2015 Annual Report

Alaska Department of Natural Resources - Division of Agriculture

Plant Materials Center

Plant Materials Center Mission:

"Serving Alaska's needs in the production of native plants and traditional crops."

ALASKA
PLANT MATERIALS CENTER
STATE OF ALASKA · DEPARTMENT OF NATURAL RESOURCES · DIVISION OF AGRICULTURE

www.plants.alaska.gov

The Plant Materials Center

The 405 acre Plant Materials Center (PMC) near Palmer, Alaska was established by the State Legislature in 1972 to promote the State's agricultural industry in accordance with Alaska Statute 03.22.10. The PMC's core services are to:

- Develop seed and plant materials suitable for Alaska growers
- Provide recommendations for erosion control, seed production, and revegetation throughout Alaska
- Act as the repository for Alaska developed crops and varieties
- Maintain the State's certified seed laboratory for commercial and regulatory seed quality testing
- Maintain and produce an adequate number of varieties of seed potatoes for seed growers
- Provide information and recommendations on invasive plant and agricultural pest management

Introduction

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Overview

FY 2015-2016 Enacted Operating Budget

Fiscal Year 2015 Operating Budget: $2,631.0 M

General Fund	$2,075.8
Federal Receipts	$372.4
CIP Receipts	$72.1
Interagency Receipts	$68.1
State Designated Receipts	$26.0
Program Receipts	$16.6

Fiscal Year 2016 Operating Budget: $2,365.5 M

General Fund	$1,932.4
Federal Receipts	$322.4
CIP Receipts	$0.0
Interagency Receipts	$68.1
State Designated Receipts	$26.0
Program Receipts	$16.6

Operating budget figures are provided here for the state fiscal years 2015 and 2016.
Other figures and activity described within this report cover the calendar year 2015.
Monthly General Fund Expenditures can be found in the appendix on page 43.

Features

405 acre production farm
150 acres active production
9,000 ft^2 greenhouse production space
3,000 ft^2 seed storage facility

Nationally certified seed laboratory
Soils analysis laboratory
In-vitro potato production laboratory
Commercial seed cleaning facility

Programs

Foundation Seed Production and Sales
Horticulture Evaluation
Invasive Plant and Agricultural Pest Management
Plant Pathology Laboratory
Potato Production and Disease Monitoring
Revegetation
Seed Cleaning and Conditioning
Seed Laboratory
Soil Conservation

2015 Program Revenue*

Seed Cleaning	$27,188
Potato Sales	$11,595
Seed Sales	$8,726
Seed Lab Testing	$3,206
Certification	$1,496

** Figures above denote 2015 calendar year.*

Staff: 13 Full-time, 8 Seasonal

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History

With support from the University of Alaska, conservation groups, and farmers, Governor Bill Egan signed into law a bill creating the Alaska Plant Materials Center (PMC) in 1972. This legislation directed the PMC to fulfill traditional agricultural responsibilities including providing technical reclamation assistance and developing plant varieties and techniques for revegetation and erosion control industries. Since then the PMC has seen over 40 years of agricultural program growth in the areas of foundation seed production, horticultural crop development, improvement in erosion control technology, disease-free potato seed production, Arctic Genetic Resource collection and maintenance, certified seed analysis services, and statewide invasive plant and agricultural pest monitoring and management. These programs are centered on the 405 acre facility just outside of Palmer. Additionally, countless off-site trials, plantings, and observations have been made across the state in both traditional agricultural centers and remote locations.

Since the founding legislation, state and federal funds have supported the development of a 3,000 ft^2 seed storage facility (2001), a nationally certified seed analysis laboratory (2003), an expanded administrative office with conference space (2004), a 3,500 ft^2 equipment maintenance building (2005), and both large and small-scale seed cleaning and conditioning facilities. This development has allowed the PMC to continue to support the agriculture industry with applied, Alaska-based information, technology, and services for over 40 years.

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Program Reports

Foundation Seed Production & Sales

In accordance with the PMC's mission, the Foundation Seed Production program provides seed to producers for cultivar seed production. Certification assures that plants have been properly handled and meet the high standards of pedigree retention, varietal purity, and viability; and that they are free of weeds, diseases, and physical damage.

2015 Forb, Grass, and Grain Harvest

2015 — Ongoing

Objective:

The Foundation Seed Production and Sales goal is to produce high-quality seed that is well-suited to Alaska's climate and soils, will produce economic benefits, and make this seed available to commercial growers. There are four types of Certified Seed classes:

- ***Breeder Seed:*** Seed or vegetative material directly controlled by the originating plant breeder, institution, or supplier of the source plants used for the initial and recurring increase of foundation seed.
- ***Foundation Seed:*** Seed that is the progeny of breeder seed. Production is carefully supervised to maintain specific genetic and physical purity. Foundation seed is available for purchase from the PMC's seasonal seed sale.
- ***Registered Seed:*** Registered seed is the progeny of foundation seed and must be managed appropriately to maintain satisfactory genetic and physical purity.
- ***Certified Seed:*** Certified seed is the progeny of foundation or registered seed, which has the genetic and physical purity required for certification.

Funded by:

State of Alaska

Details:

The PMC planted, cultivated, rogued, and harvested 29 different crops of forbs, grasses, and grains on the production fields during the 2015 growing season.

Results:

Crops harvested in 2015 are listed in **Table 1** (next page).

Foundation Seed Production & Sales

Table 1. Foundationseed crops harvested in 2015.

Forbs	Grasses
Knik Iris	'Arctared' Fescue
Kobuk Dwarf Fireweed	'Benson' Beach Wildrye
Kotzebue Arctic Wild Chamomile	'Egan' American Sloughgrass
Twenty Mile Yarrow	Engmo Timothy
	Henderson Ridge Red fescue
	'Kenai' Polargrass
Grains	Nelchina Spike Trisetum
'Bebral' Winter Rye	'Norcoast' Bering Hairgrass
'Nip' Oats	'Nortran' Tufted Hairgrass
'Weal' Barley	'Nugget' Kentucky Bluegrass
'Egan' Barley	'Polar' Brome
'Ceal' Oats	'Service' Big Bluegrass
'Toral' Oats	'Sourdough' Bluejoint Reedgrass
'Lidal' Barley	'Wainwright' Slender Wheatgrass

Future Plans:

Foundation production fields will continually be regenerated and harvested to maintain genetic purity and seed production vigor. During the 2016 production season, all foundation level oats will be planted for regeneration and additional seed increase.

Knik iris in full bloom.

Foundation Seed Production & Sales

Seasonal Seed Sale

April 2015 — September 2015

Objective:

To provide a foundation seed source to the general public, research and educational facilities, and large scale growers. Foundation seed is seed that is genetically close to the original variety/cultivar that meets or exceeds the demands of an Alaskan climate.

Funded by:

State of Alaska

Details:

The PMC maintains foundation seed production fields on-site and follows strict requirement guidelines to ensure quality seed. These guidelines include:

- Weed eradication in the field
- Maintaining an appropriate distance between varieties/cultivars to avoid cross-pollination
- Each plant producing an ideal amount of seed
- Overwintering ability
- Competition survival rate
- Ornamental value
- Hardiness
- Flowering consistency
- Ability to meet production demands
- Development and establishment of a strong root system

Once these plants are harvested and processed they are available for growers to purchase as 'Foundation' level seed. These growers then increase the seed amounts by growing them in their own fields. From that crop they have the option to have their seed 'Certified.'

Results:

- **Research Seed Distributions:** Seed from the PMC was distributed to several organizations for research, field trials, and educational purposes.
- **Foundation Seed Sale:** Eight grain lots, three forb seed lots, and 10 grass seed lots were listed for sale. Results of that sale are shown in **Table 2** below.

Table 2. Foundation seed sold in 2015.

Foundation Grain	Grain Weight	Foundation Grass	Grass Weight
'Beberal' Rye	1,080 lbs.	'Nortran' Hairgrass	502 lbs.
'Thual' Barley	700 lbs.	'Kenai' Polargrass'	13.7 lbs.
'Nip' Oats	50 lbs.	'Egan' American Sloughgrass	15 lbs.
'Lidal' Barley	250 lbs.	'Sourdough' Bluejoint Reedgrass	3.5 lbs.
		'Arctared' Red Fescue	2 lbs.
		'Gruening' Alpine Bluegrass	2.22 lbs.
	Total: 2,080 lbs.		**Total 538.42 lbs.**

Future Plans:

Continue holding a seed sale throughout the growing season.

Horticulture Evaluation

The Horticulture Evaluation program was established at the PMC in 2012 to develop new techniques and varieties for commercial plant production of horticultural crops in Alaska. These techniques for producing fruits, cut flowers, vegetables, and ornamental crops will be of value to commercial plant producers and end users in Alaska. The evaluation of pesticides and their use for commercial production is also conducted.

Apple Rootstock Trial

July 2013 — Ongoing

Objective:

To evaluate apple rootstock varieties and production techniques for performance in Alaska's climates.

Funded by:

State of Alaska;
Alaska Pioneer Fruit Growers Association

Details:

The apple rootstock trial is a collaborative project of the PMC and the Alaska Pioneer Fruit Growers Association (APFGA). The APFGA provided fencing for a one acre plot to protect the rootstock selections from moose damage. Every year new rootstocks are planted for evaluation. After each winter, selections are made for specimens that will be continued in the trial.

Results:

This trial was a three year agreement with the APFGA and has been extended by both parties. Every winter we have experienced severe die-off. This could be because apples are not self-compatible. Seedling rootstocks have varying phenology from their parentage. Currently, the PMC is collecting seed from *Malus* spp. throughout the state to incorporate into the trial.

During 2013, the PMC planted 338 *Malus x ranetka* seedling rootstocks into #2 nursery pots. The PMC also planted 620 *Malus x ranetk*a seedling rootstocks and 273 *Malus baccata* seedling rootstocks within the fenced perimeter. All of the seedling rootstocks were two year old material acquired from Lawyer Nursery. After the first winter, there were 20 *M. x ranetka* to survive in the field and all of the potted rootstocks died. There were also 14 *M. baccata* rootstocks that survived. That was a combined survival rate of 2.76%. These surviving rootstocks were transplanted in rows with six feet between rows and four feet between plants.

During 2014, 1,351 two year old, *M. x ranetka* seedling rootstocks and 452 two year old, *M. baccata* seedling rootstocks from Lawyer Nursery were planted within the fenced area. The APFGA supplied 10 Budagovsky 118 (BUD 118) clonal rootstocks which were also planted. The PMC germinated *M. x ranetka* seed and transplanted the seedlings into containers in the greenhouse. There were 44 specimens that were then transplanted into the fenced enclosure once they were hardened off.

During the spring of 2015, all of the specimens from the 2013 and 2014 plantings were assessed for new growth. All of the *M. baccatta* rootstocks planted in 2013 survived the winter of 2014. Only five of the remaining 20 *M. x ranetka* rootstocks from 2013 had survived. That was an overall survival rate of 55.9% during the winter of 2014, and a 1.5% survival rate of the original 2013 planting.

Seven BUD 118 clonal rootstocks, six *M. x ranetka* rootstocks, and 54 *M. baccata* rootstocks survived the 2014 winter from that year's planting. The overall survival rate of the 2014 planting was 3.61%.

The PMC germinated the seedlings for the 2015 planting from seeds collected locally and from seed purchased from a supplier. There were five *Malus* spp. collections with a total of 435 rootstocks planted. Seedlings from two local *M. baccata* trees totalling 131 were planted. There were 316 seedlings of *M. x ranetka* and 389 seedlings of *M. pumila* 'Borowinka' that were planted. These two latter seeds were acquired from Sheffield's Seed Company. These seeds will be cleaned and stored for germination in 2016.

Future Plans:

Every year new collections will be incorporated into the trial, including specimens grown from collected seed and nursery stock. As hardy selections are made, techniques in micropropagation will be used to produce clonal rootstocks that are winter-hardy. A progress report will be uploaded to http://www.plants.alaska.gov/pdf/2015AppleTrial.pdf once completed.

Asparagus Specialty Crop Evaluation Trial

June 2014 — March 2016

Objective:

Asparagus is a high-value specialty crop that could be valuable to market growers in Alaska. This project is to determine varieties that can survive in Alaska's climate and remain marketable.

Funded by:

Federal: US Department of Agriculture (USDA);
and State of Alaska

Details:

The project is evaluating 13 hybrid and one open-pollinated variety that are currently available. Asparagus is a crop that does not reach maturity for three years and has the potential to be marketable for 10-15 years. The evaluation trials have three sites in three different regions of Alaska; the PMC, Nikiski, and North Pole.

Results:

The plot at the PMC experienced a severe first winter. Only one variety, Jersey Gem, survived the first winter with nine out of 40 crowns surviving. This winter kill was due to insufficient planting depth and no snow cover for insulation. We experienced soil temperatures of negative six degrees Fahrenheit, at six inches deep, with a low air temperature of negative 19.5 degrees Fahrenheit. Jersey Gem was the only variety that was started from seed at the PMC. All of the other varieties planted in 2014 were one year old crowns obtained from sources in the lower 48 states. Another study assessing the winter survivability of seedling transplants versus the planting of one year old crowns might be a future research option.

The Nikiski plot also had a low amount of snow cover throughout the winter. The survival rates there were better than those at the PMC. Low soil temperatures in Nikiski were 19 degrees Fahrenheit at 6 inches deep. The low air temperature was negative 6.7 degrees Fahrenheit.

At the North Pole plot, the snow cover was sufficient to provide ground insulation throughout winter. The

low soil temperature at 6 inches deep was 21.5 degrees Fahrenheit and the low air temperature was minus 50.5 degrees Fahrenheit. Both off-site locations had several varieties with survival rates greater than 70%; These varieties were Jersey Gem, Jersey Giant, Del Monte 361, Mondeo and NJ 1122.

Three varieties with survivability over 70% were determined at both off-site locations. These are Jersey Gem - 96%, Del Monte 361 - 86% and Jersey Giant - 73%. The two latter varieties will reach harvest maturity in the spring of 2016. Jersey Gem will not be harvested until the spring of 2017.

Future Plans:

During the spring of 2016, the surviving plants will be assessed for harvesting and monitored throughout their third growing season. A final report will be published in 2016 and will be uploaded to http://www.plants.alaska.gov/pdf/2015Asparagus.pdf once completed.

Broccoli Trial

April 2015 — July 2015

Objective:

The broccoli trial was conducted to study and determine varieties that will grow with vigor and produce well in Alaska's climate.

Funded by:

State of Alaska

Details:

During the summer of 2015, a demonstration trial for broccoli cultivars and varieties was repeated from 2014 in order to compare the results of the two growing seasons. Nine hybrid cultivars and one open-pollinated variety were planted into a randomized block design with four replications in double row raised beds, 16 feet long, with 18 inches between beds, and 18 inches between rows. The plants were spaced 8 inches within the row. The trial was conducted to evaluate quality, production, and maturity.

Results:

The 2015 growing season began with unseasonably warm temperatures for Southcentral Alaska. The second week of June experienced a high of 86.8° F with an average max temperature of 78° F. During the 2014 growing season the highest temperature of 81.2° F was recorded in the first week of July much later in the growing season. The earlier varieties; Blue Wind, Bonanza, Waltham #29, Packman and Green King did not perform as well as the previous growing season. These varieties did not produce terminal heads of adequate sizes and most bolted early due to the warmer temperatures. The later varieties; Green Magic, Arcadia, Belstar, and Diplomat were not affected by the warmer temperatures and began producing sizeable terminal heads. Once these varieties reached a measurable size, moose consumed the terminal heads. After several days of feeding on the terminal heads, the plot was longer valuable for data collection. A final report will be uploaded to http://www.plants.alaska.gov/pdf/2015BroccoliTrial.pdf once completed.

Future Plans:

The trial will be conducted again in 2016. The plot will be relocated to a protected, fenced area.

Horticulture Evaluation

Caneberry Variety Demonstration Trial

June 2014 — Ongoing

Objective:

To evaluate caneberry varieties and determine production techniques for successful performance and growth in Alaska.

Funded by:

State of Alaska

Details:

During the summer of 2014, a demonstration plot for caneberries was established at the PMC. Nine varieties of raspberries and blackberries were planted in a trellis system to evaluate survival, flowering, and fruiting. The varieties consisted of several fall and summer bearing raspberries and several fall bearing blackberries. The fall bearing raspberries planted were Autumn Britten, Heritage, Polana, and Joan J. The fall bearing blackberries were Prime Ark®, Prime Jan, and Prime Jim. The summer bearing varieties of raspberries were Boyne, Cascade Delight, Nova, Latham, and SK Red Mammoth. Varieties that have not been trialed in Alaska are being compared to those that are known to perform well in Alaska. Cascade Delight and Autumn Britten were bare root plantings spread throughout the row while the others were bare root canes or rooted cuttings.

Results:

Because there was no snow cover for the first winter, caneberries of the fall bearing raspberry and blackberry varieties died off. Several of the summer bearing raspberries experienced some winter-kill as expected. Cascade delight developed 16 surviving plantings, Nova had 10 surviving rootstocks, and 16 of the Latham rootstocks survived. Two of the summer bearing raspberries survived the winter and performed well displaying fruit production and new cane growth. Boyne had 24 rootstocks and all of the 25 SK Red Mammoth survived the first winter. Flowering times and fruit production will be observed during the 2016 growing season.

Future Plans:

Several new varieties will be introduced in the coming year to compare to those that have survived to date. A progress report will be uploaded to http://www.plants.alaska.gov/pdf/2015Caneberry.pdf once completed.

Cauliflower Specialty Crop Trial

July 2014 — Ongoing

Objective:

This new trial will evaluate and determine what varieties can tolerate Alaska's environment and short growing season.

Funded by:

Federal: USDA and State of Alaska

Details:

During the summer of 2015, an observational demonstration trial was conducted throughout the state

with 18 growers participating in varying locations. The PMC selected 35 available cultivars/varieties of cauliflower. These seeds were sent to participating growers to start their own plants and collect data throughout the growing season. The participants were given enough seed for at least five plants per variety and allowed to choose how many varieties they would trial. Each location ranged from one variety to all 35 varieties being grown. This project introduced growers to new varieties, as well as older varieties they may not have tried.

The PMC trialed all 35 varieties in a random block design. The transplants were planted in double row raised beds, 10 feet long, with 18 inches between beds, and 18 inches between rows. The plants were spaced 12 inches within the row.

Results:

The 2015 growing season began with unseasonably warm temperatures for Southcentral Alaska. The second week of June experienced a high of 86.8° F with an average max temperature of 78° F. One variety, Celeritas, produced a terminal early and began to bolt. All of the other varieties began producing terminal heads later during the growing season but were found by moose. The moose fed on the cauliflower for several days rendering the crop invaluable for data collection. There have been mixed results from the other growers that participated. Data is still being compiled from the off-site growers.

Future Plans:

The trial will be conducted again in 2016. A more controlled method of research will be used with participating growers to obtain valuable data. The plot at the PMC will be relocated to a protected, fenced area. A progress report will be available once all of the data has been compiled and will be located at http://www.plants.alaska.gov/pdf/2015Cauliflower.pdf.

PMC Greenhouses.

Invasive Plant and Agricultural Pest Management

The Invasive Plant program coordinates prevention, outreach, and management strategies for invasive plant issues through collaboration with land managers, agencies, organizations, and policy makers across Alaska. These efforts are guided by the implementation of its Strategic Plan and relevant noxious weed regulations and policies. The goal is to help keep Alaska's pristine landscapes and natural resources free from the impacts of noxious and invasive plants.

Canada Thistle Management

2008 — 2016

Objective:

Effectively manage Canada thistle in Anchorage and treat it to background levels.

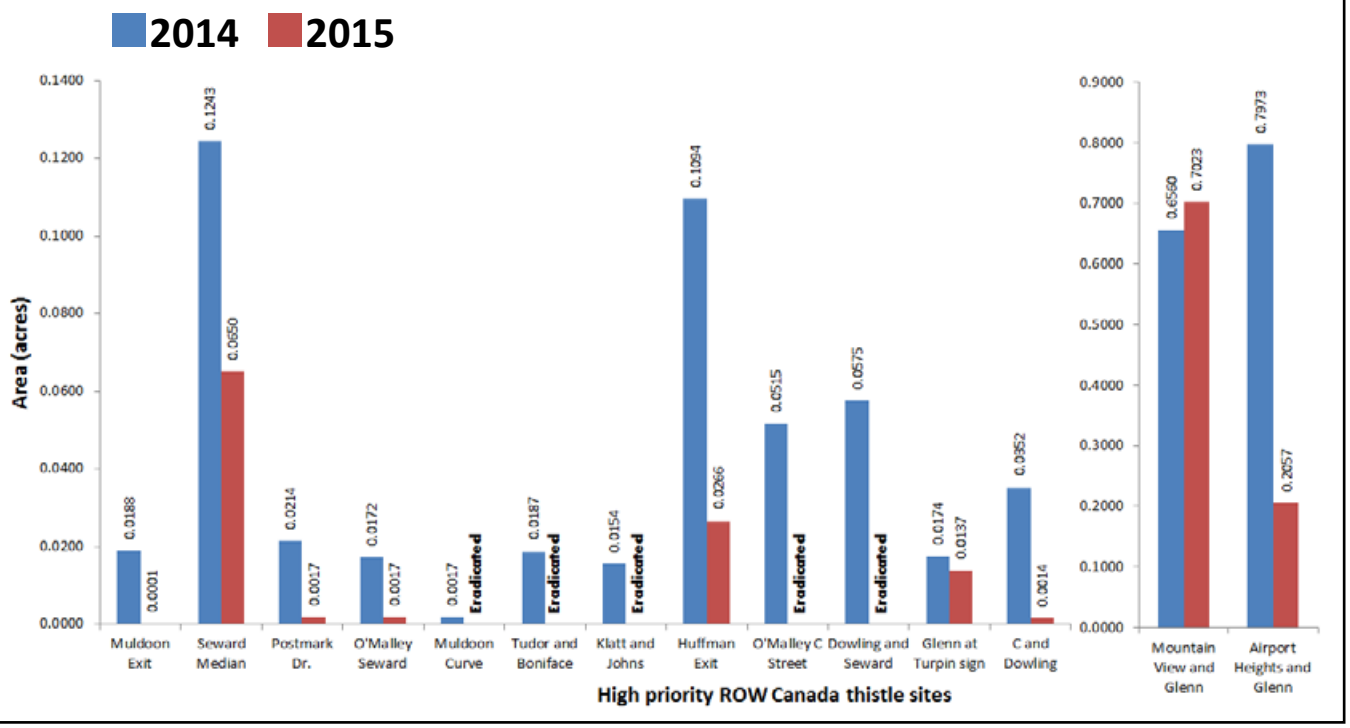
Funded by:

Federal: US Forest Service (USFS), US Fish and Wildlife Service (USFWS); State of Alaska

Details:

Since 2007, the Alaska Natural Heritage Program's Exotic Plant Information Clearinghouse has documented over 300 records of the noxious plant Canada thistle in the Anchorage area. To date, it is unknown how many of these records are still infested due existing records requiring updates. Since 2009, Canada thistle has been mechanically and manually managed to prevent the dispersal of seeds. However, because Canada thistle spreads through rhizomes, this management has not been effective in having site-specific eradication. During 2014, PMC staff chemically managed Canada thistle for the first time using products with the active ingredients aminopyralid, triclopyr, and glyphosate. During the 2015 field season, PMC staff recorded results of effective management on high priority sites, and treated nine sites in 2015 (**Figure 1**). PMC staff collaborated with the Alaska Department of Transportation (DOT) Integrated Vegetation Management Plan environmental staff, and Alaska Department of Environmental Conservation (DEC) to complete this project.

Figure 1. Changes in Canada thistle acreage after 2014 herbicide treatment.



The Canada thistle project's goal is to contain and prevent this noxious plant from becoming an agricultural problem in Alaska, concentrating efforts in Anchorage to protect the Matanuska-Susitna Valley, and to effectively manage high priority infestations to prevent invasion in natural areas. PMC staff collaborated with the Kodiak Soil and Water Conservation District to distribute grant funds to aid in the treatment of Canada thistle infestations within their jurisdictions outside of Anchorage.

Results:

During 2014, a total of 15 high priority infestations were chemically managed in state-owned right-of-ways. One site was treated with triclopyr, four sites were treated with glyphosate, and 10 sites were treated with aminopyralid. Of these 15 total sites, only 10 of them had Canada thistle present in 2015; Five high priority right-of-way sites met the goal of eradication. Of the remaining 10 sites, eight sites were reduced in area coverage from 21% - 99%, and stem count densities were reduced significantly. The remaining two sites had the same in stem count densities, but were reduced in area coverage up to 48%.

Because of the effectiveness of aminopyralid resulting in eradication of five Canada thistle sites, nine sites utilized aminopyralid applied with a backpack sprayer. A total of ~one acre of Canada thistle was treated in the Anchorage area in 2015, and four sites were mechanically or manually managed to prevent the spread of seed in an area where we didn't have permission to apply herbicide. In Kodiak, two sites were chemically managed, and several more surveys were completed in new areas.

Future Plans:

Plans for 2016 include continued monitoring of chemically managed high priority sites to ensure eradication and managing the Canada thistle infestations that need follow-up herbicide treatments. In 2016, PMC staff will follow-up on half of the Alaska Natural Heritage Program's Exotic Plant Information Clearinghouse's records to determine if and how much Canada thistle is present, and record its location to determine the management jurisdiction. Additional surveys in the Matanuska-Susitna Valley will also be conducted to understand the extent of Canada thistle in a agricultural areas. Finally, outreach and education will continue as an integral part of finding new infestations.

Anchorage Elodea Eradication

2015 — 2017

Objective:

To eradicate the invasive submersed aquatic invasive plant elodea from local lakes to prevent it from spreading throughout the state and causing economic and environmental harm.

Funded by:

Federal: USFWS

Details:

Elodea, Alaska's first submersed aquatic invasive plant, was first discovered in Chena Slough in Fairbanks in 2010, sounding the alarm to the rest of Alaska to understand the spatial distribution of this invasion. During 2011, elodea was discovered in three Anchorage lakes: DeLong, Little Campbell, and Sand. By 2013, DNR founded the Anchorage Elodea Eradication project to effectively manage it with the use of herbicides, and stopping the spread by making it unlawful to sell, transport, or distribute into or throughout the state. The USFWS provided funds to Citizens Against Noxious Weeds Invading the North (CANWIN) to

support the Elodea Eradication project. In preparation for the 2015 herbicide applications in the three lakes, PMC staff obtained an Alaska Department of Conservation Pesticide Use Permit for applications in aquatic sites, wrote an USFWS approved Environmental Assessment guided by the National Environmental Policy Act (NEPA) process, and held a public meeting to discuss the eradication plan.

During the 2014 growing season, PMC staff along with USFWS, Alaska Department of Fish and Game (ADF&G), and Anchorage Park Foundation representatives, a systematic survey of elodea and other native vegetation in DeLong, Little Campbell, and Sand lakes was completed. Elodea was found in 62% of the sample points in DeLong Lake, 90% in Little Campbell, and 82% in Sand Lake. Because elodea was found in great amounts throughout the lakes, the entire waterbody was treated. Fluridone, a systemic herbicide, was chosen for the treatments because of its ability to target elodea at low concentrations (~8ppb), and have relatively minimal effects on non-targeted species, including native plants. Fluridone does not impact mammals, birds, or fish; instead it inhibits a plant's ability to create chlorophyll resulting in plant die-off. When used as directed it does not have any swimming, fishing, or drinking water restrictions.

Results:

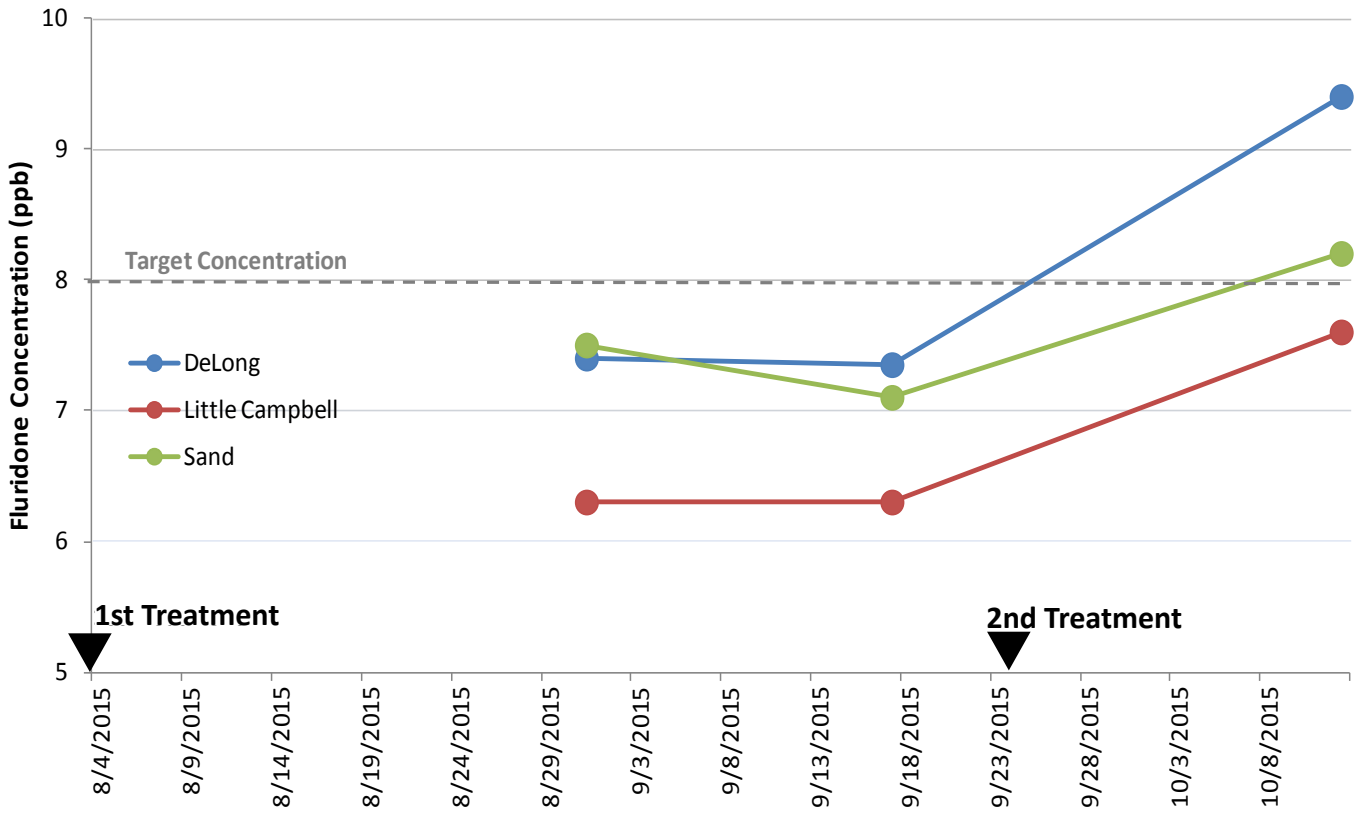
Fluridone was applied to DeLong, Little Campbell, and Sand lakes during the growing season of 2015; one liquid treatment on August 4 and two pelleted treatments on August 5 and September 24. Several weeks after the first application, Elodea displayed symptoms of chlorotic damage; lacking chlorophyll at the growth tips, looking pink and translucent (**Figure 2**). Biomass was not seen to be reduced during the 2015 field season because of fluridone's mode of action and the need for fluridone to stay in the water column for at least 90 days for desired effect. However, the concentration levels of fluridone in each of the infested lakes were monitored throughout the season and stayed within a target range of ~8 ppb. In DeLong Lake, concentrations of fluridone ranged from 7.1 to 9.5 ppb between August 31 and October 12 (**Figure 3 - next page**). Little Campbell concentrations ranged from 7.6 to 6.2 ppb. and Sand Lake concentrations ranged from 8.3 to 7.2 ppb.

Figure 2. Elodea showing signs of chlorotic damage.

Future Plans:

Fluridone applications will continue for at least two more years and concentrations and plant abundance will be measured for three years. The entire Anchorage area will continue to be monitored indefinitely once eradication is accomplished to prevent reinfestation. Public meetings and outreach will continue to be an integral part of this project throughout the duration of the project.

Figure 3. Anchorage elodea eradication project flouridone concentrations.



Lake Hood Rapid Response

2015 — 2017

Objective:

To eradicate the invasive submersed aquatic invasive plant elodea from Lake Hood, the world's busiest floatplane/seaplane base, to prevent it from spreading throughout the state and causing economic and environmental harm.

Funded by:

Lake Hood Airport Maintenance DOT

Details:

On June 10, 2015 elodea was discovered in Lake Hood by the National Parks Service. Evidence points to floatplanes as being vectors for the spread of elodea, requiring a rapid response. By the end of June, elodea's extent was surveyed in Lake Hood and a management plan was being drafted to use Diquat, a contact herbicide for the littoral area, and fluridone, a systemic herbicide as a whole-lake treatment. The Kenai Borough offered funds to purchase the first application of product before funding for the project was established between the Department of Transportation (DOT), managers of Lake Hood maintenance and operations, and the PMC. Plant Materials Center staff justified the need for an emergency exemption to the Department of Environmental Conservation's (DEC) Pesticide Use Permit to treat Lake Hood by

emphasizing:

1. Floatplane pilot safety risk - The excess vegetation was hindering controlled taxiing in landing and take-off areas.
2. Environmental harm - If elodea is left unmanaged in Lake Hood, it could be transported to remote areas where resident fish habitat could irreversibly be altered to favor invasive vegetation.
3. Economic harm - If elodea does become established it could economically affect recreation (i.e. boating, fishing, swimming), and waterfront property values.

The Emergency Exemption was approved by the DEC, and other permits were acquired by the PMC before the first application of diquat on July 24, 2015. A follow-up application of fluridone was applied on September 22 and 23.

Results:

Diquat was applied to the 100 foot buffer perimeter of the Lake Hood shoreline. Within 3-4 days, elodea was showing symptoms of herbicidal action; yellowing in color and losing turgor pressure, making the plant less erect in the water column. After seven days of the diquat application, elodea and other native vegetation was turning brown, and biomass was rapidly being reduced. As a result, Lake Hood's vegetation harvester equipment was able to remove the dead biomass and ensure the safety of pilots. Native vegetation was observed growing back in mid-October because Diquat does not kill plants, rather it reduces the above ground biomass.

Fluridone was applied as a whole lake treatment to Lake Hood. Fluridone, a systemic herbicide, was chosen for the treatments because of its ability to target elodea at low concentrations (~8ppb), and have relatively minimal effects on non-targeted species, including native plants. The fluridone was applied to eradicate elodea preventing its spread to remote Alaska. Fluridone concentrations are targeted to be ~8 ppb. After two weeks of the initial treatment, concentrations average 8.3 ppb.

Future Plans:

The PMC and Lake Hood DOT managers are currently determining an integrated management strategy that will include the eradication of elodea, native vegetation management for pilot safety, and public awareness with educational outreach. To reach elodea eradication, fluridone will be applied to Lake Hood until 2017, while concentrations will be maintained at ~8 ppb through monitoring and timing of applications. Diquat will be utilized when needed to maintain a safe flight operational environment; after the lake harvester equipment is deemed ineffective for the volume of vegetation. Environmental parameters will continue to be monitored by DOT staff to ensure water quality is being maintained to an acceptable standard. Additionally, communications between the Lake Hood User's Group, the Lake Hood Pilots Association, and the Lake Hood Airman's club will continue to be open and transparent in actions for integrated vegetation management.

Plant Pathology Laboratory

The Plant Pathology Laboratory at the PMC provides diagnostic services and disease management support to the PMC and the Division of Agriculture. Observed disease resistance and implemented management techniques are recorded throughout the variety trials for future reference.

General Plant Pathology

January 2015 — Ongoing

Objective:

Diagnosis, documentation, and management of plant diseases in agronomic and horticultural crops, including those grown at the PMC and throughout the state.

Funded by:

Federal: USDA Cooperative Agriculture Pest Survey;
State of Alaska

Details:

Staff edited the disease chapter of the Alaska Cooperative Extension Service (CES) Master Gardener Manual and attended a high tunnel workshop on September 8 in Kenai, AK to support the increasing number of growers using high tunnels. Water, nutrients, pest management, and building structure and maintenance were the topics of discussion.

Growers and CES continue to submit fire blight simples (caused by *Erwinia amylovora*) in apples and related species. A Cooperative Agricultural Pest Survey (CAPS) project for tobacco rattle virus (TRV) in peony and its vector nematodes was completed. Samples were submitted by Division of Agriculture inspectors, growers, and CES personnel.

Thirty-two samples were received and diagnosed for crops, including: carrots, tomatoes, lettuce, cherries, peonies (non-TRV), lilacs, other fruits and vegetables, and insect larvae. Most samples were received as physical specimens. A small number were submitted and diagnosed from photographs. Diagnoses and management recommendations were made for all.

Results:

Six additional fire blight infections were confirmed in apples and saskatoons in the Fairbanks/ Delta Junction area, as well as several likely infections in Palmer and Big Lake by symptomology. Management and varietal resistant recommendations were given to growers. Ten peony samples were processed for TRV and five of them tested positive. Most samples were received from new growers. TRV-infected peonies throughout the Matanuska-Susitna Valley and the Fairbanks/ Delta Junction area have been documented for two years. Long-term effects of TRV are unclear but preliminary theories suggest the amount of energy the plant devotes to foliage, flower production, and winter storage is reduced. Over time these differences may be substantial to a perennial's performance.

Clubroot (**Figure 4**), caused by *Plasmodiophora brassicae,* was also confirmed in two fields in the Matanuska-Susitna Valley. Its presence in the area has been known since 2001. It has also been found in community gardens in Anchorage and Juneau. Spores spread easily in infested soil, irrigation water, and by wind. Clubroot is a difficult disease to manage because the resting spores can survive upwards of 20 years (or longer) in soil. Management recommendations were made to growers. The PMC is attempting to register

additional fungicides to aid in disease management.

Future Plans:

The lab will continue to diagnose samples and make management recommendations for all crops grown in the state. In addition to supporting growers with specific problems the division can better monitor, manage, and understand crop diseases in the state.

A list of fire blight susceptibility for apple and pear varieties commonly grown in Alaska is being compiled as a supplement to the 'Home Orchards' or 'Fruit Varieties' publications created by the CES.

Figure 4. Clubroot of broccoli.

Potato Disease Testing

January 2015 — Ongoing

Objective:

Provide disease diagnosis, management recommendations, and additional support as needed to potato growers.

Funded by:

State of Alaska

Details:

Field samples were collected by growers, inspection staff, Cooperative Extension Service (CES) agents, and PMC staff. Greenhouse and tissue culture samples were collected and tested at the PMC. The project helps the PMC produce disease-tested Generation Zero (GO) seed potatoes, as well as helping growers manage disease, improve yields, and improve quality. The lab also provides diagnostic support for field inspectors and CES personnel.

Tissue culture plantlets were tested for six viruses: Potato leafroll virus (PLRV), Potato virus A (PVA), Potato virus M (PVM), Potato virus S (PVS), Potato virus X (PVX), and Potato virus Y (PVY), as well as Potato spindle tuber viroid (PSTVd) and bacterial contamination. To bring us into compliance with the national harmonization plan, during the fall of 2015 we also began testing for Potato mop-top virus (PMTV) and Tobacco rattle virus (TRV). Potato plants in the PMC greenhouse were tested for PLRV, PVX, PVY, and bacteria.

Increased survey and testing for viruses began in 2013 and has revealed higher than expected amounts of virus infection in the state. In cooperation with inspection staff, virus testing was increased during 2015. Individual samples were taken when symptomatic plants were found; this gives indication of the presence or absence of virus in that field. Composite random samples were taken from selected variety/generation/field combinations to give approximate percentage infected. Potato plants from the PMC field and growers'

fields were tested for three viruses: PLRV, PVX, and PVY.

Many states perform post harvest grow-out testing of seed lots during the winter. Grow-outs give a measure of total infections, as well as information on late season infections (symptoms that developed or infections that occurred after the final field inspection). In addition, symptoms may express differently under different environmental conditions. Postharvest tests are often required for the export of seed potatoes to foreign markets. Division of Agriculture inspectors performed grow-outs in Hawaii on a "trial lot" to learn about the process and identify potential issues. Samples were tested for PLRV, PVX, and PVY.

Growers submitted tuber core samples for Bacterial ring rot (BRR) testing and many tuber samples were received for storage rots.

Results:

Four hundred and seventy-three tissue culture plantlets were tested earlier in the year for PLRV, PVA, PVM, PVS, PVX, PVY, PSTVd, and bacterial contamination. Most of the mother plants were lost during the summer, due to a growth chamber failure. During the fall of 2015 the clone bank was restarted. To bring us into compliance with the national harmonization plan, we also began testing for Potato mop-top virus (PMTV) and tobacco rattle virus (TRV). An additional 140 potential mother plants and 11 maintenance lines were tested at the increased standard. Tissue culture plantlets with bacterial contamination, or questionable ELISA absorbance values were discarded.

Greenhouse plants were tested for PLRV, PVX, and PVY; 188 composite samples were taken from 1% of a variety (or 10 plants, whichever was greater). All samples were negative for all viruses tested. Harvested tubers will be tested for soft rot bacteria and bacterial ring rot over the winter months.

Field sampling around the state yielded information on virus distributions. Samples were collected from 13 growers around the state, representing 63 variety/generation/field combinations. One hundred-two individual symptomatic samples were collected, with 24 PLRV+ and five PVX+. Two hundred-fifty composite leaf samples were taken from 1% of a variety (or 10 plants, whichever is greater), with 17 PLRV+ and 5 PVX+. Percent infections ranged from 0%-20% within a variety/generation/field, with a caveat that small sample sizes can skew data. PLRV was found in the Matanuska-Susitna Valley, as well as north of the Alaska Range. PVX was found in the Matanuska-Susitna Valley, but not north of the Alaska Range in this survey. PVY was not found in any of the samples submitted to the lab, though past work has shown the presence of both PVY-n and PVY-o/c strains in the state. Testing results as well as inspector's visual assessments were given to growers to aid in their management decisions. Please note that current Alaska seed certification standards are based on visual assessments of disease.

Lab testing of the 85 Hawaii grow-out composite leaf samples showed three PLRV+ (approximately 0.7%), and one PVX+ (approximately 0.2%).
Tuber core testing for bacterial ring rot was performed for three growers, who submitted 14 lots for testing. No infected lots were found.

A total of 39 other potato samples were received for *Phytophthora*, *Fusarium*, *Pythium,* and *Pseudomonas*

(soft rot) testing (**Figure 5)**. Many samples were infected with *Fusarium*, *Pythiu*m, and soft rot bacteria, no *Phytophthora* infections were found.

Figure 5. *Pseudomonas* sp. (one of many bacterium that can cause soft rot) under a UV light.

Future Plans:

Continue testing tissue culture plantlets to ensure the G0 seed produced at the PMC is of the highest quality.

Pathology staff has collaborated with the Division of Agriculture Inspections staff to apply for a grant through the Specialty Crop Grant program to continue virus surveys. If received, this will increase our understanding of virus levels around the state and determine the best methods to manage them.

Bacterial ring rot testing and general pathology services will continue to be offered to all growers. Testing helps staff to understand what issues are occurring statewide and how to address them.

The plant pathology laboratory at the PMC.

Potato Production and Disease Monitoring

The Potato program provides quality seed potatoes to commercial growers that are varietally pure and pathogen tested. Seed provided by the PMC is used as the initial stock for a multiple year certified seed production scheme.

2015 Potato Harvest

September 2015

Objective:

The Potato program supports the commercial potato industry by producing Generation Zero (G0), disease-tested potato seed and assists producers with disease monitoring and management recommendations.

Funded by:

State of Alaska

Details:

Potatoes are among the most valuable crops grown on Alaskan farms, creating a net value of over three million dollars annually. The potato can be afflicted by a wide range of pests and diseases, many of which are carried in or on the tubers used for seed. Diseases can cause significant losses, reducing both yields and quality. Seed potatoes free from disease are therefore required to assure successful yields and quality.

The PMC maintains a production system that serves as the starting point of Certified Seed Potato Production in Alaska. Virus-tested GO seed potatoes are produced at the PMC's lab and greenhouse and are made available to certified seed growers. These growers plant, harvest, and replant their Certified Seed crop across multiple seasons to increase their volume for sale into the commercial market. The PMC source of clean seed enables the certified grower to maintain vigorous and high quality seed lots by annually purchasing new seed and flushing out their older generations into the commercial market.

The importation of seed from outside the state or planting of non-certified seed has the potential to introduce pests and increase the risk of disease transmission to localized plantings. Growers wishing to try new varieties are encouraged to work with the PMC to obtain clean seed potato stock.

Results:

During 2015, 155 potato varieties were planted in the field at the PMC as a part of our clonal potato germplasm collection that has been maintained for over 30 years. These potatoes are used for varietal identification, virus and disease monitoring, and germplasm maintenance. During the vegetative stage all plants are examined for disease and virus symptoms and undergo testing if symptoms are present.

On September 17 the maintenance plots were harvested and a 25 pound bag of each variety was collected. Field grown seed represents a reservoir of tubers that can be evaluated for storage qualities, tuber description documentation, planting trials, and to re-initiate tissue culture production.

Remaining tubers from this planting were collected by volunteers and donated to local food banks, senior centers, My House, and the Mat-Su Women's Shelter. Over 900 lbs. of potatoes were donated.

In addition to the 155 maintenance plots, staff collaborated with potato breeders in Idaho, Oregon, Colorado, Wisconsin, and North Dakota to bring new varieties and new genetic crosses to Alaska to evaluate in a field trial. Growers were invited to participate in this evaluation process to help identify promising varieties and genetics for continued assessment. Thirty varieties newly available from breeding programs were planted in replicates of either 25 or 50 tubers, depending on minituber availability. Approximately 8,000 single-hills were planted from seedling tuber families, each representing a genetically unique true seed potato. In total, 80 varieties were retained for continued evaluation. Those varieties are list at: http://www.plants.alaska.gov/pdf/2015FieldPotatoEvaluation.pdf.

Thirty-seven varieties of G0 certified seed potatoes were harvested from the greenhouse as ordered by Alaskan potato growers. Over 1,000 lbs. of G0 seed potatoes were produced and will be provided to growers for the 2016 growing season. Eighteen new to Alaska varieties were grown for 2016 PMC field evaluations. The new material was selected based on grower interest in red and russet potatoes. Processing capabilities, as seen with the chipping varieties, was also a factor in selection. All material in the greenhouse was screened for six viruses of concern and inspected by certification staff.

Future Plans:

The PMC has been maintaining a clonal potato germplasm for 31 years and will continue to do so to ensure an ongoing source of suitable varieties for our Alaskan conditions. It will also continue the production of G0 seed based on orders from Alaska certified seed growers. The Potato program was placed on a One-Time Increment (OTI) funding by the legislature during 2015. The legislature will have to act to reinstate funding beyond June 2016.

Seed Potato Industry Support

July 2013 — September 2015

Objective:

During the 2013 legislative session approximately $300,000 was re-appropriated to the Division of Agriculture for the FY14-FY15 budget cycle for seed potato testing, promotion, and education for the purposes of strengthening the potato industry for potential export capacity.

Funded by:

State of Alaska

Details:

Clean seed stock is essential for the potato industry to explore exportation options to other countries. This funding was approved to strengthen the potato industry by providing a better understanding of diseases of concern for the Alaska potato industry (bacterial ring rot, potato virus X,Y, and potato leaf roll virus), implementing outreach programs that bring national expertise to the industry through presentations and participation at national meetings, providing training opportunities for inspection staff, and upgrading aging equipment and infrastructure at the PMC to align with national standards. This funding expired with the close of the 2015 fiscal year.

Potato Production and Disease Monitoring

Results:

Disease Scoping and Assessment

Funds were allocated to purchase a real-time polymerase chain reaction (PCR) system to facilitate the detection of disease-causing organisms in plants. This machine is capable of simultaneously testing for multiple organisms and has increased the PMC's ability to test for bacterial ring rot and other diseases of concern on seed entered for certification. Pathology staff was provided training at an existing laboratory that currently houses PCR systems for disease detection.

This project allowed an the increase in testing PMC potatoes and plantlets for potato leafroll virus (PLRV), potato virus A (PVA), potato virus M (PVM), potato virus S (PVS) potato virus X (PVX), potato virus Y (PVY), and potato spindle tuber viroid (PSTVd), and bacterial contamination. Additionally, growers' fields were tested for three viruses: PLRV, PVX, and PVY. Potato virus Y positive samples were strain-typed to determine strains present in the state and provide diagnostic support for field inspectors. Additionally, growers voluntarily submitted tuber core samples for bacterial ring rot (BRR) testing. Results of this testing were reported previously and can be found at:
http://www.plants.alaska.gov/pdf/2014_BRRSeedLotSourceTrial.pdf.

Bacterial Ring Rot Inoculation Research

This project allowed the Division of Agriculture to work in cooperation with the University of Alaska Experiment Station to inoculate potatoes with BRR for the purpose of conducting field examinations to better understand the systemic expressions of BRR in the field. Symptom development of BRR is often suppressed or delayed in cool, wet climates. Staff performed a variety trial with six of the most commonly grown varieties in Alaska: 'BakeKing', 'CalWhite', 'Cherry Red', 'Russet Norkotah', 'Shepody', and 'Yukon Gold'. Ten tubers of each variety were inoculated with *Clavibacter michiganensis* subsp. *sepedonicus*, the causal agent of BRR. This trial yielded very few symptomatic plants within the time frame in which inspections usually occur which demonstrates that visual symptoms are not reliable indicators for detecting BRR in Alaska. A full report can be found at: http://plants.alaska.gov/pdf/2014BRRReport.pdf.

Outreach and Education

The Division of Agriculture hosted a Potato Symposium in March of 2014 featuring national and international potato experts discussing disease and other issues facing export projects around the world. Dr. Stewart Gray from Cornell University, Dr. Phil Nolte from the University of Idaho, Dr. Rob Davidson from Colorado State University, Willem Schrage from North Dakota State Seed Potato Program, and Keith Esplin from the NEU Seed Cooperative presented and discussed Alaska's potato industry with over 30 potato producers and members of the public.

Participation in National Potato Board Meetings

The US Potato Expo convention represents the most comprehensive gathering of potato interests in North America. Industry leaders, growers, researchers, processors, marketing representatives, and policy makers all attend. The meeting presents current topics of concern for the potato industry as a whole. Specific market sectors are addressed in concurrent parallel sessions.

Funds facilitated the Division of Agriculture attendance and participation for the 2015 National Potato Board meeting during January. Experts discussed past attempts at seed potato exports and gave advice regarding

how Alaska could develop international export opportunities.

Training Opportunities for Field Inspectors

Field identification of disease symptoms requires extensive training. Previously, this training was offered in cooperation with the Associated Seed Growers, Inc. These funds allowed Division of Agriculture staff to travel to locations that host winter-grow out of potato crops and work with experts in the field for disease identification. This training was provided during 2014 and 2015 to certification inspection staff.

Upgrade to PMC greenhouse, production systems and storage units

Upgrades to aging equipment and infrastructure to align with national standards. These upgrades included:

- Insect proofing of G0 production greenhouse to eliminate virus pathways
- Upgraded environmental controls to improve efficiency in an aging production system
- Replaced cracked greenhouse roof panels
- Installed a humidification system in a storage building
- Re-purposed existing space to create a new storage facility. Improved temperature controls were installed to replace existing 30 year old units.

PMC staff collaborated with potato breeders in the lower 48 to bring new varieties or genetics to Alaska for evaluation. This material was planted during the spring of 2015 and was evaluated mid-September. Growers were invited to participate in the evaluation process to identify promising varieties (**Figure 6**) and genetics for future trials. Over 30 new lines or varieties were planted in 25 or 50 hill plots in the field, depending on minituber availability. Over 1,000 single-hills were planted for seedling tuber families. Evaluation criteria included displaying a pleasing size and shape and growing a good yield. Traits such as, russeted skin, or colorful specialty potential were also noted. In total, 80 varieties or families were retained for continued evaluation. This report can be found at http://www.plants.alaska.gov/pdf/2015FieldPotatoEvaluation.pdf.

Future Plans:

This one-time funding from the legislature expired on June 30, 2015.

Figure 6. Growers were invited to the PMC to evaluate new varieties of potatoes.

Revegetation

The Revegetation program at the PMC is involved in production, reclamation, research, and knowledge transfer. Program priorities include developing site specific revegetation approaches using baseline data collection to make recommendations on species selection, seeding mixtures, plant material options, field implementation, and monitoring. Program staff provide technical assistance with revegetation plan writing or on-site vegetation inventory, wild seed collection, and reference documentation for industry professionals, state and federal agencies, and private companies.

Revegetation/Native Brome Evaluations

August 2012 — Ongoing

Objective:

The purpose of the PMC native plant commercialization program is to research, locate, and collect candidate native plant species that have the potential for landscaping, erosion control, and revegetation purposes. Species that appear suitable or have apparent potential are wild-harvested from the field and brought back to the PMC to be processed, cleaned, and evaluated. Initial evaluations will rate vigor, uniformity/attractiveness, pests, overwintering survival, seed production, and adaptation. These ratings are based on a numerical scale. The selection process varies depending on the person's knowledge, judgment, and past experiences.

Funded by:

Federal: Natural Resource Conservation Service (NRCS)

Details:

From 2001-2004 the PMC acquired seed from five circumpolar regions (Iceland, Faroe Islands, Greenland, Norway, and Nunavut) with similar climate and latitude to Alaska. Hundreds of accessions with potentially high conservation values (revegetation, erosion control, etc.) were brought back to Alaska to be processed and cleaned. The collection was then reduced to the current 48 species that are undergoing evaluation.

During 2012 PMC staff, in cooperation with NRCS, travelled to communities in Southeast Alaska in search of two particular brome species; Alaska brome (*Bromus sitchensis*) and Fringed Brome (*Bromus ciliatus)*. Approximately 17 collections of Alaska brome were collected in four out of 11 communities. They are now undergoing an evaluation process for potential use in conservation efforts. Accessions were brought back to the PMC for cleaning and processing. Accessions were sowed and thinned into rootainers during April 2013 to establish seedlings. Field transplanting and irrigation began during August 2013 when seedlings were approximately two inches tall. Establishment was successful.

Results:

Field evaluation of species accessions and their individual plants began during the summer of 2014 and will continue through 2015 and 2016. Performance records are being recorded on individual plants within each accession. For example; POGL 3026 is the accession tundra bluegrass (*Poa glauca*) and it has 32 plants in that row. Seed is collected from every plant within that row and stored in seed envelopes as "uncleaned seed." This will ensure that we have seed stock available in the event of field failures or seed supply shortages. The 2015 season consisted of reducing each row to a manageable five plants. These top five plants are selected based on qualitative observations and not specifically recorded data. These plants will be used for an additional cycle of establishment and selection during the summer of 2016.

Future Plans:

During the summer of 2016 seed from the top five plants previously selected will be started as seedlings in a greenhouse and transplanted into randomized replicated fields for a second cycle of evaluation and selection. Seedlings will be planted in contrasting areas so that there will be much diversity and complexity to determine how the species will react to varying conditions. This second cycle of selection will also help to determine desirable traits. If plants show value and are reasonably uniform, they are placed into seed increase blocks for production of foundation seed.

A germplasm accession may potentially be shepherded through Pre-Variety Germplasm (PVG) categories on either genetic track (natural[1] or manipulated[2]) to achieve formal release. For most native plant accessions, however, germplasm evaluation and comparison are designed to facilitate native plant use in localized site revegetation rather than advancement toward formal release (Cultivar/Variety). In this context, a germplasm designation within any PVG category (Source identified, Selected class, or Tested class) is a legitimate end product. The PMC releases plant species primarily as Selected Class following the natural track designation.

A final report will be written in 2018. The end result is to have selected class foundation seed available for commercial growers.

Noatak Seed Harvest Project

November 2014 — Ongoing

Objective:

Teck Alaska, Inc. (TAK) has partnered with the PMC and NANA Regional Corporation to study the feasibility of establishing a local seed harvest business in Noatak.

Funded by:

Red Dog Mine

Details:

This effort can help support the Noatak economy by teaching the community how to utilize this natural resource. Seed has the potential to be marketed to Red Dog Mine, airstrips, roads, gravel pits, and similar projects that often require seed to revegetate and stabilize a site after heavy equipment work. Revegetation is most successful when using local native plant species. Team members were selected from a diverse group of people consisting of a representative of NANA, Red Dog Mine, and two PMC agronomists. The PMC representatives educated the Noatak community regarding the possibility of establishing a native seed industry by

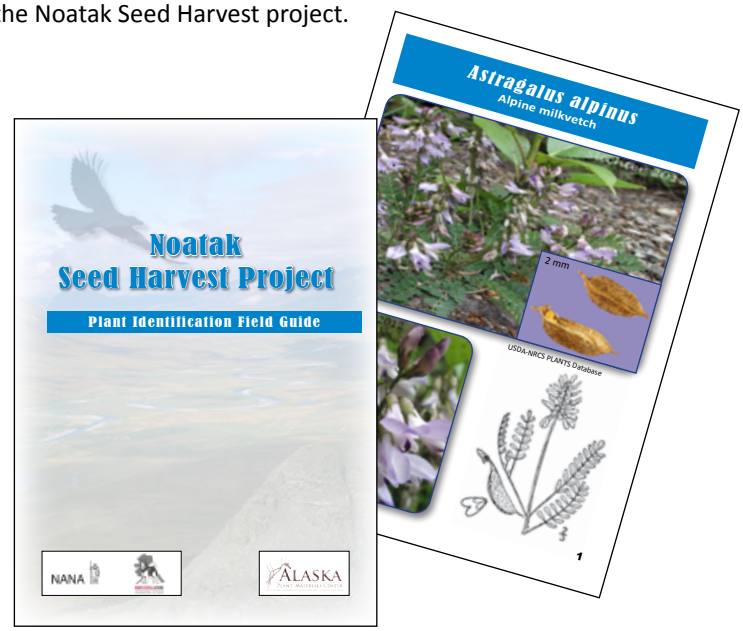


Figure 7. A field identification guide was created for participants in the Noatak Seed Harvest project.

identifying, collecting, cleaning and selling native seeds for regional revegetation projects. A training manual was created (**Figure 7, previous page**) to teach participants proper identification, seed collection, cleaning, and storage methods so they can market them for revegetation projects in the region (http://plants.alaska.gov/pdf/Noatak_fieldguide.pdf). Members also participated in field training exercises to locate and collect seeds from the desired species.

Results:

Items collected in Noatak and their market value are shown in **Table 3**.

Table 3. Species harvested for Noatak Seed Harvest project in 2015.

Species name	Common name	Wild Seed Collected (amount)	Unit Price	Cleaning Costs = $42.00/hr.	Species Market Value (- cleaning costs) =
Hedysarum alpinum	Alpine sweetvetch or Eskimo Potato	513.41g = 18.11oz	$12.82/oz	$84.00	$148.17
Chamerion latifolium	Dwarf fireweed	60.0 grams	$7.95/gm	$84.00	$393.00
Calamagrostis canadensis	Bluejoint reedgrass	3.2g = 0.11 oz	$15.20/oz	$42.00	-$40.33
Oxytropis deflexa	Nodding locoweed	n/a	n/a	n/a	n/a
Astragalus aboriginum	Indian Milk-vetch	27g = 0.95oz	13.05oz	$21.00	-$8.60
TOTALS		**603.61g**		**$231.00**	**$492.24**

Future Plans:

Continue to work with Red Dog, NANA, and Noatak to study the feasibility of a local seed harvest business in Noatak.

Seed Cleaning and Conditioning

The Seed Cleaning and Conditioning Program works to make an appropriate supply of high quality seed is available to growers and other industries through the cleaning of raw seed material into a processed, ready-for-market or planting-product.

Seed Cleaning Facilities *2015*

Objective:

Seed cleaning and conditioning is an integral step in producing the highest quality seed that is free of contaminants. The PMC's seed cleaning facilities process seed from its own foundation seed fields as well as seed from Alaska seed growers, private firms, and other state and federal agencies. There are two seed cleaning and conditioning facilities; the 'large seed house' for lots greater than 250 lbs., and the 'small seed cleaning' facility for all other seed lots, including those intended for research and demonstration. Cleaning and conditioning operations are traditionally completed during the winter months. All cleaning and conditioning services are provided on request and are charged by the hour, including shipping cost of clean or uncleaned seed.

Funded by:

State of Alaska

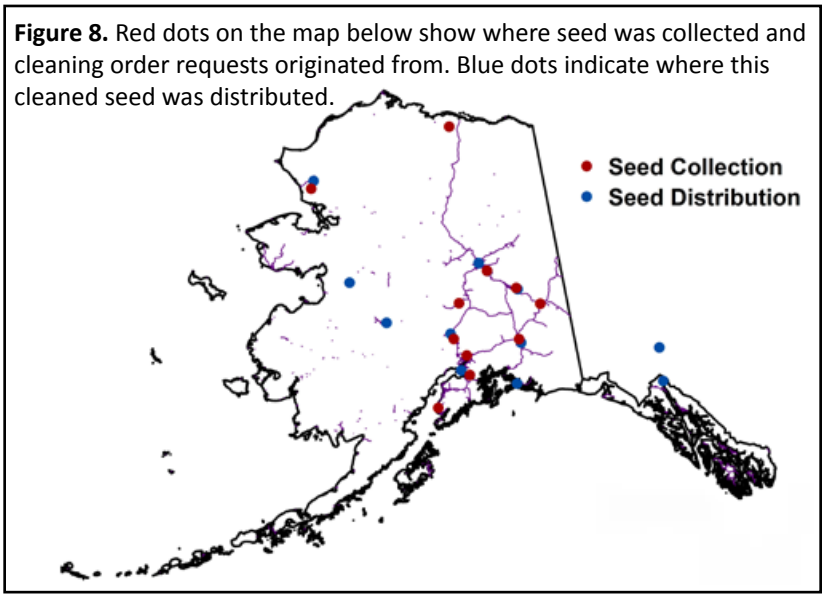


Figure 8. Red dots on the map below show where seed was collected and cleaning order requests originated from. Blue dots indicate where this cleaned seed was distributed.

Details:

Seed cleaning and conditioning is the process of separating the target seed crop from unwanted materials. Unwanted materials include other crop seed, weed seeds, and inert matter inadvertently collected inthe field during harvest. The physical traits of each species of seed allows for this process due to their unique size, width, specific gravity, or seed surface. Dynamic environmental conditions may change these traits annually. Every piece of seed cleaning equipment has the ability to use one or more of these traits to assist in the process. To help determine which equipment or process to use, all seed lots prior to cleaning undergo a preclean sample test to determine the amount of unwanted material that is to be removed in a seed lot.

Results:

The small lot seed cleaning facility processed 20 PMC foundation lots and 43 non-PMC lots for commercial companies, nonprofits, and government agencies. The large seed house cleaned 14 commercial lots for a grand total of 88,658 lbs. of raw uncleaned material. Once cleaned, this material resulted in 43,071 lbs. of seed. All of this seed was tested for purity and germination and ensures a quality seed source for foundation level seed.

Future Plans:

The PMC will continue to provide seed cleaning services to assure quality end products for a variety of organizations and individuals from around the state and Canada. The map in **Figure 8** shows where seed cleaning order requests originated from and were distributed to after cleaning.

Seed Laboratory

The Alaska State Seed Lab at the PMC is the only official seed testing lab in the state of Alaska. The lab has been a member of the Association of Official Seed Analysts (AOSA) since 1998. The lab offers germination, noxious weed, purity, seed weight (seeds/g or seeds/lb.), seed moisture, seed identification, and tetrazolium (TZ) tests. Customers range from state and federal agencies, local seed growers, environmental firms, and hobby gardeners.

General Seed Laboratory Information *2015*

Objective:

Seed laboratories are an important link between the seed producer and the customer. By testing the seed, the laboratory ensures that the seed producer will receive a fair price for their crop. The laboratory also protects the customer from paying too high of a price for substandard seed.

The Alaska State Seed Laboratory tests seed for several state and federal agencies including Department of Transportation (DOT), Department of Natural Resources (DNR), Bureau of Land Management (BLM), and USFWS. Other customers include large and small scale seed growers, local green businesses, environmental firms, and hobby gardeners. The Alaska Seed Laboratory performs following seed tests: germination, noxious weed, purity, seed weight (seeds/g or seeds/lb.), seed moisture, seed identification, and tetrazolium (TZ).

Results:

Number of tests performed during 2015 shown in **Table 4** below:

Table 4. Seed lab tests performed in 2015.

Name of Test	Description	Number of Tests
Germination	This is a physiologic viability test that determines the percentage of live seeds that produce normal seedlings under favorable germination conditions. It requires 400 seeds for germination in most cases.	153
Noxious weed	This test determines the presence of seed from plants that are especially undesirable and difficult to control. The report is based on the Alaska noxious weed seed list. The "All-states" noxious weed exam can be requested.	50
Purity	This test determines the percentage by weight of pure seed, other crop seeds, inert matter and weed seeds in a test sample.	183
Seeds per gram	This test provides information about seed size, density, presence of small, underdeveloped seed in the seed lot. It helps to determine seeding rates.	10
Seed moisture content	This test determines the percentage by weight of moisture content in seeds. Seed moisture content affects the storage capacity of the seed, their germination and vigor.	23
Tetrazolium (TZ)	This is a quick biochemical viability test which determines the number of live seeds based on dehydrogenase enzymes activity in seeds. It indicates the percentage of live and dead seeds in any sample regardless of its dormancy level. The test can be performed in 24-48 hours. It requires 200 seeds in most cases.	16
Total		**435**

Soil Conservation

The Soil Conservation program at the PMC provides technical assistance in the protection of soil resources for contractors, state and federal agencies, and other land users engaging in conservation, erosion, and sediment control projects. This program assists with soil analysis interpretation, guidance on proper field sampling, and provides site-specific fertilizer recommendations.

Soil Health Project

September 2015 — September 2020

Objective:

The purpose of this project is to conduct a study of changes in soil health by comparing selected cover crop species mixes. One, two, four, and six species mixes have been carefully selected in an effort to validate their benefits on soil health. These mixes will be rotated on a one, two, and three year basis. Data for biomass production, soil nutrients, biological measurements, and soil physical properties will be collected each growing season for a period of four years. A technical reference guide will be created for federal/state agencies, and the general public.

Funded by:

Federal: NRCS

Details:

This project will be conducted at the PMC. Participants from the NRCS will assist in field data collection when needed.

Results:

Project design is ongoing during winter 2015-2016.

Future Plans:

Project data collection will not actively start until the spring of 2016.

The PMC field chosen for the upcoming Soil Health project.

Additional Projects

Additional Plant Materials Center Projects

Denali Alfalfa Project

August 2015 — August 2020

Objective:

This project will establish a research plot for 'Denali' alfalfa (*Medicago sativa*), propagate it for seed, and determine if it is beneficial for use as an Alaska forage crop. Currently there is less than 50 lbs. of 'Denali' alfalfa seed in existence and as a result seed is not commercially available. Since known seed supplies are extremely low, the goal is to propagate sufficient seed before research trials began.

Funded by:

Federal; NRCS

Details:

Seed will be propagated for use in small research trials at the PMC. Leaf cutter bees (*Megachile rotuntata*) will be imported and used to propagate the alfalfa using the same process as other parts of North America. To ensure the survival of 'Denali' alfalfa in the event of a poor seed production year at the PMC, it will also be propagated under contract by an out of state alfalfa seed producer. Once sufficient seed is propagated, research trials will be conducted on nutrient composition, yield production, winter hardiness, and pesticide resistance. All data will be collected and accessed over a period of five years.

Results:

During the 2015 growing season 10 lbs. of 'Denali' alfalfa seed was sent to a contracted seed producer in Estevan, Canada. Initially this seed producer planted three acres of 'Denali' seed in an effort to increase future seed stock. Alfalfa does not produce seed its first year of growth so the 2015 growing season was an establishment year. Seed will be harvested the fall of the 2016. The three acre field was established and grew quite well during 2015. The producer in Estevan has estimated that approximately 75 to 100 lbs. of seed is expected during the 2016 harvest, assuming favorable weather conditions. Alfalfa seed production typically ranges from 25 to 500 lbs. an acre depending on variety and management. Because 'Denali' alfalfa is not a strong seed producer, a production of 75 lbs. an acre is considered average.

Future Plans:

Once the supply of seed is increased, research trials will be conducted in areas throughout Alaska. Areas being considered are Kodiak Island, Copper Center, Matanuska-Susitna Valley, Point Mackenzie, Kenai Peninsula, Delta Junction, and Fairbanks. Growers from each region will cultivate one acre plots of 'Denali' alfalfa and will be under contract to conduct routine data collection and monitoring of his or her research plot. Data from each plot will be collected for a minimum of three years unless the site is unsuccessfully established. Research criteria such as winter hardiness, nutrient composition, yield production, pesticide resistance, climate conditions, and general field parameters will be collected and recorded.

Additional Plant Materials Center Projects

Forage Growth Curve Project

January 2012 — September 2016

Objective:

Provide a series of technical reference guides on growth curves for commonly used forage species in eight different regions of Alaska. These regions include Fairbanks, Delta Junction, Copper Center, Palmer, Point MacKenzie, Soldotna, Homer, and Kodiak Island.

Funded by:

Federal: NRCS

Details:

Study plots were constructed in each location in June 2012. Samples are collected bi-monthly throughout the growing season (June-September). Data collections include yield production, nutrient evaluation, and general field parameters. This five year project started in 2012 and will continue through the 2016 growing season. It is currently in its fourth year of evaluation.

Additional field personnel have been added to the project's budget in an effort to coordinate synchronized sampling efforts due to the far distances and travel time between plots. Two NRCS staff members, two PMC employees, and one private sub-contractor are allocated to the project budget.

Results:

Climate Summary

For the 2015 growing season (June 1- September, 2015), farmers in Alaska harvested ~24,000 acres of hay. This production was an increase of 6,000 acres over the 2014 harvest which produced approximately 18,000 acres. The 2015 harvest is the highest on record since the 2007 harvest, which boasted an impressive 23,000 acres. Even though acreage harvested in 2015 was the highest in nearly a decade, the average yield was lower than expected at roughly .95 tons per/acre. Growth curve data suggest that lower yields can mostly be contributed to above average temperatures and drought-like conditions during the 2015 growing season. According to the Alaska Climate Research Center (ACRC), temperatures throughout Alaska in 2015 deviated from 2.5°F to 4.5°F warmer than the 30 year recorded state-wide average.

Data Collection

From June 1-September 15, 2015, a total of 64 grass hay samples were collected, dried, and weighed. These samples were taken from eight selected regions that includes Fairbanks, Delta Junction, Kenny Lake, Palmer, Point Mackenzie, Soldotna, Homer, and Kodiak. A series of field parameters such as soil temperature, precipitation, ambient air temperature, phenological stage, real time weather, and general site conditions were also recorded. Additionally, 32 grass hay samples were collected in an effort to analyze the nutrient composition of hay throughout the growing season in each region. This nutrient data will be utilized to generate a standard growth curve and ultimately determine the appropriate time of harvest as it relates to yield production and forage quality.

Field Findings

During the 2015 growing season six out of eight growth curve sample areas received less than one inch of rain from June 1-July 15, 2015. This lack of precipitation stressed plants that were already weakened from a warm winter with little snow pack. Snow pack is vital to the survival and overall health of a plant to

persist through the winter. The winter of 2015 produced temperatures that fluctuated between 25°F and 40°F; which melted snow that is needed for insulation and caused plants to break dormancy and metabolize, using precious energy reserves needed during spring growth. Several hay fields bolted early in the growing season causing lower than expected first cutting yield production in the majority of the state. The growing season continued while temperatures stayed well above normal. There was little to no increase in precipitation until mid-August. From August 15 through most of September, precipitation increased substantially across most of the sampling areas with some sites in Homer, Soldotna, and Point Mackenzie receiving in excess of five inches of rain the first two weeks of September. This caused several sampling areas to lodge making it difficult to collect an accurate field sample. Several growers cut their fields just before they received large quantities of rain. This made it challenging to dry their hay crop and ultimately resulted in a loss due to molding.

In conclusion, hay fields throughout Alaska produced relatively well considering 2015 was one of hottest and driest summers on record. Field crop yields varied from .85 to 1.6 tons per/acre depending upon region. As one might expect fertilizer, irrigation, region, and individual management practices played a significant role in yield production of hay fields in Alaska.

Future Plans:

All technical data will be assessed and analyzed once the project has reached completion. Once data has been analyzed a final publication, in the form of a technical reference guide, will be compiled during the winter of 2016.

Forage Growth curve project plot in Palmer, Alaska in its fourth growing season during June, 2015. This site displays a lower than normal yield due to the hot, dry summer across Alaska.

Native Plant Material Development Project (Seeds of Success)

September 2014 — September 2019

Objective:

The objectives of this project are to develop plant material and technology to aid in revegetation and soil and water conservation efforts and to encourage a healthy native plant seed industry in Alaska. This project will increase the PMC's wild plant material inventory and supply the BLM with needed material for their projects.

Funded by:

Alaska Bureau of Land Management

Details:

This project is an extension of a previous project from 2009-2014. A new agreement between the BLM and the PMC was signed during September 2014. New field plantings were established, existing plants maintained, fields harvested, seed collected, and cleaned.

Results:

Staff has been growing plugs for field seed increase and on-site revegetation.

The following species were selected for seed increase in the field this spring:

Beckmannia syzigachne - AK930-621
Trisetum spicatum - AK930-636
Festuca saximontana - AK930-615

Nine hundred plugs were planted in the greenhouse during March. By May, young plants were well established and by June, they were transplanted in the field. Plants grew rapidly in response to irrigation and warm weather. Some plants set seed that was able to be harvested in the fall. For example, *Beckmannia syzigachne,* transplanted in May, produced a large amount of seed by the end of the summer.

Over seven hundred additional plugs were grown for use with an on-site revegetation project.
These species are:

Carex athrostachya - AK930-631
Carex bonanzensis - AK930-628
Carex utriculata - AK930-638
*Carex saxatili*s - AK930-622 and AK930-627
Juncus arcticus - AK930-629

These plugs were started at the end of January because they required a month long pre-chill to overcome dormancy. This is typical for *Carex* and *Juncus*. By the time plants were transported to the site they were very well rooted and ready to be transplanted.

<u>Maintenance of existing plantings</u>

Most of the species planted the previous summer overwintered successfully regardless of minimal snow cover, there was no damage observed. Seed from these plantings was harvested for the first time

in 2015. A weed management program was implemented the last few seasons and included mechanical and chemical methods. Field plantings were fertilized the beginning of the season and irrigated regularly throughout the growing season.

Seed Harvest

The following amounts of seed were harvested from field and box garden increase plots are shown in **Table 5**.

Seed Cleaning

Seed cleaned at the PMC includes field increases and new collections. After cleaning the amount of seed from field and box garden increases was over thirty-three pounds. Total weight of the clean seed from wild collections exceeded five and half pounds.

Future Plans:

Next season more collections will be obtained from areas with vegetation disturbance. A few more species will be planted in field increase plots. A progress report for this project can be found at http://plants.alaska.gov/pdf/SOSProgressReport_2015.pdf.

Table 5. Seed harvested from field and box garden increase plots.

Species	Clean Weight
Arctagrostis latifolia - AK930-165	*450 g*
Arctagrostis latifolia - AK930-465	*208 g*
Arctagrostis latifolia - AK930-527	*139 g*
Artemisia tilesii - AK930-75	*97 g*
Beckmannia syzigachne - AK930-621	*5,658 g*
Bromus inermis - AK930-480	*270 g*
Calamagrostis canadensis - AK930-457	*118 g*
Calamagrostis purpurescens - AK930-463	*219 g*
Chamerion latifolium - AK930-391	*9.6 g*
Deschampsia cespitosa - AK930-159	*450 g*
Deschampsia cespitosa - AK930-452	*810 g*
Festuca rubra - AK930-497	*5,154 g*
Hedysarum alpinum - AK930-95	*118 g*
Hedysarum alpinum - AK930-522	*130 g*
Leymus mollis - AK930-456	*1,090 g*
Poa alpina - AK930-162	*77 g*
Trisetum spicatum - AK930-389	*204 g*
Total	**1502.6 g = (33.56 lbs.)**

Seeds of Success seed increase plots.

Division of Agriculture Open House

Annual Open House

July 2015

Objective:

The PMC hosted its first Open House in many years to invite community and agency members to learn more about the activities and programs the Division of Agriculture and the PMC has to offer.

Funded by:

State of Alaska

Details:

Participants enjoyed a hay ride through the PMC trial fields and learned about the plethora of programs the Division offers and why they are important to Alaska agriculture (**Figure 9**). Guests learned about the Farm to School Program, the Alaska Grown and Marketing Program, Invasive Plants Management, Soil Conservation, Revegetation, Horticulture, Potato Trials, Seed Cleaning and Production, Pathology and Laboratory services, the Agricultural Revolving Loan Fund, and Land Sales opportunities. All who attended seemed to find something that interested them. Visitors were able to test their knowledge at the potato guessing game, invasive plant identification test, and some youth activities took place at the Farm to School booth. Multiple demonstrations were held around the facility, the PMC's farm equipment was on display, and a donated lunch was provided.

Results:

Over 120 visitors from all areas of the state were in attendance and excited to learn more about what the Division of Agriculture does for the industry and the State of Alaska.

Future Plans:

The PMC intends to host a Division of Agriculture Open House on an annual basis to keep the public updated and informed about new and existing projects.

Figure 9. Guests enjoy a hayride tour of the farm fields (left) and learn about the horticulture program (right).

Open House attendees enjoyed a tour of the PMC fields and learned what crops are being produced and why the division is growing and testing them.

Guests learned about the many horticulture trials and the potato program.

Additional Plant Materials Center Projects

Publications *2015*

Objective:

Publications staff provides graphic design, print and web content, and technical writing and editing for the Division of Agriculture programs and collaborating agencies.

Funded by:

State of Alaska

Details:

Staff develops materials as needed using Adobe design and Microsoft software. Staff also participates in marketing and outreach events and provides software support as needed. Staff works closely with the Invasive Plants and Marketing programs to create materials from conception to completion.

Results:

Interagency Projects:

- Noatak Project training manual, poster, and field guide
- European Bird Cherry brochure and poster
- Alaska Grown vegetable brochure series
- Hosted Alaska Trails Conference, Agriculture Appreciation Day, PMC Open House, and State Fair outreach booths.
- Created Southcentral agriculture land sales book for use in spring 2016 and formatted and edited Fairbanks fall 2015 publication.
- Created Livestock Brand Book and Farm to School conference program guide
- Created advertisements for 'The Frontiersman' calendar and Peony Association Conference

External Projects:

- Elodea Sign for the Anchorage Parks Foundation
- CNIPM Strategic Plan, quarterly newsletters, and social media management
- Created Grazing Management Plan document for MLW
- Outreach support for AK Tilth Project

**Additional publications can be found at http://plants.alaska.gov/PMCPubsIndex.html and are not inclusive of all Publications created by the PMC.*

Future Plans:

Continued development of online and print materials to support the division and collaborating agencies where needed. Development of the next biannual addition of Source Book.

Contributions

Staff Presentations

Bowen, Bryan (January 2015) *Certified Seed Growers Report - Potatoes.* Presented to: Alaska Seed Growers, Inc. Plant Materials Center. Palmer, AK.

Carter, Robert and Heather Stewart (March 2015) *Efficiency Comparison of Marketed Organic and Natural Herbicides: A Greenhouse Pilot Study.* Presented to: Cordova stakeholders Public Workshop. Mt. Eccles Elementary School and US Forest Service Headquarters. Cordova, AK.

Czapla, Phil and Casey Dinkel (January 26, 2015) *Revegetation and Erosion Control.* Presented to: DOT Design Engineer Team. Anchorage, AK.

Czapla, Phil and Casey Dinkel (February 11, 2015) *Revegetation and Erosion Control*. Presented to: DOT Northern Region Environmental Staff. Fairbanks, AK.

Czapla, Phil and Casey Dinkel (April 24, 2015) *Revegetation and Erosion Control.* Presented to: Government agencies and general public. Kenai CWMA Cooperative Weed Management Association. USFWS Visitor Center, Homer, AK.

Czapla, Phil and Casey Dinkel (May 14, 2015) *Revegetation and Erosion Control.* Presented to: DOT Design Engineer Team. Juneau, AK.

Czapla, Phil and Casey Dinkel (November 19, 2015) *Revegetation and Erosion Control.* Presented to: American Society of Civil Engineers (ASCE) Alaska Section. Mat-Su College, Palmer, AK.

Foreaker, Ralph (March 4, 2015) *Apple Rootstock Trial*. Presented to: 2015 Alaska Sustainable Agriculture Conference. Fairbanks, AK.

Steinlage, Todd (January 2015) *Bacteria and Virus Testing*. Presented to: Potato Growers Meeting. Palmer, AK.

Steinlage, Todd (February 2015) *Bacterial Ring Rot (BRR).* Presented to: AK Produce Grower's Conference. Palmer, AK.

Steinlage, Todd (March 2015) *Division of Agriculture Pathology Program*. Presented to: Alaska Sustainable Agriculture Conference. Fairbanks, AK.

Stewart, Heather (March 2015) *Elodea in Alaska: A Statewide Perspective.* Presented to: Cordova Stakeholders Public Workshop. Cordova, AK.

Stewart, Heather (March 2015) *2014 Canada thistle Management in Anchorage: Right-of-Way Herbicide Application*. Presented to: Alaska Certified Pesticide Applicator Workshop. Anchorage, AK

Stewart, Heather (March 2015) *Polar Lab lecture Series: Out, Out, Weed! A Statewide Perspective to Manage Invasive Plants*. Presented to: Polar Lab Lecture Series. Anchorage, AK.

Stewart, Heather (April 2015) *Aquatic Invasive Species Field Staff Training*. Presented to: William Jack Hernandez Sport Fish Hatchery. Anchorage, AK.

Staff Presentations

Stewart, Heather (April 2015) *Weed Free Forage and Gravel: How the Matanuska-Susitna Valley Borough can utilize this program*. Presented to: Matanuska-Sustina Borough. Palmer, AK.

Stewart, Heather (April 2015) *Fairbanks Public Meeting: Elodea in the Chena System*. Presented to: Elodea Public Scoping Meeting. Fairbanks, AK.

Stewart, Heather (April 2015) *Alaska's Freshwater Aquatic Invasive Plant Species*. Presented to: Kenai Cooperative Weed Management Area Conference. Homer, AK.

Stewart, Heather (April 2015) *Elodea in Alexander Lake: What's Next?* Presented to: Mat-Su Fish Habitat Partnership Project Tour. Mat-Su Borough Flight Tour, AK.

Stewart, Heather (April 2015) *Elodea in the Water.* Presented to: Lake Hood User Group Meeting. Anchorage, AK.

Stewart, Heather (October 2015) *Elodea in Lake Hood: The Stars Align in an Emergency.* Presented to: Committee for Noxious and Invasive Plant Management Conference. Juneau, AK.

Stewart, Heather (October 2015) *Invasive Elodea: Management Actions in Alaska.* Presented to: American Fisheries Society Chapter Meeting. Homer, AK.

Stewart, Heather (November 2015) *Invasive Elodea: Management Actions in Alaska and the Future of the Mat-Su.* Presented to: Mat-Su Salmon Symposium. Palmer, AK.

Stewart, Heather (November 2015) *Invasive Elodea: Management in the State and Lake Hood.* Presented to: NRCS Technical Advisory Board Meeting. Palmer, AK.

Stewart, Heather (November 2015) *Invasive Elodea: Management in the State and Lake Hood.* Presented to: NRCS Technical Advisory Board Meeting. Palmer, AK.

Stewart, Heather (December 2015) *Lake Hood Pilots Association: Elodea in Lake Hood.* Presented to: Lake Hood Pilots Association Meeting. Anchorage, AK.

Staff Publications & Reports

Foreaker, Ralph (December 2015) *2015 Apple Rootstock Evaluation Trial.* http://www.plants.alaska.gov/pdf/2015AppleTrial.pdf. PMC. Palmer, AK.

Foreaker, Ralph (February 2015) *2014 Broccoli Variety Demonstration Trial.* http://www.plants.alaska.gov/pdf/2014BroccoliTrial.pdf. PMC. Palmer, AK.

Foreaker, Ralph (December 2015) *2015 Broccoli Variety Demonstration Trial.* http://www.plants.alaska.gov/pdf/2015BroccoliTrial.pdf. PMC. Palmer, AK.

Foreaker, Ralph (December 2015) *2015 Caneberry Demonstration Trial.* http://www.plants.alaska.gov/pdf/2015Caneberry.pdf. PMC. Palmer, AK.

Foreaker, Ralph (December 2015) *2015 Garlic Variety EvaluationTrial.* http://www.plants.alaska.gov/pdf/2015GarlicTrial.pdf. PMC. Palmer, AK.

Mahlev, Lyubomir (September 2015) *Seeds of Success Progress Report.* http://plants.alaska.gov/pdf/SOSProgressReport_2015.pdf. PMC. Palmer, AK.

Stewart, Heather (December 2015) *2015 Canada thistle Management: The Effectiveness of Herbicides.* http://2015Canadathistlemanagement.pdf. PMC. Palmer, AK.

Stewart, Heather and (June 2015) *Anchorage Lakes Elodea Eradication Project: Environmental Assessment.* http://plants.alaska.gov/invasives/pdf/FINAL_EA_Anchorage2015.pdf. PMC. Palmer, AK: Prepared for USFWS: NEPA.

Stewart, Heather and Kimberly Allen (December 2015) *European Bird Cherry Brochure.* http://plants.alaska.gov/pdf/2015EBC.pdf. PMC. Palmer, AK.

Acknowledgements

Retirement:

Mike Keen began working at the PMC in the summer of 1993 and dedicated over 22 years to the division. He worked on the facilities, in the fields, and operated equipment. Mike's enthusiasm, knowledge, and hard work were a great asset to the production fields and day to day operations. Mike retired in July of 2015 and moved out of state to be closer to family. His work and personality is missed by all at the PMC and we wish him the best of luck in his future endeavors.

This document was created in accordance with Alaska Statute 03.22.060.

Appendix

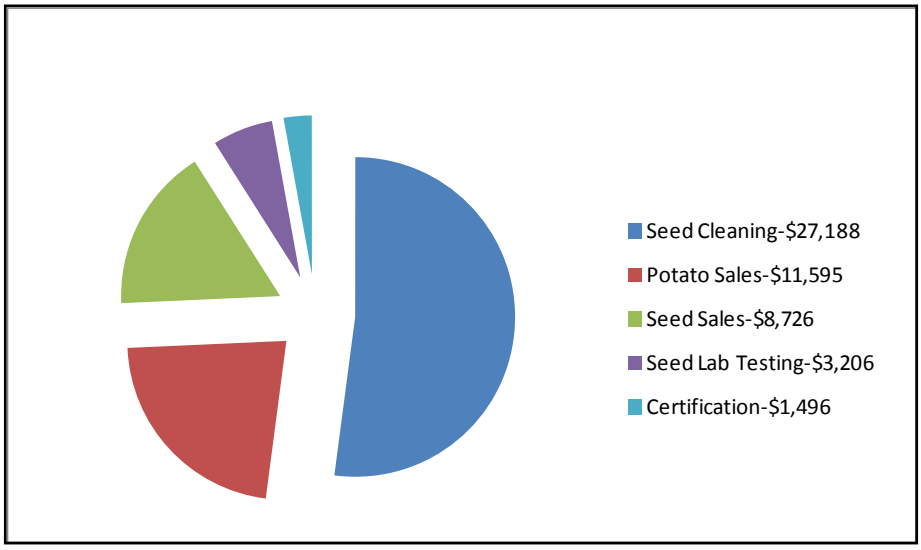
Appendix

2015 Calendar Year - Monthly General Fund Expenditures

	January	February	March	April	May	June
Personal Services	$126,392	$124,029	$132,780	$137,983	$141,068	$137,698
Travel	$5,871	$2,789	$722	$3,500	$180	$1,482
Services	$12,070	$12,191	$27,869	$12,164	$22,630	$30,524
Commodities	$8,060	$1,533	$19,871	$20,070	$23,509	$23,308

	July	August	September	October	November	December
Personal Services	$125,801	$109,570	$125,640	$125,625	$125,364	$121,932
Travel	$0	$0	$1,020	$1,556	$870	$3
Services	$4,335	$7,207	$21,683	$17,080	$15,196	$17,200
Commodities	$413	$4,429	$4,249	$1,956	$11,572	$15,437

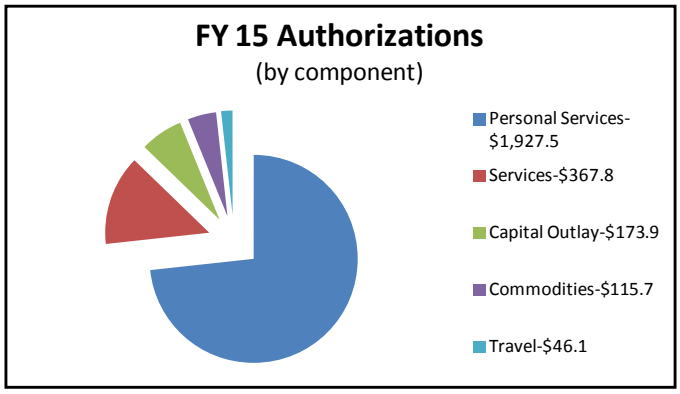
2015 Calendar Year - Program Revenue



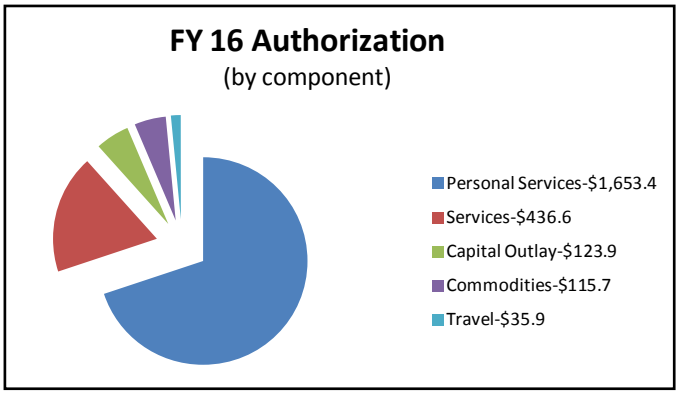
Appendix

2015/2016 Fiscal Year Budget

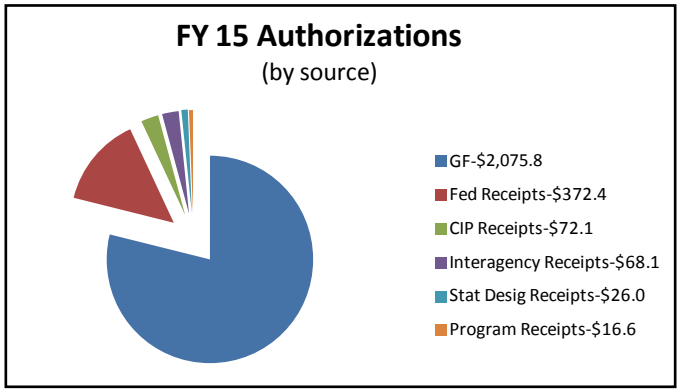
Fiscal Year 2015 Operating Budget Enacted by Component



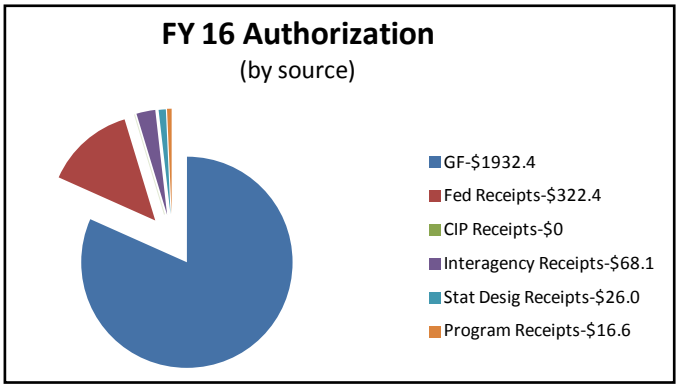
Fiscal Year 2016 Operating Budget Enacted by Component



Fiscal Year 2015 Operating Budget Enacted by Source



Fiscal Year 2016 Operating Budget Enacted by Source



Total FY 15 Operating Budget $2,631.0 M

Total FY 16 Operating Budget $2,365.5 M

Appendix

Other Sources of Funding

Source	Project	Value	Duration
USDA Specialty Crop	Asparagus Variety Evaluation	$26,720	2013-2015 (ongoing)
Pioneer Fruit Growers	Apple Rootstock Trial	$7,500	2013-ongoing
USDA Specialty Crop	Cauliflower Crop Trial	$35,200	2014-2016 (ongoing)
US Forest Health Protection	Statewide Canada Thistle Management	$100,000	2013-2016 (ongoing)*
USDA NRCS	Invasive Species Training	$45,000	2013-2015 (ongoing)
USDA NRCS	Forage Evaluation	$110,000	2014-2018 (ongoing)
USDA NRCS	Native Brome Evaluation	$12,300	2012-2016 (ongoing)
Teck Alaska/Nana Regional Corporation	Noatak Native Seed Harvest	$15,000	2014-ongoing
USDA NRCS	Forage Growth Curve	$185,000	January 2012-December 2016
Bureau of Land Management	Native Plant Material Development	$29,845	2014-2019 (ongoing)
National Fish and Wildlife Service	Alexander Lake Elodea Eradication	$100,000	2015-2016 (ongoing)
SOA-Department of Transportation	Lake Hood Elodea Eradication	$107,000	2015-2016 (ongoing)
USDA-NRCS	Denali Alfalfa Research	$25,000	2015-2017 (ongoing)
USDA-NRCS	Soil Health Study	$142,000	2015-2019 (ongoing)

*This represents current grant funds. Project began in 2008 with previous grant funding.