

PLANT MATERIALS PROJECT SUMMARY REPORTS

from the Natural Resources Conservation Service to the National Park Service

FY 2018





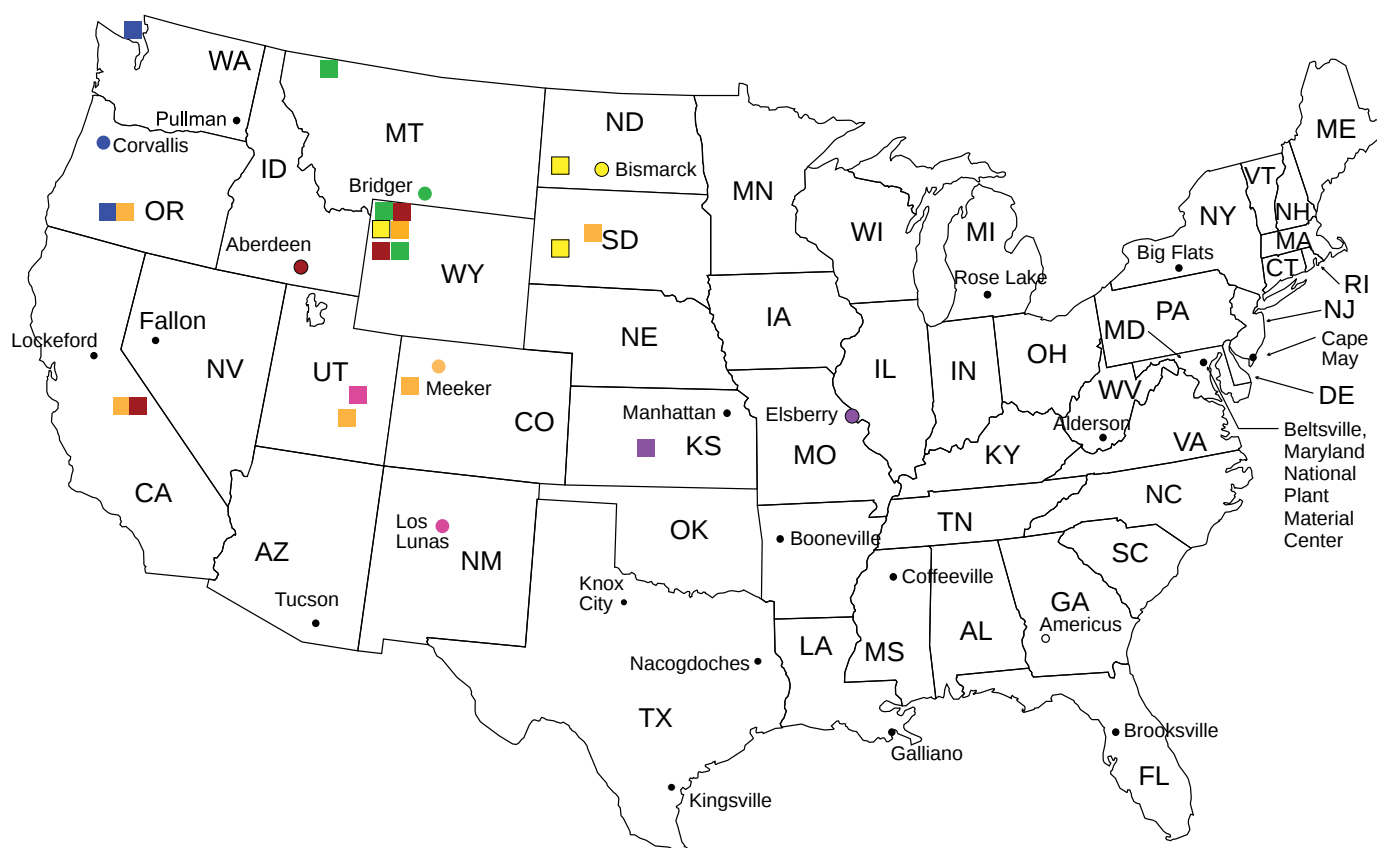
CONTENTS

INTRODUCTION.....	1
FISCAL YEAR 2018 PROGRAM SUMMARY.....	2
INTERMOUNTAIN REGION.....	5
Arches and Canyonlands National Parks, Utah	5
Los Lunas, New Mexico, USDA NRCS Plant Materials Center	5
Bryce Canyon National Park, Utah	7
Meeker, Colorado, Upper Colorado Environmental Plant Center	7
Colorado National Monument, Colorado	9
Meeker, Colorado, Upper Colorado Environmental Plant Center	9
Glacier National Park, Montana	10
Bridger, Montana, USDA NRCS Plant Materials Center	10
Grand Teton National Park, Wyoming	12
Aberdeen, USDA NRCS Plant Materials Center	12
Bismarck, North Dakota, USDA NRCS Plant Materials Center	13
Bridger, Montana, USDA NRCS Plant Materials Center	14
Yellowstone National Park, Wyoming	16
Aberdeen, Idaho, USDA NRCS Plant Materials Center	16
Bridger, Montana, USDA NRCS Plant Materials Center	17
Meeker, Colorado, Upper Colorado Environmental Plant Center	20
MIDWEST REGION	23
Badlands National Park, South Dakota	23
Meeker, Colorado, Upper Colorado Environmental Plant Center	23
Fort Larned National Historic Site, Kansas	24
Elsberry, Missouri, USDA NRCS Plant Materials Center	24
Mount Rushmore National Memorial, South Dakota	27
Bismarck, North Dakota, USDA NRCS Plant Materials Center	27
Theodore Roosevelt National Park, North Dakota	29
Bismarck, North Dakota, USDA NRCS Plant Materials Center	29
PACIFIC WEST REGION	31
Crater Lake National Park, Oregon	31
Corvallis, OR, USDA NRCS Plant Materials Center	31
Meeker, Colorado, Upper Colorado Environmental Plant Center	34
San Juan Island National Historical Park, Washington	35
Corvallis, Oregon, USDA NRCS Plant Materials Center	35
Yosemite National Park, California	36
Aberdeen, Idaho, USDA NRCS Plant Materials Center	36
Meeker, Colorado, Upper Colorado Environmental Plant Center	37
APPENDIX	41

ACRONYMS

BADL	Badlands National Park
COLM	Colorado National Monument
CRLA	Crater Lake National Park
FOLS	Fort Larned National Historic Site
GLAC	Glacier 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
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
SAJU	San Juan Island National Historical Park
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	●	Grand Teton, Mount Rushmore, Theodore Roosevelt ■
Bridger, MT	●	Glacier, Grand Teton, Yellowstone ■
Corvallis, OR	●	Crater Lake, San Juan Island ■
Elsberry, MO	●	Fort Larned ■
Los Lunas, NM	●	Arches & Canyonlands ■
Meeker, CO	●	Badlands, Bryce Canyon, Crater Lake, Colorado National Monument, Yellowstone, Yosemite ■



INTRODUCTION

This is the 2018 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 park units with current plant materials projects, associated park resource managers, respective PMC's, 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 2018 PROGRAM SUMMARY

Accomplishments

Cooperating NRCS Plant Centers

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

Cooperating Conservation District, Meeker, Colorado

Upper Colorado Environmental Plant Center

Native Seed and Plant Production

- 14 national park units
- 8,802 bulk pounds of seed
- 22,833 plants
- 82 different native species produced

Park-Collected Native Seed Processed

- Five national parks
- 98 wildland collections
- One mechanically in-field harvested collection (FlalVac)
- More than 1,150.3 bulk pounds of seed
- More than 99 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 11 park units in addition to those with interagency agreements.
- Assistance to 29 park units and associated staff.
- Seven training sessions offered including seed collection, seed mix design, and wetland restoration and delineation.
- Four plant center reviews.

Development and Administration of Interagency Agreements and Task Orders

- 17 interagency agreements and 15 revegetation contracts were administered and coordinated totaling \$851,292.
- There were 25 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 Seed Increase Projects Reviewed

Arches and Canyonlands National Parks	Grand Teton National Park
Badlands National Park	Mount Rainier National Park
Bryce Canyon National Park	Mount Rushmore National Park
Colorado National Monument	San Juan Island National Historical Park
Crater Lake National Park	Theodore Roosevelt National Park
Fort Larned National Historic Site	Tallgrass Prairie National Preserve
Gateway National Recreation Area	Yosemite National Park
Glacier National Park	Yellowstone National Park
Glen Canyon National Recreation Area	

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, wetland delineation, pollinator information and general revegetation program technical support to more than 35 NPS staff and nine park units.
- 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 2018 annual interagency summary report.



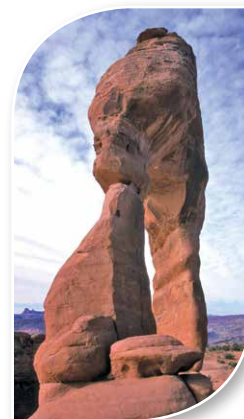
INTERMOUNTAIN REGION

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 Arches and Canyonlands National Parks.

Accomplishments. A new interagency agreement was initiated 08/08/2016 to continue seed production of three fields of *Achnatherum hymenoides* through 2018. This project contract was modified in 2018 for a no-cost extension through July 31, 2021, to complete seed production. Seed was harvested in 2018, but processing was not completed before this report was published. Data in the tables below reflects the 2017 data provided.



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
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066888	SFP-17-F27NARCH	71	36.25
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066907	SFP-16-F24NCANYN	78	5.26
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066907	SFP-17-F24NCANYN	95	42.06
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066908	SFP-16-F33NCANYN	70	20.0
<i>Achnatherum hymenoides</i>	Indian ricegrass	9066908	SFP-17-F33NCANYN	—	58.4



Arches and
Canyonlands National
Park, *Achatherum
hymenoides*, Los
Lunas, New Mexico,
May 2019.

Bryce Canyon National Park, Utah

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

Introduction. Indefinite Delivery/Indefinite Quantity (IDIQ) Contract AG-8B05-C-12-0002 was initiated June 26, 2012. Task Order No. P12PD12573 called for the production of two, 0.5-acre fields; Indian ricegrass (*Achnatherum hymenoides*) and nodding brome grass (*Bromus anomalus*) for Bryce Canyon National Park (BRCA). Task Order No. P16PD03151, completed in August of 2015, requested production of bottlebrush squirreltail (*Elymus elymoides*) and up to six forbs. In 2017, a sole source contract 140P1218P0019 was ratified to extend production of all products through 2020, with the exception of *Bromus anomalus*, which is to be discontinued.

Accomplishments. Upper Colorado Environmental Plant Center (UCEPC) harvested *Achnatherum hymenoides* and *Elymus elymoides* along with three forbs. The *Achnatherum hymenoides* had by far its best year of production with more than twice as much seed as the next highest yielding season. The *Elymus elymoides* was also quite productive this year with seed yields near the highest ever. As recommended, the *Bromus anomalus* field was removed. Small quantities of three forbs were also harvested.

On April 5, 2018, western wallflower (*Erysimum asperum*), dragon mint (*Dracocephalum parviflorum*), multi-lobed packera (*Packera multilobata*), and hoary tansyaster (*Machaeranthera canescens*) were planted into single or multiple rows of varied lengths to establish these annuals or short-lived perennials for seed production. Fumewort (*Corydalis aurea*) and Wheeler's thistle (*Cirsium wheeleri*) plots were not replanted as these plots had established plants in them.

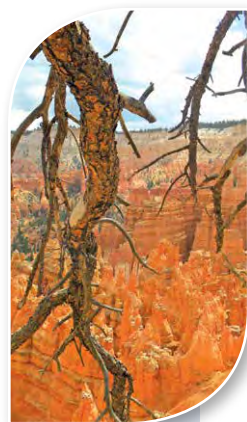
Forb establishment was slow and limited for *Erysimum asperum*, *Dracocephalum parviflorum*, and *Machaeranthera canescens*. There was very little germination at all for *Packera multilobata*, but there is no additional seed of this species to establish a plot. To supplement the small forb plants, three 300-ft rows of *Erysimum asperum* were planted on August 9, 2018. A very good stand was achieved with this planting.

No seed shipments were made to Bryce Canyon in 2018.

The following table shows information for the last five years of 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
			2012	1.3	0.0	3.5	1/22/13
			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
			2015	13.6	34.8	0.0	2/11/16
			2016	38.2	0.0	64.5	3/2/17
			2017	18.04	0.0	29.0	2/22/18
			2018	Discontinued			
<i>Achnatherum hymenoides</i>	Indian ricegrass	0.5	2012	0.0	0.0	0.0	Re-planted
			2013	7.09	19.5	0.0	3/7/14
			2014	20.82	24.0	0.0	2/26/15
			2015	33.41	34.8	0.0	3/24/16
			2016	26.33	0.0	26.6	6/23/2017
			2017	8.56	0.0	9.2	5/17/18
			2018	53.2	0.0	74.0	1/30/19



The following table recaps planting and production of each forb species and *Elymus elymoides*.

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	0.0	84.64	30.89	2/22/18
			2018	35.0	0.0	93.07	32.57	12/28/18
<i>Cirsium wheeleri</i>	Wheeler's thistle	560 ft	2016	159 g	159 g 0.0	NA	NA	NA
			2017	220 g				
			2018	224 g				
<i>Corydalis aurea</i>	scrambled eggs (fumewort)	100 ft	2016	15 g	—	NA	NA	NA
			2017	NA				
			2018	2 g				
<i>Dracocephalum parviflorum</i>	American dragonhead	100 ft	2016	3.6 lbs	3.2 lbs	NA	NA	NA
			2017	8 g				
			2018	102 g				
<i>Erysimum asperum</i>	western wallflower	1,625 ft	2016	5.2 lbs	4.6 lbs	NA	NA	NA
			2017	NA				
<i>Machaeranthera canescens</i>	hoary tansyaster	75 ft	2016	61 g	43 g	NA	NA	NA
			2017	NA				
<i>Packera multilobata</i>	lobeleaf groundsel	250 ft	2016	16 g	—	NA	NA	NA
			2017	NA				

Technology Development. Specific cultural practices, harvest, and cleaning protocols were used to produce seed from each product and to establish annual and biennial forbs. Seed from each species was planted on three different dates: April 5, August 6, and October 18. While little confidence can be obtained from single planting date results, from our experiences, the August planting was by far the most successful for the establishment of and resulting seed yield for each of these products.



Bryce Canyon National Park,
Corydalis aurea, Meeker,
Colorado, 2018.



Bryce Canyon National Park,
Elymus elymoides, Meeker,
Colorado, 2018.

Colorado National Monument, Colorado

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

Introduction. Indefinite Delivery/Indefinite Quantity (IDIQ) 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 2018, Upper Colorado Environmental Plant Center (UCEPC) maintained fields of *Poa secunda*, *Hedysarum boreale*, *Achnatherum hymenoides*, and *Leymus salina* but obtained only small seed yields from the grasses. From collections conducted by Colorado National Monument staff, UCEPC established fields of all four materials to be used in seed increase efforts. All fields are now well established and should produce at their maximum potential assuming favorable environmental conditions.

It was not reported in last year's progress report, but a seed shipment was made on October 4, 2017, of 1.5 lbs of *Poa secunda* and 4.7 lbs of *Achnatherum hymenoides*.

A 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 2016 2017 2018	0.67	6.7 4.8 1.4 1.5	6.1 3.83 NA NA	6.7	1/25/16 3/2/17 NA NA
<i>Hedysarum boreale</i>	Utah sweetvetch	8/7/15	2016 2017 2018	0.13	NA NA 4.5	— 3.5	Trace Trace	NA 1/8/19
<i>Leymus salina</i>	Salina wildrye	8/5/2016	— 2018	0.5	— 368 g	— NA	— NA	— NA
<i>Poa secunda</i>	Sandberg bluegrass	7/29/15	2016 2017 2018	1.2	NA 2.8 44	— 33.08	Trace	NA NA 1/1/19



Photo credit:
Rob Kurtzman



Colorado National Monument, *Poa secunda*, Meeker, Colorado, 2018.



Colorado National Monument, *Hedysarum boreale*, Meeker, Colorado, 2018.



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 2018, 96 seed lots representing 61 species were shipped to Glacier National Park. The total weight of seed delivered was 63.6 lbs. Seed distribution included 34 grasses (19 species), 53 forbs (36 species), and nine woody plants (six species). Twenty-one wildland seed collections were processed at the Bridger Montana Plant Materials Center for Glacier National Park in 2018. These consisted of eight grass lots (five species), two forb lots (two species), and 11 woody plant lots (six species). The combined weight of all collections was 63.6 lbs. Five new site species collections were identified and assigned new accession numbers, including, Engelmann's spruce, *Picea engelmannii* (9091214, Siyeh Bend); subalpine fir, *Abies lasiocarpa* (9091215, Huckleberry Lookout); *Picea engelmannii* (9091216, Huckleberry Lookout); Douglas fir, *Pseudotsuga menziesii* (9091217, Bowman Campground); and white spiraea, *Spiraea betulifolia* (9091218, North Fork).

Seed increase field status as of December 31, 2018, appears in the first table below. No new seed production fields were installed at the Bridger Montana Plant Materials Center for Glacier National Park in 2018. Two declining seed increase fields were retired in 2018 including Columbia brome, *Bromus vulgaris* (9088297, Many Glacier) and blue wildrye, *Elymus glaucus* (9075846, Saint Mary). As of December 31, 2018, seven seed increase fields remained totaling 0.525 acres.

Glacier National Park seed increase fields, December 2018

Scientific Name	Common Name	Accession Number / GLAC ID	Planting Date	Field Size (acres)	Bulk Cleaned Seed (kg)	Status
<i>Bromus carinatus</i>	California brome	9087612/LML	5/05/14	0.03 FLD 5	7.260	—
<i>Bromus vulgaris</i>	Columbia brome	9088297/MG	6/20/13	0.06 FLD 4	4.080	removed
<i>Elymus glaucus</i>	blue wildrye	9075846/SML	6/20/13	0.06 FLD 4	0.333	removed
<i>Eurybia conspicua</i>	eastern showy aster	9087433/LM	7/01/14	0.03 FLD 4	0.149	—
<i>Festuca idahoensis</i> ¹	Idaho fescue	9081497/TM	8/21/15	0.33 FLD 11	0.153	—
<i>Potentilla arguta</i> ssp. <i>arguta</i>	tall cinquefoil	9087975/SM	8/13/15	0.015 FLD 4	0.050	—
<i>Potentilla hippiana</i>	wooly cinquefoil	9063269/SM	8/13/15	0.03 FLD 4	0.697	—
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	9081993/SML	8/21/15	0.05 FLD 11	0.056	—
<i>Symphyotrichum laeve</i> var. <i>geyeri</i>	Geyer's aster	9078605/LM	8/15/12	0.04 FLD 4	0	declining

¹ - Erroneously reported as "removed" in the 2016 Glacier National Park Summary Report. Glacier National Park containerized plants held in cold storage at MTPMC, December 31, 2018.

Glacier National Park seed increase fields, December 2018 (cont.)

Scientific Name	Common Name	Accession Number/ GLAC ID	Planting Date	No. of Units	Container Size (cubic inches)	Status
<i>Mahonia repens</i>	Oregon grape	9091051/ MGL	1/26/15	19	40	held in storage



Bromus carinatus, accession 9087612, July 2018.





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 *Pseudoroegneria spicata* fields was harvested in 2009 and 2010, and the field was then discontinued in late 2010 because of diminishing seed yield. The original *Festuca idahoensis* 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 idahoensis* 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 idahoensis* and a 1-acre field of *Elymus glaucus* were established. Also in 2015, 650 x 6 ft rows of Sulphur buckwheat (*Eriogonum umbellatum*), showy goldeneye (*Heliomeris multiflora*), and one-flower sunflower (*Helianthella uniflora*) using greenhouse grown materials were installed. *Helianthella uniflora* had excellent establishment but has not produced any seed as of 2018. *Heliomeris multiflora* had fair establishment from the transplants, and a small amount of seed was harvested in 2015.

Full harvests were done in 2016 and 2017. *Helianthella uniflora* did not establish from transplants or direct seeding efforts. In 2018, the Aberdeen Idaho Plant Materials Center assisted with harvesting *Elymus trachycaulus* and *Bromus marginatus* in the Riniker MB and West fields at Grand Teton National Park, and the seed was processed at the plant materials center in Aberdeen.

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	2018 Cleaned Bulk (lbs)	2018 PLS (lbs)	Total PLS Inventory (lbs)*	Test Date
<i>Bromus marginatus</i>	mountain brome	2.0	2015	940	301	621	1/28/19
<i>Bromus marginatus</i>	mountain brome	unk	NA**	749	271	—	2/04/19
<i>Elymus glaucus</i>	blue wildrye	1.0	2015	28	5	240	2/06/19
<i>Elymus trachycaulus</i>	slender wheatgrass	unk	NA***	1059	285	630	1/28/19
<i>Festuca idahoensis</i>	Idaho Fescue	3.0	2012, 2015	1348	403	1360	2/05/19
<i>Helianthella uniflora</i>	one-flower sunflower	6' by 650'	2015	0	0	1.0	10/10/14
<i>Heliomeris multiflora</i>	showy goldeneye	6' by 650'	2015	0	0	4.4	2/17/17
<i>Eriogonum umbellatum</i>	buckwheat	6' by 650'	2015	0	0	1.0	12/13/13

* Includes prior harvests

** In situ harvest of Riniker MB field in 2018

*** In situ harvest of Riniker South field in 2018

To date, the Aberdeen Idaho Plant Materials Center has delivered 7,668 lbs of seed to Grand Teton National Park. The plant materials center currently has 1,329 lbs of *Bromus marginatus*, 1,069 lbs of *Festuca idahoensis*, 481 lbs of *Elymus trachycaulus*, 22 lbs of *Elymus glaucus*, and 4.4 lbs of *Heliomeris multiflora* in inventory (not including seed originally provided).



Grand Teton National Park, *Bromus marginatus*, Aberdeen, Idaho, 2018.



Grand Teton National Park, *Festuca idahoensis*, Aberdeen, Idaho, 2018.

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 brome (*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 seed will be distributed to the park for reclamation activities. The contract expired on December 31, 2018.

Accomplishments. One-acre fields of both *Elymus trachycaulus* and *Bromus marginatus* were harvested in 2018. Seed was cleaned and tested, and 613 lbs of Pure Live Seed (PLS) harvested from 2016 and 2017 were distributed to the park on October 23, 2018. The 2018 harvest will be distributed to the park in the spring of 2019.

Seed production and distribution are summarized in the following table.

Seed Production for Grand Teton National Park

Scientific Name	Common Name	Accession Number	Date Planted	Field Size (Acres)	2018 Harvest date	2018 PLS (lbs)	Distribution to parks in 2018 PLS lbs	Test Date
<i>Bromus marginatus</i>	mountain brome	9094354	4/22/15	1.0	7/5/18	135.4	65.3	2/19/2019
<i>Elymus trachycaulus</i>	slender wheatgrass	9094353	5/21/2015	1.0	7/10/18	115.3	547.69	1/28/2019



Grand Teton National Park, *Elymus trachycaulus*, accession 9094353, Bismarck, North Dakota, July 2018.

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 2018. A total of 2.17 lbs of wildland seed of *festuca idahoensis* (accession 9091154) was sown on May 10, 2018, to establish a 0.96-acre seed increase field. No wildland seed was processed at the Bridger Montana Plant Materials Center for Grand Teton National Park in 2018.

There was one seed increase field for Grand Teton National Park in production at the Bridger Montana Plant Materials Center as of January 1, 2018. As of December 31, 2018, there were two seed production fields totaling 1.93 acres. The *Pseudoroegneria spicata* field produced 180 bulk lbs of seed in 2018. However, heavy, non-target slender wheatgrass (*Elymus trachycaulus*) in the *Pseudoroegneria spicata* wildland collection resulted in largely *Elymus trachycaulus* production.

The status of seed increase fields for Grand Teton National Park is provided in the following tables for 2018 and early 2019 (May 1, 2019), respectively.

Status of Seed Increase fields for 2018 for Grand Teton National Park

Scientific Name	Common Name	Number	Date Planted	Acres	Status
<i>Festuca idahoensis</i>	Idaho fescue	9091154	05/10/2018	0.96	new
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	9091155	04/24/2017	0.97	remaining

Status of Seed Increase Inventory for early 2019 (May 1, 2019) for Grand Teton National Park

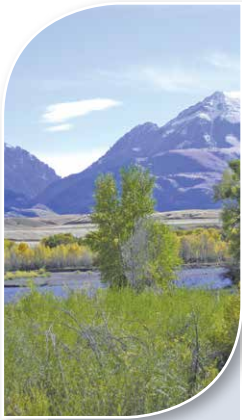
Scientific Name	Common Name	Accession Number	Lot I D	Total Bulk (lbs)	PLS (lbs)
<i>Festuca idahoensis</i>	Idaho fescue	9088206	SCO-14-GTF12	297.8	288.9
<i>Festuca idahoensis</i>	Idaho fescue	9088206	SCO-15-GTF12	50.0	46.5
<i>Poa secunda</i>	Sandberg bluegrass	9088212	SCO-14-GTF12POA	76.0	68.8
<i>Poa 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
<i>Pseudoroegneria spicata</i> *	bluebunch wheatgrass	9091155	SCO-18-GTSSP	180.0	166.9

*Mostly *Elymus trachycaulus*)

Technology Transfer/Development. Technical Note MT-119, *Vegetative Guide for Identifying Four Native Wheatgrasses in Montana and Wyoming* was circulated to the National Park Service to improve collection of targeted native wheatgrass species.



Grand Teton National Park, *Festuca idahoensis*, accession 9091154, June 2019.



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. *Hesperostipa comata* ssp. *comata* was harvested as hay mulch and baled for transport to the park in 2010 through 2012; it is no longer in production at the Aberdeen Idaho Plant Materials Center. Seed was harvested from the *Poa secunda* field from 2010 through 2013 and the *Pseudoroegneria spicata* field from 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 were 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	2018 Cleaned (lbs)	2018 PLS (lbs)	Total PLS Inventory (lbs)	Test Date
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	2.5	2013	1200	983	1633	1/24/19

The Aberdeen Idaho Plant Materials Center currently holds 416 lbs PLS of *Poa secunda* and 1,633 lbs PLS of *Pseudoroegneria spicata* in inventory.



Yellowstone National Park, *Pseudoroegneria spicata*, Aberdeen, Idaho, 2018.

 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 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 2018, three allocations of 25 seed lots totaling 254 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 nine grass lots (five species) totaling 234.6 lbs, 16 forb lots (10 species) totaling 19.5 lbs, and no woody species lots. In addition, 18 wildland seed collections were processed at the plant materials center and yielded a total of 27.7 lbs of bulk seed, including 24.4 lbs from seven grass lots (seven species), and 3.3 lbs. from 11 forb lots (11 species). Seven new species/site collections were identified and new accession numbers assigned. All wildland collections in 2018 were from Canyon to Lake and were identified in inventory by lot numbers containing a "B".

Twelve fields totaling 6.15 acres were in production in the spring of 2018 for Yellowstone National Park. No new seed production fields were planted in 2018. Of the 12 fields in production in the spring, 10 fields produced a total of 1,249.8 bulk pounds of seed. By fall 2018, 10 fields totaling 5.23 acres remained in production (see the following table).

Current wildland and seed increase inventories are available upon request.

Technology Transfer/Development. Technical Note MT-119, *Vegetative Guide for Identifying Four Native Wheatgrasses in Montana and Wyoming* was circulated to the National Park Service to improve collection of targeted native wheatgrass species.

In 2018, the final study report *Comparing Establishment and Growth of Five Native Grass Species Collected in Yellowstone National Park to those Selected by the Plant Materials Program* was completed and posted to the Montana, Wyoming, and plant materials websites.

Seed Production for Yellowstone National Park

Scientific Name	Common Name	Accession Number/ YELL Site Number	Date Planted	Field Size (Acres)	2018 Bulk Clean Seed (lbs)	PLS%	Test Date
<i>Achnatherum hymenoides</i>	Indian ricegrass	9081501/Site 64	9/11/2015	0.32 FLD 10	removed	NA	NA
<i>Bromus anomalus</i>	nodding brome	9081696/Site 140	4/13/2016	0.24 FLD 5	25.6	42.67 other crops	02/25/19
<i>Bromus marginatus</i>	mountain brome	9088024/Site 17	8/13/2013	0.33 FLD 10	47.0	89.38	02/22/19
		9088024/Site 17	7/30/2014	0.60 FLD 28	removed	NA	NA
		9087449/Site 146	5/26/2015	0.87 FLD 1	145.0	78.91	02/19/19
		9087448/Site 85	4/13/2016	0.54 FLD 5	141.0	92.57	02/25/19

Scientific Name	Common Name	Accession Number/ YELL Site Number	Date Planted	Field Size (Acres)	2018 Bulk Clean Seed (lbs)	PLS%	Test Date
<i>Elymus glaucus</i>	blue wildrye	9088030/Site 17	4/12/2016	0.12 FLD 5	3.6	NA too small	NA too small
<i>Elymus trachycaulus</i>	slender wheatgrass	9087474/Site 146 9063443/Site 31	4/26/2017 4/26/2017	1.00 FLD 24 0.48 FLD 21	522.0 239.0	87.85 93.94	02/27/19 05/06/19
<i>Leymus cinereus</i>	Basin wildrye	9081887/Site 45 9088032/Site 64	8/17/2010 4/26/2017	0.33 FLD 5 0.48 FLD 21	70.6 2.0	57.97 NA too small	03/06/19 NA too small
<i>Pseudoroegneria spicata</i> *	bluebunch wheatgrass*	9081759/Site 140	4/12/2016	0.84 FLD 5	54.0 *high slender	78.14	02/21/19



Yellowstone National Park,
Elymus trachycaulus, accession
9087474, June 2018.



Yellowstone National Park,
Leymus cinereus, accession
9081887, June 2018.

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 alyssum (*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 begin three years in advance of project initiation.

Accomplishments. In 2018, two allocations of seed totaling 44.8 PLS pounds and representing four seed lots and four species were distributed to Yellowstone National 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 Bridger Montana Plant Materials Center for cleaning for the Gardiner Basin project in 2018.

In January 2018, four fields totaling 2.62 acres remained in production at the Bridger Montana Plant Materials Center for Gardiner Basin, including Indian ricegrass (*Achnatherum hymenoides*, 9081862 – Site 64), common yarrow (*Achillea millefolium*, 9091090 – Site 64), slender wheatgrass (*Elymus trachycaulus*, 9081525 – Site 41), and bluebunch wheatgrass (*Pseudoroegneria spicata*, 9087860 – Site 148). On May 5, 2018, a 0.45-acre field of Sandberg bluegrass (*Poa secunda*, 9090791 – Site 64) was planted. As of December 31, 2018, four seed production fields remained totaling 2.93 acres (see the following table).

Current seed inventories are available upon request.

Technology Transfer/Development. Technical Note MT-119, *Vegetative Guide for Identifying Four Native Wheatgrasses in Montana and Wyoming* was circulated to the National Park Service to improve collection of targeted native wheatgrass species.

In 2018, the final study report *Comparing Establishment and Growth of Five Native Grass Species Collected in Yellowstone National Park to those Selected by the Plant Materials Program* was completed and posted to the Montana, Wyoming, and plant materials websites.

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	5/4/17	0.53	360.0
<i>Achnatherum hymenoides</i>	Indian ricegrass	9081862	Site 64	6	11/15/16	1.00	mowed
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	9087860	Site 148	24	5/4/17	0.95	97.0 mostly slender
<i>Achillea millefolium</i>	common yarrow	9091090	Site 64	1	5/26/15	0.14	2.4 then removed
<i>Poa secunda</i>	Sandberg bluegrass	9090791	Site 64	24	5/10/18	0.45	new field



Yellowstone National Park,
Elymus trachycaulus, accession
9081525, June 2018.

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 through an Indefinite Delivery/Indefinite Quantity (IDIQ) Contract AG-8B05-C-12-0002, Task Order No. 140P2018F0267. The task order calls for the Upper Colorado Environmental Plant Center to produce seed of bluebunch wheatgrass (*Pseudoroegneria spicata*) and green needlegrass (*Nassella viridula*) in one-acre fields.

Accomplishments. The *Pseudoroegneria spicata* field was established in 2015 and produced seed in 2016, 2017, and 2018. The *Nassella viridula* field was planted on July 28, 2016, but produced only a minimal amount of seed in 2017. It was much more productive in 2018.

A single shipment was made on March 27, 2018, of 152 pounds of *Pseudoroegneria spicata* and a single pound of *Nassella viridula*.

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 2018	7/31/15	1.0	7/10/17 7/2/18	79.3 251	68.56 214.48	2/21/2018 12/28/18
<i>Nassella viridula</i>	green needlegrass	2017 2018	7/28/16	1.0	6/30/17 6/27/18	1.0 158.5	NA 148.65	NA 12/26/18

Technology Development. Standard planting, cultural practices, harvest, and cleaning protocols were used to produce *Pseudoroegneria spicata* and *Nassella viridula*. The reasons for the large increase in seed yield for both products are unknown.



Yellowstone National Park.
Pseudoroegneria spicata.
Meeker, Colorado, June 2018



Yellowstone National Park,
Nassella viridula, Meeker,
Colorado, June 2018.





MIDWEST REGION

Badlands National Park, South Dakota

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

Introduction. The Upper Colorado Environmental Plant Center (UCEPC) and Badlands National Park entered into an agreement for native shrub production through Task Order No. P17PD00637 assigned to IDIQ contract AG-8B05-C-12-0002 on March 1, 2017. The plant center was 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 was 1,600 plants, 800 each of two species. Delivery was to be split, with half of the plants of each species shipped in the fall of 2017 and the remainder to be either shipped to Badlands National Park or delivered to Casper, Wyoming, in the fall of 2018. Because of inconsistent germination and a delay in the construction, it was determined that the 2017 plants be held for delivery until 2018.

Accomplishments. Seed was delivered to the Upper Colorado Environmental Plant Center shortly after the task order was signed, and the seed was directly planted into 10, cubic-inch conetainers in March 2017. Germination of *Chrysothamnus nauseosus* was poor, and germination of *Rhus trilobata* was sporadic and included plants that did not germinate until July 2018. With a number of plants needing to be held over an extra year, products originally produced in the 10, cubic-inch conetainers were replanted into larger, 62.5-cubic-inch tree pots.

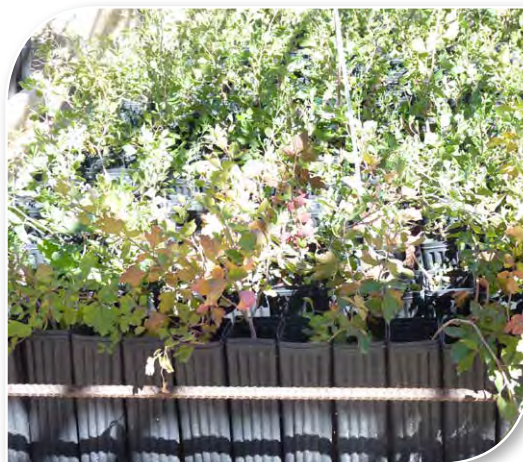
Because all 2017 materials were eventually repotted into tree pots and held an extra year, there was unexpected mortality. Target numbers were not met, but delivered plants were much larger than seven-month-old stock. Hopefully, the larger, older plants will have higher survival rates than the smaller, younger plants would have had.

Plants were delivered to the Denver/Golden, Colorado, area on October 11, 2018, where they were loaded into a Ford Expedition for transport to Badlands National Park.

The following table summarizes the number of plants delivered to Badlands National Park via the Denver Service Center.

Summary of Plants Delivered to Badlands National Park

Species	Common Name	No. Plugs Targeted	No. Plugs Delivered
<i>Chrysothamnus nauseosus</i>	rubber rabbitbrush	400/year	440
<i>Rhus trilobata</i>	skunkbrush sumac	400/year	605



Left: Badlands National Park, *Chrysothamnus nauseosus*, Meeker, Colorado, 2018

Right: Badlands National Park, *Rhus trilobata*, Meeker, Colorado, 2018.



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 (NPS) in 2016 to provide technical expertise in the growing and maintenance of native plant materials for the Fort Larned National Historic Site (FOLS). Fort Larned has a need to preserve their native plant resources and revegetate their parklands. This requires restoring native plant germplasm from local populations. Because the National Park Service does not have the adequate infrastructure and equipment needed to propagate the desired quantities of plants needed for revegetating Fort Larned National Historic Site, it was agreed that the National Park Service would provide local germplasm seed stock to the Natural Resources Conservation Service (NRCS), which in turn, would be propagated at the Elsberry Missouri Plant Materials Center.

Accomplishments. At the beginning of 2018, seed from native species listed in the following table were prepared for cold storage over the winter to induce dormancy. All seeds were cleaned with Westrup and Seedburo equipment. 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.

The following table notes native plant species propagated at the Elsberry Missouri Plant Materials Center in 2018.

Plant Species Propagated for 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 incarnata</i>	swamp milkweed
<i>Asclepias speciosa</i>	showy milkweed
<i>Asclepias syriaca</i>	common milkweed
<i>Asclepias tuberosa</i>	butterfly milkweed
<i>Astragalus crassicaupus</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>Calamovilfa longifolia</i>	prairie sandreed
<i>Ceanothus americanus</i>	New Jersey tea
<i>Cercis canadensis</i>	eastern redbud
<i>Chamaecrista fasciculata</i>	partridge pea
<i>Cucurbita</i> sp.	gourd
<i>Dalea candida</i>	white prairie clover
<i>Dalea multiflora</i>	roundhead prairie clover
<i>Dalea purpurea</i>	purple prairie clover
<i>Dalea villosa</i>	silky prairie clover
<i>Delphinium carolinianum</i>	Carolina larkspur

Scientific Name	Common Name
<i>Desmanthus illinoensis</i>	Illinois bundleflower
<i>Distichlis spicata</i>	Inland saltgrass
<i>Echinacea angustifolia</i>	black sampson
<i>Eragrostis trichodes</i>	sand lovegrass
<i>Glycyrrhiza lepidota</i>	American licorice
<i>Helianthus annuus</i>	annual sunflower
<i>Helianthus maximiliani</i>	Maximilian sunflower
<i>Ipomoea leptophylla</i>	bush morning glory
<i>Koeleria macrantha</i>	prairie junegrass
<i>Lespedeza capitata</i>	roundhead lespedeza
<i>Liatris punctata</i>	dotted blazing star
<i>Liatris pycnostachya</i>	prairie blazing star
<i>Mimosa nuttallii</i>	catclaw sensitive briar
<i>Oenothera macrocarpa</i>	Missouri evening primrose
<i>Oligoneuron</i> sp.	goldenrod
<i>Panicum virgatum</i>	switchgrass
<i>Pascopyrum smithii</i>	western wheatgrass
<i>Penstemon cobaea</i>	cobaea beardtongue
<i>Psoralea tenuiflorum</i>	slimflower scurfpoea
<i>Ratibida pinnata</i>	pinnate prairie coneflower
<i>Ribes aureum</i>	golden currant
<i>Ribes odoratum</i>	clove currant
<i>Salvia azurea</i>	azure blue sage
<i>Schizachyrium scoparium</i>	little bluestem
<i>Silphium laciniatum</i>	compass plant
<i>Silphium</i> sp.	rosinweed
<i>Sorghastrum nutans</i>	Indiangrass
<i>Sporobolus airoides</i>	alkali sacaton
<i>Sporobolus cryptandrus</i>	sand dropseed
<i>Strophostyles helvola</i>	amberique-bean
<i>Tripsacum dactyloides</i>	eastern gamagrass

To prevent mold during the cold-moist stratification period, seeds were initially treated with various mold-preventing solutions. One-third of all seeds was treated with fungicide, one-third was treated with bleach, and one-third was not treated with any mold-preventing solution. For the fungicide treatment, a solution was made of 4 tablespoons Captan mixed in 8 cups of water; seeds were soaked in the solution for ten minutes. The bleach solution consisted of one part 8.25% sodium hypochlorite to eight parts water; seeds were soaked in the solution for ten minutes. Next, all seeds were placed in labeled ziplock bags with damp sand. Typically, 6 tablespoons of seed were mixed with 2 cups of sand and 4-6 teaspoons of water—just enough to allow the sand medium to form into a ball. Bags were labeled with the species, date, and mold treatment, and then placed in cold storage for two months. Many of the individual species stratification requirements (including scarification, inoculation, and cold-moist stratification) were sourced from the Native Plant Propagation Database and Prairie Moon Nursery.

In the spring, the seed was removed from cold stratification and moved to a greenhouse. Ray Leach Conetainers were potted with a planting medium sourced from Forest Keeling Nursery (Elsberry, MO). The potted conetainers were then planted with the cold stratified seed and sand mixture, and then labeled with the species, mold-preventing treatment, and planting date. The greenhouse temperature was set to a high/low of 65/55°F for two weeks and then bumped up to 75/65°F for the rest of the spring. The irrigation regime was set to five minutes of watering twice a day. Plants were treated with insecticide and fertilizer as needed.

In late summer, seedlings were moved outside to a shadehouse. Seedlings were protected from the sun by a shade cloth and were watered for five minutes twice per day.

In late fall, senesced plants were moved into a root cellar for the duration of the winter. While in the cool, climate-controlled root cellar, plants were watered two to three times to maintain moist soil.

Technology Development. During the summer, a quick, subjective survey was performed on the plants to determine whether mold-preventing treatments made a difference in seedling germination and performance. Within each species, the three treatments were ranked with a ‘3’, ‘2’, or ‘1’ with ‘3’ having the greatest number of germinated seedlings and ‘1’ have the fewest number of germinated seedlings. Scores were averaged across all species for each treatment. Results are shown in the following table.

Averaged mold-preventing treatment scores

Treatment	Bleach	Fungicide	Control
Average Rank Score	2.0	2.3	1.7

In the MOPMC experiment, the fungicide treatment produced the greatest number of healthy seedlings, followed by bleach, and then the control. Overall, the results suggest that adding at least one of the mold-preventing treatments, either fungicide or bleach, can increase the number of germinating seeds after a period of cold-moist stratification compared to no mold prevention at all. Further studies are needed to provide quantitative results on the effects of mold prevention treatments on seeds during cold-moist stratification.

Future Work. In 2019, the Elsberry Missouri Plant Materials Center will continue to propagate seedlings in the greenhouse after they are taken out of cold storage. Native annual species will be seeded in potted conetainers in early 2019 as well. All plants will be delivered to Fort Larned National Historic Site in the late spring/early summer of 2019.



Asclepias tuberosa seedlings growing in conetainers in a shadehouse at the Missouri Plant Materials Center (Elsberry, MO) over the summer in 2018.

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 (NRCS), Bismarck North Dakota Plant Materials Center (NDPMC) entered into an interagency agreement with the USDI 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 agreed to increase seed for use in rehabilitation of social trails at the Mount Rushmore National Memorial. Seed was collected by NPS staff. The germplasm was collected from populations as closely related as possible, both genetically and ecologically, to park populations. The seed harvested from these fields has been cleaned, tested, and distributed to Mount Rushmore National Memorial for reclamation projects. The following species and amounts were agreed upon by both parties. The contract expired 9/30/2017. The agreement was extended until 9/30/2018 to allow for the seed cleaning of the 2017 harvest and distribution of seed.

Targeted Species and Goaled Seed Amounts for 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 last seed harvests were completed in 2017. Seed harvested was cleaned the winter of 2017. All seed was shipped on November 14, 2018 to Wind Cave National Park where it will be stored in a controlled environment until needed by Mount Rushmore National Memorial. The contract agreement expired September 30, 2018.

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

Seed Collected for 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

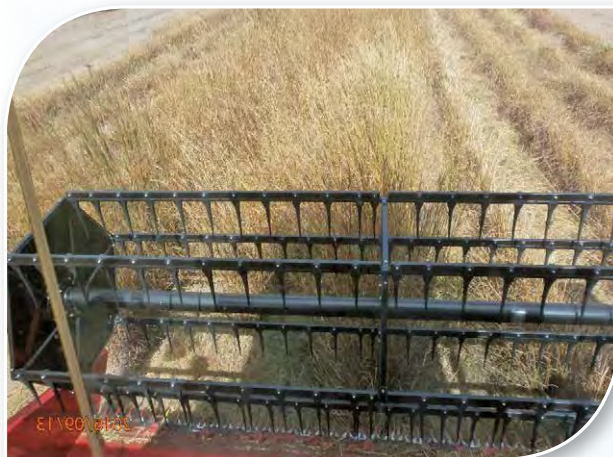
Seed production and inventory are summarized in the table on the following page.



Seed Production for Mount Rushmore National Memorial

Scientific Name	Species	Date Planted	Seeding Rate PLS (Lbs/Acre)	Field Size (Acres)	2018 Seed Harvest Date	2018 Seed Production PLS (lbs)	Inventory sent to park on 11/14/18 (lbs PLS)	Last Seed Test Date
<i>Andropogon gerardii</i>	big bluestem	May 2014	6.0	0.8	No harvest	0	121.70	3/23/2017
<i>Schizachyrium scoparium</i>	little bluestem	May 2014	4.0	0.8	No harvest	0	20.00	3/13/2017

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



Mount Rushmore National Memorial, *Andropogon gerardii*, accession 9094438, September 13, 2016.

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 the 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 agreement began on March 12, 2015 and expired on June 16, 2018. The plant materials center agreed to produce native grass seed of three species originally collected in Theodore Roosevelt National Park by park personnel and plant materials center 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 goal seed amounts for the contract period between 2015 and 2018.

Theodore Roosevelt National Park

Scientific Name	Common Name	Accession Number	PLS (lbs)
<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. Seed was harvested from the slender wheatgrass (*Elymus trachycaulus*), sideoats grama (*Bouteloua curtipendula*), and blue grama (*Bouteloua gracilis*) fields in 2018. The seed was cleaned and tested for purity and germination by the North Dakota State Seed Lab. No seed was distributed to the park in 2018.

Seed production and inventory are summarized in the following table.

Seed Production for Theodore Roosevelt National Park

Scientific Name	Common Name	Date Planted	Field Size Acres	2018 Seed Harvest Date	2018 Seed Production PLS (lbs)	Inventory as of 4/10/2018 PLS (lbs)	Seed Test Date
<i>Bouteloua curtipendula</i>	sideoats grama	2012 and 5/29/15	1.0	8/8/18	256.6	916.8	5/14/19
<i>Bouteloua gracilis</i>	blue grama	2012	0.3	8/17/18	58.36	259.4	3/21/19
<i>Elymus trachycaulus</i>	slender wheatgrass	5/21/15	1.0	7/20/18	406.26	1087.26	1/28/19
<i>Koeleria macrantha</i>	prairie junegrass	Field removed	0.3	N/A	NA	4.01	NA
<i>Nassella viridula</i>	green needlegrass	Field removed	1.0	N/A	NA	308.81	NA
<i>Pascopyrum smithii</i>	western wheatgrass	Field removed	0	N/A	NA	878.05	NA

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 curtipendula, accession 9092175, July 2018.





PACIFIC WEST REGION

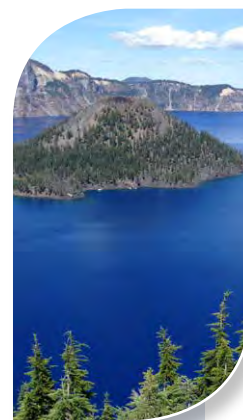
Crater Lake National Park, Oregon

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 ORPMC staff 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, ORPMC staff will also provide on-site consultation and training. Activities in 2018 included inspection and cleaning of provided seed, delivery of seed, and propagation and delivery of three species of container-grown grasses for the South West Rim Drive zone.

Accomplishments. On September 13, 2018, ORPMC staff delivered 3,569 grass plugs to the park as well as the Crater Lake seed collections in storage at the plant materials center. ORPMC staff also cleaned 59 different accessions of seed collected by NPS staff in the fall of 2018. Some seed from previous years' collections and 2018 collections remain in storage at the plant materials center and will be used for future plant propagation or wildland seeding efforts.

The following tables reflect 2018 deliveries, collections, and current seed in storage at the Corvallis Oregon Plant Materials Center.



Crater Lake National Park—Northeast East Rim Drive

Scientific Name	Accession	Seed delivered to the park (g)	Seed returned to the PMC (g)	2018 collections cleaned by PMC (g)	Total seed in storage at PMC (g)
<i>Achnatherum occidentale</i>	9109231	—	—	114	114
<i>Boechera horizontalis</i>	9109236	—	—	—	—
<i>Bromus carinatus</i>	9109238	—	—	26	26
<i>Calyptidium umbellatum</i>	9109350	—	—	<1	<1
<i>Carex halliana</i>	9109260	—	—	552	552
<i>Carex pachycarpa</i>	9109349	—	—	82	82
<i>Diplacus nanus</i>	9109351	—	—	3	3
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	9109246	—	—	276	276
<i>Ericameria nauseosa</i>	9109282	39	—	49	49
<i>Lupinus lepidus</i> var. <i>lobbii</i>	9109270	15	—	43	43
<i>Penstemon rydbergii</i>	9109352	—	—	48	48
<i>Phacelia hastata</i> ssp. <i>compacta</i>	9109252	37	—	110	110

Crater Lake National Park—Northwest East Rim Drive

Scientific Name	Accession	Seed delivered to the park (g)	Seed returned to the PMC (g)	2018 collections cleaned by PMC (g)	Total seed in storage at PMC (g)
<i>Achnatherum occidentale</i>	9109301	—	—	16	16
<i>Aconogonon davisiae</i> var. <i>davisiae</i>	9109267	93	20	14	34
<i>Calyptidium umbellatum</i>	9109353	—	—	<1	<1
<i>Carex breweri</i>	9109240	53	—	29	29
<i>Castilleja applegatei</i>	9109338	—	—	3	3
<i>Castilleja arachnoidea</i>	9109242	16.7	—	—	—

Crater Lake National Park—Northwest East Rim Drive (cont.)

Scientific Name	Accession	Seed delivered to the park (g)	Seed returned to the PMC (g)	2018 collections cleaned by PMC (g)	Total seed in storage at PMC (g)
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	9109261	—	—	51	51
<i>Eriogonum marifolium</i>	9109302	40	—	—	—
<i>Eriogonum pyrolifolium</i> var. <i>coryphaeum</i>	9109258	99	—	53	53
<i>Juncus parryi</i>	9109266	191	—	57	57
<i>Luetkea pectinata</i>	9109249	222	7	28	35
<i>Lupinus lepidus</i> var. <i>lobbii</i>	9109262	12.7	—	29	29

Crater Lake National Park—Central West Rim Drive

Scientific Name	Accession	Seed delivered to the park (g)	Seed returned to the PMC (g)	2018 collections cleaned by PMC (g)	Total in storage at PMC (g)
<i>Achnatherum occidentale</i>	9109229	157	410	25	435
<i>Aconogonon davisiae</i> var. <i>davisiae</i>	9109263	58	—	<1	<1
<i>Anemone occidentalis</i>	9109233	3,727	1,325	—	1,325
<i>Arnica viscosa</i>	9109333	0.3	—	—	—
<i>Boechera horizontalis</i>	9109235	7.5	—	—	—
<i>Bromus carinatus</i>	9109339	—	—	55	55
<i>Carex breweri</i>	9109332	8	—	56	56
<i>Carex pachycarpa</i>	9109340	—	—	61	61
<i>Castilleja applegatei</i>	9109272	17	—	5	5
<i>Castilleja</i> sp.	9109341	—	—	9	9
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	9109244	59	—	165	165
<i>Ericameria greenei</i>	9109286	128	—	<1	<1
<i>Eriogonum marifolium</i> var. <i>marifolium</i>	9109248	548	511	243	754
<i>Eriogonum pyrolifolium</i> var. <i>coryphaeum</i>	9109273	33	—	62	62
<i>Lupinus lepidus</i>	9109342	—	—	1	1
<i>Penstemon davidsonii</i> var. <i>davidsonii</i>	9109250	211	21	32	53
<i>Phlox diffusa</i>	9109253	28	—	1	1

Crater Lake National Park—South West Rim Drive

Scientific Name	Accession	Seed delivered to the park (g)	Seed returned to the PMC (g)	2018 collections cleaned by PMC (g)	Total in storage at PMC (g)
<i>Achnatherum occidentale</i>	9109228	364	1,000	67	1,067
<i>Aconogonon davisiae</i> var. <i>davisiae</i>	9109336	7.5	7.5	—	7.5
<i>Anaphalis margaritacea</i>	9109343	—	—	<1	<1
<i>Bromus carinatus</i>	9109237	1,863	1,863	321	2,109
<i>Carex breweri</i>	9109335	1.4	—	—	—
<i>Carex halliana</i>	9109257	1,169	1,152	234	1,386
<i>Carex pachycarpa</i>	9109241	2,583	800	345	1,145
<i>Carex pachycarpa</i> with squirreltail and needlegrass (mixed collection)		949	936	—	936
<i>Castilleja arachnoidea</i>	9109334	3.8	—	—	—

Crater Lake National Park—South West Rim Drive (cont.)

Scientific Name	Accession	Seed delivered to the park (g)	Seed returned to the PMC (g)	2018 collections cleaned by PMC (g)	Total in storage at PMC (g)
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	9109243	649	608	537	1,145
<i>Elymus glaucus</i>	9109344	—	—	47	47
<i>Ericameria greenei</i>	9109247	124	142	95	237
<i>Eriogonum marifolium</i> var. <i>marifolium</i>	9109265	1,091	—	214	214
<i>Eriogonum pyrolifolium</i>	9109345	—	—	6	6
<i>Eremogone pumicola</i>	9109354	—	—	8	8
<i>Eucephalus ledophyllus</i>	9109355	—	—	23	23
<i>Holodiscus microphyllus</i> var. <i>glabrescens</i>	9109264	136	—	85	85
<i>Juncus parryi</i>	9109346	—	—	4	4
<i>Lupinus andersonii</i>	9109271	1,665	153	16	169
<i>Lupinus lepidus</i>	9109347	—	—	3	3
<i>Phlox diffusa</i>	9109274	19	19	1	20

Crater Lake National Park—North West Rim Drive

Scientific Name	Accession	Seed delivered to the park (g)	Seed returned to the PMC (g)	2018 collections cleaned by PMC (g)	Total in storage at PMC (g)
<i>Achnatherum occidentale</i>	9109230	78	—	7	7
<i>Aconogonon davisiae</i> var. <i>davisiae</i>	9109232	47	—	59	59
<i>Arnica viscosa</i>	9109234	0.2	—	—	—
<i>Calyptridium umbellatum</i>	9109356	—	—	6	6
<i>Carex breweri</i>	9109239	315	—	155	155
<i>Castilleja arachnoidea</i>	9109337	2.5	—	—	—
<i>Castilleja</i> sp.	9109348	—	—	22	22
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	9109245	960	—	158	158
<i>Eremogone pumicola</i>	9109357	—	—	3	3
<i>Ericameria greenei</i>	9109283	70	—	—	—
<i>Eriogonum marifolium</i> var. <i>marifolium</i>	9109259	370	—	17	17
<i>Eriogonum pyrolifolium</i> var. <i>coryphaeum</i>	9109269	41	—	15	15
<i>Lupinus andersonii</i>	9109303	277	—	59	59
<i>Lupinus lepidus</i>	9109304	301	—	27	27
<i>Penstemon davidsonii</i> var. <i>davidsonii</i>	9109251	128	—	9	9
<i>Phlox diffusa</i>	9109268	28	5	2	7

Technology Development. This year, a few of the species collected by park staff had never been cleaned at the Corvallis Oregon Plant Materials Center. PMC staff were able to develop new seed cleaning protocols for *Calyptridium umbellatum*, *Diplacus nanus*, *Penstemon rydbergii*, and *Eremogone pumicola*.



ORPMC staff member, Vanessa East, delivering container grasses to the park in September 2018.

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

Introduction. Indefinite Delivery/Indefinite Quantity (IDIQ) Contract AG-8B05-C-12-0002, Rimrock Drive Rehabilitation provided the avenue for Task Order No. 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. Seed was to be produced for a single year (2017) for the *Elymus elymoides* and three years for the *Bromus carinatus*. Since the *Elymus elymoides* was tall enough to be harvested mechanically, contract AG-8B05-C-12-0002 was ratified on August 28, 2018, which calls for seed production of all materials through 2020.

Accomplishments. Seed production in 2018 was up significantly for the *Elymus elymoides* field and the SWRD brome. While the NEERD brome field was much more productive than the previous year, it was still less than half of what was expected.

Seed Production for Crater Lake National Park

Scientific Name	Common Name	Accession	Field Size (acres)	Planting Date	Harvest Date	Clean Bulk Seed (lbs)
<i>Bromus carinatus</i>	California brome	SWRD	0.27	7/29/2016	7/10/17 6/27/18	1.6 66.5
<i>Bromus carinatus</i>	California brome	NEERD	0.20	8/4/2016	7/5/17 6/29/18	91 g 8.4
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	bottlebrush squirreltail	NWRD, NWERD, NEERD, SWRD, CWRD	2.20	7/28/2016	7/7/17 6/28/18	9.6 123.5

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

Crater Lake National Park, *Elymus elymoides* ssp. *elymoides*, Meeker, Colorado, 2018



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*) (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 2019.

Accomplishments. The *Elymus glaucus* field was planted in the fall/winter of 2016/2017 and produced its first crop of seed of 116 lbs in 2018! 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 and, consequently, was seeded in the spring of 2017. It produced its first crop of 110 lbs in 2018. A new field of *Festuca roemerii* was established in the fall of 2017 using plugs and did not produce any seed in 2018.

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

Seed Increase Field Sizes for San Juan Island National Historical Park

Scientific Name	Common Name	Accession and Source	Planting Date	Field Size (Acres)	2018 Harvest (LBS.)
<i>Elymus glaucus</i>	blue wildrye	9079607	9/27/16	0.5	116
<i>Bromus sitchensis</i>	Sitka brome	9079606	5/10/17	0.5	110
<i>Festuca roemerii</i>	Roemer's fescue	9079605	10/15/17	1.5	NA

There were no deliveries in 2018, and old seed from a previous agreement is stored at the ORPMC. Details are listed below.

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

Scientific Name	Common Name	Accession Number	Agreement Acreage	PLS Inventory (lb)	Clean Bulk Seed Inventory (lb)	Test Date
<i>Bromus sitchensis</i>	Sitka brome	9079606	0.5	N/A	362	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	N/A	327	11/17/2014



Festuca roemerii, accession 9079605, seed increase field at the Corvallis Plant Materials Center, December 15, 2018.





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 various construction projects. Target plant production for 2018 was 10,000 plants.

Accomplishments. Seed was delivered to the Aberdeen Idaho Plant Materials Center in the fall of 2017. Seed of species with known dormancy was sown into 10, cubic-inch containers and placed either outside for overwinter stratification or into refrigerated coolers on December 20, 2017. Species with no stratification requirement for germination were planted in April 2018 and started directly in the greenhouse. Approximately 13,000 plants were delivered to Yosemite National Park in the fall of 2018. Propagation and seed cleaning protocols were developed for all species under production and submitted to the Propagation Protocol Database on the Native Plant Network.

The following table reflects the plants requested and delivered in 2018 greenhouse production.

Plants Requested and Delivered for Yosemite National Park

Wetland Species	Common Name	No. Plugs Targeted	No. Plugs Delivered
<i>Achillea millefolium</i>	common yarrow	0	600
<i>Agastache urticifolia</i>	nettleleaf giant hyssop	300	450
<i>Apocynum cannabinum</i>	Indianhemp	75	150
<i>Carex feta</i>	greensheath sedge	625	650
<i>Carex fracta</i>	fragile sheath sedge	500	800
<i>Carex hasseii</i>	salt sedge	500	0
<i>Carex hoodii</i>	Hood's sedge	500	650
<i>Carex senta</i>	swamp carex	1,500	1,850
<i>Carex subfusca</i>	brown sedge	700	900
<i>Carex vesicaria</i>	blister sedge	1,500	900
<i>Euthamia occidentalis</i>	western goldentop	0	300
<i>Juncus effusus</i>	common rush	200	500
<i>Juncus ensifolius</i>	swordleaf rush	700	1,000
<i>Melica aristata</i>	bearded melicgrass	300	250
<i>Melica harfordii</i>	Harford's oniongrass	500	700
<i>Penstemon rydbergii</i>	Rydberg's penstemon	300	600
<i>Scirpus microcarpus</i>	panicked bulrush	1,500	2,000
<i>Solidago canadensis</i> ssp. <i>elongata</i>	rough Canada goldenrod	300	700
Total Plugs:	—	10,000	13,000



Yosemite National Park, greenhouse plant production, Aberdeen, Idaho, 2018.

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 (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. In 2018, a purchase order, No. 140P2018F0267, was applied to the above contract for continued production through 2020. 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. 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 Harford's oniongrass (*Melica harfordii*) germinated, but was frost heaved in the spring of 2017. The Sierra lessingia (*Lessingia leptoclada*) established and flowered late but did produce some seed. The *Elymus elymoides*, *Achillea millefolium*, *Lessingia leptoclada*, and *Achnatherum nelsonii* all produced small amounts of seed in 2018. The *Achnatherum nelsonii* and *Lessingia leptoclada* were not contracted in the new agreement, but production plots remain from the original task order and have been maintained to provide some additional seed to the park.

The following table summarizes the seed production history.

Seed Production 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 0.27	8/17/15 6/16/16	1,744 243	—	—	—	—
<i>Bromus carinatus</i>	California brome	0.77	—	—	7/5/16 7/2/17 6/30/18	58.5 36 55	42.85 33.61 43.8	12/26/16 9/20/17 10/24/18
<i>Elymus glaucus</i>	blue wildrye	0.5 0.5	8/14/15 6/16/16	516 410	—	—	—	—
<i>Elymus glaucus</i>	blue wildrye	1.00	—	—	8/1/16 7/24/17 7/20/18	23.5 140 175	20.32 135.5 167.3	12/29/16 9/20/17 11/01/18
<i>Elymus trachycaulus</i> *	slender wheatgrass	0.5 0.2 0.8	8/14/15 6/7/16 7/28/17	1,243 54 454	7/21/16 7/18/17 7/18/18	67.0 221 407	48.74 214.74 383.9	12/29/16 9/19/17 10/08/18
<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 1,200 plugs	8/25/17 8/14/18	87 g 8.8	NA 3.38	NA 12/21/18
<i>Elymus elymoides</i>	bottlebrush squirreltail	0.02	8/11/16	10	7/14/17 8/14/18	66 g 107 g	NA	NA
<i>Achnatherum nelsonii</i>	Columbia needlegrass	0.06	8/11/16	46	7/18/17 8/14/18	3 g 64 g	NA	NA
<i>Lessingia leptoclada</i>	Sierra lessingia	.006	8/11/16	10	9/28/17 10/16/18	24 g 10 g	NA	NA
<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 acres 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.

In 2018, two shipments were sent to the park, all produced in 2018. The first shipment consisted of 200 lbs of *Elymus Trachycaulus*, 125 lbs of *Elymus glaucus*, and 55 lbs of *Bromus carinatus*. These were shipped on October 5, 2018. A second shipment was sent on October 18, 2018. The remainder of the *Elymus Trachycaulus* and blue wildrye were sent directly to the park. In all, 207 additional lbs of *Elymus Trachycaulus* and 50 lbs of *Elymus glaucus* were sent in the second shipment. A small amount of *Elymus glaucus* 'clean-off seed' is all that remains on inventory for the park, besides the small quantities of forbs identified in the preceding table.

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



Yosemite National Park,
Bromus carinatus, Meeker,
Colorado, 2018



Yosemite National Park,
Elymus trachycaulus,
Meeker, Colorado, 2018

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

City/State	Center	Address	City, State, Zip Code	Phone Number
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/>

