Alaska Plant Materials Center

2004 Annual Report

Alaska Department of Natural Resources- Division of Agriculture

ALASKA PLANT MATERIALS CENTER

2004 ANNUAL REPORT

Prepared by:

Stoney J. Wright
Manager, Plant Materials Center

Susan L. Mayer
Administrative Clerk III

Orlando Bautista
Agronomist

William L. Campbell
Agronomist

Peggy Hunt
Agronomist

Nancy J. Moore
Agronomist

Andrew S. Nolen
Agronomist

Donald Ross
Agronomist

Michael Thomson
Agronomist

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF AGRICULTURE

PLANT MATERIALS CENTER

FRANK H. MURKOWSKI, GOVERNOR

CENTRAL OFFICE
1800 GLENN HIGHWAY, SUITE 12
PALMER, ALASKA 99645-6736
PHONE: (907) 745-7200
FAX: (907) 745-7112

NORTHERN REGION OFFICE
3700 AIRPORT WAY
FAIRBANKS, ALASKA 99709-4699
PHONE: (907) 451-2780
FAX: (907) 451-2751

HC04 BOX 7440
PALMER, ALASKA 99645-9706
PHONE: (907) 745-4469
FAX: (907) 746-1568

May 3, 2005

LETTER FROM THE DIRECTOR

The Alaska Plant Materials Center (PMC) will be celebrating its 32nd anniversary in 2005. The PMC'S present and past-dedicated employees should be proud of their accomplishments. Maintaining high levels of service over a thirty- one year period has been challenging with increased costs of operation while at the same time state funding decreased.

The PMC has maintained excellent service levels while actively seeking non-state funds to continue
their daily operations. Additionally, changes in methods of operation and efficiency improvements have allowed the PMC to continue providing a multitude of services to the public and individuals it serves.

The PMC Manager has promised further improvements and efficiency changes. These will include increasing the level of non-state funding, thereby further reducing the need for Agriculture Revolving Loan Funds.

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

Sincerely,

Larry DeVilbiss
Director

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

TABLE OF CONTENTS

Page

Introduction 1

History 2

North Latitude Revegetation & Seed Production Project 4
- Revegetation & Reclamation Efforts 4
  - Cold Regions Plot Evaluation Network 8
  - Red Dog Mine Revegetation & Demonstration Plots 12
  - Upper Knob Creek & Jones Mine 14
  - North Atlantic Germplasm Collection Project 16
  - West and South Greenland Collection Project 19
  - Nunavaut Territory, Canada Germplasm Collection Project 21
  - Native Plant Evaluation Project 24
  - DOT/PF Vetch Survey 32
  - Alaska Seed Growers Assistance Project 33
- Foundation Seed Program 36
  - Inspection & Sampling 39
- Potato Disease Control Program 42
  - Pathogen Testing 42
  - Seed Potato Certification 45
  - Educational Program 48
  - Scab Resistance Trial 48
  - Variety Development 48
  - Disease-Tested Seed Potato Production 50
  - Virus Disease Expression Plot 51

List of Appendices

Appendix A Current & Historical Budget Information 52
Appendix B New & Pending Crop Releases 57
Appendix C List of Publications 61
Appendix D Acknowledgements 80

TABLE OF CONTENTS Continued

Page

List of Figures

Figure 1 Map of Alaska....6
Figure 2 Typical Plot Layout....7
Figure 3 Seed Increase Pyramid....38
Figure 4 Tuber Introduction....44
Figure 5 Alaska Seed Potato Production and Disease Testing....45

List of Tables

Table 1 Revegetation and Turf Varieties....39
Table 2 Cereal Grain Seed and Oil Seed Varieties....40
Table 3 Cereal Grain Sales and Receipts....40
Table 4 Grass Seed Sales and Receipts....41
Table 5 Certified Seed Potatoes....47
Table 6 Seed Potato Production....50

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 two major programs: Revegetation and Native Seed Production, and Potato Production. 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 did not allow an open house in 2002. Construction activities precluded an open house in 2004. However, in 2005 the PMC's open house program will resume.

The majority of the Plant Materials Center's funding comes from non-state sources. In recent years, USDA has become the major funding source. The majority of the remaining operating monies are allocated from the Agriculture Revolving Loan Fund. The PMC no longer relies on the state general fund. That change occurred in fiscal year 1997. 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 now 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. 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 to operate the Arctic Genetic Resources Unit. This includes an operating and capital grant. In 1998, the Germplasm Repository became a reality. The first USDA employee was hired and the state initiated designing of a screen house. The screen house was completed in 2001. The Arctic Genetic Resources Unit currently holds accessions of alpine, arctic, polar plants with a special emphasis on wetland species. The site also became instrumental at increasing germplasm held at other USDA repositories. We expect a long and productive cooperative effort with USDA. A new short-term specific cooperative agreement was implemented in 2003.

In 1999, a grant from USDA Natural Resource Conservation Service (NRCS) allowed the PMC to expand its program in native seed production and commercialization. This program is expected to last five years or more.

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 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.

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 instate seed industry while providing state-of-the-art revegetation and erosion control information to the public.

Revegetation & Reclamation Efforts

The construction of the Trans Alaska Pipeline in the 70's 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.

The project follows seven basic steps to establish a resource of conservation plants for use in land reclamation, wildlife habitat improvement and erosion control. 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) advanced and final testing and field evaluation plantings; 6) establish large scale seed or vegetative increases; and, 7) release of a variety or cultivar.

This program has gathered at least 275 plot years of information collected from sites around the state (Figure 1), developed 11 new cultivars for revegetation and reclamation and assisted scores of agencies and private companies in reclamation, erosion control and revegetation. Figure 2 represents a typical plot layout used in off-site evaluations.

This report outlines some of the present revegetation and reclamation research being conducted by the PMC and summarizes current activities at sites around the state. Additional information can be found in the individual reports that are listed in this report. Copies of these reports are available from the Alaska Plant Materials Center.

Figure 1 – Map of Alaska

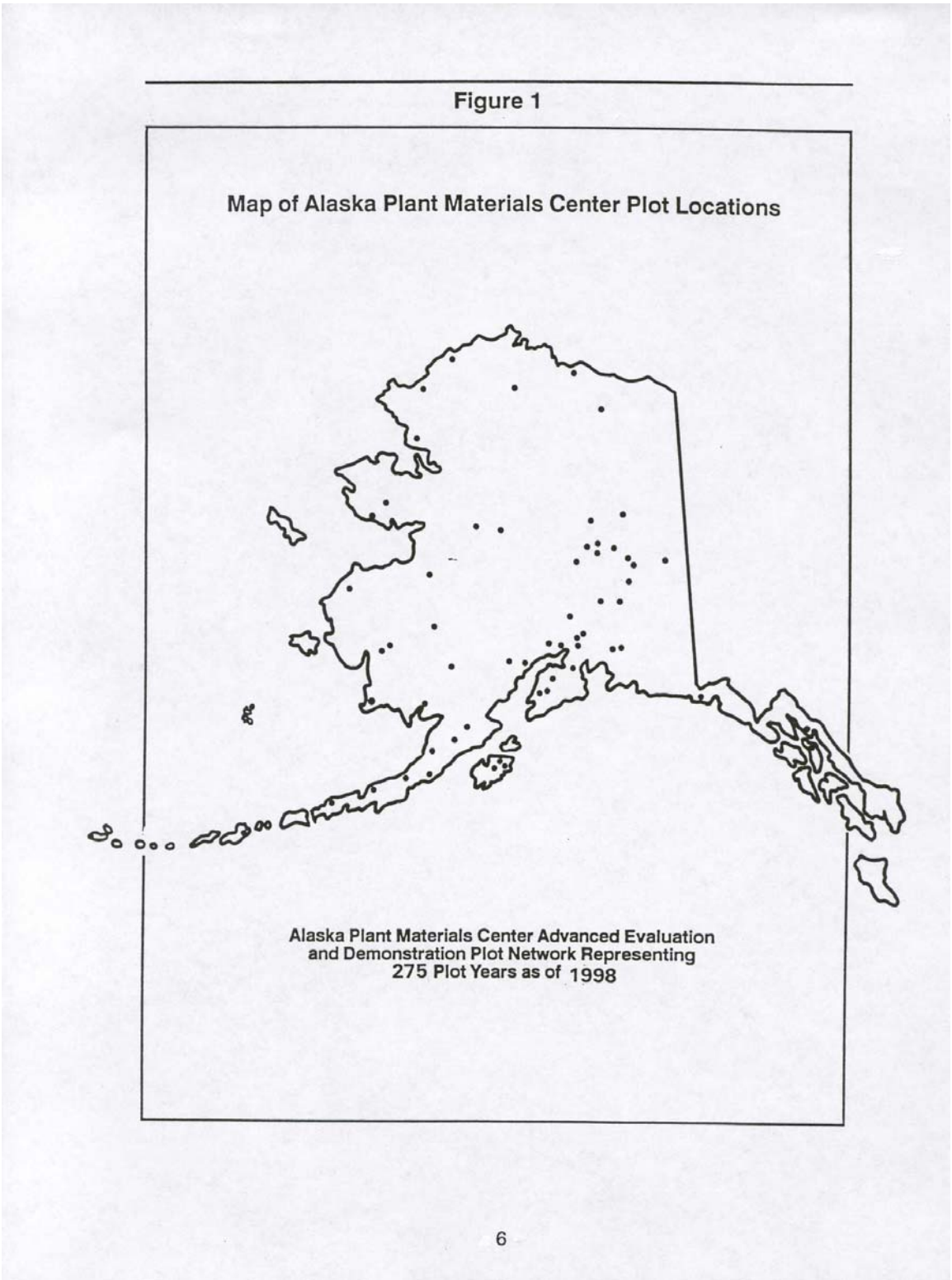


Figure 2 – Typical Plot Layout

Nugget Kentucky bluegrass	Merion Kentucky bluegrass
Park Kentucky bluegrass	Banff Kentucky bluegrass
Sydsport Kentucky bluegrass	Fylking Kentucky bluegrass
Service big bluegrass	Troy Kentucky bluegrass
Sherman big bluegrass	Canbar canby bluegrass
Tundra glaucous bluegrass	Reubans Canada bluegrass
Poa glauca T08867	Gruening alpine bluegrass
Agropyron subsecundum 371698	Sodar streambank wheatgrass
Nordan crested wheatgrass	*Agropyron subsecundum*
Fairway crested wheatgrass	*Agropyron violaceum*
Summit crested wheatgrass	*Agropyron boreal*
Critana thickspike wheatgrass	*Agropyron yukonese*
Fults alkaligrass	Vantage reed canarygrass
Climax timothy	Engmo timothy
Elymus arenarius	*Elymus sibiricus* 34560
Norcoast Bering hairgrass	*Elymus sibiricus* 2144
Sourdough bluejoint	Nortran tufted hairgrass
Meadow foxtail	*Calamagrostis canadensis*
Garrison creeping foxtail	*Alopecurus geniculatus*
Boreal red fescue	Arctared red fescue
Egan American sloughgrass	*Festuca scabrella*
Durar hard fescue	Pennlawn red fescue
Covar sheep fescue	Highlight red fescue
Kenai polargrass	Manchar smooth brome
Alyeska polargrass	Carlton smooth brome
Caiggluk tilesy sagebrush	Polar brome

The U.S. Cold Regions Plot Evaluation Network

The project is responsible for the obtaining and evaluation of plant materials/seeds indigenous to regions north of 52° North Latitude and equivalent vegetated regions in the southern hemisphere (south of 52° South Latitude). Support will be given to all U.S. and foreign parties engaged in authorized plant material acquisition and research in the stated geographic regions.

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.

2003 Activities

Seed was obtained from Alaskan and Canadian sources. They were as follows:

-Alaska Mill and Feed
-Alaska Plant Materials Center
-Hannas Seeds

All test plots were laid out in the same manner. Each species was planted in a 4' x 10' plot making the overall plot dimensions 20' x 72'. The plot layout is as follows:

Park Kentucky Bluegrass	Alene Kentucky Bluegrass
Nugget Kentucky Bluegrass	Tundra Glaucous Bluegrass
Service Big Bluegrass	Norcoast Bering Hairgrass
Durar Hard Red Fescue	Nortran Tufted Hairgrass
Arcta Red Fescue	Boreal Creeping Red Fescue
Pennlawn Red Fescue	Boreal Creeping Red Fescue
Gruening Alpine Bluegrass	*Poa macrocalyx*
Puccinellia nutkaensis	Egan American Sloughgrass
Alyeska Polargrass	Meadow Foxtail
Sourdough Bluejoint	*Artemisia tilesii*
Hannas High Tech Alfalfa	Beaver Alfalfa
James Dahurian Wild Rye	Siberian Wild Rye
Altai Wild Rye	Russian Wild Rye
Kirk Crested Wheatgrass	Slender Wheatgrass
Wainwright Slender Wheatgrass	Intermediate Wheatgrass
Manchar Smooth Brome	Carlton Smooth Brome
Climax Timothy	Engmo Timothy
Farol Timothy	Alma Timothy

Plots have been planted across the state with many different cooperators. The plot locations, date planted and the cooperators are as follows:

Location	Date Planted	Cooperator
Homer	June 11, 2003	Jim Van Oss
Willow	June 23, 2003	DOT&PF
Delta Junction	June 25, 2003	UAF
North Pole	June 27, 2003	Warren Smith
7 Mile Camp Dalton Hwy	June 28, 2003	DOT&PF
Jim River Camp Dalton Hwy	June 29, 2003	DOT&PF
Talkeetna	July 7, 2003	DOT&PF
Trapper Creek	July 7, 2003	DOT&PF
Cascade Camp Glenn Hwy	July 9, 2003	DOT&PF
Nome	July 15, 2003	AK Gold and DOT&PF
Kodiak	August 28, 2003	Bill & Buck Burton

All the plots except the Kodiak one have been evaluated this season. Plots are scheduled for evaluation at least once per year for the next three years. Of the plots evaluated this year, good growth is present in most species.

Several more plots are planned for next year. More species will be included in the plots from sources such as the Alaska Plant Materials Center Native Plant Nursery, Arctic Alpine Seed, Northstar Seeds, Seedland, and others.

2004 Activities

Plots planted in 2004 were the same as the 2003 plots plus some additional species. Additional plant material was obtained from the Alaska Plant Materials Center and the Native Plant Nursery.

The plot layout for 2004 was as follows:

Cold Regions Plot Layout 2004

Park Kentucky Bluegrass	Alene Kentucky Bluegrass
Nugget Kentucky Bluegrass	Tundra Glaucous Bluegrass
Service Big Bluegrass	Norcoast Bering Hairgrass
Durar Hard Red Fescue	Nortran Tufted Hairgrass
Arcta Red Fescue	Boreal Creeping Red Fescue
Pennlawn Red Fescue	Boreal Creeping Red Fescue
Gruening Alpine Bluegrass	*Poa macrocalyx*
Puccinellia nutkaensis	Egan American Sloughgrass
Alyeska Polargrass	Meadow Foxtail
Sourdough Bluejoint	*Artemisia tilesii*
Hannas High Tech Alfalfa	Beaver Alfalfa
James Dahurian Wild Rye	Siberian Wild Rye
Altai Wild Rye	Russian Wild Rye
Kirk Crested Wheatgrass	Slender Wheatgrass
Wainwright Slender Wheatgrass	Intermediate Wheatgrass
Manchar Smooth Brome	Carlton Smooth Brome
Climax Timothy	Engmo Timothy
Farol Timothy	Alma Timothy
Kenai Polargrass	*Poa eminens*
Polar Brome	*Agropyron macrourum*
Max Q Tall Fescue	Needlegrass
Hedysarum alpinum	*Ligusticum scoticum*
Solidago multiradiata	*Senecio pseudo-arnica*
Lupinus nootkatensis	*Cnidium cnidifolium*
Artemesia stellariana	Tripleurospermum
Denali Alfalfa	Tall Jacob's Ladder

The plots in Southeast Alaska, as well as one plot at Red Dog Mine, had the following additions as well:

Senecio pseudo-arnica	Dwarf Fireweed *Chamerion latifolium*
Polemonium pulcherrimum	*Geranium erianthum*
Boykinia richardsoni	*Plantago canescens*
Solidago decumbens	*Aster sibericus*
Oxytropis campestris	*Oxytropis deflexa*
Galium boreale	

Many additional plots were planted in 2004. The locations and cooperators are listed below.

Location	Date Planted	Cooperator
Juneau	5/10/04	DOT and Div of Parks
Sitka	5/11/04	DOT
Ketchikan	5/12/04	Ketchikan and USFS
Petersburg	5/13/04	DOT
Glennallen	5/24/04	DOT
Valdez	5/25/04	DOT
Tok	5/26/04	DOT
Lake Creek	5/29/04	Bentalit Lodge
Kodiak	6/02/04	Bill and Buck Burton
McGrath	6/08/04	DOT and Les Malone
Nome	6/23/04	Rick Wolfe
Delta Junction	7/1/04	Harley Olberg
Red Dog Mine	7/11/04	Red Dog Mine

Evaluations of all of the plots planted in 2003 were evaluated at least once during the summer of 2004. Most of the plots were performing well. The Kodiak plot needed to be replanted due to damage from grazing livestock. Most of the 2004 planted plots were evaluated in the fall. Additional plots are planned for the North Slope, Bethel and other locations in 2005.

Grain was included in some locations in 2004. The barley, wheat and oat varieties maintained by the PMC were sent to interested growers in various regions of Alaska including Nome, McGrath, and Delta Junction. All varieties performed well in all locations though grower notes will need to be reviewed to determine the levels of maturity attained.

Red Dog Mine Revegetation & Demonstration Plots

This project grew out of a mutual need for information. The PMC required revegetation data from northwestern Alaska, and Cominco Alaska, Inc. needed information on species that would perform well in future mine revegetation programs. In 1987, Cominco agreed to provide the PMC with sites to establish evaluation and demonstration plots for at least four years.

In order to provide the best information for both the PMC and Cominco, three plot sites, representing different conditions were selected. A site selected near the port facility was a sandy, gravel beach area common to the region. The second plot was located at the original campsite's fuel bladder containment area. The third plot was similar to the camp area, but provided a site to compare spring and fall seedlings.

This combination of plots was intended to supply data for revegetation species selection and planting windows for seeding. The port site was planted on July 6, 1987 and provided information regarding revegetation in the coastal portion of the mine project.

A dormant plot was seeded at the campsite on September 8, 1987. Because of space limitations, the plot dimensions were slightly reduced and 12 accessions were dropped from the plot. The accessions that were eliminated are species that have failed elsewhere in northern Alaska. Their elimination from the plantings did not compromise the value of the information obtained from the plots. On June 15, 1988, a plot was planted on gravelly soil similar to the surface that will exist when construction of the mine is complete.

A major demonstration planting was also established on June 14, 1988. This plot, located on an abandoned disposal site north of the facility, was recontoured and seeded entirely with native species. It was also evaluated for four growing seasons. The completion of the evaluation program occurred September 1990, at which time a final report was prepared for Cominco.

A complete listing of conclusions and recommendations can be found in 1990 Final Report of Data and Observations Obtained From the Red Dog Mine Evaluation and Demonstration Plots.

During September 1992 and 1993, these sites were again visited and evaluated. All of the plots and trials continued to perform very well. During the 1993 site visit, plans were developed for a new research effort planned for 1994. These plans were put "on hold" until 2002.

In 1996, a collection of native species occurred near the port site. This seed was cleaned at the PMC and returned to the mine operator. The 1997 site visit was not conducted because of scheduling conflicts. The areas were, however, evaluated in 1998.

In 2001, soil samples were taken from several locations within the mine site. The samples were sent to the PMC and were tested for pH, N, P, and K as well as several heavy metals that are known to be present in the mine spoils. The soils were then used in greenhouse trials with the goal of determining specific plant species that might tolerate and thrive in the toxic soils.

In 2003, Red Dog mine was again visited to review revegetation efforts. Changes in Tech Cominco personnel resulted in the loss of some of the technical notes on soil sample locations and revegetation activities. A summary of the historical involvement of the PMC with Red Dog was prepared along with pressed samples of plant materials currently being used for revegetation at the mine.

The 2004 site visit to Red Dog Mine was completed July 10 – 14. The goals of the trip were to establish test plots, review revegetation activities and performance, and develop a working relationship with the contractor developing the restoration plan for the mine.

Test plots were installed at three locations around the mine site. Fifty-two individual accessions were planted in each plot. Diverse plot locations were selected in order to give a broad representation of the performance of individual species on different parent materials. The test plots will provide valuable information on plant species that are suitable for use in ongoing revegetation activities.

Many areas at Red Dog Mine have been seeded since revegetation efforts began at the site. These locations were visited in order to start or continue monitoring efforts. Photo points have been established at bridge crossings on the port road. Later a new series of photo points was established at many locations around the mine site. Photos were taken during these visits and will continue to be taken during future visits to develop a photographic documentation of the progression of the restoration. Permanent transects have been installed at three locations. These will provide a quantitative measure of plant cover and species diversity.

Red Dog Environmental personnel collected soil samples in order to continue greenhouse evaluations. The greenhouse trials will occur in the summer of 2005.

Upper Knob Creek and Jones Mine

In 1998, the Plant Materials Center continued to work with the Division of Mining and their abandoned mine land program to revegetate two additional sites, Upper Knob Creek and Jones Mine Phase II. Upper Knob Creek is divided into several pits of varying size totaling over 40 acres. The Jones Mine is a 15- acre area 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.

Past revegetation efforts have demonstrated that planting combinations of brush layers, bundles, live stakes, transplants and seeding with native grasses and forbs are appropriate techniques for revegetating sites with steep slopes and erosive soils.

These techniques were used at Upper Knob Creek and Jones Mine Phase II sites. Also, soil that had been salvaged was spread over a relatively small area on the upper slopes of the Jones Mine.

The Jones Mine contains both cut and fill slopes. After the area was graded to contour, most of the area was scarified. Some areas on the middle and upper portions of the cut slope could not be scarified because large rocks would be pulled to the surface and disturb the site too much. Several terraces were created on the lower section of the mine to reduce slope length.

Transplants salvaged from Phase III of the Jones Mine restoration were placed on the terraces. In addition to transplants, numerous brush layers were scattered over the slope. Bundles were strategically placed in areas where riling had begun to occur and in other locations that appeared to be prone to erosion.

Plots were also established to evaluate three alternative fertilizers, Biosol, Fertil-fibers and Humazyme. Three large plots were set up on the southeast-facing slope and three smaller plots were set up on a northeast-facing slope. The products were applied according to manufacturer's directions. The site was seeded with native grasses and forbs and the area outside of the fertilizer study plots was fertilized with 20-20-10 fertilizer.

The timing of activities is important and this project reminded us of this point on several occasions. The site was well scarified and then a backhoe was used to move transplants and install brush layers. The substrate where the backhoe had traveled became compacted and smooth. The benefits of scarification were lost and the soils became more vulnerable to erosion.

During June 2000, a seven-acre section of Phase III of the Jones Mine was revegetated. The site was scarified and planted with willow bundles and a few brush layers. A large quantity of willows had been purchased for the 2000 planting season with the idea that more of Phase III would be ready for revegetation. Since only a total of seven acres was available, the site was planted heavily. Excess material was used on selected areas in Lower Knob Creek.

Driwater, the gel slow release-watering product described in the Lower Knob Creek section, was used at this site also. The product was installed late in the season when the rains were beginning and it is not apparent that it provided a benefit. In dry years it may be very beneficial. This site will be monitored for several years.

The Upper Knob Creek site contained four pits. The primary revegetation effort focused on slowing surface water erosion. Bundles, and to a limited extent, brush layers were placed in areas that had begun to show signs of riling in Pits 6 and 7. After a very heavy thundershower, the importance of timing became apparent again. Many of the bundles had just begun to leaf out when they were buried by sediment resulting from the erosion caused by the intense rainfall. The young new shoots required careful excavation by hand. Despite the weather conditions, the woody plantings became well established.

All of the pits were seeded with native grasses and forbs and fertilized with 20-20-10 granular fertilizer. With the exception of Pit 6, seed and fertilizer was broadcast by hand. The fertilizer for Pit 6 was applied with an airplane.

Pit 6 was particularly susceptible to erosion. In 1999, additional willows and grass seed were planted at Pits 6 and 7 at Upper Knob Creek. Considerable erosion had occurred at these pits late in the 1998 growing season. Intensive willow plantings using brush layering, bundles and gully plantings addressed these erosion areas. A light seeding of grass was also broadcast on bare areas.

The 1999 plantings appeared to be growing well at the end of growing season. Some of the woody plantings were not completed until mid-July, nearly two weeks after the recommended cutoff date. A survey of the plantings in 2000 indicated that the willows planted late survived.

Extensive cooperation with the Division of Mining, Land and Water's Abandoned Mine Land Project continued in 2002 with the revegetation of Phase V of Jonesville Mine. The area consisted of a large rock face that needed seed and fertilizer above and below it. The lower 18-acre portion was easily treated using a 4x4 tractor with a broadcast spreader. The upper 8-acre portion was considerably more challenging due to poor accessibility and steep terrain. The entire project was completed August 10, 2002 and good growth was apparent in September.

Planning for the revegetation of Phases III and IV of Jonesville Mine was completed

and then revised in 2002. These areas have steep, erosive slopes consistent with the rest of the site. The area was contoured to decrease downhill water movement. Live stakes, bundles, straw logs and seeding with native grasses and forbs were the techniques employed to revegetate this portion of the site. Alder seedlings were planted as a new possible technique on the upper most portion of phase IV. Seeds were collected in the fall of 2002 for around the mine site. The seed was cleaned and tested. Seeds were sown in flats in a greenhouse and were about 3 inches tall at the time of transplanting onto the site. Approximately 4000 alder seedlings were planted.

A monitoring program was implemented on phases III and IV and monitoring continued on phase V. Phase V is showing good growth after one season with only one small area needing more seed in 2003. By the fall of 2003, the willows and grass seedlings were growing well across phases III and IV.

Plant establishment on phases III, IV and V continued to be tracked through 2004. Growth was good on all species planted. Even the test planting of alders performed well. Wildlife and ATV traffic only resulted in a few lost plants. Species diversity in the restored areas is increasing.

North Atlantic Germplasm Collection Project

As a part of the newly funded Cold Regions Vegetation Project, the PMC initiated a seed collection project on Iceland and the Faroe Islands in 2001. Part of the program is dedicated to acquisition of seed from other circumpolar regions.

Germplasm Collection Project on Iceland and the Faroe Islands
August 19, 2001 – September 11, 2001

Results of the Collection Effort:
Iceland - August 19-25, 2001, North Iceland
Faroe Islands – August 31 – September 7, 2001
Iceland – September 8-11, 2001, South Iceland

Most of the species targeted and collected were indigenous to both Alaska and the two Atlantic Island groups. Collection of material not present in Alaska was limited and only conducted based on interest expressed by the Icelandic or Faroese scientists.

Material Collected/Total Accessions:

Angelica archangelica /1
Anthoxanthum odoratum /4
Dactylis glomerata /2
Deschampsia caespitosa /14
Deschampsia flexuosa /4
Festuca richardsonii /11
Festuca rubra /12
Holcus lanata /4
Leymus arenarius /23
Ligusticum scoticum /1
Lolium multiflorum /2
Lupinus nootkaetensis /9
Luzula sylvatica /1
Phleum alpinum /3
Phleum pretense /1
Poa alpina /14
Poa glauca /11
Poa pratensis /3
Trisetum spicatum /2

Total: 123 accessions

All the material collected was immediately re-cleaned and tested after arrival in Palmer. In March 2002, all the collections were planted in greenhouses. The resulting seedlings were field planted in July 2002. All the plantings are on PMC property at Palmer. Between July and October 2002, all the plantings were evaluated three times.

Again in 2002 a seed collection project was planned and conducted on the Svalbard Archipelago (Spitzbergen), Norway and the Tromso region of Norway. The collections occurred between August 16 and September 10, 2002.

As with the Iceland and Faroe Islands collections of 2001, the Norway collections concentrated on species common to both the collection areas and Alaska. The new material from Norway and particularly Svalbard, (78-81 degrees north latitude) has added a significant and important component to the U.S. collection.

Material collected/total accessions:

Leymus arenarius /19
Deschampsia caespitosa /40
Deschampsia boreal /10
Deschampsia alpina /88
Trisetum spicatum /6
Poa arctica /7
Poa alpina /4
Poa glauca /2
Alopecurus borealis /3
Festuca rubra /4
Festuca hyperboreal /1
Festuca richardsonii /19
Festuca vivipara /1
Colpodium vahlianum /1
Puccinellia phyganodes /1
Calamagrostis stricta /1
Dupontia pelligera /1
Luzula arcuta /1
Papaver dahlianum /1
Rumex acetosa /1
Oxyria digyna /1

Total: 212 accessions

All the seed was returned 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 on the PMC property in June 2003. Evaluation of the plantings continued through 2004.

West and South Greenland Collection Project

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, including 31 species. This is the largest collection the Plant Materials Center has 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.

There were only minor flight delays between towns so time on the ground was maximized. The people on Greenland were very helpful. All of these factors contributed to the success of the project.

The Danish Plant Health Directorate, located outside Copenhagen, was helpful and efficient in having the seed inspected. Every collection was inspected and a Phytosanitary Certificate was issued after two working days.

Upon arrival in Seattle the seed was immediately sent to the local APHIS inspection station for a final screening. Four collections needed further inspection and were held in Seattle. Two days after the seed collection was surrendered to APHIS the remainder of the collections arrived in Palmer.

The seed was planted at the PMC in June 2004 and evaluated by traditional techniques.

Greenland Species and Accessions Collected:

Agrostis capillaries	14
Agrostis mertensii	1
Alopecurus alpina	18
Angelica archangelica	4
Artemisia borealis	8
Calamagrostis langsdorffii	9
Calamagrostis neglecta	5
Campanula gieseckiana	4
Cerastium alpinum	1
Deschampsia caespitosa	45
Deschampsia flexuosa	14
Dryas integrifolia	1
Elymus alaskanus	9
Eriophorum scheuchzeri	1
Festuca brachyphylla	16
Festuca Richardsonii	11
Festuca rubra	22
Hierochloe odorata	2
Leymus mollis	91
Nardus stricta	1
Phleum alpina	3
Poa alpina	9
Poa arctica	35
Poa glauca	16
Poa pratensis	19
Poa flexuosa	18
Papaver radicatum	1
Puccinellia maritima	10
Salix glauca	1
Saxifraga oppositifolia	3
Trisetum spicatum	13
Viscaria alpina	2
Total	**407**

The remaining areas of the Circumpolar region are still of interest. Closing this loop will be possible over the next two years.

Nunavut Territory, Canada Germplasm Collection Project.

Introduction and Overview

The seed collection project conducted from August 19 to September 22, 2004, in the Canada High Arctic (Nunavut) was very successful. The collection consists of 424 collections and includes 27 species. This is the second largest collection the Plant Materials Center has ever made during a federally funded germplasm collection project. It is only slightly smaller than the Greenland collection made last year. The collection conditions were not ideal, only a few days were free of rain. Rain tends to make collection difficult and often produces seed that requires additional work to dry prior to shipping.

There were also some major flight delays and the commercial airline schedules were not the best so time on the ground could be maximized. The high Canadian Arctic was fascinating in many regards other than the vegetation. People were open and friendly.

The Canadian Genetic Resources Unit located in Saskatoon, was helpful and efficient in having the seed inspected. Every collection was inspected and a Phytosanitary Certificate was issued after one working day.

From Saskatoon the seed was sent to Beltsville, Maryland to clear US Customs. On Sept 30 the inspected seed collections arrived in Palmer. The system worked like it was intended.

The Nunavut collection along with the material from 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. While the collection efforts have been time consuming, the potential value of the collections is immeasurable. The remaining areas of the Circumpolar region are still of interest. Closing this loop will be possible over the next two years. A collection project in Lessor Canadian Arctic (Nunavik, the NWT and Yukon) is now in the planning stage. Any efforts in Russia are still in the very early planning stages and will require more investigation.

Itinerary and Collection Areas

19 Aug. -- Anchorage-Fairbanks-White Horse, Yukon Territory
20-21 Aug. – Yellowknife, Northwest Territories
22-25 Aug. – Cambridge Bay (Kaluktutiak) Victoria Island collection area. 30 accessions
26-27 Aug. – Rankin Inlet (Kangiqsliniq) collection area. 26 accessions

28-31 Aug. – Resolute (Qausuittuq) Cornwallis Island collection area. 18 accessions
1-4 Sept. – Grise Fiord (Ausuittuq) Ellesmere Island collection area. 49 accessions
5 Sept. – Iqaluit (Forbisher Bay) Baffin Island
6-8 Sept – Pond Inlet (Mittimatalik) Baffin Island collection area. 90 accessions
9 Sept. – Iqaluit, Baffin Island
10-13 Sept. – Clyde River (Kangiqtugaapik) Baffin Island collection area. 86 accessions
14-16 Sept. – Iqaluit (Forbisher Bay) Baffin Island collection area. 102 accessions.
17 Sept. – Rankin Inlet (Kangiqsliniq) collection area. 27 accessions
18 Sept. – Winnipeg, Manitoba
19-22 Sept.—Saskatoon, Saskatchewan for Phytosanitary certificate and pack seed for shipment to Beltsville MD
22 Sept. – Calgary, Vancouver, Seattle, Anchorage

Nunavut Territory Species and Accessions Collected

Alopecurus alpinus	136
Arctagrostis latifolia	1
Armeria scabra	2
Artemisia borealis	7
Calamagrostis langsdorffii	1
Calamagrostis neglecta	9
Carex membranacaea	8
Deschampsia caespitosa	18
Draba lactea	16
Eriophorum scheuchzeri	3
Festuca baffinensis	9
Festuca brachyphylla	1
Festuca vivipara	5
Hierochloe alpina	10
Honckenya peploides	4
Leymus mollis	42
Poa alpina	11
Poa arctica	55
Poa glauca	46
Poa pratensis	19
Poa flexuosa	18
Papaver radicatum	5
Puccinellia greenlandica	2
Puccinellia phyrangoides	11
Salix arctica	17
Salix herbaceae	1
Salix reticulata	1
Tofieldia pusillia	1
Trisetum spicatum	2
Total	**424**

Acknowledgements

This collection project would have been nearly impossible without the assistance of Dr. Ken Richards with Plant Genetic Resources of Canada. Dr. Richards provided the permit to collect in Canada.

Dallas Kessler, also with the Plant Gene Resources of Canada, was extremely helpful in getting the seed through the Canadian inspection process needed for the Phytosanitary certificate. Dallas also made sure the collection was properly sent to Beltsville.

I also wish to thank Maryann Loftus with the PEO in Beltsville for her assistance in getting the seed through US Customs and letting me know that I would clear US Customs in Vancouver Canada; not Seattle. This minor detail was important, as there are no APHIS inspectors in Vancouver, British Columbia who would have accepted the seed for inspection in Seattle.

Native Plant Evaluation Project (The Native Plant Nursery)

In 1999, the PMC was awarded a federal grant to initiate a project of commercializing native plants in Alaska. The $350,000 grant is intended to fund additional collection efforts and hire employees and purchase equipment. The project is intended to last five years with continued grants of an equal size. This project also allows for the re-use of the Alaska Forest Nursery. The project is funded by the U. S. Natural Resources Conservation Service (NRCS).

One of the first accomplishments of this project was to produce the second edition of the Directory of Alaska Native Plant Sources in January 2000. This document is very useful as a marketing tool for our native plant growers and suppliers.

By April of 2000, the project was fully staffed with 2 Agronomists, a Maintenance Mechanic and 2 Laborers. By mid-April planting was well underway.

During this first growing season, plants were grown from seed collections made by the PMC staff over the last several years. Seed of nine wetland species and 20 upland plants were sown. Different growing media were used to address the growing requirements of the various species.

This initial growing season was an experiment to begin identifying cultural requirements for the different species. There was no attempt to involve growers at this early stage.

The plants produced from these first seedings were planted in a variety of locations for demonstration and evaluation. The dryland plants such as the *Oxytropis*, *Potentilla multifida, Plantago canescens* and *Dryas* were planted into droughty sites.

The remainder of the upland species was planted at a school, the PMC fields and the outside production beds at the PMC Nursery. The wetland species were planted into newly created wetland and production beds at the PMC Nursery. Any seed produced at these sites will be harvested.

Additional seed collections were made from native plants in the Southcentral Region for production and hopefully distribution to growers during the 2001 growing season.

The first announcement of the 2001 native plant distribution came during the Alaska Greenhouse Conference and Garden Fair on April 19-21, 2001. A letter was distributed to interested native plant growers; attached to the letter was a listing and brief description of the plant offerings. Additional advertisement of the program occurred through NRCS, the newspaper and word of mouth.

We received over 20 inquiries about the program. In early June and later in August, we distributed 7,399 plants and 7.29 pounds of seed to 17 growers. At the same time, we provided written material describing the techniques we used to produce the plants, including soil media and scarification techniques.

Not all of the plants we had placed on the April 19th plant listing were ready for distribution in June. We distributed those plants in August. In the meantime, we had produced additional plants that were also offered to growers.

The plants were distributed free of charge with the understanding that once production was underway, the grower would pay the Nursery in seed for the plants and/or seed they had received.

Considerable effort was made to germinate and produce wetland plants. The program experienced mixed results and those species that grew well were distributed to growers and special wetland revegetation projects.

Another accomplishment in 2001/2002 was the updating of the Directory of Native Plant Sources. The directory is now online at: http://www.dnr.state.ak.us/ag/native_directory.htm.

The plans for 2002 include producing more species for distribution follow up with the current growers and expanding our seed collection efforts. An agreement with DOT/PF has been developed to produce wetland vegetation mats for installation in 2004 as a trial/demonstration planting.

In 2002, the Native Plant Nursery distributed over 38 grams of seed and 20,000 plants representing 57 species to 20 growers. Additional plants were placed in another demonstration project, a new wildlife pond at Big Game Alaska.

Information continues to be shared with growers on marketing opportunities and plant growing tips. Interaction with the growers after they receive plants has been limited. In 2003, we hope to conduct site visits.

An extensive fall planting was made; the seeded trays were placed in the cooler for over-wintering and stratification. This method of over-wintering should be better than placing the trays in wood chips. The trays in the cooler are protected from the wind, snow and ice and can be moved to the greenhouse for germination earlier.

The 2003 growing season began with a disaster. The temperatures were near 0º F, the winds were howling and a roof panel broke causing the greenhouse to freeze and the water system to break. A planting of 5,000 alders also froze. Repairs to the greenhouse and watering system were repaired and eventually the alders were reseeded. This event set us back approximately 3 weeks. Despite the slow start, the growing season was highly productive.

The fall seedings, planted in 2002, were over wintered in a cooler that was controlled by outdoor ambient temperatures. Again the plantings were well protected from the weather and grew well when placed in the greenhouse. Approximately 42 accessions had been over wintered and additional 49 accessions were planted in the spring.

The Nursery tested new stratification protocols for the fall plantings. One method that worked particularly well for the wetland plants was the peat sandwich. The seeds were exposed to moist peat throughout the winter. This method helped to increase the germination of *Carex aquatilis* considerably.

Sixty-seven species or 7600 plants and 424 grams of seed were distributed to 16 growers. Twelve of the growers were new participants in the program. Five of our past growers have provided seed for payment of plants received.

In 2003 the Native Plant Nursery provided alder seedlings and other upland plants to several special projects with State Forestry, Division of Mining and the US Fish and Wildlife Service in Kenai. Surplus wetland plants were provided to a wastewater treatment project in Talkeetna and to Big Game Alaska for a pond in a moose enclosure.

After distributing thousands of plants to growers and special projects there were still many plants left in the Nursery inventory. The accessions with large numbers of plants were placed into upland, facultative upland and wetland fields at the Plant Materials Center (PMC). Those accessions with fewer numbers of plants were placed into approximately 30 raised beds. Hopefully these plantings will provide a continuous source of seed for the various species.

In July and August we conducted site visits to observe the plant production operations of several of the growers. Fourteen site visits were conducted in Talkeetna, Trapper Creek, Willow, Wasilla, Sheep Mountain, Anchorage, Seward, Girdwood, Ester, Two Rivers and Delta. Site visits were not conducted in Southeast, Sterling and Homer. The results of our visits and phone conversations were varied. Generally growers that were already in the plant production business and/or avid gardeners were having the greatest success growing native plants. However, none of the growers are ready yet to be listed in the Directory for Native Plants.

The challenges encountered by several growers included loss of plants because the plants were never placed in the ground, water stress and weeds. One grower returned the seed and plants because she felt that her clientele was not interested in native plants. Three or four growers have experienced life events that have forced them to no longer have time to work with the native plants and a few others appear to have thought growing native plants was a good idea but were unable to follow through.

Seed was collected from the fields at the PMC, raised beds at the Nursery and the wild during the late summer and fall. Over 160 accessions were collected, representing approximately 120 species. Most of the accessions were cleaned and 62 species were seeded in the fall for growth in 2004.

The Program is in the process of entering native plant propagation protocols on the Native Plant Network, an international database found at http://nativeplants.for.uidaho.edu/network. Nine protocols have been entered so far. We will continue to add protocols to the database until all suitable propagation protocols have been entered.

The Directory of Native Plant Sources has been updated. The 5th edition can be found on the web at http://www.dnr.state.ak.us/agNEWnative_directory.htm.

Evaluation of current plantings will continue. Maximizing seed production from our field plantings will also be a priority.

The primary goal of the Alaska Plant Materials Center Native Plant Nursery has been to increase the commercial availability of native plants and seed for landscaping or revegetation. To accomplish this goal, the Nursery has advertised for new growers, distributed plants and seed to growers, provided germination and growing information, provided notice to growers of commercial opportunities and provided an opportunity to advertise their crops through the annual publication of the Directory of Native Plant Sources found at http://www.dnr.state.ak.us/ag/NEWnative_directory.htm.

The title of this Project is now "The Native Plant Evaluation Project." This change in title reflects the upcoming move from the facilities at Trunk Road to the PMC facilities at the Butte. The goal of the Project remains the same, although evaluation is an increasingly important factor.

The Native Plant Evaluation Project opened with full staffing on March 1, 2004. Initially, the greenhouse was inspected and made ready for plant production.

The 2003 fall plantings were overwintered in a cooler that was allowed to experience ambient outdoor temperatures. During the winter of 2002-2003, this overwintering method proved to be considerably better than leaving the plants minimally protected outside. The plantings are protected from the wind and desiccation. Approximately 59 accessions were planted in the fall of 2003 for growth in 2004.

We continued to try new stratification methods for some seeds, particularly for some wetland species. For example, we did not allow *Menyanthes trifoliata,* buckbean, to dry. The seed was separated from the chaff and placed immediately into a small container of water that was then exposed to ambient outdoor temperatures. With this treatment, the germination for this species

increased dramatically when it was planted in the spring.

In the spring the over wintered plantings are gradually brought into the greenhouse; the first species are those we know will take longer to germinate and those that are unknown. We also start our spring plantings.

Notice of the spring plant distribution was given to previous growers by letter or e-mail. The general public was notified through public service announcements, the newspaper, radio and state web notice board.

We received over 30 inquiries about the program. We ultimately distributed 53 species, 2079 plants and 18.9 grams of seed to 17 growers, seven of which were new to the program.

The plants are provided to the growers free of charge with the idea that these plants will provide the foundation of the growers' commercial plant/seed production program. We do ask that the Nursery be reimbursed for the plants with viable seeds from the species the growers had received.

The Nursery had an agreement with State Forestry to produce 1,000 alder seedlings. Only several hundred plants were large enough for field planting by August, so the remainder of the plants have stayed at the Nursery and will be used by Forestry in 2005.

Plants that had been grown for the new U.S. Fish and Wildlife (USFW) Education Center in Kenai were finally taken to Kenai in August. The project had been delayed for a year. Nursery staff transported the plants and helped plant for one day. Staff from USFW completed the plantings. The native plantings will provide an educational tool and a demonstration planting for drought tolerant plants.

After a year's delay, the project for Department of Transportation (DOT) was completed. In early September sixty sedge vegetation mats measuring 3 feet by 10 feet were transported to a pond near Bird Point along the Seward Highway. The plants were healthy and vigorous and were moved and installed without damage. DOT, the contractor and Nursery staff were pleased with the apparent success of the project.

The Nursery has entered into an agreement with the Chugach National Forest to collect seed of native plants that would be suitable for spot treatment of areas affected by forest fire. Staff from the Nursery made a sizable collection of Nootka Lupine for the project in 2004. Additional seed collections will be made in 2005. Production of seedlings for transplanting is part of the program if needed. This initial program will go through 2005. Additional funding for future years is possible.

Surplus wetland plants were given to Alaska Wildlife Conservation Center (formerly Big Game Alaska) for planting into a new pond in the bear enclosure.

In September, Nursery staff traveled to Copper Center to deliver drought tolerant native plant seed to Natural Resource Conservation Service for use at a newly established interpretive trail head. In addition the staff met with personnel from the Wrangell St. Elias National Park to discuss revegetation and seeding options for the new Park Headquarters. Seeds from selected drought tolerant native plants were later sent to the Park for fall planting.

Monies from the Kuroshima Oil Spill funded a trip to the Unalaska/Dutch Harbor area to collect seeds. These collections will be used to repair disturbances that will be created when road work is completed in 2005.

The Native Plant Nursery uses e-mail, the Postal Service and the telephone as a means of communication with the growers. The reasons for communication include plant offerings, notification of opportunities to sell plants, useful information and inquiries as to whether or not the grower is ready to be included in the Native Plant Directory. Among the seventeen active growers, five were visited and the rest were contacted by telephone.

Most of the growers have healthy field plantings although they are plagued by weeds. One grower has been promoting native plants and has sold some of his seed. Another grower has health problems and may have to leave the program. Unfortunately, health problems have interfered with several growers' plans to participate in the Native Plant Program.

All of the growers seem reluctant to list their plants/seed on the Directory of Native Plant Sources. Our challenge is to encourage growers to go on the Directory. The public then can become educated and learn which growers are working with specific native plants. This will increase the opportunity for specific contracts to be developed.

In mid July native plants begin to disperse their seed. Seed was harvested from plantings at the Nursery and from the field plantings at the Plant Materials Center. Several collection trips were also taken this summer.

Seed collection locations included the Healy area, the Denali Highway, Tangle Lakes, Gulkana glacier, McClaren summit, McCarthy, Hatcher Pass, Craigie Creek, Puritan Creek trail and Unalaska/Dutch Harbor. Over 130 accessions were collected representing over 100 species. Several new species were added to the Nursery inventory.

Over 100 collections were cleaned in the fall. These included collections harvested from the PMC field and the Nursery plantings. Several more collections need to be cleaned and they will be cleaned in the spring.

Fall planting was relatively limited. Only 16 accessions were planted. Distribution of plant materials in the spring of 2005 will be primarily seed.

The Native Plant Nursery developed “Guidelines for Native Plant Propagation” that was distributed to all growers. General information was presented in this document as well as specific information on germination methods we have used for various species.

More specific information on propagation protocols can be found on the Native Plants Network, an international database for plant propagation. At present we have entered a total of 17 propagation protocols. This effort will continue as time permits.

The Directory of Native Plant Sources will be updated in February 2005. We are hopeful that some of the growers will be ready to list in the Directory.

Alaska Native Plant Nursery
2004 Plants / Seeds Distribution

Species	# Plants	Seeds(gram)
Aconitum delphiniifolium	51	0.6
Androsace chamaejasme	12	
Anemone narcissiflora	26	50
seeds		
Aquilegia formosa	63	1.5
Arctophila fulva	42	3.0
Arctostaphylos uva-ursi	24	
Arnica amplexicaulis	32	
Arnica angustifolia	28	
Arnica frigida	2	
Arnica lessingii	20	
Aruncus dioicus	64	
Astragalus alpinus	9	
Astragalus americanus	1	
Athyrium felix-femina	102	
Betula nana	36	
Boykinia richardsonii	40	
Carex aquatilis	208	
Carex mertensii	58	
Carex utriculata	16	
Chamerion latifolium		0.5
Claytonia arctica	1	
Corydalis sempervirens	43	
Cornus canadensis	18	

Species	# Plants	Seeds (grams)
Delphinium glaucum	106	
Drosera rotundifolia	6	
Erigeron purpuratus	32	0.2
Eriophorum brachyantherum	12	
Eriophorum angustifolium	38	
Eurybia sibirica (Aster)	26	
Geranium erianthum	106	2.0
Geum rossii	7	
Iris setosa		1.0
Leptarrhena pyrolifolia	36	
Matteuccia struthiopteris	36	
Melandrium sp.	72	
Myrica gale	4	1.0
Oplopanax horridus	7	
Papaver alboroseum	35	0.5
Papaver lapponicum		0.5
Papaver macounii	55	0.6
Papaver radicatum	42	
Pinguicula vulgaris	93	
Petasites frigidus	2	
Polemonium pulcherrimum		2.5
Rumex arcticus	3	
Schoenoplectus tabernaemontani	263	
Senecio triangularis	19	
Silene acaulis	5	
Spiraea beauverdiana	12	
Swertia perennis	38	
Typha latifolia	34	
Vaccinium caespitosum	52	
Viburnum edule	42	

Total species: 53

Total plants: 2079 **Total Seeds (Grams): 18.9**

Department of Transportation and Public Facilities Vetch Survey

Recent statewide interest in invasive/non-native plants prompted concern in DOT/PF about certain species becoming established along road right-of-ways. *Vicia cracca* is one that is prevalent, thus DOT/PF and the PMC joined together to look into the extent of the infestation and the role DOT/PF should play in its control. The report is available on the internet at:
http://www.dot.state.ak.us/stwddes/research/assets/pdf/fhwa_ak_rd_02_11.pdf.

Though infestations are considered a problem, more research is needed to determine the invasiveness of this species before eradication control measures are implemented. Including this species in a general weed management plan is appropriate. Care must be taken not to misidentify other native legumes with similar growth habits as the problem vetch. Many strategies are effective in controlling it but mowing is preferred.

Alaska Seed Growers Assistance Project

The Alaska native seed industry is in a fledgling stage. Presently, commercial growers are producing as little as fifteen to twenty percent of the statewide demand. This percentage will be increased by this project. The State of Alaska has a history of encouraging resource development, which can be accomplished when enough native, non-invasive seed is available for development projects.

Resource development in Alaska could be impacted by the lack of seed produced at competitive prices. This project is intended to assist growers in meeting seed demand in an efficient and competitive manner.

The Alaska Plant Materials Center (AKPMC) is and has been for the past fifteen years the primary research/service agency involved in native species seed production. Our mission statement clearly supports this project. "The North Latitude Plant Materials Center works to promote Alaska-produced agricultural crops for use in revegetation and seed production." No other agency has the experience with producing Alaska revegetation species on a statewide scale. This is critical when planning for revegetation of lands disturbed by resource development.

Specifically this project will:

- Provide on-farm assistance for commercial seed producers
- Publish manuals and flyers for seed growers and potential growers in the art of efficient and effective native seed production
- Facilitate educational programs for primary users of native plant seed while finding out their needs, problems, and program limitations
- Publish a statewide revegetation manual to provide users of "Alaska Produced Seed" clear, concise, and up-to-date information on methods, seed availability, and species adaptation
- Publish informative brochures on the various species/varieties of plants being produced or nearing production in Alaska.

The Alaska Seed Grower Assistance Program, including a Seed Production Manual, and a Statewide Revegetation Manual, was first funded in 2003. Funds are approved through 2006 through the Cooperative State Research, Education, and Extension Service Program of the United States Department of Agriculture. The funds pass through the University of Alaska, Fairbanks, a land grant university.

Progress made on the project during 2004 is extensive. Evaluating the main concerns of users and growers of Alaska native seed showed a lack of knowledge of plants being grown for production. Many research and

informational materials on these plants exist, but not in a usable format. Thus, the highest priority for this project is individual plant flyers, interpretively describing the use and cultivation of native plants. A statewide Alaskan revegetation manual is the second priority, with a seed production manual being ranked third.

Developing plant flyers involves interpretive design, photos, research, evaluation of educational needs, accuracy of information, and grammatical review. Revisions continue until the flyer passes standards developed by the review committee. During this report period the following plant flyers are ready for public use:

- 'Benson' Beach Rye
- 'Nortran' Tufted Hairgrass
- 'Gruening' Alpine Bluegrass
- 'Arctared' Fescue
- 'Sourdough' Bluejoint Reedgrass
- 'Reeve' Beach Wildrye
- 'Egan' American Sloughgrass
- 'Nugget' Kentucky Bluegrass
- Wainwright Slender Wheatgrass
- 'Norcoast' Bering Hairgrass
- Solomon Thickspike Wheatgrass
- 'Service' Big Bluegrass
- 'Alyeska' Polargrass
- 'Kenai' Polargrass.

To support the project:

- Hundreds of digital photos were taken
- On- and off- farm support was personally provided for both commercial and independent Alaska seed growers
- A trial field test of the affect of *Lolium multiflorum* on establishing native grasses was begun
- An educational List-serve was set up as a forum for Alaska native seed growers
- The outline for a statewide revegetation manual was established.

The question, "Why use Alaska native seed versus seed from outside Alaska?" continues to underline the need for this program. The seeds in our collections have evolved and adapted to the harsh winter conditions, long summer daylight, and drought-like conditions present in much of the region north of 60 degrees latitude.

Our grasses and legumes are especially suited to propagate in adverse conditions. They thrive because they are acclimatized to a "photoperiod" consisting of longer daylight in the summer, which triggers them to set seed and

go dormant at the proper time in late summer. Grasses and legumes introduced from the south are not triggered to set seed and go dormant which means that over time they will die off. Using native species means that less seed is needed because they have a better survival rate.

Once established, native species require no irrigation or fertilization. They are also resistant to most pests and diseases, and will not become invasive, as many foreign species will. Native plants also balance the ecology of the site for all species, attracting other native plants, insects and wildlife.

This project will enable producing quantities of native seed for use on highway, airport, and mining revegetation sites by providing educational and technical assistance to Alaskans involved in seed production. Expertise from this project will enable selection of components for seed mixes according to site specifications to meet environmental needs.

Other continuing activities include continued maintenance and coordination of communications with other Alaskan plant ecologists, farmers, plant growers, and professionals; research and staying up-to-date on new and existing information and technology; and responding to current needs on weed evaluation, noxious plant determinations, ethnobotanical concerns, and photo documentation.

This project has the support of the Alaska Seed Grower’s Association.

Foundation Seed Program

This section of the North Latitude Revegetation and Seed Production Project increases and preserves cereal grain and grass varieties developed for the special growing conditions prevalent in Alaska and other northern latitude countries.

In the past, “breeder” seed of grasses and grain were obtained from the University of Alaska, Agricultural and Forestry Experiment Station (AFES). The Alaska Plant Materials Center was given the responsibility for producing breeder seed of the numerous varieties of grasses in 1994. Small blocks of breeder seed have been established and are being maintained. Breeder seed of the numerous grain varieties developed and released by the AFES are still provided.

The progeny of breeder seed, designated “foundation” seed, is made available to the industry through the state’s seed certifying organization, the Alaska Seed Growers, Inc., in conjunction with the state Division of Agriculture. This process ensures that farmers growing “registered” (progeny of foundation) and “certified” (progeny of registered) classes of seed meet all requirements of genetic purity and cleanliness, and are in compliance with state seed regulations and the Federal Seed Act.

When the PMC began operations in 1973, the Foundation Seed Program began increasing newly released varieties of barley, oats, and wheat. These varieties, bred by the University of Alaska, Agricultural Experiment Station, became the primary crops of the agricultural projects of the late 1970s and early 1980s. At the same time, new varieties of grasses for revegetation and turf gradually became available. As production from the large projects wound down, interest increased in revegetation varieties. Today, the Foundation Seed Program raises over a dozen varieties of grasses and forbs bred for revegetation and reclamation throughout the state. In addition, new seed collections from throughout the state are planted and evaluated. Promising species are increased at the PMC and made available for new revegetation projects.

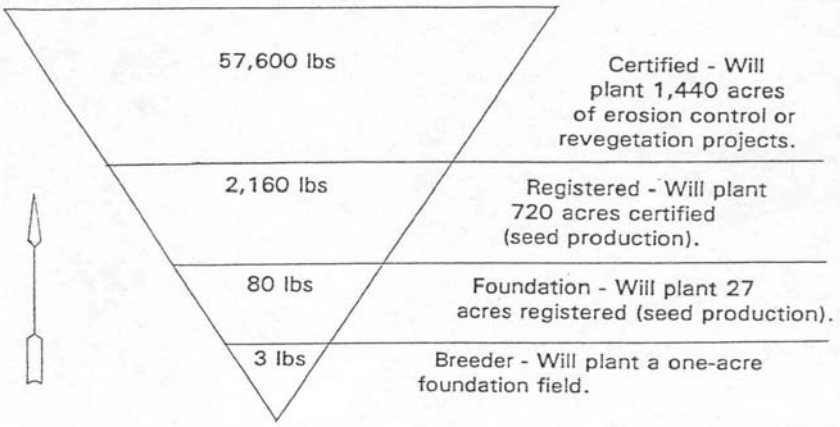
Seed quality is a prime essential to successful farming. A grower needs to know that the variety will perform, has acceptable germination and is free from contaminants.

Plant breeders explore the genetic potential of a variety. Varieties are selected based on the intended use as food, fiber, an ecological niche or its chemistry.

Successful growers understand the requirement for good germination and vigor from their seeds. The Federal Seed Act requires that seed offered for sale meet minimum germination standards.
Contaminants in seed include broken seed, chaff, dust, weed seed, other crop seed and pathogenic organisms. The higher the purity of clean seed, the less the possibility of introducing unwanted pests. The introduction of weeds or diseases in the seed increases the production costs and reduces yields not only in the present, but in future years as well.

As a member of the Association of Official Seed Certifying Agencies, the PMC's Foundation Seed Program, along with the Alaska Seed Growers, Inc., joins 43 other states in insuring that in-state and interstate purchasers have access to high quality, genetically pure seed.

Figure 3 - Seed Increase Pyramid



This diagram illustrates the increase of three pounds of grass 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.

Inspection and Sampling

A service formerly delegated to the Division of Agriculture's main office has been reassigned to the PMC's Foundation Seed Production Program - inspection of certified seed fields and official sampling of seed lots for germination and purity testing. The area of responsibility is south central Alaska, primarily the Matanuska and Susitna Valleys. Seed lots were sampled for testing as required.

Table 1. Revegetation and Turf Varieties in Production in 2003.

Variety	Class	Planted	Acres
'Nugget' Kentucky Bluegrass	Breeder	94	5
'Nugget' Kentucky Bluegrass	Breeder	96	2
'Nugget' Kentucky Bluegrass	Breeder	01	2
'Sourdough' Bluejoint	Breeder	97	.5
'Sourdough' Bluejoint	Breeder	01	1
‘Arctared’ Red Fescue	Breeder	97	1
‘Arctared’ Red Fescue	Breeder	01	2
‘Norcoast’ Bering Hairgrass	Breeder	00	2
'Nortran' Tufted Hairgrass	Breeder	97 & 00	3
‘Kenai’ Polargrass	Breeder	01	2
‘Alyeska’ Polargrass	Breeder	01	.5
'Caiggluk' Tilesy Sagebrush	Breeder	95	.5
'Reeve' Beach Wildrye	Foundation	90 & 00	2
‘Gruening’ Alpine Bluegrass	Breeder	00 & 02	1.5

Table 2. Cereal Grain Seed & Oil Seed Varieties in Storage at the Plant Materials Center, December 2004.

Barley		Wheat		Oats		Rye	
Variety	lbs	Variety	lbs	Variety	lbs	Variety	lbs
Lidal	3,100	Ingal	1,000	Toral	2,000	Bebral	1,000
Otal	1,500	Nogal	2,600	Ceal	5,000		
Thual	7,000	Froid	150	Nip	5,000		
Weal	4,400			Golden Rain	5,000		
Finnaska	2,200						
Datal	2,700						
Total	20,900	**Total**	3,750	**Total**	18,000	**Total**	1,000

Table 3. Cereal Grains Sales & Receipts, 1998 - 2004.

Type	1998	1999	2000	2001	2002	2003	2004
Barley	150	13,000	500	2,450	2,800	6,100	11,500
	$60.00	$2,600.00	$170.00	$689.40	$878.77	$2071.24	$3613.07
Oats	3,000	6,600	1,100	5,500	1,100	400	4,400
	$600.00	$1,980.00	$390.00	$1,997.42	$380.62	$153.98	$1,473.31
Wheat	1,300	1,500	400	1,500	0	0	0
	$278.00	$330.00	$133.75	$431.90	0	0	0
Total	4,450	21,000	2,000	9,450	3,900	6,500	15,900
	$938.00	$4,910.00	693.75	$3118.72	$1,259.39	$2,225.22	$5,086.32

Table 4. Grass Seed Sales & Receipts, 1998 - 2004.

Variety	1998	1999	2000	2001	2002	2003	2004
'Nugget' Kentucky	40 lbs	0	97 lbs	25 lbs	119 lbs	110 lbs	94 lbs
Bluegrass	$480.00	0	$1,164.00	$288.75	$743.65	$1,248.50	$1,055.62
'Arctared' Red	0	200 lbs	0	0	185 lbs	0	30
Fescue	0	$2,600.00	0	0	$1,551.19	0	$278.40
'Sourdough'	0	0	0	0	0	0	0
Bluejoint	0	0	0	0	0	0	0
'Alyeska'	0	0	0	0	19 lbs	0	0
Polargrass	0	0	0	0	$336.68	0	0
'Gruening' Alpine	0	0	0	0	0	0	0
Bluegrass	0	0	0	0	0	0	0
'Kenai' Polargrass	0	0	0	0	0	0	0
'Egan' American	20 lbs	0	80 lbs	30 lbs	0	30 lbs	0
Sloughgrass	$291.00	0	$1,840.00	$637.80	0	$418.20	0
'Norcoast' Bering	0	0	0	0	0	4 lbs	0
Hairgrass	0	0	0	0	0	$64.52	0
'Nortran' Tufted	0	100 lbs	0	151 lbs	39 lbs	39 lbs	130 lbs
Hairgrass	0	$1,500.00	0	$1,422.53	$542.10	$648.96	$2,167.10
Polar Brome	0	0	0	0	0	0	0
'Tundra' Glaucous	0	10 lbs	0	0	0	0	0
Bluegrass	0	$130.00	0	0	0	0	0
'Caiggluk' Tilesy	0	0	0	0	0	0	0
Sagebrush	0	0	0	0	0	0	0
	60 lbs	310 lbs	177 lbs	206 lbs	362 lbs	183 lbs	530 lbs
Total	$772.00	$4,230.00	$3,004.00	$2,349.80	$3,173.62	$2,380.18	$4,636.21

Potato Disease Control Program

Potatoes are among the most valuable crops grown on Alaskan farms. Commercial potato production is highly capital intensive. 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 a vegetatively propagated plant 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. 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 Plant Materials Center.

Seed produced at the PMC is sold to growers who increase the original allotment over the next several years. Seed potatoes are subjected to strict certification inspections to assure minimal disease incidence. The volume of certified seed produced in this fashion enables a grower to replace older diseased seed with clean seed.

Alaska is unique in that many disease and insect pests common to North America that require chemical control do not occur here. 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 would cause major problems. The importation of seed is therefore discouraged. Growers who wish to try new varieties are encouraged to obtain clean seed stock from the PMC.

Pathogen Testing

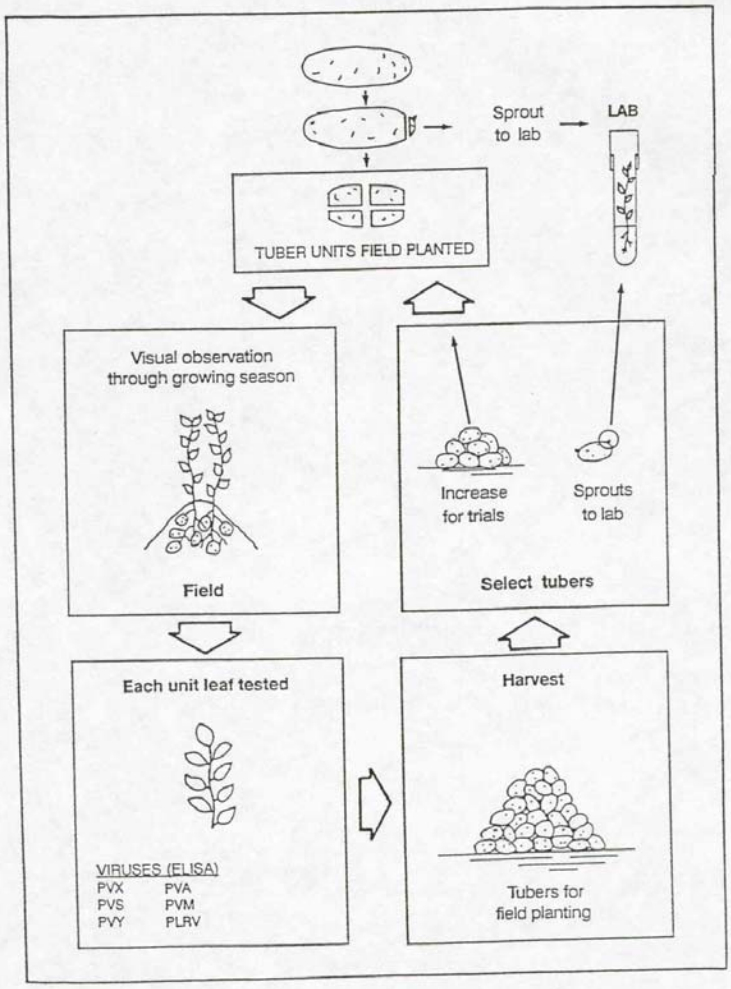
The major focus of the potato program is providing quality seed potatoes to commercial seed growers. Low levels of disease are required of quality seed because diseases can negate a crop's usefulness as seed. The seed provided by the PMC is used as the initiating stock for the ensuing multiple year certified seed production scheme. This 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.

Testing for the presence of diseases is performed in the PMC laboratory on all the initial seed stocks (Figure 4). 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), 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 (Figure 5).

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.

Figure 4. TUBER INTRODUCTION



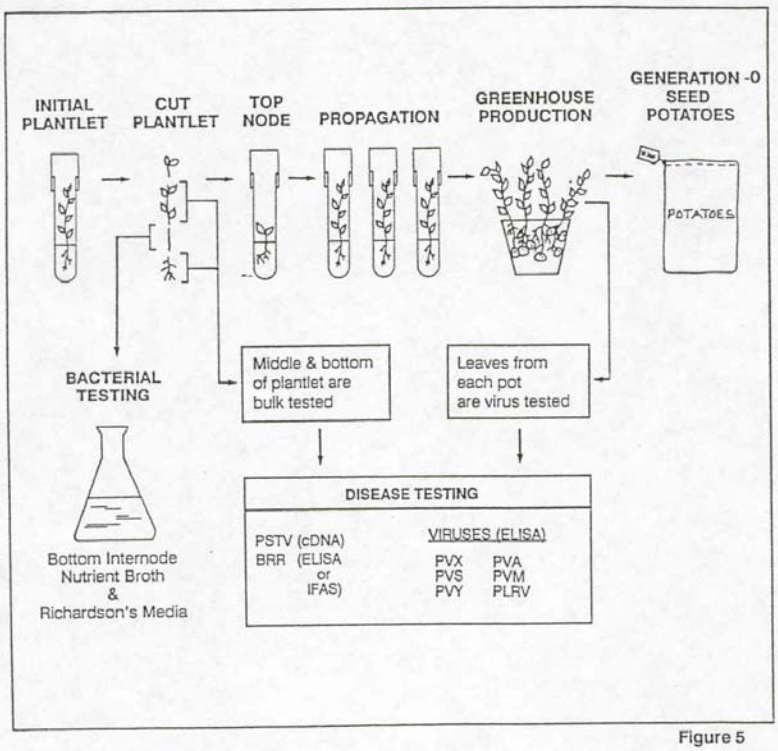


Figure 5

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 that have become 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 that 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. 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 PMC’s Potato Disease Control Program conducts the inspections. Certified seed potatoes are grown in the Matanuska Valley, Fairbanks, Bartlett Hills, Nenana, Delta Junction and Kodiak. Each lot was inspected according to certification standards for disease and varietal purity.

Table 5. Certified Seed Potatoes

Year	# Growers	# Varieties	# Lots	Acreage
1999	17	44	188	123
2000	14	238*	180	122
2001	12	49	153	128
2002	11	49	160	116
2003	8	43	172	145

*Includes PMC variety bank.

Educational Program

The University of Alaska Cooperative Extension Service holds an Annual Potato Conference to update growers on research projects and innovations pertaining to potato production. Presentations were made outlining potato diseases found in Alaska. Various control measures were discussed focusing primarily on using quality seed as a management tool.

Scab Resistance Trial

Potato scab is caused by the bacteria *Streptomyces scabies*. It causes brown, circular lesions on the potato skin. The lesions can be raised or sunken and detract from the appearance of the potato. Peeling removes the affected area. Recent work has demonstrated that a chemical (Thaxtomin) produced by this organism can cause lesions to form on tubers in the absence of the live pathogen. The amount of the phytotoxic chemical produced has been shown to correlate with the severity of the pathogenicity of various isolates of the causal organism.

Planting cultivars known to be resistant to scab coupled with production practices that help reduce disease severity is central to integrated pest management systems.

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 materials 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 1900's, 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 instate source to help obviate the necessity of importing seed potatoes which could introduce exotic diseases.

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 that are distributed the following spring. The process takes 18 months form 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.

Table 6. Seed Potato Production

Year	Number of Varieties	G-0	G-1	Plantlets
1999	50	1,877	1,000	550
2000	72	1,200	687	2,880
2001	49	1840	350	400
2002	62	3,645	699	160
2003	74	1,553	989	1,200
2004	33	971	920	0

* Due to a shortage of certified seed potatoes, the Plant Materials Center sold field grown seed.

Seed stocks were provided to:

Ohio Potato Growers Association
University of Wisconsin Madison
University of Minnesota
Cornell University

Virus Disease Expression Plot

A small plot was established to examine viral disease symptom expression. Four seed pieces each of known virus-infected materials were planted May 30th. The diseases were Potato Leafroll Virus (PLRV), Potato Virus Y (PVY), Potato Virus M (PVM), Potato Virus X (PVX), Potato Virus S (PVS), and very small tubers harvested from a plant having Witches Broom symptoms.

Symptoms of virus infection, except PVS, were apparent throughout the season for all viruses beginning a few days after emergence. The Witches Broom material did not emerge until mid August. It appeared healthy until late September when a light marginal chlorosis could be observed on the newer expanding leaves.

APPENDIX A

CURRENT & HISTORICAL BUDGET INFORMATION

CALENDAR YEAR 2004 AUTHORIZATIONS, EXPENDITURES, AND PROGRAM RECEIPTS

ARLF Authorizations

Authorizations FY 2004 PMC Total	544,900
Alaska Plant Materials Center	
Project Total	544,900
Personal Services	479,700
Travel	3,000
Contractual	45,200
Supplies	17,000

PMC Operating Budgets
for the Past Seventeen Fiscal Years

		FY88	FY89	FY90	FY91	FY92	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04
Author-ization in Thous-ands	PMC	596.7	556.7	556.1	566.1	620.8	608.9	585.6	595.3	433.3	522.9*	508.6*	511.1	485.9	523.4	522.0	535.6	544.9
										100.0*								
	Forest Nursery		0	0	0	0	0	180	0	95.2	0	0	0	0	0	0	0	0
Personnel		16	16	16	16	16	16	17	17	15	14	15	19	22	24	36	37	30
Full Time		7	7	7	7	7	7	7	7	6	5	6	5	6	8	9	13	12
Part Time		9	9	9	9	9	9	10	10	9	9	9	14	16	16	17	24	18

* Indicates Agriculture Revolving Loan Fund source.

When comparing personnel figures listed for FY 03 to those in FY 87, bear in mind that the Plant Materials Center is now performing basically the same duties at nearly the same level as it did in 1987 with 198,100 fewer dollars. The PMC has started generating operating money from federal and private grants to cover needed operations. These funds are in the form of short-term contracts that must continually be renewed. Money to hire and keep labor support staff has been the most critical issue facing the PMC. In the last three years, reductions in supplies and contractual (utilities) have also become areas of constant concern. These funds are now being supplemented with program receipts.

Program Receipts
Calendar Year 2004

Contracts, Reimbursable Service Agreements and Grants

Source	Face Value of Contracts Awarded in 2004
USDA Agricultural Research Service (Germplasm Repository)	40,000
USDA Natural Resources Conservation Service	350,000
USDA Natural Resources Conservation Service	268,800
U.S. Army National Guard	8,200
U.S. Depart of Military and Veterans Affairs	10,729
Alaska Dept. of Fish and Game, Sport Fishing Div.	3,428
Alaska Dept. of Transportation/PF	10,695
Alaska Dept. of Transportation/PF	9,048
Alaska Dept. of Natural Resources, Mining, Lands and Water	20,000
Alaska Dept. of Natural Resources, Forestry	23,000
Alaska Seed Growers	14,000
University of Alaska/ USDA CREES	220,233
	978,133

RSA, Program & Federal Receipt Values Since CY 1988

Prior to 1988, Program Receipts and contracts were not sought by the Plant Materials Center.

1988	1989	1990	1991	1992	1993	1994	1995	1996
42,195	31,407	58,417	117,981	126,071	202,886	377,161	334,200	212,800

1997	1998	1999	2000	2001	2002	2003	2004
304,200	1,086,000	928,400	1,013,200	5,630,000	1,238,389	1,262,552	978,133

2004 Calendar Year Monthly Expenditures of ARLF Funds to the Nearest Dollar												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PMC Totals	35,521	30,002	28,451	26,282	34,634	59,905	26,912	57,859	70,547	68,183	58,059	37,528
Personal Services	29,234	28,014	22,845	21,280	30,524	58,793	22,928	54,301	63,904	62,271	49,925	23,597
Travel	969	0	0	0	766	20	0	345	299	0	33	8
Contractual	5,208	1,953	4,162	1,259	3,150	1,063	211	1,862	5,434	4,895	6,243	10,823
Supplies	110	35	1,444	3,743	194	29	3,773	1,351	910	1,017	1,858	3,100

APPENDIX B

NEW & PENDING CROP RELEASES

CROP CULTIVARS DEVELOPED AND ADVANCED BY THE ALASKA PLANT MATERIALS CENTER

'Long' Barclay Willow, *Salix barclayi* - This attractive, fast growing native willow was released for commercial production in 1985. This cultivar will be used for reclamation, landscaping and shelterbelts.

'Roland' Pacific Willow, *Salix lasiandra* - Roland was released in 1985 and is probably the most attractive willow selected by the PMC to date. This cultivar will be used for landscaping, stream protection and revegetation throughout most of Alaska.

'Wilson' Bebb Willow, *Salix bebbiana* - This willow has a dense growth form and has many potential uses for screening, windbreaks and living fences. Because of the species' wide range of adaptability, it is also expected to be utilized for reclamation activities. Wilson is a 1985 release.

'Oliver' Barren Ground Willow, *Salix brachycarpa* - Oliver was released for commercial production in 1985. This cultivar's interesting growth form will lend itself well for incorporation into hedges. Additional uses range from reclamation to windbreaks.

'Rhode' Feltleaf Willow, *Salix alaxensis* - Rhode was also released for commercial production in 1985. This species occurs throughout Alaska and is listed as a preferred wildlife species. This cultivar will find uses in habitat restoration, reclamation, streambank protection and shelterbelts.

'Egan' American Sloughgrass, *Beckmannia syzigachne* - Egan was released for commercial seed production in 1986. This cultivar has performed well at most test sites. Its expected uses are wetland restoration and waterfowl habitat enhancement. In 1991, Egan was registered as a crop cultivar with the Crop Science Society of America.

'Gruening' Alpine Bluegrass, *Poa alpina* - This selection of alpine bluegrass was released for production in 1987. A native species, alpine bluegrass has shown extreme hardiness throughout Alaska and it is well adapted to harsh sites such as mine spoil. In 1991, Gruening was registered as a crop cultivar with the Crop Science Society of America.

'Caiggluk' Tilesy Sagebrush, *Artemisia tilesii* - Caiggluk tilesy sagebrush is a native collection of sagebrush. It was placed in commercial production in 1989. The expected uses range from mine reclamation to restoration of sites contaminated with toxic metals. The cultivar will add diversity to seed mixes. This is the first native broadleaf species brought into commercial production in Alaska. In 1991, Caiggluk was registered as a crop cultivar with the Crop Science Society of America.

'Service' Big Bluegrass, *Poa ampla* - This accession of big bluegrass was derived from a collection made in the Yukon Territories. During the PMC evaluation process, the collection out-performed 'Sherman' big bluegrass (the only known cultivar of big bluegrass) in all categories. Service is expected to find use in dry land revegetation projects in Alaska south of the Yukon River.

'Reeve' Beach Wildrye, *Elymus arenarius* - Reeve beach wildrye was developed from a seed collection obtained from Norway. During the evaluation process, it was determined that this accession was capable of producing commercially viable amounts of seed. This was of extreme interest, as beach wildrye is notorious for not producing seed. Further evaluation indicated that the accession also had hardiness and adaptive traits making it useful in coastal revegetation and reclamation. In 1991, Reeve was released for commercial production. Reeve was registered as a crop cultivar with the Crop Science Society of America in 1994.

'Benson' Beach Wildrye, *Elymus mollis* - This accession was released for commercial production in 1991. Unlike Reeve, Benson was released for vegetative production only. This extremely aggressive and hardy, local collection does not produce seed in any appreciable amounts, therefore, commercial propagation can only be accomplished by vegetative means. This cultivar will find use in transplanting projects where erosion and accretion are beyond the capabilities of any seed species. Benson will become an important cultivar in coastal dune stabilization and restoration in Alaska. In 1994, the cultivar Benson was registered with the Crop Science Society of America.

'Kenai Carpet' Nagoonberry, *Rubus arcticus L*. - 'Kenai Carpet' nagoonberry was selected from a native collection made on the Kenai Peninsula. This vigorously growing ground cover has been tested at various trial sites since 1985. It is best suited for use in large areas where an alternative to turf grass or a mulch is desired. Kenai Carpet nagoonberry spreads by rhizomes and often out competes the surrounding vegetation. A minimal amount of fruit is produced by this cultivar. It was named and released for commercial production in 1991.

'Peanut' syn. 'Swede' Potato. This fingerling potato traces back to the Matanuska Valley in the 1930s. The tubers are small and resemble a peanut in shape and have yellow flesh. Desirable qualities include good yield under adverse conditions and a long dormancy.
'Rote Erstling' syn. 'Rode Eerstling' Potato. European variety promoted by Dr.

Donald Dinkel, University of Alaska Fairbanks (retired). Round, red with yellow flesh. Early maturing.

'Alaska Sweetheart' Potato. Germplasm provided by Jayson Dearborn. Round, red with pale pink flesh.

APPENDIX C

LIST OF PUBLICATIONS AND PRESENTATIONS

PUBLICATIONS

Campbell, W. L. I987. Potatoes Alaska! Spudman. January and February 1987. 4 pp.

Campbell, W. L. 1988. Potato Disease Control Technical Report 1984-1988. State of Alaska, Division of Agriculture, Plant Materials Center. 14 pp.

Campbell, W. L. 1988. Alaska Potatoes: A Textbook Example of Virus Flushout (Abstract). American Potato Journal. 65:479.

Campbell, W. L. and D. W. Bagley. 1989. Sucrose Analysis and Chipping Ability of Twenty Alaska Grown Potato Varieties. State of Alaska, Division of Agriculture, Plant Materials Center. 12 pp.

Campbell, W. L., D. Quarberg and M. Karlsson. 1989. Delta Potato Variety Observation Project Report. State of Alaska, Division of Agriculture, Plant Materials Center. 2 pp.

Campbell, W. L. and R. Gavlak. 1990. Commercial Seed Potato Production Program for Export. State of Alaska, Division of Agriculture, Plant Materials Center. 2 pp.

Campbell, W. L. 1990. Matanuska Valley Potato Variety Observation Plot Report. State of Alaska, Division of Agriculture, Plant Materials Center. 2 pp.

Campbell, W. L. 1992. Heirloom Varieties: How Can They Be Certified? (Abstract). American Potato Journal. 69:573.

Campbell, W. L. 1992. An Overview of Potato Production in Alaska (Abstract). American Potato Journal. 69:573.

Campbell, W. L. 1993. Factors Reducing Monetary Return of Potato Production in Alaska (Abstract). American Potato Journal. 70:801.

Campbell, W. L. 1994. Varietal Resistance to Potato Scab in Alaska. (Abstract). American Potato Journal. 71:665.

Campbell, W. L. 1994. Certified Seed Potato Directory 1994. State of Alaska, Division of Agriculture, Plant Materials Center.

Campbell, W. L., A.S.G. Inc. 1994. Potato Seed Certification Handbook 1995. State of Alaska, Division of Agriculture, Plant Materials Center, and Alaska Seed Growers, Inc.

Campbell, W. L. 1995. 1995 Certified Seed Potato Directory. State of Alaska, Division of Agriculture, Plant Materials Center.

Campbell, W. L. 1995. Reviving Potato Breeding in Alaska (Abstract). American Potato Journal. 72:616.

Campbell, W. L. 1996. Certified Seed Potato Directory. State of Alaska, Division of Agriculture, Plant Materials Center.

Campbell, W. L. 1996. Disease-Tested Cultivar Maintenance. Abstract. American Potato Journal. 73:347.

Campbell, W. L. 1998. Late Blight Management Plan for Alaska. State of Alaska, Division of Agriculture, Plant Materials Center. 20 pp.

Campbell, W.L. 2003. Alaska Seed Production. Dec 2003. 2 pp

Campbell, W.L. 2004 Alaska's Potato Growing Problems. Abstract. American Journal of Potato Research. 81:49

Gavlak, R. G., D. Carling, M. Comeau, J. Purser, W. Vandre, J. Walworth, C. Wright. 1990. Vegetable Variety Trials Matanuska Valley, Alaska. University of Alaska Fairbanks Agriculture and Forestry Experiment Station. AFES Circular 80. 16 pp.

Gavlak, R. G., W. L. Campbell, J. L. Walworth, C. L. Johnson, J. E. Muniz and T. A. Tindall. 1993. Nitrogen Fertilization of Irrigated Russet Potatoes in Southcentral Alaska. American Potato Journal. 70:571-578.

Hopkins, A., S. A. Mayasich, S. J. Wright, W. C. Hanson and K. J. Cabble. 1994. U. S. Department of Energy. Remediation and Restoration of Radioactive Sites: Project Chariot Case Study. Abstracts of Society of Environmental Toxicology and Chemistry. 15th Annual Meeting, Denver Colorado, November 1994. 1 p.

I. M. Lee, K.D. Bottner, J. E. Munyaneza, W. L. Campbell, G. A.Secor, N. C. Gudmestad. Closely related but distinct phytoplasmas associated with potato purple top and potato witches-broom disease in the U.S. APS Abstracts of Presentations 2004 Annual Meeting

Hunt, Peggy; Moore, Nancy. 2003. Propagation protocol for production of container *Arctophila fulva* (Trin.) Rupr. ex Anderss. plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Hunt, Peggy; Moore, Nancy J. 2003. Propagation protocol for production of container *Boykinia richardsonii* (Hook.) Rothrock plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Hunt, Peggy; Moore, Nancy. 2003. Propagation protocol for production of container *Carex aquatilis* Wahlenberg var. *aquatilis* plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Hunt, Peggy; Moore, Nancy. 2003. Propagation protocol for production of container *Carex mertensii* J.D. Prescott ex Bongard plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Hunt, Peggy; Moore, Nancy. 2003. Propagation protocol for production of container *Chamerion latifolium* (L.) Holub plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Hunt, Peggy; Moore, Nancy J. 2003. Propagation protocol for production of container *Oxytropis campestris* (L.) DC. ssp. *gracilis* (Nels.) Hult. plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Hunt, Peggy; Moore, Nancy J. 2004. Propagation protocol for production of container *Oxytropis maydelliana* Trautv. plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Karle, K. and N. J. Moore. May 2002. Evaluation of Bioengineered Stream Bank Stabilization in Alaska. Preliminary Draft. Prepared for Alaska Dept. of Transportation and Public Facilities. 52 pp.

Karlsson, M., W. Vandre, C. Wright. 1990. Research and Education Update on Alaska Horticulture. *In* Proceedings of the Ninth Alaska Greenhouse and Nursery Conference. pg 15-23.

Moore, Nancy J.; Hunt, Peggy. 2004. Propagation protocol for production of container *Papaver alaskanum* Hult. plants; State of Alaska, Dept. of Natural

Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Moore, Nancy J.; Hunt, Peggy. 2003. Propagation protocol for production of container *Polemonium pulcherrimum* Hook plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Moore, N. J. 1986. Recommendations for Reclamation Species and Techniques. Alaska Miner. April, 1986. 2 pp.

Moore, N. J. 1986. Evaluation of Conservation Species at Fort Richardson, 1983-1986. State of Alaska, Division of Agriculture, Plant Materials Center. 11 pp.

Moore, N. J., P. Brna, W. Evans, and S. J. Wright. 1986. Field Guide for Streambank Revegetation. State of Alaska, Division of Agriculture, Plant Materials Center. 15 pp.

Moore, N. J. 1986. Final Report for the Bank Revegetation Program, Bethel Small Boat Harbor. State of Alaska, Division of Agriculture, Plant Materials Center. 23 pp.

Moore, N. J. 1986. Final Report for Evaluation of Conservation Species at Fort Richardson, 1983 - 1986. State of Alaska, Division of Agriculture, Plant Materials Center. 11 pp.

Moore, N. J. and P. J. Brna. 1987. Streambank Revegetation With Woody Plants. Alaska Fish and Game. 19-24 pp.

Moore, N. J. 1987. Plant Profile 'Roland' *Salix lasiandra*. The Public Garden. The American Association of Botanical Gardens and Arboreta, Inc. January, 1987. 1 p.

Moore, N. J. et. al. 1989. Directory of Alaska Native Plant Sources. Municipality of Anchorage Coastal Management Program, and Alaska Department of Natural Resources, Division of Agriculture, Plant Materials Center. 23 pp.

Moore, N. J. and S. Wright. 1986. Studies on the Techniques for Revegetation with *Arctophila Fulva*. Volume I. State of Alaska, Division of Agriculture, Plant Materials Center. 53 pp.

Moore, N. J. and S. Wright. 1987. Studies on the Techniques for Revegetation with *Arctophila Fulva*. Volume II. State of Alaska, Division of Agriculture, Plant

Materials Center. 30 pp.

Moore, N. J. and S. Wright. 1988. Studies on the Techniques for Revegetation with *Arctophila Fulva*. Volume III. State of Alaska, Division of Agriculture, Plant Materials Center. 16 pp.

Moore, N. J. 1990. Green's Creek Revegetation Plot Interim Report. State of Alaska, Division of Agriculture, Plant Materials Center. 4 pp.

Moore, N. J. and S. Wright. 1991. Revegetation with *Arctophila Fulva*, a Final Report 1985 - 1989 for ARC0, Alaska Inc. State of Alaska, Division of Agriculture, Plant Materials Center, 50 pp.

Moore, N. J. 1992. Assessment of Erosion and Plant Cover on the Trans Alaska Pipeline, Mileposts 0-800. Volumes 1, 2 and 3. State of Alaska, Division of Agriculture, Plant Materials Center.

Moore, N. J. 1992. The Move Towards Using Wildflowers for Revegetation in Alaska. *In* Proceedings of the 12th Alaska Greenhouse and Nursery Conference.

Moore, N. J. 1993. Directory of Alaska Native Plant Sources. State of Alaska, Division of Agriculture, Plant Materials Center. 31 pp.

Moore, N. J. and S. Wright. 1994. Revegetation Manual for King Salmon Air Force Base, King Salmon Alaska. State of Alaska, Division of Agriculture, Plant Materials Center. 51 pp. Appendices.

Moore, N. J. 1994. Final Report for the U.S. Forest Service - Wrangell District, Revegetation Test Plots. State of Alaska, Division of Agriculture, Plant Materials Center. 11 pp.

Moore, N. J. 1995. Revegetation Recommendations: Haines Highway Construction Project Milepost 24 to the Border *for* Department of Transportation and Public Facilities and Department of Fish and Game. 5 pp.

Moore, N. J. and G. Muhlberg. 1996. Revegetation technique single-page flyers including Dormant Cuttings, Live Stakes, Brush Layering, Bundles, etc. Alaska Department of Fish and Game (ADF&G), Habitat Division, Department of Natural Resources, Division of Agriculture, Plant Materials Center, funded by ADF&G/Environmental Protection Agency, Anchorage, Alaska. 9 pp. (Draft).

Moore, N. J. 1997. Soil Bioengineering Techniques for Riparian Applications in

Alaska: Materials and Methods *in* ISCORD 1997 Proceedings of the International Symposium on Cold Region Development, American Society of Civil Engineers. New York. 4 pp.

Moore, N. J and D. R. Ross. 2001. Alaska Native Plant Production Center Annual Report. Department of Natural Resources, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 9 pp.

Moore, N. J. and M. Hunt. 2002. Alaska Native Plant Production Center Annual Report. Department of Natural Resources, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 21 pp.

Moore, N. J. and M. Hunt. 2003. Alaska Native Plant Production Center Annual Report. Department of Natural Resources, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 5 pp.

Nolen, Andrew S. 2002. Vetch Infestations in Alaska. Department of Natural Resources, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 38 pp.

Ross, Donald; Moore, Nancy. 2004. Propagation protocol for production of container *Arnica frigida* C. A. Mey. ex Iljin plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Ross, Donald; Moore, Nancy. 2004. Propagation protocol for production of container *Aruncus dioicus* (Walt.) Fern. var. *acuminatus* (Rydb.) Rydb. ex Hara plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Ross, Donald; Moore, Nancy. 2004. Propagation protocol for production of container *Betula nana* L. ssp. *exilis* (Sukaczev) Hultén plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Ross, Donald; Moore, Nancy; VanZant, James. 2004. Propagation protocol for production of container *Schoenoplectus tabernaemontani* (K.C. Gmel.) Palla plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Ross, Donald; Moore, Nancy. 2004. Propagation protocol for production of container *Menyanthes trifoliata* L. plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Ross, Donald; Moore, Nancy. 2004. Propagation protocol for production of container *Papaver macounii* Greene ssp. *discolor* (Hultén) Rändel ex D. F. Murray plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Ross, Donald; Moore, Nancy. 2004. Propagation protocol for production of container *Swertia perennis* L. plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Ross, Donald; Moore, Nancy; Hunt, Peggy. 2004. Propagation protocol for production of container *Viburnum edule* (Michx.) Raf. plants; State of Alaska, Dept. of Natural Resources, Div. of Agriculture, Palmer, Alaska. In: Native Plant Network. URL: http://www.nativeplantnetwork.org. Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Ross, D. R. 1987. Controlled Release Fertilizer Trials on Four Containerized Woody Plants. State of Alaska, Division of Agriculture, Plant Materials Center. 9 pp.

Ross, D. R. and E. J. Heyward. 1989. Foundation Seed Production Technical Report. State of Alaska, Division of Agriculture, Plant Materials Center. 24 pp.

Ross, D. R. 1993. 1993 Initial Report - Alyeska Resort Revegetation Test Plots. State of Alaska, Division of Agriculture, Plant Materials Center. 8 pp.

Ross, D. R. 2001. Directory of Alaska Native Plant Sources. State of Alaska, Division of Agriculture, Plant Materials Center.

Wright, S. J. 1985. Willow Varieties for Alaska. State of Alaska, Division of Agriculture, Plant Materials Center and USDA Soil Conservation Service. 7 pp.

Wright, S. J. 1986. Release Notice 'Egan' American Sloughgrass. State of Alaska, Division of Agriculture, Plant Materials Center. 2 pp.

Wright, S. J. 1986. Release Notice 'Gruening' Alpine Bluegrass. State of Alaska, Division of Agriculture, Plant Materials Center. 2 pp.

Wright, S. J. and N. J. Moore. 1986. 1986 Progress Report for the Conservation Plant Project. State of Alaska, Division of Agriculture, Plant Materials Center. 87 pp.

Wright, S. J. 1986. Initial Data and Observations Obtained From the 2C Access Spur and Mine Site D Herbaceous Evaluation Plots Located in the Kuparuk Unit. State of Alaska, Division of Agriculture, Plant Materials Center. 10 pp.

Wright, S. J. 1986. Beach Wildrye (*Elymus arenarius*) Sprigging on Shemya Air Force Base, Lateral Clear Zone - A Qualitative Study in Response to Questions Arising From Contract DACA 85-86-C-0042. State of Alaska, Division of Agriculture, Plant Materials Center. 37 pp.

Wright, S. J. 1987. Final Report on Demonstration and Advanced Conservation Plantings at Kalsin Bay, Kodiak, Alaska 1982-1986. State of Alaska, Division of Agriculture, Plant Materials Center. 16 pp.

Wright, S. J. 1987. Final Report on Evaluation of Advanced Herbaceous Conservation Species at Usibelli Coal Mine, Healy, Alaska 1983 - 1986. State of Alaska, Division of Agriculture, Plant Materials Center. 11 pp.

Wright, S. J. 1987. Final Report of Initial and Advanced Conservation Plantings at Ruby, Alaska 1984 - 1986. State of Alaska, Division of Agriculture, Plant Materials Center. 16 pp.

Wright, S. J. 1987. Evaluation of Conservation Species at Premier Coal Mine Near Palmer, Alaska 1983 - 1986. State of Alaska, Division of Agriculture, Plant Materials Center. 14 pp.

Wright, S. J., L. H. Fanter and J. M. Ikeda. 1987. Initial Attempts in Establishing Beach Wildrye on Shemya Air Force Base. Abstracts of the Annual Meeting of the American Society of Agronomy, November 30, 1987, Atlanta, Georgia.

Wright, S. J. 1987. Sand Stabilization Within the Lateral Clear Zone on Shemya Air Force Base. Abstracts of the American Society of Agronomy Annual Meeting, November 30, 1987, Atlanta, Georgia.

Wright, S. J. 1987. Final Report on Evaluations of Advanced Herbaceous Conservation Species at Diamond Alaska Test Pits Near Tyonek, Alaska 1983 - 1987. State of Alaska, Division of Agriculture, Plant Materials Center. 13 pp.

Wright, S. J. 1987. Reclamation In Alaska. 1987 Annual Meeting of the Alaska Miners Association Technology Short Course. State of Alaska, Division of

Agriculture, Plant Materials Center. 13 pp.

Wright, S. J., L. H. Fanter, and J. M. Ikeda. 1987. Sand Stabilization Within the Lateral Clear Zone at Shemya Air Force Base, Alaska Using Beach Wildrye, (*Elymus arenarius*). State of Alaska, Division of Agriculture, Plant Materials Center and U. S. Army Corps of Engineers, Alaska District. 16 pp.

Wright, S. J. 1988. Final Report of Advanced Conservation Grasses at Terror Lake Hydro Electric Project, Kodiak, Alaska. State of Alaska, Division of Agriculture, Plant Materials Center. l3 pp.

Wright, S. J. 1988. Final Report on Evaluation of Conservation Species at Valdez Creek Mine Near the Susitna River off the Denali Highway 1985 - 1987. State of Alaska, Division of Agriculture, Plant Materials Center. 12 pp.

Wright, S. J. 1988. Initial Demonstration and Advanced Conservation Plantings at the City of Kenai Evaluation Plot 1984 - 1987. State of Alaska, Division of Agriculture, Plant Materials Center. 12 pp.

Wright, S. J. 1988. Initial Demonstration and Advanced Conservation Plantings at Mile Post 1408 Near Delta, Alaska 1983 - 1987. State of Alaska, Division of Agriculture, Plant Materials Center. 15 pp.

Wright, S. J. 1988. Advances in Plant Material and Revegetation Technology in Alaska. Proceedings of the High Altitude Revegetation Conference. Colorado State University. Fort Collins, Colorado. 38 pp.

Wright, S. J., L. H. Fanter. 1988. Recreating a Coastal Community Using Beach Wildrye Sprigs and Seeded Grasses. Proceedings - Second Annual Meeting of Alaska Association of Environmental Professionals. Anchorage, Alaska. 1 pp.

Wright, S. J. 1988. Advances in Revegetation Technology Following the Completion of TAPS. Renergy - Alaska Oil and Industry. Vol. 7. No. 6. June, 1988.

Wright, S. J. 1989. Final Report of Data and Observations Obtained From the 2C Access Spur and Mine Site D Herbaceous Evaluation Plots Located in the Kuparuk Unit. State of Alaska, Division of Agriculture, Plant Materials Center. 13 pp.

Wright, S. J. 1989. 1988 Interim Report of Initial Data and Observations Obtained From the Red Dog Mine Evaluation and Demonstration Plots. State of Alaska, Division of Agriculture, Plant Materials Center. 16 pp.

Wright, S. J. 1989. Final Report of Data and Observations Obtained From the Chena Flood Control Project Evaluation Plots Located Near North Pole, Alaska.

State of Alaska, Division of Agriculture, Plant Materials Center. 14 pp.

Wright, S. J. 1989. Final Report of Data Obtained From the Fairbanks Evaluation and Demonstration Plots. State of Alaska, Division of Agriculture, Plant Materials Center. 12 pp.

Wright, S. J. 1989. Advances in Plant Materials Technology and Revegetation Technology in Alaska. Reclamation, a Global Perspective. American Society for Surface Mining and Reclamation. Calgary, Alberta Canada. 10 pp.

Wright, S. J. 1989. Release Notice - 'Caiggluk' Tilesy Sage. State of Alaska, Division of Agriculture, Plant Materials Center. 2 pp.

Wright, S. J. 1989. Release Notice - 'Service' Big Bluegrass. State of Alaska, Division of Alaska, Plant Materials Center. 2 pp.

Wright, S. J. 1989. Sand Control on Adak Naval Air Station. Abstracts of the 1989 Annual Meeting of the American Society of Agronomy, October 17, 1989, Las Vegas, Nevada.

Wright, S. J. 1990. Final Report of Data and Observations Obtained From the Delta Bison Range Evaluation Plot, 1986 -1989. State of Alaska, Division of Agriculture, Plant Materials Center. 10 pp.

Wright, S. J. 1990. Final Report of Initial Evaluation Plantings at the Kenny Lake Evaluation Plots, 1980 - 1989. State of Alaska, Division of Agriculture, Plant Materials Center. 16 pp.

Wright, S. J. 1990. An Overview of the Alaska Plant Materials Center's Work with Beach Wildrye *Elymus arenarius* (*E*. *mollis*). Proceedings of the Public Symposium. Restoration Following the Exxon Valdez Oil Spill. March 26-27, 1990. Restoration Planning Work Group. Anchorage, Alaska. 1 pp.

Wright, S. J. 1990. Landscaping on Adak Naval Air Station Using 'Norcoast' Bering Hairgrass and 'Arctared' Red Fescue. Abstracts of the 1990 Annual Meeting, American Society of Agronomy. San Antonio, Texas. October 29, 1990.

Wright, S. J. 1990. Advances in Plant Material and Revegetation Technology in Alaska. *In* Proceedings of the Eleventh Annual Conference on Placer Mining. March 29 - April 2, 1989. Fairbanks, Alaska. 5 pp.

Wright, S. J. 1990. Final Report of Data and Observations Obtained From the Adak Naval Air Station Evaluation Plot Network, 1988-1990. State of Alaska, Division of Agriculture, Plant Materials Center. 17 pp.Wright, S. J. 1990. Final Report of Data and Observations Obtained From the Red Dog Mine Evaluation and

Demonstration Plots. State of Alaska, Division of Agriculture, Plant Materials Center. 16 pp.

Wright, S. J. 1991. Release Notice - 'Reeve' Beach Wildrye. State of Alaska, Division of Agriculture, Plant Materials Center. 4 pp.

Wright, S. J. 1991. Release Notice - 'Benson' Beach Wildrye. State of Alaska, Division of Agriculture, Plant Materials Center. 4 pp.

Wright, S. J. 1991. Registration of 'Egan' American Sloughgrass. Crop Science. Vol. 31, No. 5. 31:1380-1381.

Wright, S. J. 1991. Registration of 'Caiggluk' Tilesy Sagebrush. Crop Science. Vol. 31, No. 5. 31:1380.

Wright, S. J. 1991. Registration of 'Gruening' Alpine Bluegrass. Crop Science. Vol. 31, No. 5. 31:1379-1380.

Wright, S. J. 1991. Assessment of Revegetation on the Aleutian Islands - Adak, Amchitka, Shemya and Attu. State of Alaska, Division of Agriculture, Plant Materials Center. 12 pp.

Wright, S. J. 1991. Using Native Seeded Species for Landscaping and Trail Restoration on Adak Naval Air Station. Abstracts of the American Society of Agronomy 1991 Annual Meeting, Denver, Colorado, October 28, 1991.

Wright, S. J. 1992. Atigun Pass Reroute Rehabilitation Plan Interim Report 1992. State of Alaska, Division of Agriculture, Plant Materials Center. 16 pp.

Wright, S. J. 1992. U. S. Coast Guard Loran C Station Located at Port Clarence, Alaska. Solid Waste Reduction and Landfill Restoration at the Abstracts of the 1992 American Society of Agronomy Annual Meeting, November 2-6, 1992, Minneapolis, Minnesota, 1 pp.

Wright, S. J. 1992. Three Case Studies of Successful Wetland Rehabilitation in Alaska Using Newly Developed Wetland Cultivars. Land Reclamation: Advances in Research and Technology. Proceedings of the International Symposium, American Society of Agricultural Engineers. December 14-15, 1992. Nashville, Tennessee. 9 pp.

Wright, S. J. 1992. Overview of Recent Coastal Restoration Projects in Alaska Using Beach Wildrye (*Elymus mollis*). Land Reclamation: Advances in Research and Technology. *In* Proceedings of the International Symposium, American Society of Agricultural Engineers. December 14-15, 1992. Nashville, Tennessee. 10 pp.

Wright, S. J. 1993. Final Report on the Evaluation of Herbaceous Species at Three Gold Mines Near Nome, Alaska 1989-1992. State of Alaska, Division of Agriculture, Plant Materials Center. 10 pp.

Wright, S. J. 1993. Information and Data Leading to the Release of 'Reeve' Beach Wildrye Leymus arenarius L. (*Elymus arenarius L.*) and 'Benson' Beach Wildrye Leymus mollis (Trin.) (Hulten) (*E. arenarius* ssp. *mollis*) for Commercial Production. State of Alaska, Division of Agriculture, Plant Materials Center. 22 pp.

Wright, S. J. 1993. Wetland Revegetation Projects in Alaska Using Adapted Species Having Commercially Available Seed. State of Alaska, Division of Agriculture, Plant Materials Center. 8 pp.

Wright, S. J. 1993. Gravel Pit Restoration Using Imprinting to Encourage Natural Revegetation by Woody Species on Fort Richardson, Alaska. Abstracts of the 1993 American Society of Agronomy Annual Meeting, November 7-12, 1993, Cincinnati, Ohio. 1 pp.

Wright, S. J. and N. J. Moore. 1993. Report to Western Regional Coordinating Committee on the Alaska Plant Materials Center's Programs, 1992-1993. Revegetation and Stabilization of Deteriorated and Altered Land. WRCC-21, Davis, California. pp 1-20.

Wright, S. J. 1994. Using Beach Wildrye for Coastal Revegetation in Alaska. Proceedings of the 1st Circumpolar Agricultural Conference. Whitehorse, Yukon, Canada. September 1992. pp 141-150.

Wright, S. J. 1994. Registration of 'Reeve' Beach Wildrye. Crop Science. Volume 34, No. 2. 34:537.

Wright, S. J. 1994. Registration of 'Benson' Beach Wildrye. Crop Science. Volume 34, No. 2. 34:537.

Wright, S. J. 1994. Effects of Beach Wildrye on Foredune Dynamics on Adak Naval Air Station, Adak, Alaska. Abstracts of the 1994 American Society of Agronomy Meeting. Seattle, Washington. November 13-18, 1994. 1 pp.

Wright, S. J. 1994. Beach Wildrye Planting Guide for Alaska. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska; U. S. Navy EFA, N W, Silverdale, Washington. 28 pp.

Wright, S. J. and N. J. Moore. 1994. Revegetation Manual for Eareckson Air Force Station Shemya, Alaska. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 65 pp. + appendices.

Wright, S. J. and N. J. Moore. 1994. Annual Report to the Western Regional Coordinating Committee 21 on the Alaska Plant Materials Centers Programs. Revegetation and Stabilization of Deteriorated and Altered Land. Anchorage, Alaska. July 24-27, 1994. 15 pp.

Wright, S. J. and N. J. Moore. 1995. Annual Report to the Western Regional Committee - 21 on the Alaska Plant Materials Center's Programs *in* Revegetation and Stabilization of Deteriorated and Altered Land. Boise, Idaho, July 10-12, 1995.

Wright, S. J. 1995. Atigun Pass Reroute Rehabilitation Project - Final Report. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 34 pp.

Wright, S. J. 1995. Collecting and Commercializing Native Wetland Species for Seed Production. pp 403-406 *in* Proceedings of the National Interagency Workshop on Wetlands: Technology Advances for Wetlands Science. Technical Report, Wetlands Research & Technology Center, U.S. Army Engineers Waterway Experiment Station, Vicksburg, Mississippi. 428 pp.

Wright, S. J. 1995. Natural Revegetation of Peat Soils on Eareckson AFS, Shemya, Alaska *in* Abstracts of the 1995 American Society of Agronomy Meeting, St. Louis, Missouri. October 30 - November 3, 1995. 1 pp.

Wright, S. J. 1995. Restoration of a Sand Quarry Located at Adak NAF, Adak, Alaska. Abstracts of the 1995 American Society of Agronomy Meeting, St. Louis, Missouri. October 30 - November 3, 1995. 1 pp.

Wright, S. J. 1995. Recent Collection Efforts and Potential Commercialization of Native Plant Species in Alaska. Abstracts of the 1995 American Society of Agronomy Meeting, St. Louis, Missouri. October 30 - November 3, 1995. 1 pp.

Wright, S. J. 1995. Pringle Hill Sand Quarry Restoration Project 1993 - 1995 -Final Report. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 31 pp + Appendix.

Wright, S. J. 1995. 1995 Interim Report - Chugach Electric Association Inc. -

Girdwood to Ingram Creek Restoration Project. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 23 pp + Appendix.

Wright, S. J. 1995. Project Chariot Revegetation Program 1993 - 1995 Final Report. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 26 pp.

Wright, S. J. 1996. Coastal Erosion in Alaska Using Seed and Transplants *in* Erosion Control Technology...Bringing it Home, Proceedings of the International Erosion Control Association, IECA. Seattle Washington, 11 p.

Wright, S. J. 1996. Department of Defense Contributions to Seed Collecting and Cultivar Development in Alaska *in* Abstracts of the 1996 Annual Meeting of the American Society of Agronomy. Indianapolis, Indiana. 1 pp.

Wright, S. J. 1996. 1996 Final Report - Chugach Electric Association, Inc. - Girdwood to Ingram Creek Restoration Project. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 39 pp.

Wright, S. J. 1997. Final Report - Natural Revegetation of Peat Soils on Eareckson Air Station, Shemya Island, Alaska - A Qualitative Study of a Natural Process. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 21 pp.

Wright, S. J. 1997. Revegetation in Alaska: Where We Have Been and Where We Are Heading *in* ISCORD 1997 Proceedings of the International Symposium on Cold Region Development, American Society of Civil Engineers. New York. 4 pp.

Wright, S. J. 1997. Erosion Control and Reclamation on Coastal Sand Areas on the Aleutian Islands of Alaska *in* ISCORD 1997 Proceedings of the International Symposium on Cold Region Development, American Society of Civil Engineers. New York. 4 pp.

Wright, S. J. 1997. Advances in Native Species Production and Technology in Alaska *in* Abstracts of the 1997 Annual Meeting of the American Society of Agronomy. Anaheim, California. 1 pp.

Wright, S. J., Grooms, D. C. and D. D. Steeby. 1997. Restoration of a Coastal Wetland Following the Rebuilding of a Transmission Line From Girdwood to Ingram Creek in Southcentral Alaska *in* ISCORD 1997 Proceedings of the International Symposium on Cold Region Development, American Society of Civil Engineers. New York. 4 pp.

Wright, S. J. 1998. Initial Report 1998 Falkland Islands Germplasm Exploration Project. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 153 pp.

Wright, S. J. 1998. 1998 Falkland Islands Germplasm Exploration Project Final Report. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 169 pp.

Wright, S. J. 1998. Results of a Ten-Year Study of Beach Wildrye Establishment and Sand Control on the Eareckson AFS Lateral Clear Zone-Shemya Island, Alaska *in* Abstracts of the 1998 American Society of Agronomy Annual Meeting. Baltimore, Maryland. 1 pp.

Wright, S. J., R. Hannan, and H. Shands. 1998. The Arctic Germplasm Repository - a New Link in the Circumpolar Network *in* Abstracts of the 1998 American Society of Agronomy Annual Meeting. Baltimore, Maryland. 1 pp.

Wright, S. J. 1998. Final Report - Interior Native Seed Collection Project. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 19 pp + appendix.

Wright, S. J. 1999. Final Report – Landfill Restoration on Adak Island. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 21 pp + appendices.

Wright, S. J. 1999. Aleutian Germplasm Collection and Preservation Project 1996 – 1999. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 12 pp.

Wright, S. J. 2000. South Georgia Island/Falkland Islands Germplasm Exploration Project 2000. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 57 pp.

Wright, S. J. 2000. Final Report: Mile Post 22 Revegetation Study. State of Alaska, Division of Agriculture, Plant Materials Center, Palmer, Alaska. 24 pp.

Wright, S. J. 2001. Initial Results in the Phenotypic Comparisons of Tussac Grass, *Poa flabellata*, Germplasm from the Falkland Islands and South Georgia Island. Proceedings: Circumpolar Agriculture Conference, Akureyri, Iceland (Abstract).

Wright, S. J. 2001. Native Plant Collections Ready for Commercial Production in Alaska. Proceedings: Circumpolar Agriculture Conference, Akureyri, Iceland (Abstract).

Wright, S. J. 2002. Tussac Grass, a Unique Southern Hemisphere Genetic Resource Worthy of Additional Research. Proceedings: American Society of Agronomy 2002 Annual Meeting. Indianapolis, Indiana.

PRESENTATIONS DURING 2004

Campbell, W.L. Potato Production in Alaska New Brunswick Potato Conference and Trade Show Perth-Andover N.B. Canada February 4-5 2004

Campbell, W.L. Potato Certification in the U.S. New Brunswick Potato Conference and Trade Show Perth-Andover N.B. Canada February 4-5 2004

Campbell, W.L. Potato Growing in Alaska. Matanuska Garden Club, Wasilla AK March 2, 2004

Campbell, W.L. Bill's Adventures in Potato Land Alaska Potato Conference Wasilla AK March 9 2004

Campbell, W.L.* P. Geraedts Potatoes in the Kyrzyg Republic Potato Association of America annual meeting, Scottsbluff NB August 8-12,2004

APPENDIX D

ACKNOWLEDGEMENTS

ACKNOWLEDGEMENTS

This annual report is composed of activities undertaken by the Plant Materials Center. Private industry, individuals and government agencies often assisted in these activities. The implementation of these activities would have been impossible without the cooperation and contribution of many individuals.

A special thank you is extended to Tom Klebesadel, PMC Farm Foreman, and the seasonal staff. The work of the PMC could not be accomplished without their support.

There are many people other than the industry and government agencies mentioned in the text, who the authors wish to thank for their assistance. They include:

Alaska Dept of Natural Resources
Division of Mining, Land and Water
Alaska Dept of Fish and Game
Division of Habitat and Restoration, Anchorage
Alaska Dept of Transportation/PF, Anchorage
Alaska Dept of Transportation/PF, Juneau
Alaska Seed Growers, Inc.
Dr. G. Allan Mitchell
Pyrah's Pioneer Peak Farm
Juneau Community Garden
Warren Smith
University of Alaska Fairbanks Agriculture & Forestry Experiment Station
(UAF AFES)
UAF AFES Matanuska Farm Staff
UAF Alaska Cooperative Extension
U. S. Forest Service, State & Private Forestry
U. S. Dept. of Agriculture, Agricultural Research Service
U. S. Dept. of Agriculture, Natural Resources Conservation Service