

PLANT MATERIALS PROJECT SUMMARY REPORTS

from the Natural Resources Conservation Service to the National Park Service

FY 2015





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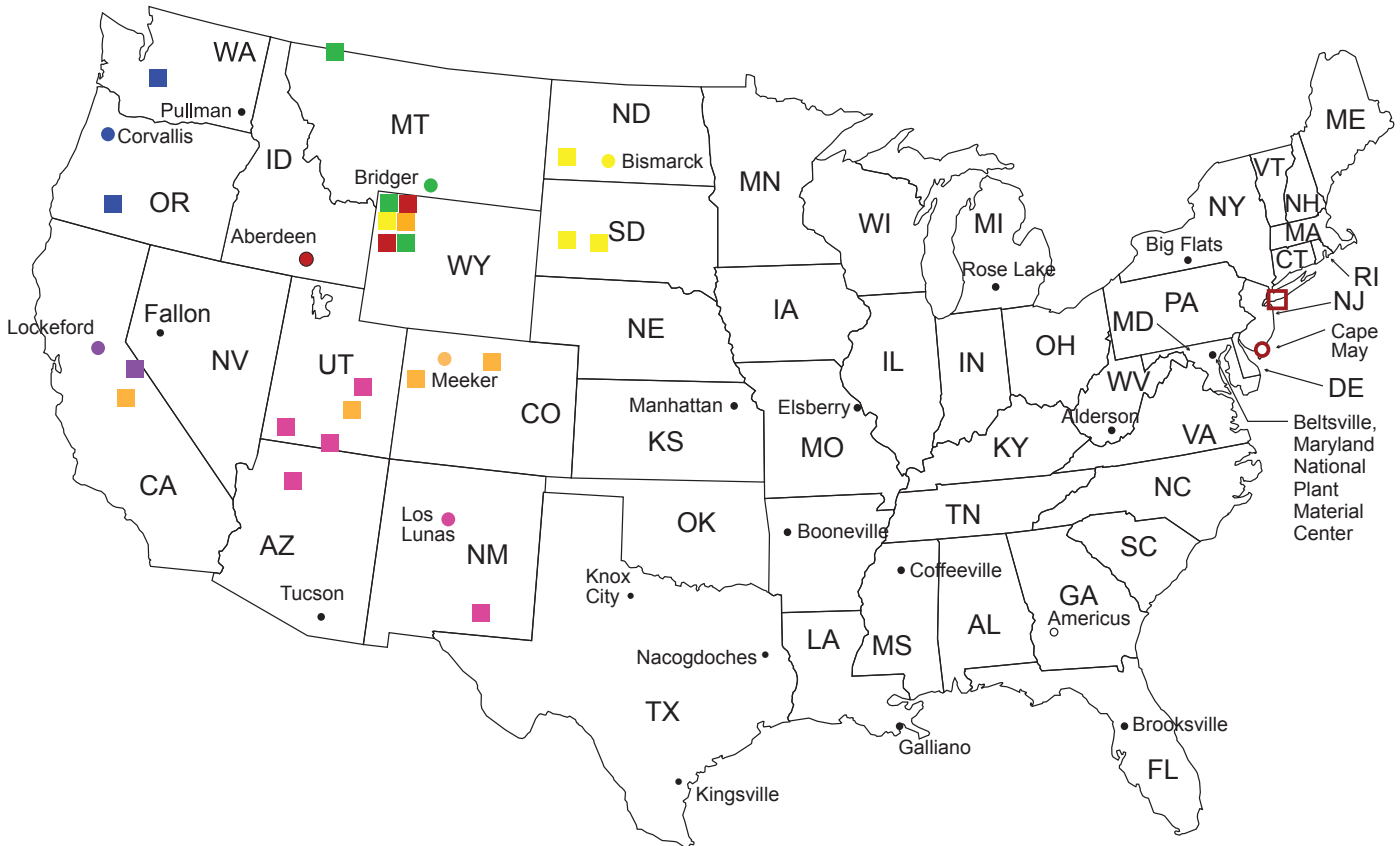
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ACRONYMS

BADL	Badlands National Park
BRCA	Bryce Canyon National Park
CAPMC	Lockeford, California, Plant Materials Center
CAVE	Carlsbad Caverns National Park
COLM	Colorado National Monument
CRLA	Crater Lake National Park
GATE	Gateway National Recreation Area
GLAC	Glacier National Park
GLCA	Glen Canyon National Park
GRCA	Grand Canyon National Park
GRTE	Grand Teton National Park
ID/IQ	Indefinite Delivery / Indefinite Quantity
IDPMC	Aberdeen, Idaho Plant Materials Center
MORU	Mount Rushmore National Memorial
MTPMC	Bridger, Montana, Plant Materials Center
NDPMC	Bismarck, North Dakota, Plant Materials Center
NJPMC	Cape May, New Jersey, Plant Materials Center
NMPMC	Los Lunas, New Mexico, Plant Materials Center
NPS	National Park Service
NRCS	Natural Resources Conservation Service
ORPMC	Corvallis, Oregon, Plant Materials Center
PLS	Pure Live Seed
PMC	Plant Materials Center
ROMO	Rocky Mountain National Park
THRO	Theodore Roosevelt National Park
UCEPC	Upper Colorado Environmental Plant Center, Meeker, Colorado
USDA	US Department of Agriculture
USDOI	US Department of the Interior
YELL	Yellowstone National Park
YOSE	Yosemite National Park
ZION	Zion National Park

NPS/NRCS Interagency Plant Materials Centers



Plant Materials Center		In cooperation with these National Park Units
Aberdeen, ID	●	Grand Teton, Yellowstone
Bismarck, ND	●	Badlands, Grand Teton, Mount Rushmore, Theodore Roosevelt
Bridger, MT	●	Glacier, Grand Teton, Yellowstone
Cape May, NJ	○	Gateway
Corvallis, OR	●	Crater Lake, Mount Rainer
Lockeford, CA	●	Yosemite
Los Lunas, NM	●	Arches & Canyonlands, Carlsbad Caverns, Glen Canyon, Grand Canyon, Zion
Meeker, CO	●	Bryce Canyon, Colorado National Monument, Rocky Mountain, Yellowstone, Yosemite

INTRODUCTION

This is the 2015 Natural Resources Conservation Service (NRCS) Plant Materials Center's (PMC) annual summary report on all interagency agreements between the National Park Service (NPS) and the Natural Resources Conservation Service. These projects relate to development of native plant materials for revegetation of park roads and other restoration projects. The National Park Service and the Natural Resources Conservation Service have been cooperating in testing and increasing native plant materials through a memorandum of understanding using interagency agreements since 1989.

The cooperating NRCS Plant Materials Centers and the Upper Colorado Environmental Plant Center (UCEPC) have prepared a park summary report for each of their projects. This summary report is a compilation of all the individual reports. The report is made available by request and is sent to all national parks with current plant materials projects, associated park resource managers, respective plant materials centers, and US Department of Agriculture (USDA) NRCS state offices. Plant species naming conventions follow USDA Plants Database.

Additional printed copies or electronic versions of this report may be requested from

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FISCAL YEAR 2015 PROGRAM SUMMARY

Technical Assistance

- The NRCS national technical advisor provided assistance to landscape architects, project specialists, and project managers at the NPS Denver Service Center relative to revegetation project needs with 9 national parks in addition to those with interagency agreements.
- The NRCS national technical advisor provided assistance to 32 national parks and associated staff.

Development and Administration of Interagency Agreements

- Eight new agreements, six new task orders, and ten modifications to agreements totaling \$941,096 in funding were coordinated by the NRCS national technical advisor.
- A total of 45 interagency agreements were administered and coordinated.
- There were 46 active projects at 19 national park units that cooperated with 10 NRCS plant materials centers, and 1 conservation district plant materials center.

Native Seed and Plant Production

- 19 national parks
- 2,713 bulk lbs of seed
- 80,314 plants
- more than 150 different native species grown

Park-Collected Native Seed Processed

- 7 national parks
- 408 wildland collections
- more than 200 lbs of seed
- more than 150 different species

Interagency Agreements and Task Orders Reviewed

Arches and Canyonlands National Parks	Grand Teton National Park
Badlands National Park	Great Smoky Mountains National Park
Bryce Canyon National Park	Mount Rainier National Park
Carlsbad Caverns National Park	Mount Rushmore National Park
Colorado National Monument	Palo Alto National Historical Park
Coronado National Memorial	Rocky Mountain National Park
Crater Lake National Park	Theodore Roosevelt National Park
Dinosaur National Monument	Sequoia and Kings Canyon National Parks
Gateway National Recreation Area	Tallgrass Prairie National Preserve
Glacier National Park	Yellowstone National Park
Glen Canyon National Recreation Area	Zion National Park
Grand Canyon National Park	

2015 Cooperating NRCS Plant Centers

Aberdeen, Idaho

Corvallis, Oregon

Bismarck, North Dakota

Lockeford, California

Bridger, Montana

Los Lunas, New Mexico

Cape May, New Jersey

Cooperating Conservation District Plant Center—Meeker, Colorado

Technology Transfer and Research

- Information provided includes basic Federal Lands Highway Program guidelines, examples of revegetation specifications, tools (seed collection techniques, seed storage, plant salvage, propagation, cost estimates, and plant monitoring). Links to the NRCS Plant Materials Program, NRCS Electronic Field Office Technical Guide, and plant propagation protocols websites were provided at training sessions and conferences, and as requested.
- Provided seed collection training, seed mix designs, pollinator information and general revegetation program technical support to more than 45 NPS staff personnel and eight national parks.
- The NRCS national technical advisor, program, and contract staff prepared and distributed to cooperating park/plant material centers and to key NPS and NRCS personnel 225 copies of the fiscal year 2014 annual interagency summary report.





INTERMOUNTAIN REGION

Arches and Canyonlands National Parks, Utah

Prepared by: **Los Lunas, New Mexico, USDA NRCS Plant Materials Center**

Introduction. On August 27, 2010, an agreement between the US Department of Interior National Park Service (NPS), Southeast Utah Group (Arches and Canyonlands National Parks), and the USDA-NRCS Los Lunas New Mexico Plant Materials Center (NMPMC) was made for the collection and propagation of native seed and for the increase of native grass species.

Populations of Indian ricegrass (*Achnatherum hymenoides*) were identified and collected by the park staff and then sent to the Los Lunas PMC for seed production purposes. The agreement states that the National Park Service will use the seed for identified project areas in the two national parks.

In December 2014, a meeting was held between Christine Taliga, NRCS-NPS liaison; Cheryl Decker, Arches and Canyonlands National Park; Robin Gregory, NPS Denver Service Center; Bernadette Cooney, Manager NMPMC; and David Dreesen, Horticulturist NMPMC that led to a decision to expand the “Needles” source of Indian ricegrass (*Achnatherum hymenoides*) to 0.50 acre in 2015.

Accomplishments. In 2015, seed grown at the Los Lunas PMC for Needles was used to increase the seed production field to 0.50 acre. Seed was harvested from both the Arches and Canyonlands National Parks seed production fields in 2015. No seed was harvested from the newly expanded Needles acreage.

Seed production and inventory are summarized in the following table.

Arches National Park								
Scientific Name	Common Name	Accession Number	Park Location	2015 Field Size (Acres)	Harvest Year	PLS (Lbs)	Cleaned Bulk Inventory (Lbs)	Test Date
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066888	N/A	0.50	1992	0.69	1.00	11/11/2011
					2014	6.13	7.00	4/9/2015
					2015	64.72	76.0	2/17/2016
Canyonlands National Park								
Scientific Name	Common Name	Accession Number	Park Location	2015 Field Size (Acres)	Harvest Year	PLS (Lbs)	Cleaned Bulk Inventory (Lbs)	Test Date
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066907	Island in the Sky	0.26	2013	6.08	0.90	5/2/2014
					2014	9.80	12.00	12/2/2014
					2015	17.07	19.90	2/17/2016
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066908	Needles	0.50	2013	1.07	1.20	3/13/2014
					2014		2.90	No test
					2015	8.37	9.70	2/17/2016
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066887	Island in the Sky and Needles mix	—	1992	1.63	3.0	11/11/2011





Canyonlands
National Park
Indian ricegrass
(*Achnatherum
hymenoides*,
9066908),
May 2014.



Bryce Canyon National Park, Utah

Prepared by: Meeker, Colorado, Upper Colorado Environmental Plant Center

Introduction. Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002 was initiated June 26, 2012. Task Order No. P12PD12573 identified Upper Colorado Environmental Plant Center (UCEPC) to manage native seed production of two 0.5-acre fields; Indian ricegrass (*Achnatherum hymenoides*) and nodding brome grass (*Bromus anomalus*) for Bryce Canyon National Park (BRCA). A new Task Order, No. P15PD02452, was initiated in August 2015 for one additional year of production of both species.

Accomplishments. The Upper Colorado Environmental Plant Center harvested both species in 2015. The Indian ricegrass produced very well in 2015, having more than doubled the clean seed amount from any other year of production. Seed test results on this crop are pending. The nodding brome field, while appearing very healthy during the year, showed signs of crop damage during seed formation. A clear, sticky, sugary sap was noted on most of the florets. Although it is not known what effect this had on production, a conversation with Colorado State University Entomologist Bob Hammon indicated his strong suspicion that Lygus insects, or possibly another developing seed insect predator, was the culprit behind the sugary sap. This very likely had a negative effect on seed development. As a result, the seed yield was low, and the quality was less than 40% PLS. This is the only known occurrence at the Upper Colorado Environmental Plant Center, but, nonetheless, particular attention will be paid to this crop in 2016.

On September 25, 2015, one shipment was made consisting of Indian ricegrass and nodding brome, as well as other products from a previous agreement.

Seed production and inventory are summarized in the following table.



Bryce Canyon National Park							
Scientific Name	Common Name	Field Size (Acres)	Harvest Year	PLS (Lbs)	Bulk Lbs Delivered	Cleaned Bulk Inventory (Lbs)	Test Date
<i>Bromus anomalus</i>	nodding brome	0.50	2011	59.9	191.0	0.0	1/30/12
			2012	1.26	0.0	3.5	1/22/13
			2013	14.22	0.0	28.0	3/7/14
			2014	51.12	0.0	86.0	2/26/15
			2015	13.6	0.0	34.0	2/11/16
<i>Achnatherum hymenoides</i>	Indian ricegrass	0.50	2012			98.0 grams	Replanted
			2013	7.09	19.5	0.0	3/7/14
			2014	20.82	24.0	0.0	2/26/15
			2015	34.81	0.0	36.25	3/24/16

Bryce Canyon National Park, *Bromus anomalus* seed production field in Meeker, Colorado, July 2015.



Bryce Canyon National Park, *Bromus anomalus* seed sap, Meeker, Colorado, August 2015.

Forb and Grass Seed Increase

Introduction. Indefinite Delivery/Indefinite Quantity (IDIQ) Contract No. AG-8B05-C-12-0002 was initiated March 17, 2015. Task Order No. P15PD00709 called for the Upper Colorado Environmental Plant Center (UCEPC) to produce seed of one grass, six or more species of forbs, and containerized plants of at least one shrub through 2016.

Accomplishments. The Upper Colorado Environmental Plant Center planted a 0.33-acre field of bottlebrush squirreltail on August 12, 2014, to ensure seed production in 2015. A total of 200 grams of park collected seed were used to establish the planting in Field 17 South. On August 4, 2015, 10.2 clean lbs of seed were harvested.

On August 6–7, the Upper Colorado Environmental Plant Center planted approximately 4,000 linear feet of park collected forb seed in Field 16 South. Seed was from six species: *Cirsium wheeleri* (147 g), *Corydalis aurea* (8 g), *Dracocephalum parviflorum* (6 g), *Erysimum asperum* (35 g), *Machaeranthera canescens* (5 g) and *Packera multilobata* (13 g). Germination and establishment was noted for all species in 2015. Only the *Corydalis* appeared to not germinate well from the August planting, and fewer than 10 plants were counted during an informal evaluation in October.

Seed production and inventory are summarized in the following table.

Bryce Canyon National Park								
Scientific Name	Common Name	Planting Date	Field Size	Harvest Year	PLS (Lbs)	Delivered Cleaned Bulk (Lbs)	Cleaned Bulk Inventory (Lbs)	Test Date
<i>Elymus elymoides</i>	bottlebrush squirreltail	8/12/14	0.33 acre	2015	8.14	10.2	0	10/2/2015
<i>Cirsium wheeleri</i>	Wheeler's thistle	8/6/15	4 rows/140 ft	—	—	—	—	—
<i>Corydalis aurea</i>	scrambled eggs (fumewort)	8/6/15	1 row/100 ft	—	—	—	—	—
<i>Dracocephalum parviflorum</i>	American dragonhead	8/6/15	1 row/100 ft	—	—	—	—	—
<i>Erysimum asperum</i>	western wallflower	8/7/15	3 rows/380 ft	—	—	—	—	—
<i>Machaeranthera canescens</i>	hoary tansyaster	8/6/15	1 row/75 ft	—	—	—	—	—
<i>Packera multilobata</i>	lobeleaf groundsel	8/6/15	2 rows/125 ft	—	—	—	—	—

Bryce Canyon National Park, *Elymus elymoides* seed increase field, Meeker, Colorado, June 2015.



Bryce Canyon National Park, *Cirsium wheeleri*, larva damaged seed, Meeker, Colorado, September 2014.

Carlsbad Caverns National Park, New Mexico

Prepared by: Los Lunas, New Mexico, USDA NRCS Plant Materials Center

Introduction. On August 23, 2004, an agreement between the USDA-NRCS Los Lunas New Mexico Plant Materials Center (NMPMC) and the Carlsbad Caverns National Park (CAVE) was made for the collection, propagation, and the increase of native grass species. A new agreement began in 2010 for the propagation of transplants and seed increase by the NMPMC for CAVE native grass species.

This agreement expired in 2012. Any remaining seed will be stored at the PMC until the park submits a request for the seed.

Seed production and inventory are summarized in the following table.

Carlsbad Caverns National Park					
Scientific Name	Common Name	Accession	PLS Inventory (Lbs)	Bulk Inventory (Lbs)	Test Date
<i>Bouteloua gracilis</i>	blue grama	9066604	13.85	19.53	1/24/07
			8.12	13.16	1/09/08
			2.79	4.01	6/17/10
			2.59	3.50	12/01/09
			8.60	17.19	12/15/11
<i>Leptochloa dubia</i>	green sprangletop	9066658	27.40	57.72	1/25/11
			14.38	18.36	12/07/11
<i>Setaria vulpiseta</i>	plains bristlegrass	9066606	17.37	35.50	5/15/08
			71.99	97.32	7/13/10
			24.04	78.50	2/12/10
			14.53	51.90	12/08/10
			46.03	54.25	1/03/12
<i>Aristida purpurea</i>	purple threeawn	9066607	7.90	11.65	4/23/08
			3.04	3.26	6/11/10
			0.54	0.70	5/18/10
			3.36	0.93	1/06/12
<i>Bouteloua curtipendula</i>	sideoats grama	9066605	41.29		1/19/06
			36.34		1/23/07
			17.14	56.75	3/10/08
			40.08	84.12	6/29/10
			13.54	23.73	12/23/09
			9.72	55.07	1/25/11
			0.74	19.96	1/03/12
			3.00 (bulk)	10.80	No test*
			1.02 (bulk)	14.76	No test*
			0.40 (bulk)		No test*

*Seed was not sent for testing due to an insufficient amount of seed, or the seed on hand was from the park collections and not from harvest at the NMPMC.





Photo credit:
Rob Kurtzman

Colorado National Monument, Colorado

Prepared by: Meeker, Colorado, Upper Colorado Environmental Plant Center

Introduction. This report covers activities conducted by the Upper Colorado Environmental Plant Center (UCEPC) for Colorado National Monument (COLM) through an Indefinite Delivery/Indefinite Quantity (IDIQ) Contract No. AG-8B05-C-12-0002. The original task order (P12PD12930) was modified to produce a single species of Indian ricegrass through 2015. A new task order (P14PD03601) was signed September 17, 2014, and called for the production of two additional species — Sandberg bluegrass through 2018 and Utah sweetvetch through 2016. This task order was modified in September of 2015 to include production of all materials, Indian ricegrass, Sandberg bluegrass, and Utah sweetvetch through 2018.

Accomplishments. On July 29, 2015, a 1.2-acre field of Sandberg bluegrass was planted in Field 17 South from seed collected by Colorado National Monument Staff in 2014. On August 7, 0.82 lbs of Utah sweetvetch seed was planted in Field 16 South to establish a 0.13-acre field from seed collected in 2014 and 2015 by Colorado National Monument staff. On September 1, the Upper Colorado Environmental Plant Center transplanted plants of Indian ricegrass from a previously contracted COLM field slated for removal to fill voids in the field through 2018. These efforts resulted in 0.67 acres of Indian ricegrass currently in production. All fields established well in 2015 and should yield seed in 2016.

On July 15, 2015, 6.7 lbs of Indian ricegrass seed were harvested from Field 17 North.

Summary of seed increase fields at the Upper Colorado Environmental Plant Center is presented in the following table.

Colorado National Monument								
Scientific Name	Common Name	Fields Planted (Acres)	Harvest Year	Field Size (Acres)	Cleaned Bulk (Lbs)	PLS (Lbs)	Cleaned Bulk Inventory (Lbs)	Test Date
Achnatherum hymenoides	Indian ricegrass	9/1/15	2015	0.67	6.7	6.1	6.7	1/25/16
Hedysarum boreale	Utah sweetvetch	8/7/15	—	0.13	—	—	NA	—
bmnbnb secunda	Sandberg bluegrass	7/29/15	—	1.2	—	—	NA	—



Glacier National Park, Montana

Prepared by: Bridger, Montana, USDA NRCS Plant Materials Center

Introduction. The Bridger Montana Plant Materials Center (MTPMC) has maintained a cooperative agreement with Glacier National Park (GLAC) since FY 1986. This agreement facilitates the collection, increase, and establishment of indigenous plant materials, as well as the development of technologies for the restoration of disturbances resulting from road construction and other projects within Park boundaries.

Accomplishments. In 2015, 49 seed lots representing 33 species were delivered to Glacier National Park or used for MTPMC seed increase. The total weight of seed delivered was 919.34 g (2.03 lbs). Seed distribution included 12 grasses (7 species), 15 forbs (15 species), and 22 woody plants (11 species). In addition, containerized plants of the following species were shipped to the park in 2015: 351 *Potentilla hippiana* (9063269-SM) and 178 *Potentilla arguta* ssp. *arguta* (9087975-SM). A total of 80 wildland seed collections were processed at the MTPMC in 2015 and are reported in the Glacier National Park 2015 Annual Technical Report.

In addition to the maintenance of established fields, two new increase fields for the park were planted in 2015. A 0.33-acre field of *Festuca idahoensis* (9081497) for Two Medicine was planted on August 21, 2015. On the same date, a 0.05-acre field of *Pseudoroegneria spicata* (9081993) for Saint Mary (Two Dog Flats) was also planted.

Seed production and inventory are summarized in the following table.



Glacier National Park								
Scientific Name	Common Name	Accession Number	Park Location GLAC Lot ID	Planting Date	Field Size (Acres)	PLS (Lbs)	Bulk Harvest (Lbs)	Test Date
<i>Bromus carinatus</i>	California brome	9087612	Lake McDonald – Medium (Park ID #11-080)	5/5/14	0.03	21.5	23.9	2/25/16
<i>Bromus vulgaris</i>	Columbia brome	9088297	Many Glacier (Park ID #11-136)	6/20/13	0.06	—	2.7	
<i>Carex microptera</i>	small wing sedge	9087799	Lake McDonald (Park ID #08-028)	6/7/11	0.03	—	1.7	
<i>Elymus glaucus</i>	blue wildrye	9075846	Saint Mary – Low (Park ID #11-031)	6/20/13	0.06	—	4.1	
<i>Eurybia conspicua</i>	eastern showy aster	9087433	Lake McDonald – Fish Creek (Park ID #04-247)	7/1/14	0.03	—	*	
<i>Festuca idahoensis</i>	Idaho fescue	9081497	Two Medicine (09-052)	8/21/15	0.33	—	New	
<i>Phleum alpinum</i>	alpine timothy	9054559	Logan Pass (Park ID #10-363)	8/03/12	0.03	—	No fill	
<i>Poa alpina</i>	alpine bluegrass	9054561	Logan Pass (Park ID #1993)	8/13/12	0.03	—	No fill	
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	9081993	SM-Two Dog Flats (11-058)	8/21/15	0.05	—	New	
<i>Symphyotrichum laeve</i> var. <i>geyeri</i>	Geyer's aster	9078605	Lake McDonald (Park ID #11-149)	8/15/12	0.04	—	0.9*	
<i>Symphyotrichum laeve</i> var. <i>geyeri</i>	Geyer's aster	9078464	Many Glacier – Low (Park ID #10-197)	6/20/13	0.05	—	3.5	
<i>Trisetum spicatum</i>	spike trisetum	9081997	Saint Mary – Low (Park ID #12-081)	6/20/13	0.06	—	0.6	

Four hundred, 7-cubic-inch containers (each) of *Potentilla arguta* ssp. *arguta* (9087975) and *Potentilla hippiana* (9063269) were sown on January 13, 2015. Two accessions of *Mahonia repens* were sown in 7-cubic-inch containers on January 26, 2015, including 9054489 (2007) and 9091051 (2014). Two hundred containers of each accession were planted.

A summary of container plants held in cold storage at the Bridger Montana Plant Materials Center and shipped to Glacier National Park follows.

Glacier National Park							
Scientific Name	Common Name	Accession Number	Park Location and GLAC Lot ID	Planting Date	Units #	Size Container cubic inches	Date shipped to GLAC
<i>Arctostaphylos uva-ursi</i>	kinnikinnick or bearberry	9078619	LM-Camas Road (08-154)	10/14/14	323	7	—
<i>Mahonia repens</i>	Oregon grape	9091051	Grinnel Trailhead – MG-L (14-041)	1/26/15	23	7	—
<i>Potentilla hippiana</i>	wooly cinquefoil	9063269	Saint Mary (SWC-09-GNPSM)	1/13/2015	351	7	8/2015
<i>Potentilla arguta</i> ssp. <i>arguta</i>	tall cinquefoil	9087975	Saint Mary (SWC-10-GNPSM)	1/13/2015	178	7	8/2015



Eurybia conspicua, accession 9087433, Bridger, Montana, June 2015.



Bromus vulgaris, accession 9088297, Bridger, Montana, June 2015.

Glen Canyon National Recreation Area, Utah

Prepared by: Los Lunas, New Mexico, USDA NRCS Plant Materials Center

Introduction. In 2013, an agreement between the US Department of Interior National Park Service, Glen Canyon National Recreation Area (GLCA), and the USDA-NRCS Los Lunas New Mexico Plant Materials Center (NMPMC) was made for the collection of native seed, the propagation of those seeds, and the increase of native grass, shrub, and tree species at the Los Lunas New Mexico Plant Materials Center.

The agreement states that the National Park Service will use the seed and transplants for identified project areas at the Glen Canyon National Recreation Area. Populations of native grass, shrub, and tree species will be identified by the park staff, and seed of the identified species will then be sent to the New Mexico Plant Materials Center. These collections will be conditioned and used by the center in seed increase plantings or for plant production.

Accomplishments: GLCA seed and plant production for 2015 is detailed in the following tables.



Seed Production

Glen Canyon National Recreation Area								
Scientific Name	Common Name	Accession Number	Amount of Seed Received in 2012	Acreage Agreement	2015 Acreage	PLS (Lbs)	Bulk (Lbs) in storage	Test Date
<i>Aristida purpurea</i>	purple threeawn	9067016	4.86 grams	0.25	0.25	0.78	0.96	4/1/14
						1.14	1.60	1/29/15
						0.95	1.10	12/8/15

Shrub and Tree Production

Glen Canyon National Recreation Area					
Scientific Name	Common Name	Accession Number	Amount of Seed Received in 2012	Proposed Plant Production	Plants Delivered in 2015
<i>Pluchea sericea</i>	arrowweed*	9067027	18.2 grams	0	40
<i>Gutierrezia sarothrae</i>	broom snakeweed	9067023	16.8 grams	500	300
<i>Eriogonum corymbosum</i>	buckwheat	9067021	17.6 grams	750	635
<i>Artiplex canescens</i>	fourwing saltbush	9067020	96.3 grams	1,000	1,390
<i>Populus fremonti</i>	Fremont cottonwood	9067025	not weighed	50	—
<i>Ericameria</i> spp.	rabbitbrush**	9067024	16.4 grams	750	1,431
<i>Baccharis</i> spp.	seepwillow	9067022	5.18 grams	50	120
<i>Atriplex confertifolia</i>	shadscale	9067019	274 grams	—	—

*The arrowweed (*Pluchea sericea*) was started in the spring of 2013 due to the uncertainty of being able to meet the Salix and Populus agreement amounts.

** The rabbitbrush seed appeared to contain four different species. One of the species appeared to be *Ericameria nauseosa* and another one appeared to be *Isocoma*. The other two species could not be identified by seed alone.

The Los Lunas New Mexico Plant Materials Center will coordinate with the Glen Canyon National Recreation Area for delivery and installation of the plants.



Aristida purpurea, accession 9067016, seed production field at the plant materials center in Los Lunas, New Mexico, 2015.



Grand Canyon National Park, Arizona

Prepared by: Los Lunas, New Mexico, USDA NRCS Plant Materials Center

Introduction. In July 1990, an agreement between the National Park Service and the Los Lunas New Mexico Plant Materials Center (NMPMC) was made to collect, propagate, and increase native grasses, forbs, shrubs, and trees for the purpose of revegetating disturbed areas and native landscaping projects in Grand Canyon National Park (GRCA). The agreement includes both the north and south rim areas of the park.

Accomplishments. In 2015, the Los Lunas New Mexico Plant Materials Center accomplished the following activities:

- Indian ricegrass – Seed was harvested in 2014 from the NMPMC production field was used to seed an additional 17 rows of GRCA Indian ricegrass, increasing the acreage to 0.41 acres. The existing 0.14 acre seed production field was harvested in 2015, and it continued to produce new seedlings in 2015 from seed shatter of the 2014 seed crop. It is anticipated seed germination in the new rows should continue in the spring of 2016. Seed from the new field should be harvested in 2016.
- Muttongrass – Seed was harvested from the 2.13-acre seed production fields.
- Needle-and-thread grass – Seed was harvested from the 0.50-acre seed production fields.
- Spike muhly – Seed was harvested from the 1.00-acre seed production field. Prior to seed harvest, the seed crop appeared to be fine. After cleaning the harvested material, the amount of seed produced was very low. The cause of the low production was not determined, but it was recognized that in the cultivar release of spike muhly, seed production greatly declined within a few years after planting.

Seed production and inventory are summarized in the following table.

Grand Canyon National Park								
Scientific Name	Common Name	Accession Number	Agreement Acreage	2015 Acreage	PLS (Lbs)	Total PLS Seed (Lbs)	Bulk Cleaned (Lbs) Inventory	Test Date
<i>Bouteloua gracilis</i>	blue grama	9062875	2.00	2.10	2.12	102.69	3.50	11/17/2009
					14.96		23.74	12/6/2010
					4.23		7.40	11/17/2011
					28.94		39.92	2/13/2013
					28.50		46.90	2/17/2014
					16.56		27.30	2/12/2015
7.38	10.50	2/3/2016						
<i>Bouteloua gracilis</i>	blue grama	9066803	0.50	0.50	8.43	39.30	13.10	1/28/2011
					4.38		6.46	12/15/2011
					23.66		32.50	2/13/2013
					1.49		3.80	3/3/2014
1.34	2.60	2/17/2015						
<i>Elymus elymoides</i>	bottlebrush squirreltail*	N/A	0.50	0.00	—	—	—	N/A
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066904	0.50	0.41	3.51	N/A	5.00	2/17/2016



Grand Canyon National Park								
Scientific Name	Common Name	Accession Number	Agreement Acreage	2015 Acreage	PLS (Lbs)	Total PLS Seed (Lbs)	Bulk Cleaned (Lbs) Inventory	Test Date
<i>Poa fendleriana</i>	muttongrass	9062861	1.00	2.13	2.00	3.51	44.70	9/17/2010
					0.14			3/13/2012
					74.71			12/20/2012
					7.68			1/20/2015
					31.19			03/04/2016
<i>Hesperostipa comata</i>	Needle-and-thread	9066797	0.50	0.50	3.97	115.72	20.10	3/28/201
					3.25			3/3/2015
					9.04			2/26/2016
<i>Bouteloua curtipendula</i>	sideoats grama*	9066732	0.50	0.00	0.50	16.26		12/04/09
<i>Muhlenbergia wrightii</i>	spike muhly	9066802	0.50	1.00	9.31	0.50	0.066	1/25/2011
					12.29			1/24/2012
					0.40			1/29/2013
					0.09			3/13/2015
					N/A			No test

*The bottlebrush squirreltail and sideoats grama fields were removed prior to 2011 as per agreement with Grand Canyon National Park.

Technology Development. Indian ricegrass and needle-and-thread grass seed have been difficult to harvest using the combine and flail-vac harvester. In 2014, a new technology developed at the PMC was used to harvest the needle-and-thread grass seed to capture greater volumes of mature seed: a vacuum harvest system. This technology was used again in 2015. The amount of seed production in the field had substantially increased allowing for the vacuum harvest system to collect a high percentage of mature seed.



Muhlenbergia wrightii, accession 9066802, seed production at Los Lunas, New Mexico, in 2015.



Hesperostipa comata, accession 9066797, seed production at Los Lunas, New Mexico, in 2015.

Grand Teton National Park, Wyoming

Prepared by: **Aberdeen, USDA NRCS Plant Materials Center**

Introduction. The Aberdeen, Idaho Plant Materials Center (IDPMC) entered into an interagency agreement with Grand Teton National Park (GRTE) in 2006 to produce seed of four native grasses for use in revegetation of disturbed areas following road construction. Since that time, several modifications have been made to the agreement to extend production fields or add new species.

Accomplishments. Seed fields of slender wheatgrass (*Elymus trachycaulus*), Sandberg bluegrass (*Poa secunda*), blue wildrye (*Elymus glaucus*), and mountain brome (*Bromus marginatus*) were planted in 2006, and seed was harvested in 2007 and 2008. Fields of Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) were planted in May 2008. Seed from the bluebunch wheatgrass fields was harvested in 2009 and 2010, and the field was then discontinued in late 2010 because of poor seed yield. The original Idaho fescue field was harvested from 2009 to 2014. In 2010, a second field of mountain brome was planted for seed harvests in 2011 and 2012. A new Idaho fescue field (1 ac) was established in 2012 for seed production in 2013 through 2014 but was extended to 2015. In 2015, 2 acres each of mountain brome and Idaho fescue, and a 1-acre field of blue wildrye were established. In addition, rows measuring 500 x 6 ft of sulphur buckwheat (*Eriogonum umbellatum*), showy goldeneye (*Heliomeris multiflora*), and one-flower sunflower (*Helianthella uniflora*) using greenhouse grown materials were installed. Sulphur buckwheat had excellent establishment. Showy goldeneye had fair establishment from the transplants, and a small amount of seed was harvested in 2015. One-flower sunflower did not appear to establish well from transplants, but it is possible that live root systems will yet produce plants. Over-seeding into open spaces in the sunflower and goldeneye rows occurred in November 2015.

Seed production and inventory are summarized in the following table.

Grand Teton National Park							
Scientific Name	Common Name	Acres	Year Planted	2015 Cleaned Bulk (Lbs)	2015 PLS (Lbs)	Total PLS Inventory (Lbs)	Test Date
<i>Bromus marginatus</i>	mountain brome	2.0	2015	—	—	*1,000	—
<i>Elymus glaucus</i>	blue wildrye	1.0	2015	—	—	—	—
<i>Festuca idahoensis</i>	Idaho Fescue	2.0	2015	—	—	—	—
<i>Festuca idahoensis</i>	Idaho Fescue	1.0	2012	283	242.39	*826	3/14/16
<i>Helianthella uniflora</i>	one-flower sunflower	6' by 650'	2015	—	—	—	—
<i>Heliomeris multiflora</i>	showy goldeneye	6' by 650'	2015	0.68	—	—	—
<i>Eriogonum umbellatum</i>	buckwheat	2015	2006	—	—	—	—

* Includes prior year harvests

To date, the PMC has delivered 7,668 lbs of seed to Grand Teton National Park in this project. The PMC currently has 1,000 lbs of mountain brome, 865 lbs of Idaho fescue, and 0.68 lbs of showy goldeneye in inventory (not including the originally provided seed or the 2015 harvest).



Grand Teton National Park, *Festuca idahoensis*, Aberdeen, Idaho, 2015.



Grand Teton National Park, *Helioeris multiflora*, Aberdeen, Idaho, 2015.

Prepared by: **Bismarck, North Dakota, USDA NRCS Plant Materials Center**

Introduction. On July 29, 2015, the Natural Resources Conservation Service (NRCS), Bismarck North Dakota Plant Materials Center (NDPMC) entered into an interagency agreement with the National Park Service, Grand Teton National Park (GRTE) to grow and produce seed of slender wheatgrass, *Elymus trachycaulus*, and mountain brome grass, *Bromus marginatus*, for use in Jenny Lake Renewal, Hayfields Restoration, and Federal Land Highways Program Gros Ventre Junction. Fields were planted at the North Dakota Plant Materials Center in 2015 with seed originating from the park. The PMC maintains seed from a previous contract that expired in 2014. Seed will be distributed to the park for reclamation activities. The contract expires on December 31, 2018.

The plant species and estimated target seed production goals are noted in the following table.

Grand Teton National Park			
Scientific Name	Common Name	Accession Number	Seed Amount (PLS lbs/year)
<i>Elymus trachycaulus</i>	slender wheatgrass	9094353	300
<i>Bromus marginatus</i>	mountain brome grass	9094354	200

Accomplishments. One-acre fields of both slender wheatgrass and mountain brome grass were seeded in the spring of 2015 into small grain stubble. The fields were seeded into 42-inch rows using a modified no-till drill. The seed was placed ½-inch deep. The fields were irrigated throughout the summer. Weed control was accomplished by hand and mechanical clipping throughout the summer. Seedlings of both species were observed in rows by the end of the 2015 growing season.

Seed production and distribution are summarized in the following table.

Grand Teton National Park						
Scientific Name	Common Name	Accession Number	Agreement Acreage	PLS (Lbs)	Clean Bulk (Lbs) Inventory	Test Date
<i>Bromus marginatus</i>	mountain brome	9094354	1.0	292.5	339.0	5/11/2015
<i>Elymus trachycaulus</i>	slender wheatgrass	9094353	1.0	264.2	273.4	4/6/2015

Technology Development. Combine settings, seed cleaning procedures, and seed tests have been documented and are available from the PMC.



Elymus trachycaulus, accession 9094353, Bismarck, North Dakota, July 2015.

Prepared by: Bridger, Montana, USDA NRCS Plant Materials Center

Introduction. In 2011, the Bridger Montana Plant Materials Center (MTPMC) entered into a multiyear cooperative agreement with Grand Teton National Park for seed increase of four native grass species, including Idaho fescue (*Festuca idahoensis*) bluebunch wheatgrass (*Pseudoroegneria spicata*); Sandberg bluegrass, (*Poa secunda*); and mountain brome (*Bromus marginatus*). Seed increase of each species was goaled for 1.0 acre, although bluebunch wheatgrass had only enough seeds for a 0.65-acre field based on the production requirement of 25 PLS seeds per foot of row. Additionally, because of high seed dormancy in Sandberg bluegrass, three seed increase fields of this species were sown in 2011 and another field sown in spring 2012. Project completion is anticipated in 2015.

Accomplishments. A total of six seed production fields of four species (5 seed sources) from Grand Teton were maintained at the PMC in 2015. The *Poa secunda* (9088212) planted in Field 11 in 2011 failed to establish and was removed in late 2012. An additional 1-acre increase field of acre *Poa secunda* (9090925) was planted in 2012 and produced poorly in 2015. Total bulk seed production in 2015 by species and total bulk seed on inventory appears in the following table. The 2015 PLS production is noted only for *Festuca idahoensis*, (9088206) because the other 2015 production lots were too small to warrant testing.

Seed production is summarized in the table on the following page.

Grand Teton National Park								
Scientific Name	Common Name	Accession Number	Date Planted	Area Planted (Acres)	2015 Bulk Seed Produced (Lbs)	2015 PLS (Lbs)	Bulk Seed On Inventory (Lbs)	Date Tested
<i>Festuca idahoensis</i>	Idaho fescue	9088206	8/11/2011	1.0	50.04	46.5	348.4	3/10/2016
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	9088209	8/11/2011	0.65	0	—	76.0	—
<i>Poa secunda</i>	Sandberg bluegrass	9088212	8/11/2011	1.3	.49	—	76.5	—
<i>Bromus marginatus</i>	mountain brome	9088217	8/11/2011	1.0	13.0	—	266.0	—
<i>Poa secunda</i>	Sandberg bluegrass	9090925	4/24/2012	1.0	5.0	—	65.0	—

All Grand Teton seed increase fields produced some seed in 2015. The *Pseudoroegneria spicata* (9088209) field produced so little seed and became contaminated with other species that it was not harvested. Bulk seed production of each seed source was much less in 2015 than 2014, primarily the result of aging fields but also high amounts of insect predation. Smut was again evident in the *Bromus marginatus* (9088217), field, and volunteer seedlings of several nontarget species recorded in the original wildland collections, especially slender wheatgrass (*Elymus trachycaulus*), continued to increase in several fields.

Technology Development. Adjustments to the screen fanning mill continued in 2015 to improve separation of nontarget and target species. Reduction in shaker speed of the Super 47B large mill resulted in significantly improved removal of undesirable species. Quinclorac herbicide applied in fall 2014 significantly reduced broadleaf weeds in 2015.



Festuca idahoensis, accession 9088206, Bridger, Montana, July 2015.

Rocky Mountain National Park, Colorado

Prepared by: Meeker, Colorado, Upper Colorado Environmental Plant Center

Introduction. Upper Colorado Environmental Plant Center (UCEPC) and Rocky Mountain National Park (ROMO) initiated an Indefinite Delivery/Indefinite Quantity (IDIQ) Contract AG-8B05-C-12-0002, Task Order P14PD01642, Bear Lake Road Revegetation, Phase II on July 28, 2014. This task order involved seed production of two grasses for revegetation of the Bear Lake Road Project for a single year. The task order required 5 PLS lbs of mountain muhly and 140 PLS lbs of woolly brome to be produced and delivered to Rocky Mountain National Park.

Accomplishments. In 2014, both products yielded well and the target quantities of seed were met as identified in the task order. The contracted amount of seed has been delivered to the park. Two additional species, Canada wildrye and bottlebrush squirreltail, were produced in 2014 in anticipation of the likely use of the germplasm in the future, either by the park or some other public entity for public benefit. These two products, along with five other species, which had been previously produced by the Upper Colorado Environmental Plant Center for Rocky Mountain National Park, remain in inventory. After the production agreements were complete, the Upper Colorado Environmental Plant Center produced these species for an additional year.

Seed production and inventory are summarized in the following table.

Rocky Mountain National Park										
Scientific Name	Common Name	Planting Date	Harvest Year	Field Size (Acres)	Clean wt Bulk Lbs	PLS %	PLS Lbs	Test Date	Bulk Lbs Delivered	Bulk Lbs On Hand
<i>Muhlenbergia montana</i>	mountain muhly	5/28/03	2014	0.5	7.7	64.94	5.0*	3/6/15	7.7	7.3
<i>Bromus lanatipes</i>	woolly brome	8/10/12	2014	1.0	177.0	79.10	140.0*	3/2/15	177.0	302.0
<i>Elymus canadensis</i>	Canada wildrye	8/2/2011	2013	0.5	222.0	63.0	140.0	3/2014	0.0	222.0
<i>Elymus canadensis</i>	Canada wildrye	8/2/2011	2014	1.5	300.0	87.1	261.4	3/2015	0.0	300.0
<i>Elymus elymoides</i>	bottlebrush wildrye	6/23/2009	2013	0.73	128.0	80.0	102	3/14	0.0	128.0
<i>Elymus elymoides</i>	bottlebrush wildrye	6/23/2009	2014	0.3	35.0	95.4	33.4	3/15	0.0	35.0
<i>Elymus glaucus</i>	blue wildrye	8/5/2008	2011	0.1	2.0	NA	NA	NA	0.0	2.0
<i>Potentilla pulchera</i>	pretty cinquefoil	6/26/2008	2011	0.17	12.0	NA	NA	NA	0.0	12.0
<i>Antennaria rosea</i>	rose pussytoes	5/18/2009	2013	Plot	0.67	NA	NA	NA	0.0	0.67

*Contracted amount of seed

The previous table provides a complete recap of the activities conducted by the Upper Colorado Environmental Plant Center in 2015 and identifies what previously-produced seed is available for park uses through negotiations. The agreement is complete, and this is the final report for the Bear Lake Road Project.

Technology Development. Standard seed production practices were conducted in 2014.





Bromus lanatipes,
Meeker, Colorado,
June 2014.



Mt. Brome Seed,
Meeker, Colorado.

Yellowstone National Park, Wyoming

Prepared by: **Aberdeen, Idaho, USDA NRCS Plant Materials Center**

Introduction. In 2008, the Natural Resources Conservation Service (NRCS), Aberdeen Idaho Plant Materials Center (IDPMC) entered into an interagency agreement with the National Park Service, Yellowstone National Park to produce seed of Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and needle-and-thread grass (*Hesperostipa comata* ssp. *comata*) for use on restoration sites at Yellowstone National Park.

Accomplishments. The needle-and-thread grass was previously harvested as hay mulch and baled for transport to the park in 2010 through 2012. Needle-and-thread grass is no longer in production at the PMC. Seed was harvested from the Sandberg bluegrass field from 2010 through 2013 and bluebunch wheatgrass field in 2011 to 2013. New 2.5-acre seed fields of Sandberg bluegrass and bluebunch wheatgrass were planted in May 2013 to produce seed in 2014 and 2015.

Seed production and inventory is summarized in the following table.

Yellowstone National Park								
Scientific Name	Common Name	Acres	Year Planted	2015 Bulk (Lbs)	2015 PLS (Lbs)	2015 Shipped (Lbs)	Total PLS Inventory (Lbs)	Test Date
<i>Poa secunda</i>	Sandberg bluegrass	1.0	2009	—	—	—	—	—
		2.5	2013	76	57.7	—	310.7	3/16/16
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	1.0	2009	—	—	*117	—	—
		2.5	2013	107	89.7	*250	118.7	3/14/16

To date, the Idaho Plant Materials Center has shipped 816 lbs of processed seed and 4,920 lbs of needle-and-thread grass in 19 bales (including approximately 16 lbs of seed per bale) to Yellowstone National Park from this project. Current inventory shows 310.7 lbs PLS of Sandberg bluegrass and 118.7 lbs PLS of bluebunch wheatgrass.



Yellowstone National Park, *Pseudoroegneria spicata*, Aberdeen, Idaho, 2015.



Yellowstone National Park, *Poa secunda*, Aberdeen, Idaho, 2015.

Prepared by: **Bridger, Montana, USDA NRCS Plant Materials Center**



Introduction. The Bridger Montana Plant Materials Center (MTPMC) has maintained cooperative agreements with Yellowstone National Park (YELL) since 1986. These agreements facilitate the collection, increase, and reestablishment of indigenous plant materials, as well as the development of revegetation technologies for restoring disturbances resulting from road construction and other improvement projects within park boundaries. Yellowstone National Park forecasts future road construction projects with adequate lead time for indigenous seed and/or plant collection and production efforts to begin 3 years in advance of project initiation. Wildland seed collections are collected by park staff, dried, and delivered to the PMC for processing, accessioning, and entry into a database.

Accomplishments. In 2015, five allocations of 116 seed lots were distributed to Yellowstone National Park or the Bridger Montana Plant Materials Center (used to plant seed increase fields) totaling 1,123.9 lbs. The distribution included 77 grass lots (23 species) totaling 1,084 lbs and 38 forb lots (16 species) totaling 39.4 lbs, and 1 woody lot (1 species) totaling 0.10 lbs. The 68 wildland seed collections yielded a total of 54.4 lbs, including 39.5 lbs from 41 grasses (16 species) and 19.8 lbs from 27 forbs (18 species).

Seed increase fields of seven grass accessions (five species) were harvested on 2.2 acres resulting in more than 259.8 lbs of bulk seed produced. Increase fields *Bromus marginatus* and *Elymus trachycaulus* (1.2 acre) were maintained but not harvested because of poor seedhead development. Five new seed increase fields (2.4 acres) were planted: two fields on 5/26/2015, two fields on 5/27/2015, and one field on 10/9/2015. Currently, there are 4.9 acres of twelve grass accessions (seven species) planted to seed increase fields at the PMC. Reference the Yellowstone National Park 2015 Annual Technical Report for wildland and seed increase inventories dating from 2005 through 2015.

Seed production is summarized in the following table.

Yellowstone National Park							
Scientific Name	Common Name	Accession Number	Date Planted	Field Size (Acres)	Bulk Clean Seed (Lbs)	PLS Seed (Lbs)	Test Date
<i>Achillea millefolium</i>	common yarrow	9091090	5/27/15	0.14	—	—	—
<i>Achnatherum hymenoides</i>	Indian ricegrass	9081862	11/8/13	0.33	23.0	9.6	—
			10/9/15	0.83			
<i>Bromus marginatus</i>	mountain brome	9088024	8/23/13	0.33	3.3	—	—
		9087449	5/26/15	0.87			
		9088025	Removed				
<i>Deschampsia cespitosa</i>	tufted hairgrass	9088028	8/23/13	0.33	5.0	4.33	3/11/16
<i>Elymus trachycaulus</i>	slender wheatgrass	9081525	8/16 & 8/21/12	0.31	127.7	124.59 90.79	3/11/16
		9087474	7/31/14	0.53	95.0		
		9076214	5/26/15	0.22			
<i>Festuca idahoensis</i>	Idaho fescue	9081537	Removed	0.33	—	—	—
		9087461	5/27/15	0.36			
<i>Leymus cinereus</i>	basin wildrye	9081887	8/17/10	0.33	4.6	—	—
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	9081759	removed	—	—	—	—

Technology Development. Adjustments to the screen fanning mill trialed in 2014 to improve separation of nontarget and target species were continued in 2015. Reduction in shaker speed of the Super 47B large mill continued to improve removal of undesirable species. Quinclorac herbicide applied in fall 2014 in seed increase fields improved broadleaf weed control in 2015.



Elymus trachycaulus, accession 9087474, Bridger, Montana, July 2015.

Elymus trachycaulus, accession 9087474, Bridger, Montana, July 2015.



Gardiner Basin

Introduction. The Bridger Montana Plant Materials Center (MTPMC) has maintained a cooperative agreement with Yellowstone National Park Gardiner Basin (YELL) since FY2008. This agreement facilitates the collection, increase, and reestablishment of indigenous plant materials, as well as the development of revegetation technologies for the restoration of native perennial grasses where desert alyssum (desert madwort, *Alyssum desertorum*) dominates in fields of the northern boundary. Yellowstone National Park forecasts future restoration projects with adequate lead time for indigenous seed and/or plant collection and production efforts to begin 3 years in advance of project initiation.

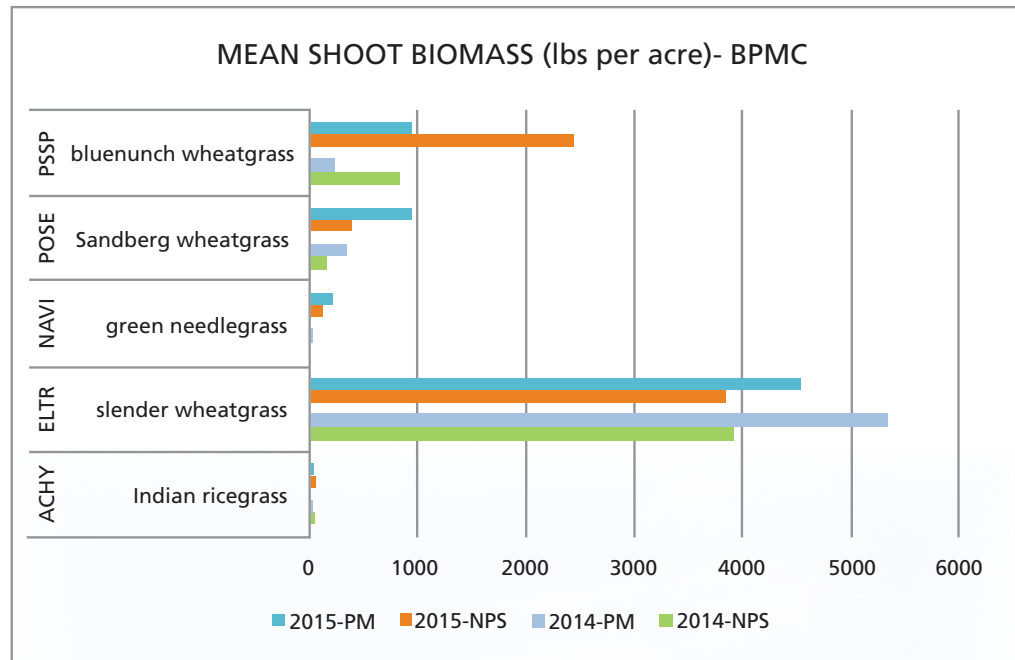
Accomplishments. Seed increase fields of three grasses were harvested from 3.1 acres resulting in approximately 398.15 lbs of bulk seed production in 2015 (see table below). All harvested lots were cleaned, and *Elymus trachycaulus* (9081525) and *Poa secunda* (9090791) were submitted for lab analysis (see table below). *Pseudoroegneria spicata* 9087860 was not submitted for testing because the lot was too small.

Seed increase fields of five grass accessions (four species) were harvested on 1.5 acres resulting in more than 396 lbs of bulk seed produced. Three seed increase blocks (1.0 acre) were maintained but not harvested because of poor seedhead development. Two new seed increase fields (1.2 acres) were planted on July 31, 2015. Seed increase blocks of four grasses (0.94 acre) were removed due to natural decline in production. Currently, there are 2.8 acres of seven grass accessions (five species) planted to seed increase blocks at the Bridger Montana Plant Materials Center. The wildland seed and increase inventory contains seed collections dating from 2005 to 2014. The 2009 seed lots of slender wheatgrass and the 2007 seed lots of mountain brome were returned to the park. Additionally, all seed lots from 2004 were distributed back to the park.

Seed production is summarized in the following table.

Yellowstone National Park							
Scientific Name	Common Name	Accession Number	Date Planted	Field Size Acres	2015 Clean Bulk (Lbs)	PLS (Lbs)	Test Date
Elymus trachycaulus	slender wheatgrass	9081525	8/16 & 8/21/12	1.26	383.2	373.88	3/11/16
Poa secunda	Sandberg bluegrass	9090791	8/14/12	0.96	8.9	7.3	3/16/16
Pseudoroegneria spicata	bluebunch wheatgrass	9087860	8/14/12	0.34	6.0	—	—

Technology Development. The Comparative Evaluation Planting (CEP), testing the growth and establishment of five indigenous versus five plant materials selections at the Cinnabar Site and at the Bridger Montana Plant Materials Center was discontinued at Cinnabar in 2015 since no target species were present in 2014. In 2015 at the PMC, the Comparative Evaluation Planting was sampled for biomass production and the study terminated. Preliminary mean results appear in the following figure, but statistical analyses have not yet been conducted.



Mean shoot biomass production, Bridger Montana Plant Materials Center, 2014 and 2015.



Elymus trachycaulus, accession 9081525, Bridger, Montana, June 19, 2015.



CEP samples, Bridger, Montana, June 2015.

Prepared by: Meeker, Colorado, Upper Colorado Environmental Plant Center

Introduction. This report covers activities conducted by Upper Colorado Environmental Plant Center (UCEPC) for Yellowstone National Park through an Indefinite Delivery/ Indefinite Quantity (IDIQ) Contract AG-8B05-C-12-0002, Task Order No. P12PD12993. The task order calls for the Upper Colorado Environmental Plant Center to produce seed for a single grass species, bluebunch wheatgrass. The Upper Colorado Environmental Plant Center is to produce approximately 240 lbs PLS for Yellowstone National Park from a one-acre field. This agreement will remain in effect until April 30, 2016.

Accomplishments. As was the case in 2014, the field of bluebunch wheatgrass simply was not vigorous from early spring throughout the season. Plant stature, color, and quantity of seed head formation all were indications that the field was in need of replacement. As a result, the Upper Colorado Environmental Plant Center planted a new one-acre field on July 31, 2015, in Field 6. This field will produce seed in 2016 and will replace the present field. Surprisingly, seed yield was higher than in 2014. A review will be done in the spring of 2016 to determine the fate of the original field.

One seed shipment was made to the park on June 10, 2015. The entire 2013 and 2014 seed lots were sent to the park. Only 2015-produced seed remains in inventory.

Seed production and inventory are summarized in the following table.

Yellowstone National Park								
Scientific Name	Species	Year	Date Planted	Acreage	Harvest Date	Clean Bulk (Lbs)	Test Date	PLS (Lbs)
Pseudoroegneria spicata	bluebunch wheatgrass	2010	8/18/2010	1.0	NA	—	—	—
		2011	—	1.0	7/19/11	10	1/6/12	5.79
		2012	Nov. 5	1.0 (blanks)	6/26/12	122	1/22/13	56.55
		2013	—	1.0	7/8/13	118	3/7/14	80.63
		2014	—	1.0	7/8/14	30	3/2/15	16.17
		2015	—	1.0	—	39	3/14/16	28.85
		2015	7/31/2015	1.0	NA	NA	NA	NA

Technology Development. Standard planting, cultural practices, harvest, and cleaning protocols have been used to produce bluebunch wheatgrass.



Pseudoroegneria spicata, Meeker, Colorado, July 2015.

Zion National Park, Utah

Prepared by: Los Lunas, New Mexico, USDA-NRCS Plant Materials Center

Introduction. The Los Lunas New Mexico Plant Materials Center (NMPMC) has had a long-standing partnership with Zion National Park (ZION) spanning over a decade. The last agreement with the park ended in 2013. The present partnership consists of storing the park's seed produced at the Los Lunas New Mexico Plant Materials Center; arrangements are being made to ship the stored seed that was produced prior to 2010 to Zion National Park.

Seed production, analysis, and inventory are summarized in the following table.

Zion National Park				
Scientific Name	Common Name	Accession	PLS on Inventory (Lbs)	Test Date
<i>Elymus elymoides</i>	bottlebrush squirreltail	9066532	2.65	8/20/09
			13.74	9/17/10
			0.47	8/27/07
			14.35	8/06/05
			12.54	8//08/11
			13.83	8/08/11
			45.90	1/17/13
<i>Bothriochloa barbinodis</i>	cane bluestem	9066543	0.60*	No test*
			1.36	1/21/05
			2.19	1/17/06
			1.58	3/09/07
			0.20*	No test*
<i>Pleuraphis jamesii</i>	Galleta	9066586	1.51	1/08/07
			0.58*	No test*
			0.46*	No test*
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066528	15.48	10/16/06
			44.12	4/28/08
			26.57	10/31/08
			33.06	11/11/09
			22.74	12/14/10
			27.87	11/30/11
			49.97	2/19/13
<i>Poa fendleriana</i>	muttongrass	9066531	4.55	5/30/08
			0.70	11/20/08
			1.84*	No test*
<i>Andropogon halii</i>	sand bluestem	9066529	2.73*	No test*
			2.80	3/20/06
			8.89	3/21/07
			3.26	6/14/10
			9.84	7/07/10
			19.48	4/19/10

*Seed amount is noted in bulk, seed was not sent for testing due to an insufficient amount of seed or the seed on hand was from the park collections and not from harvest at the Los Lunas New Mexico Plant Materials Center.





MIDWEST REGION

Badlands National Park, South Dakota

Prepared by: **Bismarck, North Dakota, USDA NRCS Plant Materials Center**

Introduction. The National Park Service has a need to preserve the native plant resources and revegetate disturbed park lands. The National Park Service requires native plants restoration to be accomplished using germplasm from populations as closely related genetically and ecologically as possible to the park populations. Quantities of native seed are needed to revegetate areas disturbed by construction activities for the Cliff Shelf Slide Repair and Rehab Loop Road Phase IV. The National Park Service has requested assistance from the Bismarck North Dakota Plant Materials Center (NDPMC). The Bismarck North Dakota Plant Materials Center has agreed to increase seed of two selected grass species collected at Badlands National Park (BADL). Technical assistance for planting, growing, and cleaning of seed will also be provided to the park. The interagency agreement was signed in May 22, 2015, and expires December 31, 2018. All seed produced at the PMC will be made available to the National Park Service upon request.

Targeted plant species and goal seed increase amounts for the new agreement period of 2015–2018 are noted in the following table.

Badlands National Park			
Scientific Name	Common Name	Accession Number	PLS lbs/year
<i>Pascopyrum smithii</i>	western wheatgrass	9092165	100
<i>Bouteloua gracilis</i>	blue grama	9092168	40

Accomplishments. On April 22, 2015, a 1-acre field of western wheatgrass was seeded using a modified no-till planter. The drill planted the seed into 42-inch rows at ½-inch depth. A field of blue grama totaling 0.3 acres was established in 2012 as part of a previous agreement with the National Park Service. This blue grama field was increased to 0.5 acre on June 1, 2015, using a modified no-till drill with a row spacing of 42 inches. Weeds were controlled in both fields by hand roguing, mechanical clipping, and herbicides. Both fields emerged and stands could be rowed by the end of the 2015 growing season. The existing 0.3-acre stand of blue grama was harvested on September 3, 2015. This seed will be cleaned and tested.



Seed production, distribution, and inventory are summarized in the following table.

Badlands National Park						
Scientific Name	Common Name	Accession Number	Agreement Acreage	PLS (Lbs.)	Clean Bulk (Lbs.) Inventory	Test Date
<i>Bouteloua gracilis</i>	blue grama	9092168	0.5	3.7	4.1	3/23/2012
		9092168	0.5	96.1	109.0	2/21/2014
		9092168	0.5	12.6	15.0	5/11/2015
<i>Elymus trachycaulus</i>	slender wheatgrass	9092166	n/a	144.4	150.0	3/12/2013
		9092166	n/a	143.8	150.0	3/13/2013
		9092166	n/a	207.6	219.0	3/13/2013
<i>Nassella viridula</i>	green needlegrass	9092167	n/a	183.9	200.0	3/20/2013
		9092167	n/a	144.1	155.0	3/20/2013
		9092167	n/a	29.7	38.9	1/17/2013
		9092167	n/a	68.4	87.0	3/6/2014
<i>Pascopyrum smithii</i>	western wheatgrass	9092165	1.0	18.7	30.6	1/17/2014
<i>Sporobolus cryptandrus</i>	sand dropseed	9092169	n/a	6.1	7.1	4/18/2012
		9092169	n/a	10.1	12.7	12/20/2013

Technology Development. Combine settings, seed cleaning procedures, and seed tests have been documented and are available from the Bismarck North Dakota Plant Materials Center.



Bouteloua gracilis, accession 9063128, Bismarck, North Dakota, July 10, 2015.

Mount Rushmore National Memorial, South Dakota

Prepared by: Bismarck, North Dakota, USDA NRCS Plant Materials Center

Introduction. On August 30, 2013, the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), Bismarck North Dakota Plant Materials Center (NDPMC), entered into an interagency agreement with the United States Department of Interior (USDOI) National Park Service, Mount Rushmore National Memorial (MORU). The agreement period is from August 30, 2013, to September 30, 2017. The Bismarck North Dakota Plant Materials Center agrees to increase seed for use in rehabilitation of social trails at the Mount Rushmore National Memorial. Seed will be collected by National Park Service (NPS) staff and provided to the PMC for increase. The germplasm will be collected from populations as closely related as possible, both genetically and ecologically, to park populations. The seed harvested from these fields will be cleaned, tested, and distributed to Mount Rushmore National Memorial for reclamation projects. The following species and amounts have been agreed upon by both parties.

Targeted plant species and goaled seed increase amounts for the new agreement period of 2013-2017 are noted in the following table.

Mount Rushmore National Memorial				
Scientific Name	Common Name	Accession number	Acres of Seed Production	Seed Amount (PLS lbs/year)
<i>Andropogon gerardii</i>	big bluestem	9094438	0.8	80
<i>Schizachyrium scoparium</i>	little bluestem		0.8	80

Accomplishments. The seed provided by the National Park Service was initially weighed, cleaned, and accessioned in 2013. The clean seed was analyzed for germination and purity at the North Dakota State Seed Lab. On May 27, 2014, the big bluestem analysis was 76% germination and 85.2% purity. The little bluestem analysis was 53% germination and 73.6% purity. This seed was planted to a 0.8-acre field of big bluestem and a 0.8-acre little bluestem field in panel A-4 at the Bismarck North Dakota Plant Materials Center at a rate of 6.0 PLS lbs per acre of big bluestem and 4.0 PLS lbs per acre of little bluestem. The fields were irrigated, and broadleaf weeds were controlled in 2014 and 2015. The big bluestem field established very well, while the little bluestem was slow to establish. The little bluestem field was observed in the spring of 2015 with few plants growing. Because of the poor stand of the original planting, six additional rows of little bluestem were planted on the west edge of the existing field on June 11, 2015. Seedling vigor was observed on the newly seeded little bluestem field. Seed was dug from the field and some had germinated but failed to emerge above ground. The seed appeared to have enough energy to sprout but not to emerge and grow. The field was rated as poor at the end of the 2015 growing season. The future of the little bluestem planting will be decided in the spring of 2016. The big bluestem continued to establish, and the stand was excellent by the end of 2015. The big bluestem field was harvested with a combine on September 24, 2015. The field produced 202 lbs of bulk seed.



Seed production, distribution, and inventory are summarized in the following table.

Mount Rushmore National Memorial						
Scientific Name	Common Name	Accession Number	Agreement Acreage	2015 PLS (Lbs)	Clean Bulk (Lbs>) Inventory	Test Date
<i>Andropogon gerardii</i>	big bluestem	9094438	0.8	78.8	98.0	4/22/2016
<i>Schizachyrium scoparium</i>	little bluestem	9094437	0.8	n/a	n/a	n/a

Technology Development. All seed harvesting and cleaning protocols have been recorded and are available from the Bismarck North Dakota Plant Materials Center.



Andropogon gerardii, accession 9094438, Bismarck, North Dakota, July 8, 2015.

Theodore Roosevelt National Park, North Dakota

Prepared by: Bismarck, North Dakota, USDA NRCS Plant Materials Center

Introduction. The Natural Resources Conservation Service, Bismarck North Dakota Plant Materials Center (NDPMC) entered into a four-year cooperative agreement with National Park Service, Theodore Roosevelt National Park (THRO) to provide seed and technical information needed for revegetation of areas disturbed by construction activities in the South Unit Route 10 Scenic Loop Road of the Theodore Roosevelt National Park in western North Dakota. The contract is scheduled from March 12, 2015, through June 16, 2018. The Bismarck North Dakota Plant Materials Center has agreed to produce native grass seed of three species originally collected in the park by National Park Service personnel and PMC staff. The seed produced at the PMC will be distributed to the park for revegetation projects.

Targeted plant species and goaled seed increase amounts for the new agreement period of 2015-2018 are noted in the following table.

Theodore Roosevelt National Park			
Scientific Name	Common Name	Accession Number	PLS pounds/year
<i>Elymus trachycaulus</i>	slender wheatgrass	9092175	300
<i>Bouteloua curtipendula</i>	sideoats grama	9092174	80
<i>Bouteloua gracilis</i>	blue grama	9092173	30

Accomplishments. A 1-acre field of slender wheatgrass was seeded on May 21, 2015. The Bismarck North Dakota Plant Materials Center had planted a 0.3-acre field of sideoats grama in 2012 as part of a previous agreement with Theodore Roosevelt National Park. This existing field was increased to 1.0 acre on May 29, 2015. The fields were seeded with a modified no-till drill and seeded into 42-inch rows. The 0.3-acre blue grama field originally seeded in 2012 is an existing field from a previous agreement. The blue grama field was not increased and will be maintained as a 0.3-acre field. The three fields were irrigated throughout the summer and weeds were controlled with hand weeding, mechanical clipping, and herbicides. The sideoats grama field and blue grama field were harvested in 2015. Seed was cleaned at the PMC and tested for purity and germination by the North Dakota State Seed Lab. No seed was distributed to the park in 2015.



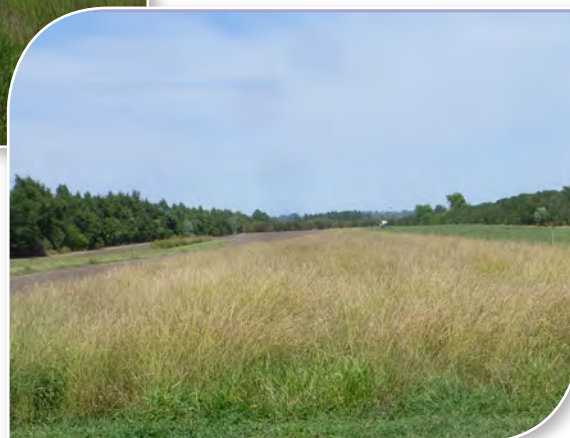
Seed production and inventory are summarized in the following table.

Theodore Roosevelt National Park							
Scientific Name	Common Name	Accession Number	Agreement Acreage	2015 Acreage	PLS (Lbs)	Clean Bulk (Lbs) Inventory	Test Date
<i>Bouteloua curtipendula</i>	sideoats grama	9092174	1.0	1.0	n/a	3.0	3/28/2012
		9092174	1.0	1.0	0.4	0.5	1/28/2010
		9092174	1.0	1.0	1.1	1.5	1/24/2013
		9092174	1.0	1.0	116.6	132.0	4/29/2015
		9092174	1.0	1.0	88.4	113.0	12/24/2015
<i>Bouteloua gracilis</i>	blue grama	9092173	0.3	0.3	30.5	43.0	5/1/2015
<i>Elymus trachycaulus</i>	slender wheatgrass	9092175	1.0	1.0	6.0	7.0	5/1/2015
<i>Koeleria macrantha</i>	prairie junegrass	9092176	n/a	n/a	2.9	5.5	4/2/2012
		9092176	n/a	n/a	1.1	1.4	8/6/2012
<i>Nassella viridula</i>	green needlegrass	9092171	n/a	n/a	1.8	2.0	3/13/2013
<i>Pascopyrum smithii</i>	western wheatgrass	9092172	n/a	n/a	2.0	16.0	3/29/2013
		9092172	n/a	n/a	113.3	129.0	2/6/2015

Technology Development. All seed harvesting and cleaning protocols have been recorded and are available from the Bismarck North Dakota Plant Materials Center.



Bouteloua curtipendula, accession 9092174, Bismarck, North Dakota, July 10, 2015.



Bouteloua curtipendula, accession 9092174, Bismarck, North Dakota, August 14, 2015.





PACIFIC WEST REGION

Crater Lake National Park, Oregon

Prepared by: **Corvallis, OR, USDA NRCS Plant Materials Center**

Introduction. The Corvallis Oregon Plant Materials Center (ORPMC) entered into an agreement with Crater Lake National Park (CRLA) in 2014 to evaluate, test, and propagate native plant materials for revegetation purposes (*East and West Rim Drives Rehabilitation Project*). It was agreed that the Corvallis Oregon Plant Materials Center would clean, visually analyze for viability, and store approximately 50 accessions of wild collected seed lots, as well as perform germination trials and develop propagation protocols for rare species, and ultimately produce 25,000 container plants to be planted in the park. Under the agreement, the Corvallis Oregon Plant Materials Center will also provide on-site consultation and training. Activities in 2015 included inspection and cleaning of provided seed, stratifying seed for plant production, completion of germination trials, site visit/consultation by ORPMC staff members in July, and collection of vegetative cuttings from the park in October.

Accomplishments. The *East and West Rim Drives Rehabilitation Project* encompasses five separate seed collection zones. Seed that was collected in 2015 was delivered to the Corvallis Oregon Plant Materials Center and cleaned. ORPMC staff cleaned approximately 48 accessions of seed totaling 35 lbs. Details regarding amounts of seed collected and seed in storage are included in the full technical reports.

The following table summarizes plant production initiated in winter of 2015.

Crater Lake National Park				
Scientific Name	Zone	QTY	Start Date	Treatment
<i>Achnatherum occidentale</i>	Northeast ERD	250	4-Jan	5 months cold strat
<i>Arctostaphylos nevadensis</i>	Northeast ERD	650	5-Jan	cold frame/heat mat
<i>Arctostaphylos patula</i>	Northeast ERD	450	5-Jan	cold frame/heat mat
<i>Carex halliana</i>	Northeast ERD	1,450	11-Dec	6 months cold
<i>Achnatherum occidentale</i>	Northwest ERD	1200	7-Jan	5 months cold strat
<i>Aconogonon davisiae</i>	Northwest ERD	500	7-Jan	cold frame
<i>Aconogonon davisiae</i>	North WRD	1,050	4-Jan	cold frame
<i>Eriogonum marifolium</i>	North WRD	400	4-Jan	4 months cold strat
<i>Eriogonum pyrolifolium</i>	North WRD	800	4-Jan	3 months cold strat
<i>Penstemon davidsonii</i>	North WRD	450	7-Jan	cold frame
<i>Achnatherum occidentale</i>	Central WRD	300	29-Dec	5 months cold strat
<i>Aconogonon davisiae</i>	Central WRD	425	29-Dec	cold frame
<i>Carex breweri</i>	Central WRD	1000	4-Jan	cold frame
<i>Ericameria geenei</i>	Central WRD	200	28-Dec	cold frame
<i>Eriogonum marifolium</i>	Central WRD	650	29-Dec	4 months cold strat
<i>Eriogonum pyrolifolium</i>	Central WRD	175	28-Dec	3 months cold strat
<i>Penstemon davidsonii</i>	Central WRD	100	29-Dec	cold frame
<i>Phlox diffusa</i>	Central WRD	200	28-Dec	4 months cold strat



Technology Development. Thirteen of the species had never been propagated before at the Corvallis Oregon Plant Materials Center. Informal germination trials were designed and set up for these species based on previous experience with similar species. Seeds were counted out in 50 seed sets and placed in plastic germination boxes on moistened germination paper. Two boxes for each treatment were either placed in a warm growth chamber set at 80°F days and 64°F nights in a walk-in cooler set at a constant 34°F or remained at room temperature in the ORPMC lab. After 6 weeks, 90 days, or 120 days in the cooler, the boxes were removed and placed either in the warm growth chamber or on the counter in the ORPMC lab.

Results of germination trials of 9 of the 13 CRLA species are noted in the following table. See the full technical report for additional details.

Crater Lake National Park				
Scientific Name	Treatment	Percent germination	Days of germination	Notes about germination
<i>Penstemon davidsonii</i> var. <i>davidsonii</i>	Warm+6 wks cold	24	4 months	Some initial germination happened in the warm (10-30%). But peak germination happened after 2-4 months in the cooler.
	Warm+ 90 days cold	44	4 months	
	Warm+ 120 days cold	62	4 months	
<i>Ericameria greenei</i>	Warm	48	30 days	Highest germination began when seeds were in cold strat for 3 weeks and remained in cold strat.
	6 weeks cold	80	35 days	
	90 days cold	84	60 days	
<i>Eriogonum pyrolifolium</i> var. <i>coryphaeum</i>	Warm	74	30 days	Seeds only germinated after being placed in the warm.
	6 weeks cold	74	25 days	
	90 days cold	84	10 days	
	120 days cold	90	10 days	
<i>Ericameria nauseosa</i>	Warm	46	30 days	Some seeds germinated in the cold, but a pulse of germination also occurred when placed in room temp.
	6 weeks cold	70	60 days	
	90 days cold	80	80 days	
<i>Aconogonon davisiae</i> var. <i>davisiae</i>	Warm	0		Seeds began to germinate in the cold, and continued to germ for about a week after moved to room temp.
	6 weeks cold	12	7 days	
	90 days cold	44	35 days	
	120 days cold	40	90 days	
<i>Boechera horizontalis</i>	Warm	0		Germination only occurred after cold strat, seeds germinated immediately when placed in the warm.
	6 weeks cold	100	7 days	
<i>Achnatherum occidentale</i>	Warm	60	90 days	Germination began after 2 months in the cooler, then continued
	6 weeks cold	60	20 days	
	90 days cold	86	60 days	
	120 days cold	82	60 days	

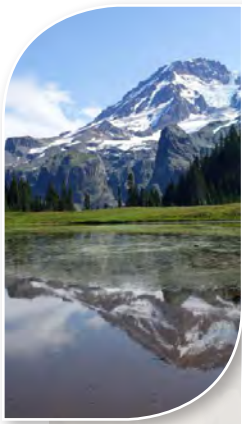
Crater Lake National Park				
Scientific Name	Treatment	Percent germination	Days of germination	Notes about germination
<i>Phacelia hastata</i> ssp. <i>compacta</i>	room temp	2	30 days	Germination began after 2 months in the cooler, then continued.
	6 weeks cold	6	2 weeks	
	90 days cold	8	2 weeks	
	120 days cold	26	45 days	
<i>Castilleja arachnoidea</i>	room temp	12	2 weeks	Germination began after 45 days in the cooler and continued for one week after being moved to warm.
	6 weeks cold	10	1 week	
	90 days cold	74	45 days	



An unheated greenhouse is a perfect environment for germinating Green's goldenweed (*Ericamerica greenei*) accession 9109286.

Cuttings of pinemat manzanita (*Arctostaphylos nevadensis*) accession 9109299.





Mount Rainer National Park, Washington

Prepared by: Corvallis, OR, USDA NRCS Plant Materials Center

Introduction. The Corvallis Oregon Plant Materials Center (ORPMC) entered into an agreement with Mount Rainier National Park (MORA) in 2015 to evaluate, test, and propagate native plant materials for revegetation purposes (*Rehabilitate Nisqually-Paradise Road Project*). It was agreed that the Corvallis Oregon Plant Materials Center would establish, harvest, and maintain four seed increase fields of three species. Grasses were collected from two elevation zones and will be isolated from each other to prevent cross-pollination. A total of 175 PLS lbs are expected from two grasses from the mid elevation zone and 300 PLS lbs are expected from three grasses from the high elevation zone.

Activities in 2015 included establishment and maintenance of four seed increase fields. Details are provided below.

Accomplishments. MORA staff collected seed for a few seasons in preparation for this project and delivered it to the Corvallis Oregon Plant Materials Center in early September 2014. ORPMC staff cleaned the seed and used it to establish five new fields.

Seed increase field sizes and direct seeding date are noted in the following table.

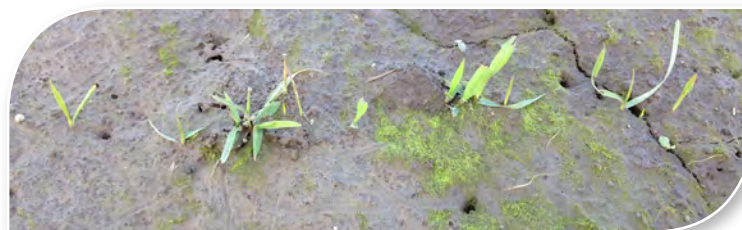
Mount Rainer National Park				
Scientific Name	Common Name	Accession and Source	Planting Date	Field Size (Acres)
<i>Elymus glaucus</i>	blue wildrye	9109226 (high)	09/22/15	0.35
		9109223 (mid)	09/22/15	0.25
<i>Bromus carinatus</i>	California brome	9109227 (high)	09/22/15	0.2
<i>Festuca rubra</i>	red fescue	9109225 (high)	10/01/2015	0.25
		9109224 (mid)	09/22/15	0.2

Technology Development. The Corvallis Oregon Plant Materials Center has grown many different collections of *Bromus carinatus* throughout its service area. A collection that has dormancy was never seen until this year. The brome seed was sown in the fall when temperatures were still favorable for germination. All other species that were fall planted had good germination in the fall, but no brome seedlings were noticed in the field in the fall or throughout the winter. In late March, bright green rows of seedlings finally appeared. It was an incredibly dry spring and summer at the Corvallis Oregon Plant Materials Center, and it was feared that the brome would not establish well if it was not irrigated. The field was irrigated every 3 to 4 weeks throughout the spring and summer.

None of the fields flowered nor produced seed this year, which is typical of these species. Harvest is expected for all fields in 2016.

There were no deliveries in 2015, and there is no seed in storage for this project.

California brome (*Bromus carinatus*), accession 9109227, Corvallis, Oregon, March 26, 2015.



California brome (*Bromus carinatus*), accession 9109227, Corvallis, Oregon, March 26, 2015.

Yosemite National Park, California

Prepared by: Lockford, California, USDA NRCS Plant Materials Center

Introduction. In 2013, the Lockford California Plant Materials Center (CAPMC) entered into an agreement with Yosemite National Park (YOSE) to produce seed of western needlegrass, *Achnatherum occidentale*, for restoration of native vegetation along the Tioga Pass. Under the original contract, there was a specification for planting 1 acre for seed production. This needed to be amended because there was insufficient seed and a low rate of germination precluding plug plant production.

The contract was amended for seed production of three additional species: blue wildrye (*Elymus glaucus*), and naked buckwheat (*Eriogonum nudum*), with seed provided by the park, and squirreltail (*Elymus elymoides*), with seed provided by the Upper Colorado Environmental Plant Center). Seed of these species was to be harvested, and the agreement ran through 2015.

Accomplishments. Blue wildrye planted in 2013 and squirreltail planted in October 2014 failed during 2015 and did not set seed. The problem was a combination of the drought and an influx of weeds of *Conyza bonariensis* and *Conyza canadensis*. These weeds are wind dispersed and now very common throughout the Central Valley in California. The weeds have become resistant to most herbicides and thrive on bare ground, including roadsides. Because of their herbicide resistance, cultivation was used to control them, but there was an additional flush of weeds with each irrigation or rainfall event. The grasses were out competed and did not produce seed.

A summary of the seed provided to the park in 2015 includes 6.2 lbs of squirreltail and 148 grams of naked buckwheat.

Technology Development. Seed of naked buckwheat (*Eriogonum nudum*) harvested in 2014 was treated with a fungicide and planted on February 2, 2015, into weed mat. The previous year's planting had contracted a soilborne pathogen, *Macrophomina phaseolina*, charcoal rot. This pathogen thrives on hot and dry conditions, and *Er. nudum* appears to be highly susceptible to this pathogen. It was hoped that the disease would not develop in the new planting area; however, there was still plant mortality of close to 20%. The plants bloomed profusely; however, there was no seed set. It was hoped that there might be a limited amount of seed and the chaff was harvested and cleaned in the normal way, but there was no seed present. It is unclear why this occurred, unless the higher temperatures associated with the weedmat in the summer interfered with seed set.



Left: Early bloom of *Eriogonum nudum* plants, Lockford, California, July 15, 2016.



Above: CAPMC staff plant *Eriogonum nudum* seeds into weedmat, Lockford, California, February 2, 2015.

Prepared by: Meeker, Colorado, Upper Colorado Environmental Plant Center

Tioga Road

Introduction. Yosemite National Park (YOSE) awarded Upper Colorado Environmental Plant Center (UCEPC) with the Indefinite Delivery/Indefinite Quantity (IDIQ) Contract AG-8B05-C-12-0002, Task Order No. P13PD00746 on July 24, 2013. The project, Rehabilitate Disturbed Areas along Tioga Road Phase I, requires revegetation with native seed indigenous to Yosemite National Park. The task order identifies the Upper Colorado Environmental Plant Center to propagate, establish, and maximize seed production from two 0.5-acre fields of native grass (*Bromus carinatus* and *Elymus elymoides*). The seed source was provided by collections made from park staff.

Accomplishments. The Upper Colorado Environmental Plant Center produced seed of Yosemite sources of *Bromus carinatus* and *Elymus elymoides* in 2015. Because of the impending need for seed application in the fall, the 2015 crops of bottlebrush and California brome were cleaned in September, samples sent in for seed testing, and all seed of both species was sent in a single shipment on October 13, 2015, directly to the park.

Seed production is summarized in the following table.

Yosemite National Park									
Scientific Name	Common Name	Planting Date	Harvest Year	Field Size (Acres)	Clean weight Bulk (Lbs)	PLS (Lbs)	Test Date	Bulk (Lbs) Delivered	Bulk (Lbs) On Inventory
<i>Bromus carinatus</i>	California brome	7/26/13	2014	0.5	66.0	30.48	3/2/15	66.0	0.00
			2015	0.5	140.0	101.6	11/10/15	140.0	0.00
<i>Elymus elymoides</i>	bottlebrush squirreltail	8/1/13	2014	0.5	7.0	NA	NA	*	0.00
			2015	0.5	1.0	0.88	10/14/15	0.00	1.0

* Shipped to the Lockford California Plant Materials Center as requested by Yosemite National Park.

Valley Loop and Camp 6

Introduction. Yosemite National Park (YOSE) used the Indefinite Delivery/Indefinite Quantity (IDIQ) Contract AG-8B05-C-12-0002 to request native seed production for the park through Task Order No. P15PD03472 with the period of performance starting September 15, 2015, and ending September 30, 2018. The project, Valley Loop and Yosemite Village Day Use Parking Area Restoration and Revegetation, requires revegetation with native seed indigenous to Yosemite National Park. The task order calls for Upper Colorado Environmental Plant Center (UCEPC) to produce seed of ten species collected by park staff. Seed collection amounts determined field sizes, which were targeted based on seed mix needs. *Bromus carinatus*, *Elymus glaucus*, *Leymus triticoides*, and *Poa secunda* were used to establish large seed fields, while *Achnatherum nelsonii*, *Achnatherum occidentale*, *Hosackia oblongifolia*, and *Acmispon americanus* were planted in small fields and plots. *Elymus elymoides* and *Achillea millefolium* will be established in the spring of 2016.



Elymus elymoides, Meeker, Colorado, June 2014.

Accomplishments. The Upper Colorado Environmental Plant Center cleaned seed as it was received from Yosemite National Park and relayed back to field staff seed amounts on hand and what additional amounts were necessary for planned field establishment. The first collections were received August 3, 2015, and continued through August 18, 2015. A teleconference between the park and the plant center was conducted on August 12 to make determinations on fields and sizes for planting based on clean seed amounts. Planting of the large grass fields commenced on August 14, 2015, and was completed on August 17, 2015. The small grass and forb fields were planted on a single day in November. It was assumed that these species may have high levels of seed dormancy, thus, it was determined that a late fall planting was most appropriate. The large grass fields will be expanded in 2016, and two additional plots, bottlebrush squirreltail and western yarrow, will be planted in the spring of 2016 to complete the terms of the task order.

Seed increase field sizes and direct seeding dates are noted in the following table.

Yosemite National Park				
Scientific Name	Common Name	Seed Received from YOSE (grams)	Planting Date	Field Size (Acres/Rows)
<i>Achnatherum nelsonii</i>	Columbia needlegrass	113 clean	11/23/15	0.1
<i>Achillea millefolium</i>	Western yarrow	28 unclean		
<i>Achnatherum occidentale</i>	California needlegrass	15 clean	11/23/15	2 - 75' rows
<i>Acmispon americanus</i>	American bird's foot trefoil	13 clean 18 unclean	11/23/15	2 - 75' rows
<i>Bromus carinatus</i>	California brome	854 8/4 collection 300 8/10 collection	8/17/15	0.5
<i>Elymus elymoides</i>	Bottlebrush squirreltail	10 clean		
<i>Elymus glaucus</i>	blue wildrye	1288 clean	8/14/15	0.5
<i>Hosackia oblongifolia</i>	narrow-leaved lotus	81 clean	11/23/15	0.07
<i>Leymus triticoides</i>	beardless (creeping) wildrye	190 clean	8/14/15	0.5
<i>Poa secunda</i>	Sandberg bluegrass	570 clean	8/14/15	0.5

Specifically, 3.2 acres of field production along with three production plots are required for the task order. Based on seed quantities and field sizes, a 0.1-acre field of western yarrow and a plot of 150 linear feet of bottlebrush squirreltail will be planted in June 2016, and three of the established grass fields will be expanded. The California brome field and the beardless (creeping) wildrye field will both be increased to 0.7 acre each and the blue wildrye field will be expanded to a full acre.

Technology Development. The Upper Colorado Environmental Plant Center treated California brome seed with 'Dividend' fungicide to prevent potential head smut infection.



NORTHEAST REGION

Gateway National Recreation Area, New York

Prepared by: Cape May, New Jersey Plant Materials Center

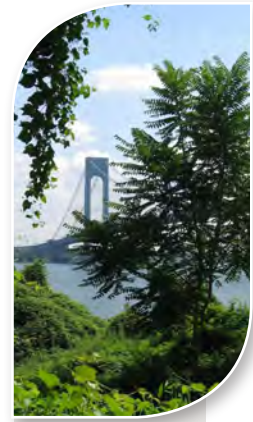
Introduction. In late October 2012, the coastline of Gateway National Recreation Area (GATE) that encompasses the Sandy Hook unit New Jersey and 2 units (Miller Field, Great Kills Park) on the southern side of Staten Island, New York, were dramatically affected by Superstorm Sandy. The natural ecosystems and some infrastructure were heavily damaged by the storm. In response to this need, the National Park Service (NPS) regional office in Boston contacted United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) headquarters to request assistance of the Cape May New Jersey Plant Materials Center (NJPMC) with providing plant materials for revegetating the damaged dunes and shorelines. The Cape May New Jersey Plant Materials Center and Gateway National Recreation Area have a nearly 25-year relationship centered on plant materials for the restoration of dunes, marshes, and natural areas in the various park units. In addition, the Cape May New Jersey Plant Materials Center has maintained some of the GATE germplasm of coastal plant materials in seed storage since the inception of this cooperative working relationship.

The most immediate need after the storm was to provide American beachgrass (*Ammophila breviligulata*) for initial stabilization of the dunes. A new beach grass production field was established from beach grass collected on the northern end (natural area) of the Sandy Hook Unit of Gateway. This new production field has produced an estimated 300,000 bare root plants in two growing seasons. In addition, this contract provides for production of two prime coastal shrubs, bayberry (*Morella pensylvanica*), and beach plum (*Prunus maritima*). Additional woody and herbaceous plants, such as coastal little bluestem (*Schizachyrium littorale*), switchgrass (*Panicum virgatum*), coastal panicgrass (*Panicum amarulum*), sumac (*Rhus* spp.), eastern red cedar (*Juniperus virginiana*), and black cherry (*Prunus serotina*) were produced to add diversity to the beach grass plantings.

The project was extended in 2015 an additional year to go through 2016.

Accomplishments. An interagency agreement with Gateway National Recreation Area was signed in July 2013 to provide up to 280,000 dormant bare root stems of American beachgrass and 1,500 bare root and/or containerized shrubs within the next 2 years. In addition, wild collections of targeted coastal plant materials and technical assistance through FY 15 (September 2015) will be accomplished.

A summary of plant species distributed through January 2016 is provided in the table on the following page.



Gateway National Recreation Area			
Scientific Name and Germplasm Source	Amount	Units (pots or culms)	Date
<i>*Ammophila breviligulata</i> (Gateway plumb beach germplasm)	8400	Culms	11/7/2013
	6800	Culms	11/12/2013
	4000	Culms	3/31/2014
	21,200	Culms	4/21/2014
	21,050	Culms	4/27/2014
Scientific Name	Amount	Units	Date
<i>* Ammophila breviligulata</i> (Sandy Hook Unit germplasm)	6000	Culms	12/10/2014
	2100	Culms	12/15/2014
	10,000	Culms	5/1/2015
	20,000	Culms	5/18/2015
	9900	Culms	6/1/2015
	6000	Culms	6/8/2015
	30,600	Culms	11/23/2015
	11,200	Culms	12/15/2015
	12,100	Culms	12/28/2015
	17,000	Culms	1/04/2016
TOTAL	190,350	Culms	
<i>Distichlis spicata</i>	100	Plugs	6/23/2014
	650	Plugs	8/25/2014
	650	Plugs	9/2/2014
TOTAL <i>Distichlis spicata</i>	1400	Plugs	
TOTAL Hibiscus moscheutos	7	2 gl. Pots	8/11/2014
<i>*Morella pensylvanica</i>	32	tree pots	6/16/2014
	48	tree pots	6/23/2014
	16	tree pots	7/14/2014
	100	plugs	6/8/2015
	100	plugs	6/15/2015
	30	quarts	6/15/2015
	600	plugs	10/7/2015
	200	plugs	10/13/2015
TOTAL <i>Morella pensylvanica</i>	1126		
<i>Juniperus virginiana</i>	300	plugs	6/22/2015
	50	plugs	10/13/2015
TOTAL <i>Juniperus virginiana</i>	350	plugs	
TOTAL <i>Opuntia humifusa</i>	16	plugs	8/11/2014

Gateway National Recreation Area			
Scientific Name	Amount	Units	Date
<i>Panicum amarum</i> var. <i>amarulum</i>	96	plugs	6/23/2014
	192	plugs	7/14/2014
	360	plugs	8/11/2014
	64	plugs	6/15/2015
	672	plugs	9/21/2015
TOTAL <i>Panicum amarum</i> var. <i>amarulum</i>	1384	plugs	—
<i>Panicum virgatum</i>	96	plugs	7/14/2014
	197	plugs	7/21/2014
TOTAL <i>Panicum virgatum</i>	293	plugs	—
<i>*Prunus maritima</i>	192	tree pots	6/9/2014
	160	tree pots	6/16/2014
	96	tree pots	6/23/2014
	153	tree pots	6/30/2014
	80	tree pots	7/14/2014
	48	tree pots	6/8/2015
	60	quarts	6/15/2015
TOTAL <i>Prunus maritima</i>	789		—
<i>Prunus serotina</i>	18	quarts	6/22/2015
TOTAL <i>Prunus serotina</i>	18		—
<i>Rhus copallinum</i>	27	quarts	6/22/2015
	78	quarts	10/13/2015
TOTAL <i>Rhus copallinum</i>	105		—
<i>Rhus typhina</i>	100	plugs	10/13/2015
	168	quart pots	8/4/2014
TOTAL <i>Rhus typhina</i>	268		—

*Highlighted = contracted species

Gateway National Recreation Area			
Available for 2016			
Scientific Name	Amount	Units	
<i>Ammophila breviligata</i>	180,000	Culms	
<i>Panicum virgatum</i>	21	PLS lbs seed	
<i>Opuntia humifusa</i>	300	2" plugs	
<i>Morella pensylvanica</i>	100	seedlings	
<i>Strophostyles helvola</i>	8.9	PLS lbs seed	

Future plans are to provide the grower industry with appropriate germplasm to be used to contract grow coastal plant materials for long-term needs within the park.

Technology Development. The park's most immediate need was to have local genetic material of coastal plants for stabilizing dune systems. However, the Cape May New Jersey Plant Materials Center will also be developing new seeding technology for adding plant diversity to the dunes within the park. Specifically, Gateway is interested in providing for more pollinator habitat on the dune systems by adding additional forbs and legumes to the dune plantings. This will require using seed lots in cold storage, as well as making additional wild collections of targeted species.

Some additional technologies include:

- Comparing the variability of beach grass genetics within the park (Sandy Hook vs. Plumb Beach) and the commercially available and widely planted Cape variety.
- Determining the viability of Gateway NPS seed that has been held in cold storage for up to 25 years.



Ammophila breviligata, planted at GATE, Miller Field.



ABOUT THIS DOCUMENT

Visit the Plant Materials Program Website (<http://Plant-Materials.nrcs.usda.gov>) and the PLANTS website (<http://plants.usda.gov>).

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APPENDIX



Plant Materials Centers				
Palmer, AK	Alaska PMC	5310 South Bodenbug Spur Road	Palmer, AK 99645	907.745.4469
Tucson, AZ	Tucson PMC	3241 North Romero Road	Tucson, AZ 85705	520.292.2999
Booneville, AR	Booneville PMC	6883 S. State Highway 23	Booneville, AR 72927	479.675.5182
Lockeford, CA	Lockeford PMC	PO Box 68, 21001 N. Elliot Road	Lockeford, CA 95237	209.727.5319
Meeker, CO	Upper CO Environmental Plant Center	5538 RBC #4	Meeker, CO 81641	970.878.5003
Brooksville, FL	Brooksville PMC	14119 Broad Street	Brooksville, FL 34601	352.796.9600
Americus, GA	Jimmy Carter PMC	295 Morris Drive	Americus, GA 31709	229.924.4499
Hoolehua, HI	Hoolehua PMC	PO Box 236	Hoolehua, HI 96729	808.567.6885
Aberdeen, ID	Aberdeen PMC	PO Box 296, 1691A South 2700 West	Aberdeen, ID 83210	208.397.4133
Manhattan, KS	Manhattan PMC	3800 S. 20th Street	Manhattan, KS 66502	785.539.8761
Galliano, LA	Golden Meadows PMC	438 Airport Road	Galliano, LA 70354	985.475.5280
Beltsville, MD	National PMC	Building 509, BARC-East, E. Beaver Dam Road	Beltsville, MS 20705	301.504.8175
East Lansing, MI	Rose Lake PMC	7472 Stoll Road	East Lansing, MI 48823	517.641.6300
Coffeeville, MS	Jamie L. Whitten PMC	2533 County Road 65	Coffeeville, MS 38922	662.675.2588
Elsberry, MO	Elsberry PMC	2803 N. Highway 79	Elsberry, MO 63343	573.898.2012
Bridger, MT	Bridger PMC	98 South River Road	Bridger, MT 59014	406.662.3579
Cape May, NJ	Cape May PMC	1536 Route 9 North	Cape May Court House, NJ 08210	609.465.5901
Los Lunas, NM	Los Lunas PMC	1036 Miller Street, SW	Los Lunas, NM 87031	505.865.4684
Big Flats, NY	Big Flats PMC	3266A State Route 352	Corning, NY 14830	607.562.8404
Bismarck, ND	Bismarck PMC	3308 University Drive	Bismarck, ND 58504	701.250.4330
Fallon, NV	Great Basin PMC	2055 Schurz Highway	Fallon, NV 89406	775.423.7957
Corvallis, OR	Corvallis PMC	3415 NE Granger Avenue	Corvallis, OR 97330	541.757.4812
Nacogdoches, TX	East Texas PMC	6598 FM 2782	Nacogdoches, TX 75962	936.564.4873
Kingsville, TX	Kika De La Garza PMC	3409 North FM 1355	Kingsville, TX 78363	361.595.1313
Knox City, TX	James E. "bud" Smith PMC	3776 Farm Road 1292	Knox City, TX 79529	940.658.3922
Pullman, WA	Pullman OMC	PO Box 646211, WSU	Pullman, WSU 99164	509.335.6892
Alderson, WV	Alderson PMC	PO Box 390, Old Prison Farm	Alderson, WV 24910	304.445.3005

For a current staff directory, please access: <http://plant-materials.nrcs.usda.gov/centers/>

