

# PLANT MATERIALS PROJECT SUMMARY REPORTS

from the Natural Resources Conservation Service to the National Park Service

**FY 2017**





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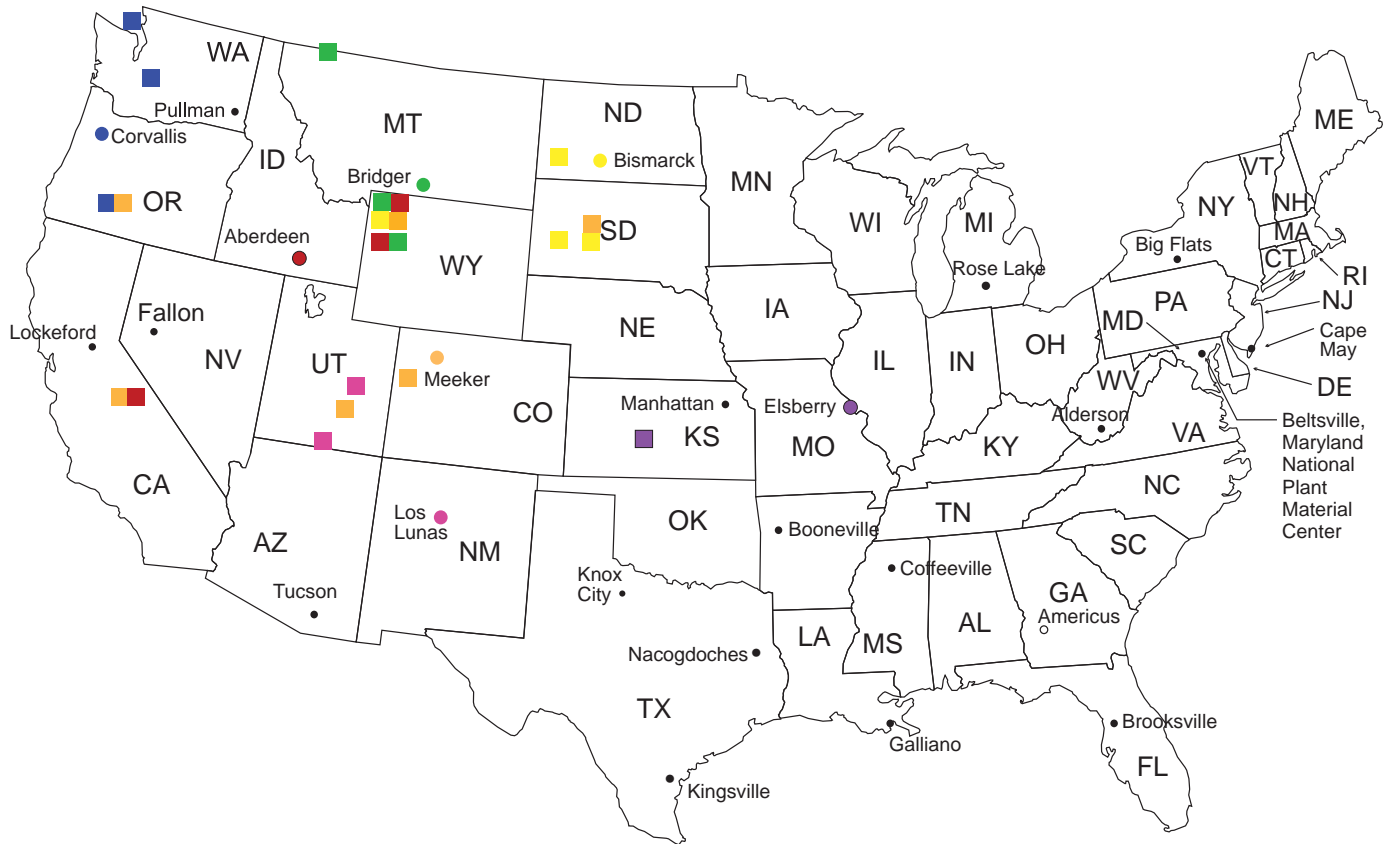
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## ACRONYMS

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BADL	Badlands National Park
BRCA	Bryce Canyon National Park
COLM	Colorado National Monument
CRLA	Crater Lake National Park
FOLS	Fort Larned National Historic Site
GLAC	Glacier National Park
GLCA	Glen Canyon National Park
GRTE	Grand Teton National Park
ID/IQ	Indefinite Delivery / Indefinite Quantity
IDPMC	Aberdeen Idaho Plant Materials Center
MOPMC	Elsberry Missouri Plant Materials Center
MORU	Mount Rushmore National Memorial
MORA	Mount Rainier National Park
MTPMC	Bridger Montana Plant Materials Center
NDPMC	Bismarck North Dakota 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
SAJU	San Juan Island National Historical Park
TAPR	Tallgrass Prairie National Preserve
THRO	Theodore Roosevelt National Park
UCEPC	Upper Colorado Environmental Plant Center
USDA	US Department of Agriculture
USDOI	US Department of the Interior
YELL	Yellowstone National Park
YOSE	Yosemite National Park

## NPS/NRCS Interagency Plant Materials Centers



Plant Materials Center	In cooperation with these National Park Units
Aberdeen, ID	● Grand Teton, Yellowstone, Yosemite
Bismarck, ND	● Badlands, Grand Teton, Mount Rushmore, Theodore Roosevelt
Bridger, MT	● Glacier, Grand Teton, Yellowstone
Corvallis, OR	● Crater Lake, Mount Rainer, San Juan Island
Elsberry, MO	● Fort Larned
Los Lunas, NM	● Arches & Canyonlands, Glen Canyon
Meeker, CO	● Badlands, Bryce Canyon, Crater Lake, Colorado National Monument, Yellowstone, Yosemite



## INTRODUCTION

This is the 2017 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 the USDA Plants Database.

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

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## FISCAL YEAR 2017 PROGRAM SUMMARY

### 2017 Cooperating NRCS Plant Centers:

- Aberdeen, Idaho
- Bismarck, North Dakota
- Bridger, Montana
- Corvallis, Oregon
- Elsberry, Missouri
- Los Lunas, New Mexico

Cooperating Conservation District Plant Center—Meeker, Colorado

### Native Seed and Plant Production

- 12 national parks
- 4,398 bulk pounds of seed
- 15,067 plants
- 72 different native species produced

### Park-Collected Native Seed Processed

- Five national parks
- 145 wildland collections
- one mechanically in-field harvested collection (FlaVac)
- more than 488 pounds of seed
- more than 160 different species





## NRCS National Technical Advisor Activities

### Technical

- Assistance for DSC professional staff engineers, landscape architects, project specialists, and project managers at the NPS Denver Service Center relative to revegetation project needs with 13 national parks in addition to those with interagency agreements.
- Assistance to 25 national parks and associated staff.
- Seven training sessions offered including seed collection, seed mix design, and wetland delineation.
- Two national presentations and one workshop offered.

### Development and Administration of Interagency Agreements and Task Orders

- Four new agreements, nine new task orders, and seven modifications to agreements totaling \$1,001,587 in funding were coordinated by the NRCS national technical advisor.
- A total of 32 interagency agreements were administered and coordinated.
- There were 32 active projects at 13 national park units that cooperated with six NRCS plant materials centers and one conservation district plant materials center.

### Interagency Agreements and Task Orders Reviewed

Arches and Canyonlands National Parks

Badlands National Park

Bryce Canyon National Park

Colorado National Monument

Crater Lake National Park

Fort Larned National Historic Site

Gateway National Recreation Area

Glacier National Park

Glen Canyon National Recreation Area

Grand Teton National Park

Mount Rainier National Park

Mount Rushmore National Park

San Juan Island National Historical Park

Theodore Roosevelt National Park

Tallgrass Prairie National Preserve

Yosemite National Park

Yellowstone National Park

### Technology Transfer and Research

- Training and information provided included basic Federal Lands Highway Program guidelines, examples of revegetation specifications, tools (seed collection techniques, seed storage, seed mix design, 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 and nine 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 2017 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, propagation, and increase of native grass seed collected by the park staff. Increased seed of Indian ricegrass (*Achnatherum hymenoides*) is used by the National Park Service to restore project areas within the two national parks.

**Accomplishments.** A new interagency agreement was initiated 08/08/2016 to continue seed production of three fields of *Achnatherum hymenoides* through 2018. Seed production and seed shipments are summarized in the following tables.



#### Seed Production for Arches National Park

Scientific Name	Common Name	Accession Number	Park Location	2016 Field Size (Acres)	Harvest Year	PLS (lbs)	Cleaned Bulk Inventory (lbs)	Test Date
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066888	Arches	0.5	2017	25.70	36.25	10/10/2017

#### Seed Production for Canyonlands National Park

Scientific Name	Common Name	Accession Number	Park Location	2016 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	2017	39.99	42.06	2/19/2018
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066908	Needles	0.50	2017	32.46	58.4	3/6/2018

#### Seed Shipment for Arches and Canyonlands National Parks

Scientific Name	Common Name	Accession Number	NRCS Lot Number	Viability (%)	Amt. Shipped (lbs)
<i>Pleuraphis jamesii</i>	James' galleta	9066107	SFP-97-F26NCANYN	21	2.0
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066888	SFP-16-F27N ARCH	75	14.90
—	—	—	SFP-17-F27NARCH	71	36.25
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066907	SFP-16-F24NCANYN	78	5.26
—	—	—	SFP-17-F24NCANYN	95	42.06
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066908	SFP-16-F33NCANYN	70	20.0
—	—	—	SFP-17-F33NCANYN	—	58.4





Canyonlands National Park, *Achatherum hymenoides*, accession 9066907, Islands in the Sky, Los Lunas, New Mexico, May 2017.



## 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 of Indian ricegrass (*Achnatherum hymenoides*) and nodding brome grass (*Bromus anomalus*) for Bryce Canyon National Park (BRCA). Task Order No. P15PD02452 was initiated in August 2015 for one additional year of production of both species in 2016. In 2017, a sole source contract was ratified to extend production of the Indian ricegrass through 2020.

**Accomplishments.** The Upper Colorado Environmental Plant Center harvested both species in 2017. The Indian ricegrass seed was cleaned with an experimental cleaning machine. A total of 9.2 pounds was produced in 2017. The *Bromus anomalus* field produced 29 clean pounds of seed in 2017, but the Pure Live Seed was only 62%. It is our recommendation to remove the *Bromus anomalus* field from production.

No seed shipments were made to Bryce Canyon in 2017.

The following table shows information for the last four years of seed production for *Bromus anomalus* and *Achnatherum hymenoides*.

### Seed Production for Bryce Canyon National Park

Scientific Name	Common Name	Field Size (Acres)	Harvest Year	PLS (lbs)	Bulk Delivered (lbs)	Bulk Inventory (lbs)	Test Date
<i>Bromus anomalus</i>	nodding brome	0.5	2011	59.9	191.0	0.0	1/30/12
<i>Bromus anomalus</i>	nodding brome	—	2012	1.3	0.0	3.5	1/22/13
<i>Bromus anomalus</i>	nodding brome	—	2013	14.2	28.0	0.0	3/7/14
<i>Bromus anomalus</i>	nodding brome	0.7	2014	51.1	86.0	0.0	2/26/15
<i>Bromus anomalus</i>	nodding brome	—	2015	13.6	34.8	0.0	2/11/16
<i>Bromus anomalus</i>	nodding brome	—	2016	38.2	0.0	64.5	3/2/17
<i>Bromus anomalus</i>	nodding brome	—	2017	18.04	0.0	29.0	2/22/18
<i>Achnatherum hymenoides</i>	Indian ricegrass	0.5	2012	0.0	0.0	0.0	Replanted
<i>Achnatherum hymenoides</i>	Indian ricegrass	—	2013	7.09	19.5	0.0	3/7/14
<i>Achnatherum hymenoides</i>	Indian ricegrass	—	2014	20.82	24.0	0.0	2/26/15
<i>Achnatherum hymenoides</i>	Indian ricegrass	—	2015	33.41	34.8	0.0	3/24/16
<i>Achnatherum hymenoides</i>	Indian ricegrass	—	2016	26.33	0.0	26.6	6/23/2017
<i>Achnatherum hymenoides</i>	Indian ricegrass	—	2017	8.6	0.0	9.2	5/17/18

### Technology Development.

A Carter-Day indent cleaner was used to clean *Achnatherum hymenoides*. It was found that a minimum of 25 pounds of bulk materials is necessary to properly charge the cleaner.

Bryce Canyon National Park, *Achnatherum hymenoides*, Meeker, Colorado, 2017.



## Forb and Grass Seed Increase

**Introduction.** Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract No. AG-8B05-C-12-0002 was initiated March 17, 2015. Task Order No. P16PD03151 requested a repeat of all actions conducted in the previous Task Order No. P15PD00709 for Bryce Canyon National Park. Specifically, the contract called for seed production of bottlebrush squirreltail (*Elymus elymoides*), six forbs, and containerized production of 100 snowberry plants from park-obtained cuttings.

**Accomplishments.** The 0.4-acre field of bottlebrush squirreltail produced 36.5 pounds of clean seed on July 17, 2017. Unfortunately, forb production was essentially nonexistent in 2017. One product, Wheeler’s thistle (*Cirsium wheeleri*), produced a nominal amount of seed at 220 grams. The harvested clean seed amounts are provided in the table below. Four of the annual forbs were replanted with 2016 produced seed for seed production in 2017. Germination occurred in all species except the *Corydalis*, which did not produce any seedlings. These forbs were planted on October 18, 2016, into Field 16 South and included *Corydalis*, *Dracocephalum*, *Erysimum*, and *Machaeranthera*. Two species, *Packera* and *Cirsium*, both biennials or short-lived perennials, were not replanted. However, both materials had reasonable stands in the spring of 2017, and the *Cirsium* produced more seed than it did in 2016. Again, the percent stands of the forbs seemed adequate for reasonable seed yields, but no forbs did well at the Upper Colorado Environmental Plant Center in 2017 because of an unseasonably late frost in mid-June. For reference, please view the photograph below of the *Packera* field, which produced no seed.

The following table recaps planting and seed production of each species.

### Seed Production for Bryce Canyon National Park

Scientific Name	Common Name	Field Size	Harvest Year	Bulk weight	Bulk Delivered	PLS %	PLS (lbs)	Test Date
<i>Elymus elymoides</i>	bottlebrush squirreltail	0.40 acre	2015	10.2 lbs	2.4	79.8	8.14	10/2/15
<i>Elymus elymoides</i>	bottlebrush squirreltail	—	2016	17.4 lbs	—	73.34	12.76	10/25/16
			2017	36.5 lbs	—	84.64	30.89	2/22/18
<i>Cirsium wheeleri</i>	Wheeler’s thistle	560 ft	2016	159 g	159 g	NA	NA	NA
			2017	220 g	0.0	NA	NA	NA
<i>Corydalis aurea</i>	scrambled eggs (fumewort)	100 ft	2016	15 g	—	NA	NA	NA
			2017	NA	—	NA	NA	NA
<i>Dracocephalum parviflorum</i>	American dragonhead	100 ft	2016	3.6 lbs	3.2 lbs	NA	NA	NA
			2017	8 g	—	NA	NA	NA
<i>Erysimum asperum</i>	western wallflower	1,625 ft	2016	5.2 lbs	4.6 lbs	NA	NA	NA
			2017	NA	—	NA	NA	NA
<i>Machaeranthera canescens</i>	hoary tansyaster	75 ft	2016	61 g	43 g	NA	NA	NA
			2017	NA	—	NA	NA	NA
<i>Packera multilobata</i>	lobeleaf groundsel	250 ft	2016	16 g	—	NA	NA	NA
			2017	NA	—	NA	NA	NA



On April 11, 2017, Upper Colorado Environmental Plant Center staff met with Bryce Canyon personnel at Green River, Utah, to pick up wildland cuttings of snowberry for propagation. These materials were immediately processed and planted for rooting. The cuttings had already broken bud and formed leaves, and unfortunately, there were no rooted plants produced from 200 individual cuttings from this effort.

**Technology Development.** Specific cultural practices, harvest, and cleaning protocols were used to produce seed from each product. Complete failure on newly leafed or budded snowberry is noteworthy since these results were not expected.



Bryce Canyon National Park, *Packera multilobata*, Meeker, Colorado, 2017.



Bryce Canyon National Park, *Elymus elymoides*, Meeker, Colorado, 2017.

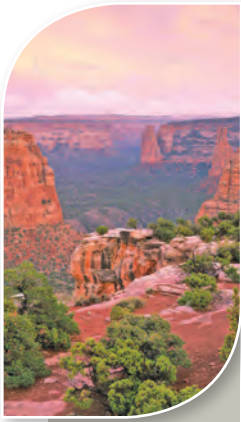


Photo credit:  
Rob Kurtzman

## Colorado National Monument, Colorado

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

**Introduction.** Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002, Task Order No. P14PD03601 was modified on July 16, 2016, to add options for seed production of Indian ricegrass (*Achnatherum hymenoides*), Sandberg bluegrass (*Poa secunda*), and Utah sweetvetch (*Hedysarum boreale*) through the field season of 2019. An additional task order (P16PD02015) was initiated for seed production of Salina wildrye (*Leymus salina*) through 2019.

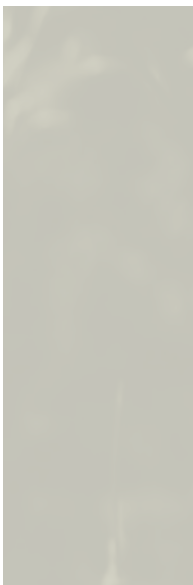
**Accomplishments.** In 2017, Upper Colorado Environmental Plant Center (UCEPC) maintained fields of *Poa secunda*, *Hedysarum boreale*, and *Achnatherum hymenoides* but obtained only very small seed yields from these materials because of an unseasonably late frost in mid-June. From collections conducted by Colorado National Monument staff, the Upper Colorado Environmental Plant Center established a 0.5-acre field of *Leymus salina* on August 5, 2016, in a spaced planting that was conducted by hand. The Upper Colorado Environmental Plant Center also assisted in seed collection of this species on June 27, 2016.

All fields are now established with seed production expected for years 2017–2019.

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

### Seed Production for 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
<i>Achnatherum hymenoides</i>	Indian ricegrass	9/1/15	2015	0.67	6.7	6.1	6.7	1/25/16
			2016		4.8	3.83		3/2/17
			2017		1.4	NA		NA
<i>Hedysarum boreale</i>	Utah sweetvetch	8/7/15	2016	0.13	NA	—	Trace	NA
			2017		NA	—	Trace	NA
<i>Leymus salina</i>	Salina wildrye	8/5/2016	—	0.5	—	—	—	—
<i>Poa secunda</i>	Sandberg bluegrass	7/29/15	2016	1.2	NA	—	Trace	NA
			2017		2.8	—		NA



Colorado National Monument, *Hedysarum boreale*, Meeker, Colorado, 2017.



## 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 and the development of technologies for the restoration of disturbances resulting from road construction and other projects within park boundaries.

**Accomplishments.** In 2017, 93 seed lots representing 48 species were shipped to Glacier National Park or used for seed increase. The total weight of seed delivered was 34.96 lbs. Seed distribution included 34 grasses (19 species), 49 forbs (23 species), and 10 woody plants (6 species). Twenty-eight wildland seed collections for the park were processed at Bridger Montana Plant Materials Center in 2017. These consisted of 13 grass lots (11 species), 10 forb lots (8 species), and 5 woody plant lots (4 species). The combined weight of all collections was 3.62 lbs. Only one new site: species collection was identified and assigned a new accession number (*Achillea millefolium* – 9091208, Siyeh Bend).

Seed increase fields, planting date, field size, and pounds produced as of December 31, 2017, appear in the first table below. No new seed production fields were installed at the Bridger Montana Plant Materials Center for Glacier National Park in 2017. One field, *Carex microptera* (9087799 – Lake McDonald) was retired.

### Seed Production for Glacier National Park

Scientific Name	Common Name	Accession Number/ GLAC ID	Planting Date	Field Size (acres)	Bulk Cleaned Seed (kg)/lbs	Status
<i>Bromus carinatus</i>	California brome	9087612/LML	5/05/14	0.03 FLD 5	2.900 6.39	—
<i>Bromus vulgaris</i>	Columbia brome	9088297/MG	6/20/13	0.06 FLD 4	0.449 0.989	—
<i>Carex microptera</i>	small wing sedge	9087799/LM	6/07/11	0.03 FLD 4	0.212 0.467	removed
<i>Elymus glaucus</i>	blue wildrye	9075846/SML	6/20/13	0.06 FLD 4	0.7000 1.54	—
<i>Eurybia conspicua</i>	eastern showy aster	9087433/LM	7/01/14	0.03 FLD 4	0.042 0.92	—
<i>Eurybia conspicua</i>	eastern showy aster	9088061/SML	6/23/13	0.03 FLD 5	1.431 3.15	—
<i>Festuca idahoensis</i> 1	Idaho fescue	9081497/TM	8/21/15	0.33 FLD 11	8.618 18.99	—
<i>Potentilla arguta</i> ssp. <i>arguta</i>	tall cinquefoil	9087975/SM	8/13/15	0.015 FLD 4	0.075 0.165	—
<i>Potentilla hippiana</i>	wooly cinquefoil	9063269/SM	8/13/15	0.03 FLD 4	1.475 3.25	—
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	9081993/SML	8/21/15	0.05 FLD 11	0.174 0.383	—
<i>Symphyotrichum laeve</i> var. <i>geyeri</i>	Geyer's aster	9078605/LM	8/15/12	0.04 FLD 4	0.036 0.079	—
<i>Symphyotrichum laeve</i> var. <i>geyeri</i>	Geyer's aster	9078464/MG	6/20/13	0.05 FLD 5	0.134 0.295	—



The following table summarizes the containerized plants delivered in 2017 and held in cold storage as of December 31, 2017.

**Summary of Plants Delivered to Glacier National Park**

Scientific Name	Common Name	Accession Number	Park Location and (GLAC Lot ID) #	Planting Date	Units #	Container Size Cubic Inches	Delivery Status
<i>Mahonia repens</i>	Oregon grape	9091051	Grinnel Trailhead Many Glacier-Low (14-041)	1/26/15	23	7	Held in storage



Glacier National Park,  
*Potentilla hippiana*, accession  
9063269, Bridger, Montana,  
July 2017.



Glacier National Park,  
*Festuca idahoensis*,  
accession 9081497,  
Bridger, Montana,  
July 2017.

## 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 to facilitate the propagation of seed collected by GLCA staff to increase the native grasses, shrubs, and tree species available to revegetate park lands. The terms of this agreement were modified and extended to December 31, 2017, to continue the seed production of purple threeawn (*Aristida purpurea*).

**Accomplishments.** Seed production and plug shipments for 2017 are detailed in the following tables.



### Seed Production for Glen Canyon National Recreation Area

Scientific Name	Common Name	Accession Number	Lot Number	Field Size (Acres)	Harvest Year	Uncleaned Bulk lbs	PLS Shipped lbs	Test Date
<i>Aristida purpurea</i>	purple threeawn	9067016	SFP-17-F21S GLEN	0.25	2017	6.6	.69	2/8/2018

### Plug Shipment for Glen Canyon National Recreation Area

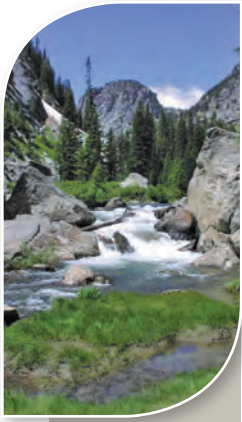
Scientific Name	Common Name	Accession Number	Plugs Shipped in 2017
<i>Aristida purpurea</i>	purple threeawn	9067016	400



Glen Canyon National Park, *Aristida purpurea* plants received from the Los Lunas Plant Materials Center, 2017.

Glen Canyon National Park, *Aristida purpurea*, accession 9076016, Los Lunas Plant Materials Center staff removing plant plugs, Los Lunas, New Mexico





## 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 idahonensis*) 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 *Festuca idahonensis* field was harvested from 2009 to 2014. In 2010, a second field of *Bromus marginatus* was planted for seed harvests in 2011 and 2012. A new *Festuca idahonensis* field (1 acre) was established in 2012 for seed production in 2013 through 2014 but was extended to 2015. In 2015, 2 acres each of *Bromus marginatus* and *Festuca idahonensis* and a 1-acre field of *Elymus glaucus* were established. In 2015, 650 x 6 ft rows of Sulphur buckwheat (*Eriogonum umbellatum*), showy goldeneye (*Heliomeris multiflora*), and one-flower sunflower (*Helianthella uniflora*) were also installed using greenhouse grown materials. *Eriogonum umbellatum* had excellent establishment but did not produce any seed until 2017. *Heliomeris multiflora* had fair establishment from the transplants, and a small amount of seed was harvested in 2015. Full harvests occurred in both 2016 and 2017. *Helianthella uniflora* did not establish from transplants or direct seeding efforts. In 2016, the Aberdeen Idaho Plant Materials Center assisted with harvesting the *Elymus trachycaulus* in the Elbo West field at Grand Teton National Park, and the seed was processed at the plant materials center. In 2017, GRTE staff conducted on-site harvests of *Elymus trachycaulus* for processing at the plant materials center.

Seed production and inventory is summarized in the following table.

**Seed Production for Grand Teton National Park**

Scientific Name	Common Name	Field Size (Acres)	Year Planted	2017 Cleaned Bulk (lbs)	2017 PLS (lbs)	Total PLS Inventory (lbs)*	Test Date
<i>Bromus marginatus</i>	mountain brome	2.0	2015	81	48	48	2/21/18
<i>Elymus glaucus</i>	blue wildrye	1.0	2015	270	267	267	2/15/18
<i>Elymus trachycaulus</i>	slender wheatgrass	13.6	NA**	388	345	345	2/26/18
<i>Festuca idahoensis</i>	Idaho Fescue	1.0	2012	219	166	960	3/6/18
<i>Heliomeris multiflora</i>	showy goldeneye	6' by 650'	2015	2.8	2.8	7.3	Not tested
<i>Eriogonum umbellatum</i>	sulphur buckwheat	6' by 650'	2015	0.4	0.4	0.4	Not tested

\* Includes prior harvests

\*\* In situ harvest of Elbo West field in 2017

To date, the Aberdeen Idaho Plant Materials Center has delivered 3,063 lbs of seed to Grand Teton National Park during this project. The plant materials center currently has 48 lbs of *Bromus marginatus*, 1,011 lbs of *Festuca idahoensis*, 345 lbs of *Elymus trachycaulus*, 267 lbs of *Elymus glaucus*, 0.4 lbs of *Eriogonum umbellatum*, and 7.3 lbs of *Heliomeris multiflora* in inventory (not including the originally provided seed).



Grand Teton National Park,  
*Bromus marginatus*,  
Aberdeen, Idaho, 2017.



Grand Teton National Park,  
*Festuca idahoensis*,  
newly installed field,  
Aberdeen, Idaho, 2017

#### 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 Grand Teton National Park to grow and produce seed of slender wheatgrass (*Elymus trachycaulus*) and mountain bromegrass (*Bromus marginatus*) for use in the 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 plant materials center 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.

**Accomplishments.** One-acre fields of both *Elymus trachycaulus* and *Bromus marginatus* are established and being maintained for seed production at the plant materials center. Both fields were fertilized in April with 40 lbs of actual nitrogen (urea 46-0-0). Weed control included herbicide application, tilling between rows, and hand weeding. The *Elymus trachycaulus* and *Bromus marginatus* fields were harvested by combine. The *Bromus marginatus* field continues to be a challenge to grow and produce seed at the Bismarck, North Dakota, location. No seed was distributed to the park in 2017.

Seed production and distribution are summarized in the following table.

**Seed Production and Distribution for Grand Teton National Park**

Scientific Name	Common Name	Accession Number	Date Planted	Field Size (Acres)	Harvest Year	PLS (lbs)	Distribution 2017 lbs	Test Date
<i>Bromus marginatus</i>	mountain brome	9094354	4/22/15	1.0	2017	65	0	1/10/2018
<i>Elymus trachycaulus</i>	slender wheatgrass	9094353	5/21/2015	1.0	2016 2017	324 223	0	4/12/2017 1/5/2018

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

Grand Teton National Park, *Elymus trachycaulus*, accession 9094353, Bismarck, North Dakota, July 2017.



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

**Introduction.** Beginning in 2011, the Bridger Montana Plant Materials Center (MTPMC) entered into a cooperative agreement with Grand Teton National Park (GRTE) to increase seed of native grasses for restoration projects within park boundaries and, if necessary, develop technologies for their successful production. In 2016, a new multi-year agreement was initiated to increase seed of Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*).

**Accomplishments.** No seed allocations were made directly to Grand Teton National Park in 2017. Wildland seed of *Festuca idahoensis* (9091154) and *Pseudoroegneria spicata* (9091155) was used at the Bridger Montana Plant Materials Center to plant two seed increase fields. No wildland or increase seed was processed at this plant materials center for Grand Teton National Park in 2017.

There were no seed increase fields for Grand Teton National Park in production at the Bridger Montana Plant Materials Center as of January 1, 2017. On April 21, 2017, an approximately 1-acre field of *Festuca idahoensis* (9091154) was planted in Field 21. On April 24, 2017, another approximately 1-acre field of *Pseudoroegneria spicata* (9091155) was planted in Field 21. Seedling emergence of *Festuca idahoensis* was very poor by late summer, and the entire field was removed and maintained fallow for the remainder of the 2017 growing season. A spring 2018 replant is planned.

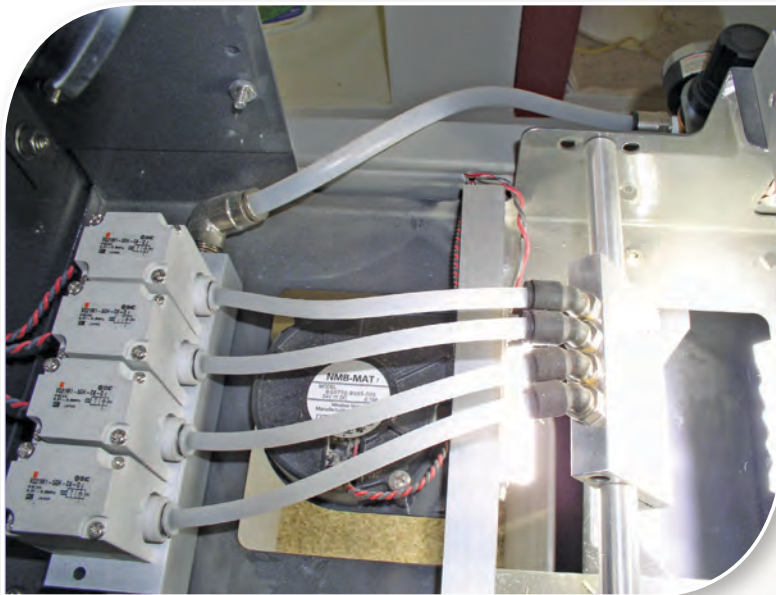
Status of seed increase fields for Grand Teton National Park is provided in the following tables for 2017 and early 2018 (March 1, 2018), respectively.

## Status of Seed Increase Fields for 2017 for Grand Teton National Park

Scientific Name	Common Name	Number	Date Planted	Acres	Status
<i>Festuca idahoensis</i>	Idaho fescue	9091154	4/21/2017	0.97	removed
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	9091155	4/24/2017	0.97	remaining

## Status of Seed Increase Fields for early 2018 (March 1, 2018) for Grand Teton National

Scientific Name	Common Name	Accession Number	Lot I D	Total Bulk (lbs)	PLS (lbs)
<i>Festuca idahoensis</i>	Idaho fescue	9088206	SCO-14-GTF12	297.8	288.9
<i>Festuca idahoensis</i>	Idaho fescue	9088206	SCO-15-GTF12	50.0	46.5
<i>Poa secunda</i>	Sandberg bluegrass	9088212	SCO-14-GTF12POA	76.0	68.8
<i>Poa secunda</i>	Sandberg bluegrass	9088212	SCO-15-GTF12POA	0.5	NA
<i>Poa secunda</i>	Sandberg bluegrass	9090925	SCO-14-GTF20	60.0	44.0
<i>Poa secunda</i>	Sandberg bluegrass	9090925	SCO-15-GTF20	5.0	NA



Color sorter processing of wildland seed of *Festuca idahoensis*, accession 9091154, Bridger, Montana, July 2017.



## 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 Yellowstone National Park (YELL) to produce seed of Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and needle-and-thread (*Hesperostipa comata* ssp. *comata*) for use on restoration sites at the park.

**Accomplishments.** The *Hesperostipa comata* ssp. *comata* was harvested as hay mulch and baled for transport to the park in 2010 through 2012. *Hesperostipa comata* ssp. *comata* is no longer in production at the Aberdeen Idaho Plant Materials Center. Seed was harvested from the *Poa secunda* field in 2010 through 2013 and the *Pseudoroegneria spicata* field in 2011 to 2013. New, 2.5-acre seed fields of *Poa secunda* and *Pseudoroegneria spicata* were planted in May 2013 to produce seed in 2014 and 2015. These fields were extended for production in 2016 and then discontinued. A new, 2.0-acre field of *Pseudoroegneria spicata* was installed in 2016.

Seed production and inventory is summarized in the following table.

**Seed Production for Yellowstone National Park**

Scientific Name	Common Name	Acres	Year Planted	2017 Cleaned (lbs)	2017 PLS (lbs)	Total PLS Inventory (lbs)	Test Date
<i>Pseudoroegneria spicata</i> *	bluebunch wheatgrass	2.5	2013	697	648	648	2/27/18

\**Pseudoroegneria spicata* field contains high amounts of *Elymus trachycaulus*. The two species were managed and processed together as a blend.

To date, the plant materials center has delivered 265 lbs of *Poa secunda* and 551 lbs of *Pseudoroegneria spicata* during this project. The Aberdeen Idaho Plant Materials Center currently holds 508 lbs Pure Live Seed (PLS) of *Poa secunda* and 648 lbs PLS of *Pseudoroegneria spicata* in inventory.



Cleaning Yellowstone National Park *Poa secunda*, Aberdeen, Idaho, 2016.



Yellowstone National Park *Pseudoroegneria spicata* seed, Aberdeen, Idaho, 2016.



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 and the development of revegetation technologies for restoring road construction and other improvement project disturbances within park boundaries. Yellowstone National Park forecasts future road construction projects with indigenous seed and/or plant collection needs. Production efforts will begin three years in advance of project initiation. Wildland seed collections are collected by YELL staff, dried, and delivered to the Bridger Montana Plant Materials Center for processing, accessioning, and entry into a database.

**Accomplishments.** In 2017, five allocations of 63 seed lots totaling 625.3 lbs were distributed to Yellowstone National Park for use in revegetation projects or for seed increase at the Bridger Montana Plant Materials Center. The seed distribution included 39 grass lots (16 species) totaling 621.8 lbs, 23 forb lots (16 species) totaling 3.29 lbs, and one shrub lot (0.22 lbs). In addition, 41 wildland seed collections were processed at the plant materials center and yielded 84.25 lbs of bulk seed, including 57.5 lbs from 16 grass lots (10 species), and 26.8 lbs from 25 forb lots (18 species). Twenty-three new species/site collections were identified and new accession numbers assigned.

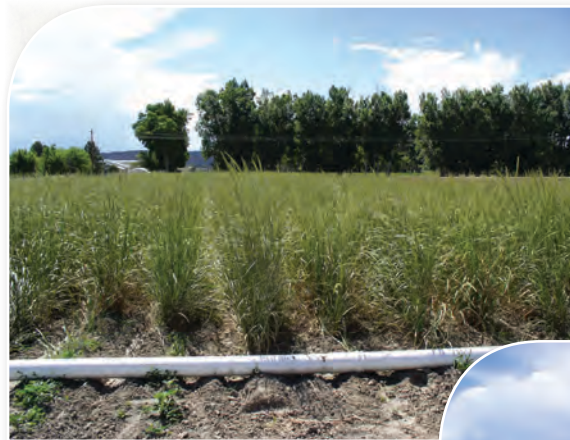
Thirteen fields totaling 5.71 acres were in production in the spring of 2017 for Yellowstone National Park. In addition, four new seed production fields totaling 2.3 acres were planted in 2017, including one basin wildrye (*Leymus cinereus*, 9088032 – Site 45), one Idaho fescue (*Festuca idahoensis*, 9087324 – Site 64), and two slender wheatgrass (*Elymus trachycaulus*, 9087474 and 9063443 – Sites 146 and 31, respectively). Poor emergence and establishment of the *Festuca idahoensis* stand (0.34 acres) resulted in its removal, with a planned replant in spring 2018. An additional four stands totaling 1.52 acres were removed in 2017 because of poor seed production, establishment, or weeds. Of the 13 fields in production in the spring, seven fields produced 442.5 bulk pounds of seed. By the fall of 2017, 12 fields totaling 6.15 acres remained in production. Seed production is summarized in the following table.

Current wildland and seed increase inventories are available upon request.

#### Seed Production for Yellowstone National Park

Scientific Name	Common Name	Accession Number/ YELL Site Number	Date Planted	Field Size (Acres)	2017 Bulk Clean Seed (lb.)	PLS (lbs)	Test Date
<i>Achnatherum hymenoides</i>	Indian ricegrass	9081501/Site 64	9/11/2015	0.32 FLD 10	0 mowed	NA	NA
<i>Bromus anomalus</i>	nodding brome	9081696/Site 140	4/13/2016	0.24 FLD 5	18.5	17.5	1/8/18
<i>Bromus marginatus</i>	mountain brome	9088024/Site 17	8/13/2013	0.33 FLD 10	0 mowed	NA	NA
		9088024/Site 17	7/30/2014	0.60 FLD 28	no fill	NA	NA
		9087449/Site 146	5/26/2015	0.87 FLD 1	166.0	156	2/27/18
		9087448/Site 85	4/13/2016	0.54 FLD 5	15.0	at lab	at lab
<i>Deschampsia cespitosa</i>	tufted harigrass	9088028/Site 17	8/23/2013	0.33 FLD 10	0 removed	NA	NA
<i>Elymus glaucus</i>	blue wildrye	9088030/Site 17	4/12/2016	0.12 FLD 5	19.0	17.5	1/16/18
<i>Elymus trachycaulus</i>	slender wheatgrass	9076214/Site 128	5/26/2015	0.72 FLD 1	89.0 removed	82.8	1/30/18
		9087474/Site 146	4/26/2017	1.00 FLD 24	0 new	NA	NA
		9063443/Site 31	4/26/2017	0.48 FLD 21	0 new	NA	NA

Scientific Name	Common Name	Accession Number/ YELL Site Number	Date Planted	Field Size (Acres)	2017 Bulk Clean Seed (lb.)	PLS (lbs)	Test Date
<i>Festuca idahoensis</i>	Idaho fescue	9087325/Site 89	9/11/2015	0.33 FLD 10	0 removed	NA	NA
		9087324/Site 64	4/26/2017	0.34 FLD 21	new then removed	NA	NA
<i>Leymus cinereus</i>	basin wildrye	9081887/Site 45	8/17/2010	0.33 FLD 5	23.5	20.4	1/25/18
		9088032/Site 64	4/26/2017	0.48 FLD 21	0 new	NA	NA
<i>Penstemon procerus</i>	littleflower penstemon	9081647/Site 31	11/15/16	0.14 FLD 1	0 removed	NA	NA
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	9081759/Site 140	4/12/2016	0.84 FLD 5	105.0	76.6	2/8/18



Yellowstone National Park,  
*Leymus cinereus*, accession  
9081887, Bridger, Montana,  
July 2017.



Yellowstone National Park,  
*Bromus marginatus*, accession  
9087448, Bridger,  
Montana, July 2017

### Gardiner Basin

**Introduction.** The Bridger Montana Plant Materials Center (MTPMC) has maintained a cooperative agreement with Yellowstone National Park (YELL) Gardiner Basin since FY 2008. This agreement facilitates the collection, increase, and reestablishment of indigenous plant materials and the development of revegetation technologies for the restoration of native perennial species where desert alysium (*Alyssum desertorum*) currently dominates fields of the northern park boundary. Yellowstone National Park forecasts future restoration projects with indigenous seed and/or plant collection needs. Production efforts will begin three years in advance of project initiation.

**Accomplishments.** In 2017, three allocations of seed totaling 19.33 bulk pounds and representing seven seed lots and six species were distributed to the park for use in revegetation projects or used for seed increase at the Bridger Montana Plant Materials Center for Gardiner Basin. No wildland seed collections were sent to the plant materials center for cleaning for the Gardiner Basin project in 2017.

In January 2017, two fields totaling 1.14 acres remained in production at the Bridger Montana Plant Materials Center for Gardiner Basin including one, fall 2016, planted field of Indian ricegrass (*Achnatherum hymenoides*, 9081862 – Site 64) and one field of common yarrow (*Achillea millefolium*, 9091090 – Site 64). In addition, four new seed production fields totaling 2.11 acres were planted in 2017, including slender wheatgrass (*Elymus trachycaulus*, 9081525 – Site 41), bluebunch wheatgrass (*Pseudoroegneria spicata*, 9087860 – Site 148), Lewis flax (*Linum lewisii*, 9091096 – Site 64), and Sandberg bluegrass (*Poa secunda*, 9090791 – Site 64). The *Linum lewisii* and *Poa secunda* fields did not emerge and were removed. As of December 31, 2017, four seed production fields remained totaling 2.62 acres. Seed production field status for 2017 is summarized in the following table.

Current seed inventories are available upon request.

#### Seed Production for Yellowstone National Park Gardiner Basin

Scientific Name	Common Name	Accession Number	YELLGB Site Number	MTPMC Field Number	Date Sown	Field Size (acres)	Bulk Clean Seed (lbs)
<i>Elymus trachycaulus</i>	slender wheatgrass	9081525	Site 41	24	5/4/2017	0.53	new
<i>Achnatherum hymenoides</i>	Indian ricegrass	9081862	Site 64	6	11/15/2016	1.00	first year
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	9087860	Site 148	24	5/4/2017	0.95	new
<i>Achillea millefolium</i>	common yarrow	9091090	Site 64	1	5/26/2015	0.14	3.86
<i>Linum lewisii</i>	Lewis flax	9091096	Site 64	24	5/4/2017	0.11	removed
<i>Poa secunda</i>	Sandberg bluegrass	9090791	Site 64	24	4/26/2017	0.52	removed



Yellowstone National Park, *Achillea millefolium*, accession 90091090, Bridger, Montana, July 2017

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

**Introduction.** This report covers activities that have been conducted by Upper Colorado Environmental Plant Center (UCEPC) for Yellowstone National Park (YELL) through an Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002, Task Order P16PD01915. The task order calls for the Upper Colorado Environmental Plant Center to produce seed of bluebunch wheatgrass (*Pseudoroegneria spicata*) and green needlegrass (*Nassella viridis*) in large fields and plots of 4-5 forbs.

**Accomplishments.** The *Pseudoroegneria spicata* field was established in 2015 and produced seed in 2016 and 2017. The *Nassella viridis* field was planted on July 28, 2016, but produced only a minimal amount of seed in 2017. Four forbs, *Ionactis alpinus*, *Stenotus acaulis*, *Plantago patagonica*, and *Musineon divericatum*, were planted in various size plots on August 10 and 11, 2016.

No seed was shipped to Yellowstone National Park in 2017.

**Seed Production for Yellowstone National Park**

Scientific Name	Common Name	Year	Date Planted	Field Size (Acres)	Harvest Date	Clean Bulk (lbs)	PLS (lbs)	Test Date
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	2017	7/31/15	1.0	7/10/17	79.3	68.56	2/21/2018
<i>Nassella viridula</i>	green needlegrass	2017	7/28/16	1.0	6/30/17	1.0	NA	NA
<i>Ionactis alpinus</i>	lava aster	2016	8/10/16	.002	NA	—	—	—
<i>Musineon divericatum</i>	musineon	2016	8/11/16	.03	NA	—	—	—
<i>Plantago patagonica</i>	woolly plantain	2016	8/11/16	.044	7/22/17	51 g	NA	NA
<i>Stenotus acaulis</i>	cushion goldenweed	2016	8/11/16	.015	NA	—	—	—

**Technology Development.** Standard planting, cultural practices, harvest, and cleaning protocols were used to produce *Pseudoroegneria spicata*. Low yield from *Nassella viridis* is unexplainable because the field is established and should yield much better. The Upper Colorado Environmental Plant Center may request assistance from a university plant pathologist in 2018.

*Ionactis* did not establish, *Musineon* completely frost heaved, *Stenotus* did not produce seed, and *Plantago* yielded a small amount of seed. *Stenotus* will be maintained in 2018.



Yellowstone National Park, *Pseudoroegneria spicata*, June 2017, Meeker, Colorado.





## 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 and 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 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 on May 22, 2015, and expires December 31, 2018. All seed produced at the plant materials center will be made available to the National Park Service upon request.

The targeted species and goaled amounts for the contract period for Badlands National Park is summarized in the following table.

#### Targeted Species and Goaled Amounts for 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.** No seed was distributed to the park in 2017. Management practices included controlling weeds by herbicide application and hand weeding throughout the season. Dry urea-based fertilizer (46-0-0) was applied in April. The blue grama field (*Bouteloua gracilis*) was burned in May. The fields were harvested in 2017. Seed has been cleaned and sent to the North Dakota State Seed Department for purity and germination tests.

Seed production and distribution for 2017 is summarized in the following table.

#### Seed Production and Distribution for Badlands National Park

Scientific Name	Common Name	Date Planted	Field Size	Seed Harvest Date	2017 Seed Production (PLS lbs)	2017 Seed Distribution to Park (PLS lbs)	Inventory as of 12/31/2017 (PLS lbs)	Seed Test Date
<i>Pascopyrum smithii</i>	Western wheatgrass	4/22/2015	1.0	8/10/17	102	0	102	1/8/18
<i>Bouteloua gracilis</i>	blue grama	2012 and 6/1/2015	0.5	8/29/17	266 bulk	0	205 TBD	2016 TBD
<i>Nassella viridis</i>	green needlegrass	removed	-	N/A	-	0	426.30	2013 & 2014
<i>Sporobolus cryptandris</i>	sand dropseed	removed	-	N/A	-	0	16.24	2012 and 2013
<i>Elymus trachycaulus</i>	slender wheatgrass	removed	-	N/A	-	0	496.01	2013



The *Pascopyrum smithii* field is composed of both *Pascopyrum smithii* and *Elymus trachycaulus*. This mix was from the initial seed collection made in the park and used in seeding the field. In 2017, the *Elymus trachycaulus* seed was the only seed produced and harvested. No *Pascopyrum smithii* seed was harvested. The 102 lbs of seed was tested and identified as mostly *Elymus trachycaulus*.

**Technology Development.** Combine settings, seed cleaning procedures, and seed tests have been documented and are available from the plant materials center.



Badlands National Park, *Bouteloua gracilis*, accession 9092168, Bismarck, North Dakota prescribed burn, May 2017.

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

**Introduction.** The Upper Colorado Environmental Plant Center (UCEPC) and Badlands National Park (BADL) entered into an agreement for native shrub production through Task Order #P17PD00637 assigned to IDIQ contract #AG8B05C12002 on March 1, 2017. The Upper Colorado Environmental Plant Center is to produce containerized plants of rubber rabbitbrush (*Chrysothamnus nauseosus*) and skunkbrush sumac (*Rhus trilobata*) through 2018 for the Cliff Shelf Slide Area revegetation project. Target plant production for the project is 1,600 plants or 800 each of two species. Delivery will occur in fall 2018 or spring 2019.

**Accomplishments.** Seed was delivered to the Upper Colorado Environmental Plant Center shortly after the task order was signed and seed was directly planted into 10, cubic-inch containers in March 2017. Germination of rubber rabbitbrush was poor, and germination of skunkbrush was sporadic.

The table below summarizes the status of plant production for Badlands National Park.

**Plant Production for Badlands National Park**

Species	Common Name	No. Plugs Targeted	No. Plugs Delivered
<i>Chrysothamnus nauseosus</i>	Rubber rabbitbrush	400/year	0
<i>Rhus trilobata</i>	skunkbrush sumac	400/year	0



## Fort Larned National Historic Site, Kansas

Prepared by: **Elsberry, Missouri, USDA NRCS Plant Materials Center**

**Introduction.** The Elsberry Missouri Plant Materials Center (MOPMC) entered into an agreement with the National Park Service in 2016 to provide technical expertise in growing and maintaining native plant materials for two NPS sites in Kansas: Fort Larned National Historic Site (FOLS) and Tallgrass Prairie National Preserve (TAPR). Both parks have a need to preserve their native plant resources and revegetate their parklands. This requires restoring native plant germplasm from local populations. The National Park Service does not have adequate infrastructure and equipment needed to propagate the desired quantities of plants. It was agreed the National Park Service would provide local germplasm seed stock to the Natural Resources Conservation Service, which in turn would be propagated at the Elsberry Missouri Plant Materials Center.

**Accomplishments.** At the beginning of 2017, seed from native species shown in the list below were prepared for cold storage over the winter to induce dormancy. Legume seeds were first scarified using a handheld seed scarifier with sandpaper, and then inoculated with the appropriate strain of rhizobia to promote mutualistic relationships with microbiota that have the ability to fix nitrogen in the soil. Seeds from all species were then sown into conetainers filled with moist, growth medium. The growth medium consisted of biofungicide, mycorrhizae, perlite, vermiculite, and water. Planted flats were labeled and then placed in a cold storage unit to induce cold-moist stratification of the seeds. Many of the individual species stratification requirements (including scarification, inoculation, and cold-moist stratification) were sourced from the Native Plant Propagation Database.

Native plant species propagated at the Elsberry Missouri Plant Materials Center in 2017 are listed in the following table.

### Fort Larned National Historic Site

Scientific Name	Common Name
<i>Amorpha canescens</i>	leadplant
<i>Andropogon gerardii</i>	big bluestem
<i>Andropogon hallii</i>	sand bluestem
<i>Asclepias syriaca</i>	common milkweed
<i>Asclepias tuberosa</i>	butterfly milkweed
<i>Astragalus crassicaarpus</i>	Groundplum milkvetch
<i>Baptisia australis</i>	blue wild indigo
<i>Bouteloua curtipendula</i>	sideoats grama
<i>Bouteloua dactyloides</i>	buffalograss
<i>Bouteloua gracilis</i>	blue grama
<i>Ceanothus americanus</i>	New Jersey tea
<i>Chamaecrista fasciculata</i>	Partridge pea
<i>Cucurbita</i> sp.	gourd
<i>Dalea purpurea</i>	purple prairie clover
<i>Delphinium carolinianum</i>	Prairie larkspur
<i>Desmanthus illinoensis</i>	Illinois bundleflower
<i>Echinacea angustifolia</i>	Black sampson
<i>Lespedeza capitata</i>	Roundhead lespedeza
<i>Liatis punctate</i>	Spotted gayfeather
<i>Mimosa nuttallii</i>	Catclaw sensitive briar
<i>Oenothera macrocarpa</i>	Missouri evening primrose



Scientific Name	Common Name
<i>Panicum virgatum</i>	switchgrass
<i>Penstemon cobaea</i>	prairie beardtongue
<i>Psoraleidium tenuiflorum</i>	Wild alfalfa
<i>Schizachyrium scoparium</i>	little bluestem
<i>Silphium laciniatum</i>	Compass plant
<i>Sorghastrum nutans</i>	Indiangrass
<i>Tradescantia ohiensis</i>	Ohio spiderwort

In the spring of 2017, seeds were taken out of cold storage and grown in a greenhouse over the summer. Plants were watered twice a day and fertilized as needed. At the end of the summer, seedlings were moved to a shade house for hardening off and remained outdoors under a shade cloth for three weeks.

In mid-September, more than 6,000 native plant seedlings were delivered to Fort Larned National Historical Site and more than 3,000 were delivered to Tallgrass Prairie National Preserve. Plants were transported in an enclosed trailer with makeshift shelves. Once plants were delivered to parks, local park staff planted seedlings by hand in the appropriate areas.

**Future Work.** In 2018, the Elsberry Missouri Plant Materials Center will continue to propagate more native seedlings for both parks through an extension of the NRCS-NPS interagency agreement. Seeds will be cold stratified over winter 2018 and then grown out in a greenhouse. In summer 2018, the seeds will be moved to a shade house where they will remain until winter 2019 at which time they will go through a cold dormancy. The seeds will finally be delivered to Fort Larned National Historic Site and Tallgrass Prairie National Preserve in spring 2019.



Fort Larned National Historical Site—Elsberry Plant Materials Center staff delivering plant materials to a temporary shade house in September 2017.



Fort Larned National Historical Site—native seeds cold stratifying in conetainers in a temperature-controlled cold storage cooler over the winter at the Missouri Plant Materials Center in 2017, Elsberry, Missouri.

## Mount Rushmore National Memorial, South Dakota

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

**Introduction.** On August 30, 2013, the USDA Natural Resources Conservation Service, Bismarck North Dakota Plant Materials Center (NDPMC) entered into an interagency agreement with the National Park Service (NPS), Mount Rushmore National Memorial (MORU). The agreement period is from August 30, 2013, to September 30, 2017. The North Dakota Plant Materials Center agrees to increase seed for use in rehabilitation of social trails at the Mount Rushmore National Memorial. NPS staff will collect the seed. 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. Both parties agreed upon the following species and amounts, and the targeted species and goaled seed amounts are summarized in the following table.



### Mount Rushmore National Memorial

Scientific Name	Common Name	Acres of Seed Production	Seed Amount (PLS lbs/year)
<i>Andropogon gerardii</i>	big bluestem	0.8	80
<i>Schizachyrium scoparium</i>	little bluestem	0.8	80

**Accomplishments.** The big bluestem (*Andropogon gerardii*) field produced large amounts of biomass in 2017, but seed production was poor. The little bluestem (*Schizachyrium scoparium*) field continues to struggle with approximately a 60% stand that is unevenly spread throughout the field. This makes it challenging to maintain this field. A small harvest was accomplished in late fall. Management of both fields included a prescribed burn in April, as well as herbicide applications and hand weeding in April and May to control weeds. Fertilizer was applied in the form of dry urea 46-0-0 in April. Irrigation water was applied during moisture stress periods throughout the summer. No seed was distributed to the park in 2017.

The following table reflects the 2013 seed collected by NPS staff for use in establishing production fields.

### Mount Rushmore National Memorial

Scientific Name	Common Name	Accession Number	Collection Date	Seed Received Bulk (lbs)	Cleaned Seed PLS (lbs)
<i>Andropogon gerardii</i>	big bluestem	9094438	Fall 2013	13.5 lbs	4.1
<i>Schizachyrium scoparium</i>	little bluestem	9094437	Fall 2013	6.5 lbs	1.6

Seed production and inventory are summarized in the following table.

**Seed Production and Inventory for Mount Rushmore National Memorial**

Scientific Name	Species	Date Planted	Seeding Rate PLS (Lbs/ Acre)	Field Size (Acres)	Seed Harvest Date	2017 Seed Production PLS (lbs)	Inventory as of 12/31/17 (lbs PLS)	Seed Test Date
<i>Andropogon gerardii</i>	big bluestem	May 2014	6.0	0.8	2015		78.82	4/22/16
					2016	13.54	29.34	3/23/17
					9/8/17		13.54	12/11/17
<i>Schizachyrium scoparium</i>	little bluestem	May 2014	4.0	0.8	9/20/16	2.86	2.86	3/12/2017
					9/28/17	16.5	16.5	3/16/2018

**Technology Development.** All seed harvesting and cleaning protocols have been recorded and are available from the plant materials center.



Mount Rushmore National Memorial, *Schizachyrium scoparium*, accession 9094437, Bismarck, North Dakota, September 28, 2017.

## 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 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 plant materials center has agreed to produce native grass seed of three species originally collected in Theodore Roosevelt National Park by park personnel and PMC staff. The seed produced at the plant materials center will be distributed to the park for revegetation projects.

The following table summarizes targeted species and goaled seed amounts for contract period 2015-2018.

### Targeted Species and Goaled Seed Amounts for Theodore Roosevelt National Park

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

**Accomplishments.** Fields of slender wheatgrass (*Elymus trachycaulus*), sideoats grama (*Bouteloua curtipendula*), and blue grama (*Bouteloua gracilis*) are being maintained at the Bismarck North Dakota Plant Materials Center. The *Bouteloua curtipendula* and *Bouteloua gracilis* fields were burned in April. Herbicides were applied in April and May to control weeds, and additional weed control was performed with between row tillage and hand weeding. Fertilizer was applied in April to all three fields. The fields were harvested in 2017. Seed was cleaned at the plant materials center and is being tested for purity and germination by the North Dakota State Seed Lab. No seed was distributed to the park in 2017.

Seed production and inventory are summarized in the following table.

### Seed Production and Inventory for Theodore Roosevelt National Park

Scientific Name	Common Name	Date Planted	Field Size Acres	2017 Seed Harvest Date	2017 Seed Production PLS (lbs)	Inventory as of 12/31/2017 PLS (lbs)	Seed Test Date
<i>Bouteloua curtipendula</i>	sideoats grama	2012 and 5/29/15	1.0	8/18/17	246	660	3/14/2018
<i>Bouteloua gracilis</i>	blue grama	2012	0.3	8/29/17	378 bulk not tested	148.5	4/11/2017
<i>Elymus trachycaulus</i>	slender wheatgrass*	5/21/15	1.0	2016 8/30/17	533 681	1,220**	3/22/2017
<i>Koeleria macrantha</i>	prairie junegrass	Field removed	0.3	8/17/16	NA	4.01	4/11/2017
<i>Nassella viridula</i>	green needlegrass	Field removed	1.0	8/4/16	NA	1.8	1/25/2017
<i>Pascopyrum smithii</i>	western wheatgrass	Field removed	0	NA	NA	115.45	NA

\*The *Elymus trachycaulus* field planted in 2015 is also composed of western wheatgrass (*Pascopyrum smithii*). Annual harvests reflect the actual composition of each of these species present in the clean seed. Seed harvested in 2016 was tested primarily as *Pascopyrum smithii* and totaled 533 lbs Pure Live Seed. The 2017 harvest resulted in 681 lbs Pure Live Seed of primarily *Elymus trachycaulus* seed.



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



Theodore Roosevelt National Park, *Bouteloua gracilis*, accession 9092173, Bismarck, North Dakota, August 2017.







## 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 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, ultimately producing 25,000 container plants to be planted in the park. Under the agreement, the plant materials center will also provide on-site consultation and training. Activities in 2017 included inspection, cleaning, and storage of provided seed.

**Accomplishments.** Corvallis Plant Materials Center staff cleaned 32 seed lots of wild collected seed in 2017. In the fall of 2017, seed currently in storage for this project was sent to the park for use in fall seeding on restoration sites. Seed that was not used was returned to the plant materials center for storage. All the seed will be stored in the seed cooler until needed for plant production or requested by the park.

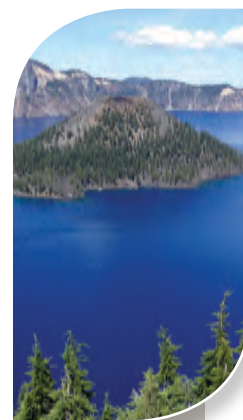
The following table reflects 2017 deliveries and current seed in storage at the Corvallis Oregon Plant Materials Center.

#### Crater Lake National Park—Northeast East Rim Drive

Scientific Name	Accession	2017 Collection weight <sup>1</sup> (g)	Total Seed in Storage Feb 2018 <sup>2</sup> (g)
<i>Achnatherum occidentale</i>	9109231	0	0
<i>Boechnera horizontalis</i>	9109236	0	0
<i>Bromus carinatus</i>	9109238	0	0
<i>Carex halliana</i>	9109260	0	0
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	9109246	0	0
<i>Ericameria nauseosa</i>	9109282	0	39
<i>Lupinus lepidus</i> var. <i>lobbii</i>	9109270	31.5	15
<i>Phacelia hastata</i> ssp. <i>compacta</i>	9109252	0	37

#### Crater Lake National Park—Northwest East Rim Drive

Scientific Name	Accession	2017 Collection weight <sup>1</sup> (g)	Total Seed in Storage Feb 2018 <sup>2</sup> (g)
<i>Achnathrum occidentale</i>	9109301	0	0
<i>Aconogonon davisiae</i> var. <i>davisiae</i>	9109267	61.5	93
<i>Carex breweri</i>	9109240	10	53
<i>Castilleja arachnoidea</i>	9109242	16.7	16.7
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	9109261	0	0
<i>Eriogonum marifolium</i>	9109302	0	40
<i>Eriogonum pyrolifolium</i> var. <i>coryphaeum</i>	9109258	0	99
<i>Juncus parryi</i>	9109266	3	191
<i>Luetkea pectinata</i>	9109249	13	222
<i>Lupinus lepidus</i> var. <i>lobbii</i>	9109262	13.4	12.7



## Crater Lake National Park—Central West Rim Drive

Scientific Name	Accession	2017 Collection weight <sup>1</sup> (g)	Total Seed in Storage Feb 2018 <sup>2</sup> (g)
<i>Achnatherum occidentale</i>	9109229	0	157
<i>Aconogonon davisiae</i> var. <i>davisiae</i>	9109263	6.3	58
<i>Anemone occidentalis</i>	9109233	1,632	3,727
<i>Boechera horizontalis</i>	9109235	0	7.5
<i>Castilleja applegatei</i>	9109272	5	17
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	9109244	0	59
<i>Ericameria greenei</i>	9109286	32	128
<i>Eriogonum marifolium</i> var. <i>marifolium</i>	9109248	0	548
<i>Eriogonum pyrolifolium</i> var. <i>coryphaeum</i>	9109273	0	33
<i>Penstemon davidsonii</i> var. <i>davidsonii</i>	9109250	73.2	211
<i>Phlox diffusa</i>	9109253	11	28
<i>Carex breweri</i>	9109332	8.1	8
<i>Arnica viscosa</i>	9109333	0.3	0.3

## Crater Lake National Park—South West Rim Drive

Scientific Name	Accession	2017 Collection weight <sup>1</sup> (g)	Total Seed in Storage Feb 2018 <sup>2</sup> (g)
<i>Achnatherum occidentale</i>	9109228	0	364
<i>Bromus carinatus</i>	9109237	0	1863
<i>Carex halliana</i>	9109257	0	1,169
<i>Carex pachycarpa</i>	9109241	575	2,583
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	9109243	0	649
<i>Ericameria greenei</i>	9109247	94	124
<i>Eriogonum marifolium</i> var. <i>marifolium</i>	9109265	0	1,091
<i>Holodiscus microphyllus</i> var. <i>glabrescens</i>	9109264	64	136
<i>Lupinus andersonii</i>	9109271	682	1,665
<i>Phlox diffusa</i>	9109274	7	19
<i>Carex pachycarpa</i> with squirreltail and needlegrass (mixed collection)	—	0	949
<i>Castilleja arachnoidea</i>	9109334	3.8	3.8
<i>Carex breweri</i>	9109335	6	1.4
<i>Aconogonon davisiae</i> var. <i>davisiae</i>	9109336	7.5	7.5

## Crater Lake National Park—North West Rim Drive

Scientific Name	Accession	2017 Collection weight <sup>1</sup> (g)	Total Seed in Storage Feb 2018 <sup>2</sup> (g)
<i>Achnatherum occidentale</i>	9109230	0	78
<i>Aconogonon davisiae</i> var. <i>davisiae</i>	9109232	20	47
<i>Arnica viscosa</i>	9109234	0	0.2
<i>Carex breweri</i>	9109239	88.5	315
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	9109245	0	960
<i>Ericameria greenei</i>	9109283	16	70
<i>Eriogonum marifolium</i> var. <i>marifolium</i>	9109259	0	370
<i>Eriogonum pyrolifolium</i> var. <i>coryphaeum</i>	9109269	0	41
<i>Lupinus andersonii</i>	9109303	22.6	277
<i>Lupinus lepidus</i>	9109304	37	301
<i>Penstemon davidsonii</i> var. <i>davidsonii</i>	9109251	3.6	128
<i>Phlox diffusa</i>	9109268	6.3	28
<i>Castilleja arachnoidea</i>	9109337	2.5	2.5

<sup>1</sup> Weight includes seed envelope

<sup>2</sup> Weight without seed envelope

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

**Introduction.** Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002, Rimrock Drive Rehabilitation provided the avenue for Task Order P16PD00861 to be executed for seed production for Crater Lake National Park through the 2019 field season. Two separate sources of California brome (*Bromus carinatus*) and a bulked source of bottlebrush squirreltail (*Elymus elymoides* ssp. *Elymoides*) have been established for seed increase. The *Elymus elymoides* ssp. *Elymoides* was harvested with a Flail-Vac harvester, not a conventional combine. As it now stands, seed is to be produced for a single year for the *Elymus elymoides* ssp. *Elymoides* (2017), and three years for the *Bromus carinatus*. Since the *Elymus elymoides* ssp. *Elymoides* can be harvested mechanically, additional years of production are likely.

**Accomplishments.** All fields are now established, and seed production will be expected for years 2017-2019.

Seed production for Crater Lake National Park is summarized in the following table.

## Seed Production for Crater Lake National Park

Scientific Name	Common Name	Accession	Field Size (acres)	Planting Date	Harvest Date	Clean Bulk Seed (lbs)	PLS (lbs)
<i>Bromus carinatus</i>	California brome	SWRD	0.27	7/29/2016	7/10/17	1.6	NA
<i>Bromus carinatus</i>	California brome	NEERD	0.20	8/4/2016	7/5/17	91 g	NA
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	bottlebrush squirreltail	NWRD, NWERD, NEERD, SWRD, CWRD	2.20	7/28/2016	7/7/17	9.6	8.36

**Technology Development.** Standard cultural practices and seed cleaning protocols, including seed treatment to prevent head smut, were used to produce seed of *Elymus elymoides* ssp. *Elymoides* and *Bromus carinatus*.



Crater Lake National Park, *Elymus elymoides*, Meeker, Colorado, 2017.



Harvest of Crater Lake National Park, *Elymus elymoides*, Meeker, Colorado, 2017.

## Mount Rainer National Park, Washington

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

**Introduction.** The Corvallis Plant Materials Center (ORPMC) entered into an agreement with Mount Rainier National Park in 2015 to evaluate, test, and propagate native plant materials for revegetation purposes (Rehabilitate Nisqually-Paradise Road Project). It was agreed that the plant materials center would establish, harvest, and maintain four seed increase fields of three species. Grasses were collected from two elevation zones and were isolated from each other to prevent cross-pollination. A total of 175 lbs Pure Live Seed (PLS) were expected from two grasses from the mid elevation zone, and 300 lbs PLS were expected from three grasses from the high elevation zone. The fields did not yield as much seed as anticipated, so two fields were maintained and harvested in 2017 to meet the seed needs for the project.

Activities in 2017 included maintenance, harvest, and seed cleaning of two seed increase fields. Details are provided in the table below.

**Accomplishments.** The high elevation blue wildrye (*Elymus glaucus*) and the high elevation red fescue (*Festuca rubra*) fields were maintained and harvested in 2017. The *Festuca rubra* field was a very productive field yielding 293 lbs this year! The *Elymus glaucus* field was quite weedy (perennial grasses) so it was selectively hand harvested, only yielding 15 lbs.

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

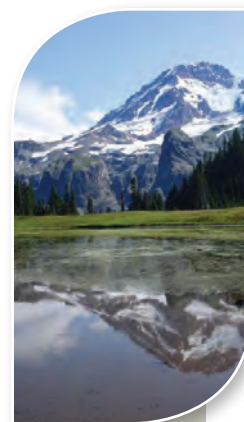
### Seed Increase Field Sizes for Mount Rainer National Park

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
<i>Festuca rubra</i>	red fescue	9109225 (high)	10/01/2015	0.45

**Technology Development.** All seed produced for this project was delivered in 2017 and is listed in the table below.

### Seed Production for Mount Rainer National Park

Scientific Name	Common Name	Accession Number	Acreage	2017 Bulk (lbs)	2017 Distribution Bulk (lbs)
<i>Elymus glaucus</i>	blue wildrye	9019226 (high)	0.35	37.5	59
<i>Festuca rubra</i>	red fescue	9019225 (high)	0.45	96.7	425
<i>Bromus carinatus</i>	California brome	9019227 (high)	0.2	1	4
<i>Festuca rubra</i>	red fescue	9019224 (mid)	0.2	n/a	22
<i>Elymus glaucus</i>	blue wildrye	9019223 (mid)	0.25	29	33





## San Juan Island National Historical Park, Washington

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

**Introduction.** The Corvallis Oregon Plant Materials Center (ORPMC) entered into an agreement with San Juan Islands National Historical Park in 2016 to provide native plant materials for the restoration of the American Camp Prairie. It was agreed that the Corvallis Oregon Plant Materials Center would produce a minimum of 480 lbs Pure Live Seed (PLS) of blue wildrye (*Elymus glaucus*), 320 lbs PLS of Sitka brome (*Bromus sitchensis*), and 480 lbs PLS of Roemer’s fescue (*Festuca roemerii*). This is equivalent to approximately 120 lbs per year of *Elymus glaucus* and *Festuca roemerii* and 80 lbs per year of *Bromus sitchensis*. The project is expected to be completed in 2020.

**Accomplishments.** A 1.5-acre field of *Festuca roemerii* was established in the fall/winter of 2015/2016, and the *Elymus glaucus* field was planted in the fall/winter of 2016/2017. The *Bromus sitchensis* field was also planned to be established in the fall of 2016, but the field was too wet to seed in the fall. It was seeded in the spring of 2017. The *Festuca roemerii* field had low vigor, high weed pressure, and was not flowering/producing seed as expected. It was decided to start a new field using plugs. The plugs were transplanted into a new field in the fall of 2017.

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

### Seed Increase Field Sizes for San Juan Island National Park

Scientific Name	Common Name	Accession and Source	Planting Date	Field Size (Acres)
<i>Elymus glaucus</i>	blue wildrye	9079607	9/27/16	0.5
<i>Bromus sitchensis</i>	Sitka brome	9079606	5/10/17	0.5
<i>Festuca roemerii</i>	Roemer’s fescue	9079605	10/15/17	1.5

There was no seed harvested and no deliveries were made in 2017, and old seed from a previous agreement is stored at the Corvallis Oregon Plant Materials Center. Details are listed below.

### Seed Stored from a Previous Agreement for San Juan Island National Park

Scientific Name	Common Name	Accession Number	Agreement Acreage	PLS Inventory (lbs)	Clean Bulk Seed Inventory (lbs)	Test Date
<i>Bromus sitchensis</i>	Sitka brome	9079606	0.5	109	126	11/17/2014
<i>Festuca roemerii</i>	Roemer’s fescue	9079605	1.5	22	30	11/17/2014
<i>Elymus glaucus</i>	blue wildrye	9079607	0.5	168	211	11/17/2014



Seeding field, *Bromus sitchensis*, accession 9079606, Corvallis, Oregon, 2017.



## Yosemite National Park, California

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

**Introduction.** The Aberdeen Idaho Plant Materials Center (IDPMC) entered into an interagency agreement with Yosemite National Park (YOSE) in 2015 to produce containerized plants for the Yosemite Valley Day Use Parking Area (aka Camp 6) redesign project. The new, day-use parking lot will relocate parking outside the setback for the two-year floodplain of the Merced River, allowing approximately 4.1 acres of former parking lot area to be restored to black oak woodland (1.9 acres) and palustrine wetland (2.2 acres), mostly within the riparian buffer. Target plant production for 2017 was 10,000 plants.

**Accomplishments.** Seed was delivered to the Aberdeen Idaho Plant Materials Center in 2015 and 2016. Seeds of species requiring cold/moist stratification were planted into 10, cubic-inch conetainers and placed outside for overwinter stratification in December 2016. The remaining species were planted directly into greenhouse conditions in March 2017. More than 11,000 plants were delivered to Yosemite National Park in the fall of 2017.

The following table reflects the plants requested and delivered in 2017 greenhouse production.



### Plants Requested and Delivered for Yosemite National Park

Wetland Species	Common Name	No. Plugs Targeted	No. Plugs Delivered
<i>Achillea millefolium</i>	Western yarrow	500	900
<i>Agastache urticifolia</i>	Nettleleaf giant hyssop	500	600
<i>Artemisia douglasiana</i>	Douglas' sagewort	500	800
<i>Asclepias speciosa</i>	Showy milkweed	500	900
<i>Carex athrostachya</i>	Slenderbeak sedge	500	900
<i>Carex feta</i>	Greensheath sedge	800	1,200
<i>Carex senta</i>	Swamp carex	250	300
<i>Carex subfusca</i>	Brown sedge	800	1,200
<i>Carex vesicaria</i>	Blister sedge	1,200	950
<i>Collinsia tinctoria</i>	Sticky Chinese houses	250	0
<i>Euthamia occidentalis</i>	Western goldentop	500	600
<i>Helenium bigelovii</i>	Bigelow's sneezeweed	250	200
<i>Juncus effusus</i>	Common rush	1,200	250
<i>Juncus balticus</i>	Baltic rush	250	0
<i>Penstemon rydbergii</i>	Rydberg's penstemon	500	700
<i>Scirpus microcarpus</i>	Panicled bulrush	1,000	1,000
<i>Solidago canadensis</i> ssp. <i>elongata</i>	Rough Canada goldenrod	500	700
Total Plugs:	—	10,000	11,200

To date, PMC staff have shipped 22,520 containerized plants during this project.



Yosemite National Park delivered plant materials by the Aberdeen Plant Materials Center staff, August 2017.

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

### Valley Loop and Camp 6

**Introduction.** Yosemite National Park (YOSE) used the Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002 to request native seed production for the park through Task Order 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 up to ten species collected by park staff.

**Accomplishments.** California brome (*Bromus carinatus*), blue wildrye (*Elymus glaucus*), and slender wheatgrass (*Elymus trachycaulus*) were established in 2015, expanded in 2016, and again in 2017. The expansion of these fields came about because there was low seed viability of a *Poa* collection that resulted in a poorly established field. An effort to produce Idaho fescue (*Festuca idahoensis*) was halted because it was discovered that Roemer's fescue (*Festuca roemerii*), a species nonnative to the park, had been collected and planted instead. Also in 2016, six additional species were planted to add diversity to the large grass fields. Columbia needlegrass (*Achnatherum nelsonii*), which had been planted in 2015, was replanted. The West Coast Canada goldenrod (*Solidago elongata*) field did not establish; the Hartford's oniongrass (*Melica harfordii*) germinated but was frost heaved in the spring of 2017. The Sierra lessingia (*Lessingia leptoclada*) established and flowered, but no seed was produced. The bottlebrush squirreltail (*Elymus elymoides*), yarrow (*Achillea millefolium*), and Columbia needlegrass (*Achnatherum nelsonii*) plantings were all successful with some seed harvested in 2017.

The following table recaps the materials planted and the planting dates along with any applicable harvest information.



## Plants, Planting Dates, and Harvest Information for Yosemite National Park

Scientific Name	Common Name	Field Size (Acres)	Planting Date	Bulk Seed Planted (grams)	Harvest Date	Bulk Clean Seed (lbs)	PLS (lbs)	Date Tested
<i>Bromus carinatus</i>	California brome	0.5	8/17/15	1744	—	—	—	—
		0.27	6/16/16	243				
<i>Bromus carinatus</i>	California brome	0.77	—	—	7/5/16	58.5	42.85	12/26/16
					7/2/17	36	33.61	9/20/17
<i>Elymus glaucus</i>	blue wildrye	0.5	8/14/15	516	—	—	—	—
		0.5	6/16/16	410				
<i>Elymus glaucus</i>	blue wildrye	1.00	—	—	8/1/16	23.5	20.32	12/29/16
					7/24/17	140	135.50	9/20/17
<i>Elymus trachycaulus</i> *	slender wheatgrass	0.5	8/14/15	1243	7/21/16	67.0	48.74	12/29/16
		0.2	6/7/16	54	7/18/17	221	214.74	9/19/17
		0.8	7/28/17	454				
<i>Festuca idahoensis</i>	Idaho fescue	0.80	8/10/16	254	Determined to be <i>Festuca roemerii</i> . Field Removed	—	—	—
<i>Achillea millefolium</i>	yarrow	0.10	8/04/16 8/5/16 6/16/17	6 1200 plugs	8/25/17	87 g	—	—
<i>Elymus elymoides</i>	bottlebrush squirreltail	0.02	8/11/16	10	7/14/17	66 g	—	—
<i>Achnatherum nelsonii</i>	Columbia needlegrass	0.06	8/11/16	46	7/18/17	3 g	—	—
<i>Lessingia leptoclada</i>	Sierra lessingia	.006	8/11/16	10	Flowered – no seed	—	—	—
<i>Melica harfordii</i>	Harford's oniongrass	0.02	8/11/16	30	Winter killed	—	—	—
<i>Solidago elongata</i>	West coast Canada goldenrod	0.06	8/11/16	20	Failed	—	—	—

\*Confirmed by Wyoming State Seed Laboratory

Specifically, 3.2 acres of field production along with three production plots are required for the task order. The Upper Colorado Environmental Plant Center planted 3.5 acres of increase material, including 3.23 acres of large seed increase and 0.27 acre of plots. The *Bromus carinatus* field and *Elymus trachycaulus* field were increased to 0.73 and 1.5 acres, respectively, and the *Elymus glaucus* field was expanded to a full acre.

On October 25, 2016, the Upper Colorado Environmental Plant Center sent 10 lbs each of *Elymus glaucus* and *Bromus carinatus* and 15 lbs of *Elymus trachycaulus* to Yosemite as requested by the park on October 19.

In 2017, two shipments were sent to the park. The first consisted of 2016 produced seed and included 51.5 lbs of *Elymus trachycaulus*, 14 lbs of *Elymus glaucus*, and 49 lbs of *Bromus carinatus*, which was shipped on August 17, 2017. On September 22, 2017, a second shipment was sent to the park consisting of 221 lbs of *Elymus trachycaulus*, 36 lbs of *Bromus carinatus*, and 140 lbs of *Elymus glaucus*, all produced in 2017. A small amount of *Elymus glaucus* ‘clean-off seed’ is all that remains on inventory for the park, besides the gram quantities identified in the table above.

**Technology Development.** The Upper Colorado Environmental Plant Center treated *Bromus carinatus* seed with ‘Dividend’ fungicide to prevent a potential head smut infection. No smut was observed in the 2017 *Bromus carinatus* seed field.



Yosemite National Park, *Elymus glaucus*, Meeker, Colorado, 2017.



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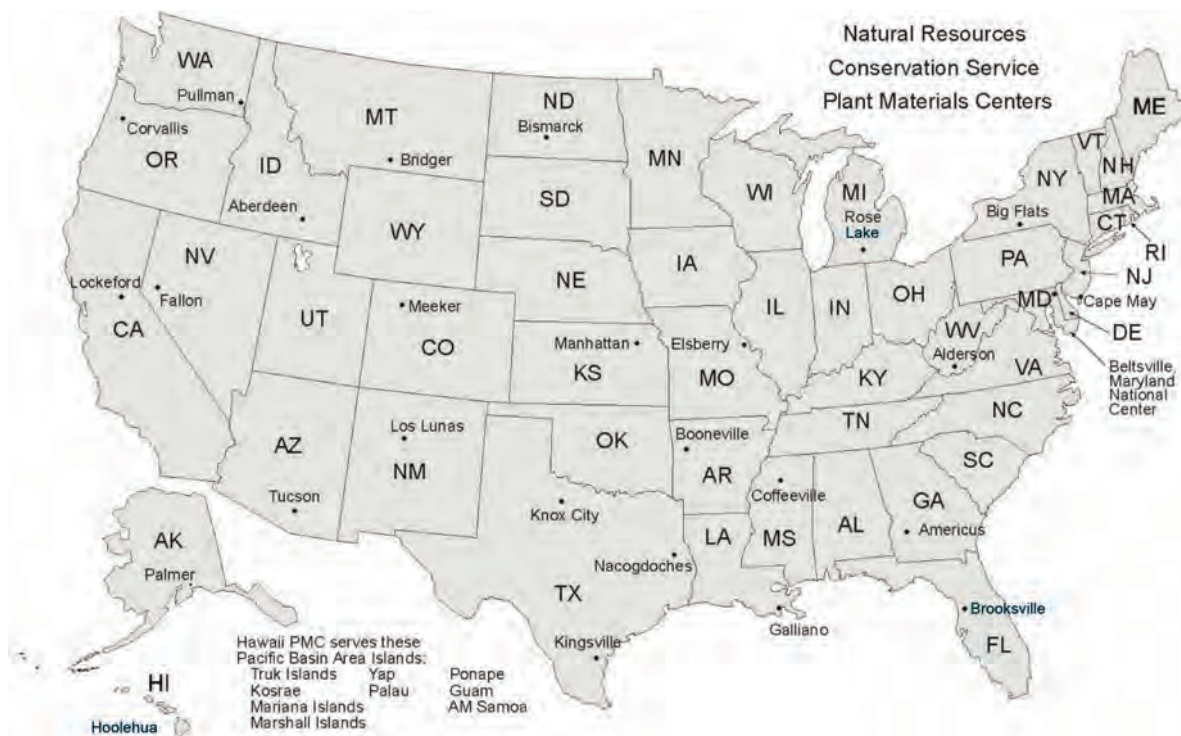
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# APPENDIX



## Plant Materials Centers

City/State	Center	Address	City, State Zip Code	Phone Number
Palmer, AK	Alaska PMC	5310 South Bodenburg 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
Coffeerville, MS	Jamie L. Whitten PMC	2533 County Road 65	Coffeerville, TX 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

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