by both agency and seed growing people. By providing growers with good scientific information which is very accessible via the Plant Materials Center's website, this program is making a difference for many Alaskans.

Curricula for agriculture in the classroom is continuing to be developed and disseminated to elementary and secondary schoolteachers, non-formal educators, and collaborating agronomists. Many of the individuals and groups are of mixed heritage – primarily Alaska native. Some of the children are physically and mentally challenged. This project instructs interns and graduate students. Workshops, classroom activities, and outreach were all delivered with hands-on, minds-on activities and with inquiry as the basis for the activities.

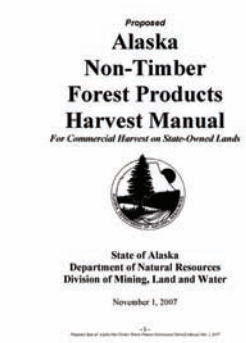
Presentations for the State of Alaska Department of Transportation, Division of Mining Land and Water, Division of Parks and Outdoor Recreation, etc. on revegetating with native Alaskan seed encourage those who write the specifications for projects to specify native seed. This then provides opportunities for Alaska seed growers to realize a secure market for their seed. Educational presentations on recent developments in seed production in Alaska were given at four different conferences. Questions were answered for hundreds of callers, visitors, and e-mailers on topics such as invasive weeds, revegetation needs, specific plant growth protocols, wildflower selections, plant selection for settling ponds, identification of mosses and unusual plants, and protocols for growing devil's club, various berries, forbs, and grasses. Many interpretive presentations were given to growers from throughout the state at the PMC, various Alaskan locations, and via media. In an effort to reach as many present and potential Alaskan native seed growers as possible, exhibits were held at the Alaska State Fair, employment fairs, and school fairs. Some of the presentations are specifically to agencies, youth, and adults about native versus invasive weeds. The Alaska Seed Growers List-Serve was maintained and information disseminated throughout 2007.

Research



Research during 2006 - 2007 focused on formulating easily established, diverse, and dependable native seed mixes to out-compete weeds. This provides an incentive for farmers to grow crops of selected forbs and grasses for the Alaska native seed market, which supplies contractors and agencies specifying seed mixes for revegetation. Two different studies were started in 2006 and evaluated in 2006 and 2007 and will be evaluated and statistically analyzed in 2008. The first study involved three combinations of forbs and grasses in different ratios planted in randomized plots with and without a mycorrhizal inoculant. Annual weeds quickly created a cover crop in every plot in 2006. In 2007, the forbs and grass took over, with little weed interference. The second study was a different treatment of an earlier project from this program. This research project on the allelopathy of annual rye on perennial native grass growth and weed suppression continues to show that rye applied at rates of 20 and 10 lbs./acre suppress both invasive weeds and the desired grasses. Both PMC projects will be evaluated one more summer before the results are published.

Alaska Ethnobotany Research Project



In a state as unique and diverse as Alaska, many considerations have to be weighed in managing a broad and newly recognized resource such as non-timber forest products. The cultural and spiritual significance of many of the species of plants, the dependence on them for personal and subsistence lifestyles, and their potential development into commercially viable products have to be balanced by the State. By developing the Alaska Non-Timber Forest Products Harvest Manual and changing the State's regulations to incorporate the Harvest Manual as law, the State is now making headway in developing a user-friendly program "to develop, conserve and enhance natural resources for present and future Alaskans" (Department of Natural Resources mission statement). Without the Ethnobotany Project this would not have been possible. The Harvest Manual is a cornerstone for the State. It defines the line between small-scale, low-impact commercial harvests and large-scale, potentially damaging commercial harvests. It describes how to sustainably harvest many Alaskan plants. This document will impact thousands of people, inspiring some to realize there is a market for native plants, protecting the subsistence and personal use harvesters, and enabling the State to effectively and knowledgably manage its land.

Non-Timber Forest Products (NTFPs) in Alaska have been harvested since the indigenous peoples in Alaska relied on them for subsistence. The beginning stage of the Ethnobotany Project (2006) identified which NTFPs in Alaska have the potential for commercial harvesting. Three different sections of the State of Alaska's government joined together to create a Harvest Manual for use in managing commercial harvest of NTFP's on State land. The State's Division of Mining, Land, and Water (DMLW) is the permitting agency for commercial harvesting on state-managed land. DMLW Natural Resource Managers and Specialists provided the input for the regulations they felt were needed in the Harvest Manual. The PMC is the knowledge base for the State's plants, with Agronomists who research and evaluate native plant ecology, growth, and health and work with NTFP's on a regular basis. The State's Department of Law provided guidance about how other states regulate commercial harvests and researched the legality of the regulation changes proposed for the State.

The process of creating an Over-The-Counter Permit, End-of-Season Report, Harvest Manual with limits on harvest amounts that were sustainable, and legal changes to the regulations was enabled by weekly meetings with the main participants. Many other people and groups contributed to the Harvest Manual including Alaska natives. The public is now invited to comment on the proposed documents. Research on response to harvest for many of the plants is ongoing, as is developing protocols for growing plants that are excluded from the manual because of their vulnerability to over-harvest. Presentations, public gardens, and plant walks provide extension for this project. One of the agronomists was part of a team of teachers for an Ethnobotany long-distance course through the University of Alaska, Fairbanks. Because of this project, people from all over the state are collaborating to educate harvesters about sustainable harvesting methods.

Potato Disease Control Program

Potatoes are among the most valuable crops grown on Alaskan farms creating a net value over 3 million dollars annually. High yields with good quality are required to assure a fair return on investment. Diseases can cause significant losses reducing yield and quality factors.

The potato is vegetatively propagated and as a consequence, has unique production problems. Many economically important diseases and pests can be carried in or on the tubers used as seed. The use of seed potatoes having little or no disease is basic to any management plan. Seed production systems have been incorporated with inspection programs to minimize this risk. Planting certified seed reduces the risk of losses caused by disease. It is for this reason that the production of disease free seed is a primary goal of the PMC.

Seed produced at the PMC is sold to growers who increase the original allotment over the next several years. Seed potatoes are subjected to inspections to assure compliance with certification tolerances. This system enables the grower to annually replace older diseased seed with clean seed.

The importation of seed from outside the state has the potential to introduce pests not known to occur in Alaska. The inadvertent introduction of these diseases or pests could cause major problems which require expensive chemical control. The importation of seed is therefore discouraged. Growers who wish to try new varieties are encouraged to obtain clean seed stock from the PMC.

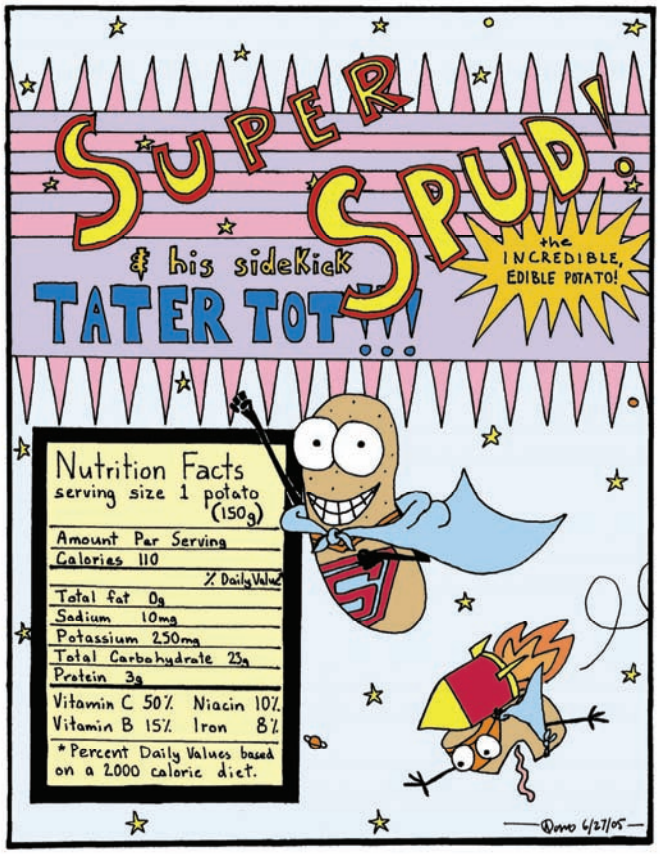


Exhibit by Domo Colburg, Intern

Pathogen Testing

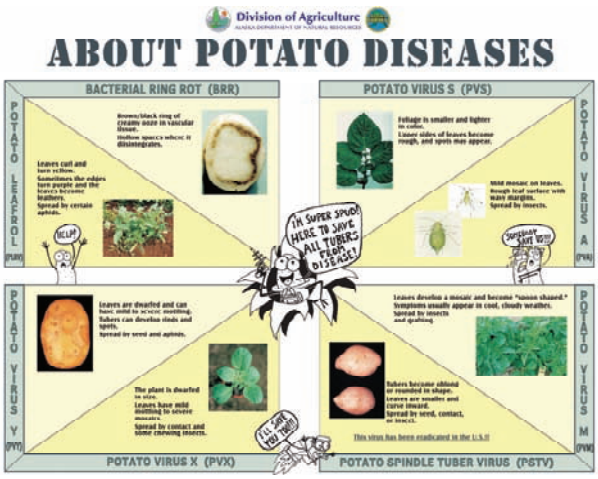


Exhibit by Domo Colburg, Intern

The focus of the potato program is to provide quality seed potatoes to commercial seed growers. The seed provided by the PMC is used as the initiating stock for the ensuing multiple year certified seed production scheme. The initial seed, therefore, must be of the highest quality possible since any disease introduced at this point would be multiplied during each successive year of seed increase. To this end, all production is rigorously tested and retested for disease prior to sale.

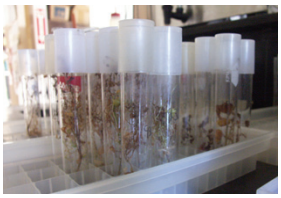
The diseases of primary importance are Bacterial Ring Rot (BRR) and the viruses Potato Leafroll Virus (PLRV), Potato Virus Y (PVY), Potato Virus X (PVX), Potato Virus S (PVS), Potato Virus A (PVA), Potato Virus M (PVM), Potato Moptop Virus (PMTV) and the viroid, Potato Spindle Tuber Virus (PSTV).

All newly acquired germplasm and each mother plant used for the in vitro propagation of the greenhouse stock are tested prior to production and again prior to harvest. The field grown materials are visually inspected during the growing season with laboratory testing performed prior to harvest.

Monitoring the health of the potato stocks at the PMC is a critical function. Understanding and accurately performing the disease test procedures, as well as interpreting the results, is essential. The PMC participates in the Potato Association of America Certification Section Standardization Project. This exercise provides participating labs the opportunity to test their materials and methods against a standardized series of antigens, and thereby developing a level of credibility. The PMC has been successful in detecting very low antigen levels as well as various strains found in North America.

Disease-Tested Seed Potato Production

Disease-tested potato plants are mass propagated in a sterile environment. The PMC produces tubers from these plants in greenhouses. Growers place orders for these seed tubers the winter prior to production. This provides the time necessary to propagate the thousands of plants required for planting tubers which are distributed the following spring. The process takes 18 months from start to finish. Stock material, if not on hand, is typically obtained from other similar programs. In some instances, the only source is a diseased tuber, so radical treatments are used by the PMC to create the initial disease-free stock. The PMC maintains a disease-tested collection of more than 200 cultivars as field grown stock, while 40 are maintained in culture and are ready for propagation.



The commercial growers have shifted from white-skinned to russet-skinned varieties during the last ten years. Gardeners who purchase a considerable amount of certified seed, have broadened their desire to include many novelty varieties having unique color, flavor or shape.

The 2006 greenhouse crop was found to be contaminated with virus and was destroyed.
In 2007 the greenhouse crop produced 1822 pounds and was comprised of 150 varieties. All stock tested clean.

Seed Potato Certification

State of Alaska Seed Regulation 11 AAC 34.075 (J) requires that all potatoes sold, offered for sale or represented as seed potatoes be certified.

The Seed Potato Certification Program is designed to provide growers with potato seed stock that is varietally pure and relatively free from disease causing organisms. These results are achieved by the voluntary compliance of seed growers to the certification regulations. Growers manage their seed production to limit the possible exposure to diseases, but reinfection can occur from soil or other sources. Certification is designed to identify and remove from use as seed those seed lots which have become too diseased or are otherwise of reduced value for use as seed.

Diseases are capable of causing severe losses. Many of the diseases affecting the potato are carried in or on the potatoes themselves. The use of seed in which diseases are absent or at low levels has been proven to greatly reduce the risk of losses caused by disease. Certified seed has been inspected during the growing season and has met low levels of the disease tolerances allowed for seed. Certified seed potatoes produced in Alaska are far superior to seed produced outside of the state. The importation of potatoes carries with it the risk of introducing diseases which are capable of having severe consequences to Alaskan growers. The local availability of disease-tested seed reduces the potential of introducing diseases not presently found in Alaska through imported seed.

The Alaska Certification Program is a "limited generation system" in which the initiating seed lot, called Generation 0 (G-0), can be field planted only a limited number of years; i.e., eight years. The rationale of a limited generation system is that the contamination of seed stocks by tuber-borne pathogens increases with each replanting and exposure to the environment. If the older seed stock is continually removed from the system and replaced with new stock, the probability that pathogens will build up to problem levels is reduced. This system has been very effective in reducing, and in some cases, eliminating virus diseases.

Seed fields are inspected for diseased plants twice during the growing season and once while in storage. Seed lots in which excessive amounts of disease are found are not allowed to be sold as certified seed.

Alaska's Certified Seed Program is administered by the Alaska Seed Growers, Inc. The inspections are conducted by the PMC's Potato Disease Control Program.

In 2006 the 240 acres of certified seed produced was comprised of 145 seed lots of 47 varieties.
In 2007 the 258 acres of certified seed produced was comprised of 139 seed lots of 47 varieties.

Certified seed potatoes were grown in the Matanuska Valley, Fairbanks, Nenana and Delta Junction. Each lot was inspected according to certification standards for disease and varietal purity.

Variety Development

The search for improved varieties is an on-going process. Finding a potato that bulks earlier, has more and better disease resistance, requires less fertilizer and tastes better are but a few of the traits we seek. The new horizon opened with the advances in biological technology appears limitless. Perhaps, a potato that would sprout legs and climb into the sack is the next level.

Breeding programs perform controlled cross-pollination between promising parental material in the hope of creating improved cultivars. The PMC has obtained true seed from several breeders. The seed was planted in the greenhouse and transplanted to the field. One or two small tubers were harvested from each plant. These will be field planted using wide spacing and single hills, which will be observed for yield, skin color and tuber shape. The few hills that meet the minimum requirements will be harvested and replanted for further observations. True seed will be obtained from several potato breeding programs to extend the types of families for testing.

There are thousands of cultivars in the world today. Each year, millions of dollars are spent on breeding programs in the search for better potatoes. Since the early 1900s, Alaskans have planted and observed hundreds of different potato varieties. Certain varieties have had their day, with improvements making the older ones obsolete, and yet sentiment or special circumstances create a desire to keep replanting them.

There are many varieties of potato beyond the mainstream russets, whites and reds. A veritable cornucopia of shape, size, color, texture, and flavor await those willing to explore. As new and unusual potato varieties are collected by the PMC, they are tested for diseases, purified, and then planted. Observations are made of horticultural characteristics, plant type, flower color, tuber shape and color, yield, and storage characteristics; the end result being a variety description.

Several novel varieties lacking this type of database have been cleansed of virus and offered for production as "experimental" varieties. These novelty potatoes have been promoted in several gardening magazines and are prized by some Alaskan growers. The PMC maintains these cultivars to provide an in-state source to help obviate the necessity of importing seed potatoes which could introduce exotic diseases.

New Plant Materials Center Facilities

Shop

The PMC received a grant from NRCS to design and construct a new equipment repair shop and equipment storage facility. The design phase was completed in 2006 and construction was finished in 2007. This facility will serve the needs of the PMC well into the future. Three bays will allow for efficient repair of equipment. The added parts storage and specialized fabrication areas will also enhance the PMC's operation.

Greenhouse Move

The PMC was fortunate to have some federal funding that allowed the move of the former Forest Regeneration Greenhouses located on Trunk Road. The need to move the unused greenhouses (state property) was accelerated when the land on which they were located on was sold by the University of Alaska. A design-build contract was awarded to a local contractor. This contract utilized an option to move the greenhouses as intact single units. Both greenhouses were moved during the winter of 2006/2007. They were ready to use in the spring of 2007 with new foundations and fully operating mechanical systems. And what a great sight it was coming down the road from Palmer!

PMC Roof Repair

In FY 2007 the PMC was granted a state funded Capital Improvement Request (CIP). Part of the CIP was used to replace a leaking roof on the main PMC building. This was the original roof and it had served the state well since 1977. We wish the new roof well and hope it too lasts for 30 years. 2037 seems such a long time from now!

Furnaces

The FY 07 CIP request also allowed the PMC to replace the remaining four fuel oil furnaces on the property. When they were replaced it eliminated the need for fuel oil on the facility. The PMC is now totally heated with natural gas.

Certified Seed Laboratory

Overview:

The Alaska State Seed Laboratory at the Alaska Plant Materials Center (PMC) is an official seed testing laboratory, certified by the national seed testing organization, Association of Official Seed Analysts (AOSA). It has been an official laboratory since 1998 and is the only one in the state of Alaska.

Essential services the laboratory provides are purity and germination tests, noxious weed seed examinations, tetrazolium testing, and grain moisture testing. The seed lab tests approximately 600-800 seed lots per year, or upwards of 1,000 individual tests per year. Clients include individual growers, the Alaska Seed Growers Association, retail sales people, conservation and natural resource industries, and other agencies such as Agriculture Research Service (ARS), Department of Transportation and Public Facilities (DOT&PF), U.S. Forest Service, and Division of Forestry (DOF). PMC grown seed intended for use by the above is also evaluated.

Test reports are a valuable tool for end users of seed. Contaminants such as inert matter, weeds and other crop seeds are reported, as well as germination potential. Required by federal law for interstate commerce and state regulations, seed offered for sale must have current and accurate testing and labeling.

In addition, the seed lab regularly researches laboratory germination and dormancy breaking techniques of understudied native species that are being considered for crops in Alaska.

The seed lab also assists other state agencies and individuals in research on various projects including seed upgrade and viability enhancement, propagation techniques, and invasive weed seed vigor.

Projects completed in 2006 and 2007:

2005 Canada Collection Project

The PMC circumpolar seed collection for fall 2005 consisted of 453 lots of seed from 22 species collected throughout northern Canada. In 2006, the seed lab tested and propagated each lot, and the seedlings were subsequently planted out for ongoing field evaluation.

IDS Spruce Seed Upgrade Project for Division of Forestry

DOF has a significant number of spruce tree seed lots that were collected over the last thirty years from all over Alaska. It was suggested that some lots of declining viability could be upgraded by a procedure known as incubation- desiccation- separation (IDS). Over the last two years, the seed lab conducted baseline germination tests on five lots of aging seed, IDS procedures were applied, as well as other mechanical upgrading techniques, and seeds were retested and reported to DOF. Follow-up germination tests were conducted after a year to determine storage longevity of upgraded seed. This accounted for over 100 germination tests in 2006 through 2007.

Reed Canary Grass Survey

The Soil and Water Conservation Districts' invasive weed control research required knowledge of viability of reed canary grass in its various stages of development. Seventeen collections of *Phalaris arundinacea* were tested in the seed lab in 2007, and reported to the invasive weed specialist.

ARS Hairgrass Project

ARS required germination and subsequent propagation of seedlings for an international cooperative DNA research project pertaining to *Deschampsia* species. Seed from at least 240 collections of hairgrass from around the world were started at the PMC seed lab in the spring of 2007.

The Alaska State Seed Laboratory continues to train and educate additional personnel in seed exams for continuity of service. Also, development of a complete seed herbarium is ongoing.

New Selected Class Releases

The following Germplasm were released in 2006 and 2007 by the Alaska Plant Materials Center for commercial seed production as Selected Class Pre-certified Germplasm seed (except for the one viviparous plant selection).

The information about each plant can be found on the PMC's website: http://www.state.ak.us/ag/ag_pmc.htm.

Attu Germplasm longawn sedge, *Carex macrochaeta*
Black Rapids Germplasm field oxytrope, *Oxytropis campestris*
Butte Germplasm beautiful jacob's ladder, *Polemonium pulcherrimum*
Cantwell Germplasm downy wildrye, *Leymus innovatus*
Council Germplasm arctic bluegrass, *Poa arctica*
Franklin Bluffs Germplasm nodding locoweed, *Oxytropis deflexa*
Knik Germplasm wild iris, *Iris setosa*
Kobuk Germplasm dwarf fireweed, *Chamerion latifolium*
Ninilchik Germplasm nootka alkaligrass, *Puccinellia nutkaensis*
Nome Germplasm glaucous bluegrass, *Poa glauca*
Paxson Germplasm alpine sweetvetch, *Hedysarum alpinum*
Port Clarence Germplasm largeflower speargrass, *Poa eminens*
Safety Germplasm viviparous fescue, *Elymus macrourus*
Shemya Germplasm dusty miller, *Artemisia stelleriana*
Slana Germplasm tufted wheatgrass, *Elymus macrourus*

Alaska Plant Materials Center From The Sky

New Presentations, 2006 - 2007

Campbell, William L. Alaska production Systems. P.N.W. Pest Management Strategic Planning Meeting. January 26th, 2006. Pocatello, ID.

Campbell, William L. Report on World Potato Congress, Boise. Alaska Potato and Vegetable Conference. March 14 – 15, 2006. Wasilla, AK.

Campbell, William L. Certification Issues Alaska Potato and Vegetable Conference. March 14 – 15, 2006. Wasilla, AK.

Campbell, William L. P.M.C. Update. Alaska Potato and Vegetable Conference, March 13-14, 2007. Wasilla, Alaska.

Hunt, Peggy. Why Grow Alaska Native Seed? April, 2006. Weed Workshop, Palmer, Alaska

Hunt, Peggy. Invasive Weed Badge. April - May, 2006. For Girl Scout Troop 455, Palmer, AK

Hunt, Peggy. Native Plants, Invasive Plants, and Opportunities for Plant Growers. Alaska Nursery and Greenhouse Meeting. January 23-24, 2007. Wasilla, Alaska. Poster.

Hunt, Peggy. Why Grow Alaska Native Seed? Weed Workshop. February 27, 2007. Palmer, Alaska.

Hunt, Peggy. Native Plants, Invasive Plants, and Opportunities for Plant Growers. Alaska Nursery and Greenhouse Meeting. May 1, 2007. Alaska Agriculture in the Classroom.

Hunt, Peggy. Invasive Weeds vs Native Plants. June 5, 2007. Upper Su Soil and Water Conservation District, Palmer, AK.

Hunt, Peggy. How to Grow Alaska Native Seed. June 25, 2007. Alaska Master Gardeners. Palmer, AK

Hunt, Peggy. Alaska Native Plants vs Invasive Plants. June 26, 2007. Girl Scout Day Camp. Wasilla, AK

Hunt, Peggy. Educational Activities on Native Plants for Elementary Students. August 8, 2007. Agriculture in the Classroom College Students. Palmer, AK.

Hunt, Peggy. Wildcrafting: Ethics and Regulatory Frameworks. Power Point. Nov. 14, 2007. Seminar in Ethnobotany for University of Alaska Fairbanks Anthropology 293 Class.

Hunt, Peggy. Non-Timber Forest Products. Power Point. Nov. 21, 2007. Seminar in Ethnobotany for University of Alaska Fairbanks Anthropology 293 Class.

Larsen, Jessica. Facilitation of day-long forum on Tribal-Agency Collaborations. May 21, 2006. Pacific Northwest Forest Practitioners Forum and the Non-timber Forest Products Working Group Face-to-Face Meeting, Vancouver, WA.

Larsen, Jessica. Balancing Commerce, Subsistence and Sustainability, Ethnobotany and Non-Timber Forest Products in Alaska. April 26, 2007. Rare Plant Forum, Anchorage, Alaska.

Larsen, Jessica. Balancing Commerce, Subsistence and Sustainability, Ethnobotany and Non-Timber Forest Products in Alaska. June 13, 2007. Global Food Alaska Presentation.

Nolen, Andrew S. Jonesville Coal Mine Revegetation. Northern Latitude Mining Reclamation Conference, Juneau, Alaska. May 16-17, 2007

Nolen, Andrew S. Review of Collections and Initial Evaluation Plots at the Alaska Plant Materials Center .Western Region Plant Materials Workshop, Portland, Oregon, March 21, 2006

Nolen, Andrew S. Review of Advanced Evaluation Plots and Technology Development at the Alaska Plant Materials Center. Western Region Plant Materials Workshop, Portland, Oregon, March 22, 2006

Wright, Stoney J. Alaska Plant Materials Center Actvities in Conservation and Erosion Control**.** Alaska Association of Conservation Districts Annual meeting**.** April 6 2006. Anchorage Alaska.

Wright, Stoney J. Alaskan Efforts in Collecting, Cataloguing and Regenerating High Latitude Accessions. Climatic Change and Genetic Resources in Northern Europe – Report of a Workshop, 18-19 September 2006. European Cooperative Programme for Plant Genetic Resources, Rovaniemi, Finland.

Wright, Stoney J. New Plant Materials For Alaska. Alaska Environmental Forum. Feb. 12, 2007. Anchorage, Alaska.

Wright, Stoney J. Alaska Plant Materials Center and Climate Change. Alaska Foresters Association Meeting. April26, 2007. Anchorage, Alaska.

Wright, Stoney J. Developing Commercial Sources of Native Seed and Plants in Alaska. 2007 North Latitude Mining Conference. May 15-17, 2007. Juneau, Alaska.

Wright, Stoney J. Alaska Coastal Dune Restoration and Stabilization with Beach Wildrye, *Leymus mollis.* International Coastal Dune Restoration Conference, 3-5 October, 2007. Santander, Spain.

Wright, Stoney J. Native Plant Ecovar Development in Alaska Supported by the Department of Defense. 2007 Annual Meeting of the American Society of Agronomy, Nov.4-8 2007. New Orleans, Louisiana.

Wright, Stoney J.and Andrew S. Nolen. Seed Collection and Revegetation. Committee for Noxious and Invasive Plant Management 2006 Annual Meeting, October 25-26, 2006. Anchorage, Alaska.

New Publications, 2006 - 2007

Hunt, Peggy and Stoney J. Wright. 2006. *Attu Germplasm longawn sedge.* Alaska Division of Agriculture, Plant Materials Center (APMC). Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2006. *Black Rapids Germplasm field oxytrope.* APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2006. *Butte Germplasm beautiful jacob's ladder.* APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2006. *'Caiggluk' Tilesius' Wormwood.* APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2006. *Cantwell Germplasm downy wildrye.* APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2006. *Council Germplasm arctic bluegrass.* APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

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Hunt, Peggy and Stoney J. Wright. 2006. *Ninilchik Germplasm nootka alkaligrass.* APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

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Hunt, Peggy and Stoney J. Wright. 2006. *Paxson Germplasm alpine sweetvetch.* APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2006. *Port Clarence Germplasm largeflower speargrass.* APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2006. *Safety Germplasm viviparous fescue.* APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2006. *Shemya Germplasm dusty miller.* APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2006. *Slana Germplasm tufted wheatgrass.* APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2006. *'Tundra' Glaucous Bluegrass.* APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2007. *Franklin Bluffs Germplasm nodding locoweed*. Alaska Division of Agriculture, Plant Materials Center (APMC). Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2007. *Kobuk Germplasm dwarf fireweed*. APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2007. *Mentasta Germplasm staghorn cinquefoil*. APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Hunt, Peggy and Stoney J. Wright. 2007. *Pioneer Peak Germplasm nootka reedgrass*. APMC. Palmer, AK. http://www.dnr.state.ak.us/ag/ag_pmc.htm.

Larsen, Jessica, Peggy Hunt, Donald Ross. 2007. *Proposed Alaska Non-Timber Forest Products Harvest Manual*. State of Alaska, Department of Natural Resources, Division of Mining, Land and Water. 40 pp.

Larsen, Jessica H. 2007. *Alaska Ethnobotany Project: Non-timber Forest Products in the 49th State*. In Proceedings for Society for Economic Botany, June 4 - 7, 2007. Chicago, IL. Abstract and Poster.

Larsen, Jessica. 2007. *Alaska Ethnobotany Project Newsletter*. Alaska Department of Natural Resources, Plant Materials Center. Palmer, AK. 2 pp.

Maniaci, Caroline. S. and Andrew. S. Nolen. 2006. *Vegetated Riprap Survey of Highways In Southcentral and Interior Alaska*. Alaska Department of Transportation and Public Facilities and Alaska Department of Natural Resources, APMC, Juneau, AK. 63pp.

Nolen, Andrew S. and Donald R. Ross. 2006. *Vegetation Survey of Alaska's Richardson Highway: Identification of Plant Communities and Assessment of Control Strategies*. Alaska Department of Natural Resources, APMC. Palmer, AK. 134pp. http://www.dot.state.ak.us/stwddes/research/assets/pdf/fhwa_ak_rd_06_04.pdf.

Nolen, Andrew S. 2007. *Chistochina River Wetland Restoration Tok Cutoff 30E Project*. Alaska Department of Natural Resources, APMC. Palmer, AK 15pp.

Nolen, Andrew S. 2007. *Abandon Mine Land Reclamation: Jonesville Mine, Sutton Alaska Phases 3 and 4*. Alaska Department of Natural Resources, APMC. Palmer, AK 17pp.

Nolen, Andrew S. 2006. *Revegetation and Monitoring of the Closed Section of Access Trail Stewart River Training Area Nome, Alaska* Alaska Department of Natural Resources, APMC. Palmer, AK 14pp.

Ross, Donald R. 2007. *Red Dog Soils Growth Trial*. Prepared for Teck Cominco Alaska Red Dog Mine. Alaska Department of Natural Resources, Plant Materials Center. Palmer, AK. 36 pp.

Wright, Stoney J. 2006. *Notice of Release of Pre-Certified Selected Class Germplasm of Native Plants for Commercial Production and Use in Alaska. 2005 Grouping of Accessions.* Alaska Department of Natural Resources, Plant Materials Center. Palmer, AK.

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Wright, Stoney J. 2007. *Notice of Pre-Certified Selected Class Germplasm of Native Plants for Commercial Production and Use in Alaska.* 2006 Grouping of Accessions. Alaska Department of Natural Resources, APMC. Palmer, AK.

Wright, Stoney J. 2007. *Developing Commercial Sources for Native Seed and Plants in Alaska*. *In* Proceedings for the Northern Latitudes Mining Conference. Juneau, Alaska (Abstract).

Wright, Stoney J. 2007. Alaska Revegetation Manual. Electronic On Line format http://www.dnr.state.ak.us/ag/pmcweb/PMC_reveg.htm. State of Alaska, Division of Agriculture, Plant Materials Center. Palmer, Alaska.

Wright, Stoney J. 2007. *Alaska Coastal Dune Restoration and Stabilization with Beach Wildrye, Leymus mollis. In* Proceedings: International Coastal Dune Restoration Conference, 3-5 October, 2007. Santander, Spain. (Abstract).

Wright, Stoney J. 2007. *Native Plant Ecovar Development in Alaska Supported by the Department of Defense. In* Abstracts of the 2007 Annual Meeting of the American Society of Agronomy, New Orleans, Louisiana. (Abstract).