

Native Plants For National Parks



NPS photo - Theodore Roosevelt National Park



NPS photo - Badlands National Park

FY 2008 Plant Materials Project Summary Reports



FY 2008
Plant Materials Project Summary Reports
from the
Natural Resources Conservation Service
to the
National Park Service

April 2009

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SO LONG

This is the eleventh and last NRCS Plant Materials Centers Annual Progress Report that I will be involved with. I want to thank the NPS Denver Service Center, the Federal Lands Highway Program, the NRCS Plant Materials Centers and National Park Units for all the cooperation and support these past 10+ years.

It has been an interesting, challenging and rewarding experience. I feel that this program has been beneficial to both agencies and has made significant contributions to the protection of our natural resources and preservation and restoration of native plant communities. I am pleased to have played a role in its implementation. I will miss the many dedicated hard working people I have met and worked with from coast to coast and border to border. Don't be surprised if I drop by to say hello and "monitor" the native revegetation plantings we worked on together!

Russ Haas

NRCS Plant Materials Revegetation Technical Advisor 1998-2009.



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INTRODUCTION

This is the 2008 NRCS Plant Materials Centers Annual Progress Report on cooperative project agreements between the National Park Service (NPS) and the Natural Resources Conservation Service (NRCS).

These projects relate to development of native plant materials for revegetation of park roads and restoration projects. The NPS and NRCS have been cooperating in testing and increasing native plants under a Memorandum of Understanding and interagency agreement since 1989.

The cooperating NRCS Plant Materials Centers have prepared two types of reports.

(1) Brief One Page Summary (attached) and (2) a comprehensive Annual Technical Report.

The “One Page Summary Report” is sent to parks with current projects, to respective NPS field areas and associated park resource managers and respective NRCS offices. Additional hard copies or CD form of the “one page summary report” are available on request.

This report can be requested from Pat Davey, NRCS National Technical Advisor, National Park Service, Denver Service Center, Transportation Division, PO Box 25287, Lakewood, CO 80225, E-mail: pat_davey@nps.gov or phone 303-969-2349.

The comprehensive 2008 Annual Technical Reports are also available at the above address or from respective Plant Material Centers.

If you have any questions or comments to improve the use and distribution of these reports, please contact Pat Davey or Sarah Wynn, NPS National Technical Advisor at 303 969-2292, email:sarah_wynn@nps.gov.

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NATIONAL PARK SERVICE
And
NATURAL RESOURCES CONSERVATION SERVICE

INTERAGENCY PLANT MATERIALS PROGRAM

2008 PROGRAM SUMMARY

Technical Assistance

- NRCS NTA (National Technical Advisor) provided assistance to Landscape Architects, Project Specialists and Project Managers at the NPS Denver Service Center relative to revegetation project needs with five National Parks in addition to those with interagency agreements.

- On site program technical assistance was provided by NRCS NTA at 15 National Parks.

Development and Administration of Interagency Agreements

- Nine new agreements and five amendments to agreements were developed this year. A total of 38 active interagency agreements were administered and coordinated.

- There were 48 active projects at 29 National Park units in cooperation with 11 Plant Materials Centers.

Native Seed and Plant Production

- 25 National Parks
- 3,952 pounds of seed
- 18,600 container transplants
- 244 park indigenous species (109 grasses, 106 forbs, 1 legume, 33 shrubs)

Native Seed/Plant Deliveries

- 9 National Parks
- 836 pounds of seed
- 18,600 container transplants
- 138 park indigenous species (35 grasses, 66 forbs, 7 sedges, 2 legumes and 28 shrubs)

Processing of Park Collected Seed

- 2 National parks
- 302 pounds of seed
- 31 species (19 grasses, 9 forbs, 3 shrubs)

Interagency Program Reviews

Reviews were held at:

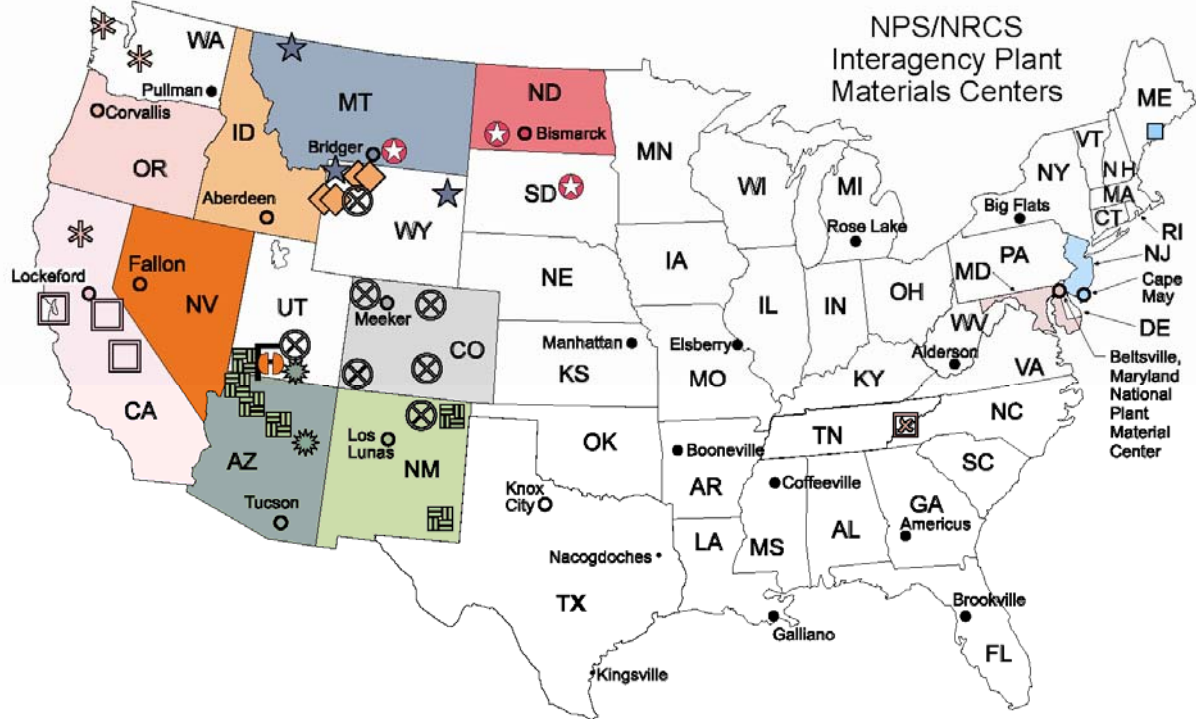
- **National Parks:** Bryce Canyon NP, Rocky Mountain NP, Carlsbad Caverns NP, Saguaro NP, Badlands NP, Mesa Verde NP, Theodore Roosevelt, Fort Stanwix NHS, Glacier NP.
- **Plant Materials Centers:** Meeker, Colorado; Los Lunas, New Mexico; Bismarck, North Dakota; Aberdeen, Idaho; Fallon, Nevada; Lockeford, California; Tucson, Arizona; Corvallis, Oregon; Big Flats, New York.

Technology Transfer and Research

- NRCS/NPS NTA and program staff coordinated with DSC Operations Information/Technology staff to continue down load of revegetation program related information to the *Inside NPS* internet website:
http://workflow.den.nps.gov/staging/8_transportation/phase_reveg.htm

Information provided includes basic FLHP program guidelines, examples of revegetation specifications, tools (seed collection, storage, plant salvage, propagation, cost estimating, monitoring etc.) Links to the NRCS PM and Plant Propagation Protocols websites and much more.

- NRCS NTA assisted in preparation of the meeting and made three presentations at a Revegetation Workshop for NPS Southwest Region Parks, Tucson AZ.
- Consulted with selected parks to further define protocols to be used to monitor FLHP revegetation projects
- NRCS NTA and program staff prepared and distributed to cooperating Parks/PMCs and key NPS and NRCS personnel, the FY2008 annual Interagency Program Summary Report.



Plant Materials Center			In cooperation with these National Parks
Aberdeen, ID	●	◆	Grand Teton NP, Yellowstone NP
Beltsville, MD	●	◻	Great Smoky Mountains NP
Bismarck, ND	●	★	Little Bighorn Battlefield NM, Theodore Roosevelt NP, Badlands NP
Bridger, MT	●	★	Devils Tower NM, Glacier NP, Yellowstone NP
Cape May, NJ	●	◻	Acadia NP
Corvallis, OR	●	✱	Mt. Rainier NP, Olympic NP, Lassen Volcanic NP
Lockeford, CA	●	◻	Sequoia and Kings Canyon National Park, Golden Gate NP, Yosemite NP
Los Lunas, NM	●	◻	Carlsbad Caverns NP, Capulin Volcano NP, Grand Canyon NP, Pipe Spring NM, Wupatki NM, Zion NP
Meeker, CO	●	⊗	Bryce Canyon NP, Canyon de Chelly NM, Dinosaur NM, Grand Teton NP, Great Sand Dunes NM, Mesa Verde NP, Rocky Mountain NP
Tucson, AZ	●	✱	Canyon de Chelly NM, Zion NP
Fallon, NV	●	Ⓜ	Zion NP

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BRYCE CANYON NATIONAL PARK

2008 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION: Bryce Canyon National Park and Natural Resources Conservation Service (NRCS) signed a formal Inter-Agency agreement on January 7, 2004. IA No. 1211-04-004 outlined the field production of *Elymus trachycaulus*, slender wheatgrass. Three amendments were added to the original agreement, including the production of containerized products and an extension to the production of slender wheatgrass.

On July 15, 2008, a new agreement, IA agreement No. 1211-08-010 was signed. This agreement is for the establishment of a 0.5 acre field of *Bromus anomalus*, nodding brome, to be produced through 2011.



Bryce Canyon NP slender wheatgrass

ACCOMPLISHMENTS: On August 19, 2008, eighty-three containerized shrubs were delivered to the park by PMC employees. Propagation of several shrub species is ongoing in the greenhouse for 2009 delivery. The slender wheatgrass field produced 137 pounds of seed for the 2008 growing season and was tilled under in November. On January 14, 2008, seed was received for cleaning from Bryce Canyon National Park. Sixty-five grams of miscellaneous material will be added to their inventory. On August 21, 2008, a 0.5 acre field was planted with *Bromus anomalus*, nodding Brome. The seed used to establish the field had been previously produced at the UCEPC in 2004.

TECHNOLOGY DEVELOPMENT – Specific information about germination trials, soil preparation, seeding rates, equipment, seedling establishment methods, or any other seed processing or handling techniques is available upon request.

CANYON de CHELLY NATIONAL MONUMENT

**2008 Annual Summary Report
Prepared by**

**UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, CO**

INTRODUCTION: This report is in reference to sub agreement IA No-1211-08-003.

In February of 2008, an interagency agreement was signed between the National Park Service, Canyon de Chelly National Monument (CDCNM) of the U. S. Department of Interior and the Natural Resources Conservation Service (NRCS). The agreement calls for NRCS-Upper Colorado Environmental Plant Center (UCEPC) to produce seed of two native species (Indian ricegrass *Achnatherum hymenoides* and western wheatgrass *Pascopyrum smithii*) from seed stock collected by park personnel at the monument. The agreement stipulates that that UCEPC will produce 50 pounds of Pure-Live-Seed (PLS) of Indian ricegrass and 50 PLS-pounds of western wheatgrass. This agreement will remain in effect until September 30, 2010.

ACCOMPLISHMENTS: As per agreement, seed collections from the monument were insufficient to meet the required amounts necessary for field establishment. The seed that was received was cleaned and planted this year. A single field, 1.3 acres, of Indian ricegrass was planted October 8, 2008, which utilized the entire cleaned seed amount of 2.65 pounds. No seed of western wheatgrass was collected at the monument in 2008. Seed of both species will need to be collected in 2009 to establish the plantings as specified in the agreement.

TECHNOLOGY DEVELOPMENT: Standard planting, cultural practices, harvest and cleaning protocols will be utilized to handle the Indian ricegrass and western wheatgrass.

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CANYON de CHELLY NATIONAL MONUMENT

**2008 Annual Summary Report
Prepared by**

**UPPER COLORADO ENVIRONMENTAL PLANT MATERIALS CENTER
MEEKER, CO**

INTRODUCTION – This report is in reference to sub agreement IA No-F739008005.

In June of 2008, an interagency agreement was signed between the National Park service, Canyon de Chelly National Monument (CDCNM) of the U. S. Department of Interior and the Natural Resources Conservation Service (NRCS). The agreement calls for NRCS-Upper Colorado Environmental Plant Center (UCEPC) to produce seed of two native species (Indian ricegrass *Achnatherum hymenoides* and western wheatgrass *Pascopyrum smithii*) from seed stock collected by park personnel at the monument. The agreement stipulates that UCEPC will establish two acres of Indian ricegrass and one acre of western wheatgrass. This agreement will remain in effect until September 30, 2011.

ACCOMPLISHMENTS – As per agreement, seed collected at the monument and cleaned at UCEPC resulted in 2.6 pounds, enough seed to plant about 1.3 acres of Indian ricegrass on October 7, 2008. No seed of western wheatgrass was collected at the monument in 2008 to initiate the planting as called for in the agreement. Seed of both species will need to be collected in 2009 to complete the plantings as specified in the agreement.

TECHNOLOGY DEVELOPMENT – Standard planting, cultural practices, harvest and cleaning protocols will be utilized to handle the Indian ricegrass and western wheatgrass.

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CANYON de CHELLY NATIONAL MONUMENT

2008 Annual Summary Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE PLANT MATERIALS CENTER TUCSON, ARIZONA

INTRODUCTION: This project involves the production of 50 PLS lbs of *Bouteloua gracilis*, 35 PLS lbs of *Sporobolus cryptandrus*, 60 PLS lbs of *Sporobolus airoides*, and 140 PLS lbs of *Aristida purpurea*. Seed produced will be used for revegetation of disturbed areas in Canyon de Chelly National Park. The last signature on the agreement was on the 14th of November, 2007 with the project extending until the 30th of September, 2010. At this time, two borders of *Sporobolus airoides* are in production. The completion date of this project is dependent upon adequate seed collection from the park.

ACCOMPLISHMENTS: Seed collections from Park Service personnel were received by Plant Materials personnel in late 2007 and/or early 2008. Most of the seed received was either immature or the amount inadequate for establishment of production fields.

Please see the table below. Seed received late 2007, early 2008:

<u>Species</u>	<u>Bulk Amount (g)</u>	<u>Condition/Comments</u>
<i>Bouteloua gracilis</i>	115	Collected too early, not enough for field establishment
<i>Sporobolus cryptandrus</i> w/ <i>Bouteloua gracilis</i>	43	Collected too early, too difficult to separate during cleaning into separate species
<i>Aristida purpurea</i>	1.5	Not enough for field establishment
<i>Bouteloua curtipendula</i>	65	Not a project species, not enough for field establishment
<i>Sporobolus cryptandrus</i>	9.8	Collected too early, not enough for field establishment
<i>Pleuraphis rigida</i>	20	Not a project species, not enough for field establishment
<i>Sporobolus airoides</i>	UKN	Used to establish 2 borders (0.18 acre/border * 2 = 0.36 acres)

Of the seed received, only the *Sporobolus airoides* was of an adequate amount and viable. It should be noted that park service personnel have reported that additional seed was sent to the Plant Materials Center in 2008. This seed has not been located at the center and the former manager of the

center, does not recall its arrival. At this time, the PMC has not received adequate seed for further project production.

Alkali Sacaton Fields:



Harvest:

Production was initiated at the center in June 2008. The first harvest was conducted in November 2008 with a bulk weight of 15 lbs. Samples of the first harvest have been sent to New Mexico State University for germination testing.

CAPULIN VOLCANO NATIONAL MONUMENT

**2008 Annual Summary Report
Prepared by**

**NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
LOS LUNAS NEW MEXICO**

INTRODUCTION: On August 30, 2004, an agreement was made between Capulin Volcano National Monument (CVNM) of the U.S. Department of Interior (USDI) and the Natural Resources Conservation Service (NRCS) of New Mexico. This agreement declares that the Los Lunas Plant Materials Center (LLPMC) will produce seed of agreed upon native species for CVNM.

ACCOMPLISHMENTS:

A. Seed Production



Little bluestem seed production field for Capulin Volcano National Monument

The LLPMC produced the following seed in 2008 for CVNM:

Common name	Scientific name	Agreement Acreage	2008 LLPMC Acreage	Harvest (Bulk lbs.)
Mountain muhly	<i>Muhlenbergia montana</i>	0.50 acre	0.50 acre	No harvest
Blue grama	<i>Bouteloua gracilis</i>	0.50 acre	0.50 acre	7.40
Little bluestem	<i>Schizachyrium scoparium</i>	0.50 acre	0.50 acre	Not Available ¹
Sideoats grama	<i>Bouteloua curtipendula</i>	0.50 acre	0.00 acre	Not Available ¹
Western wheatgrass	<i>Pascopyrum smithii</i>	–	–	None

TECHNOLOGY DEVELOPMENT:

- Mountain muhly – No seed was harvested from this planting in 2008. This planting had poor forage production in 2008 and no viable seed was found in any of the inflorescences in the field.
- Blue grama – Seed was harvested in 2008. The planting was healthy and the plants produced many seedheads, but seed formation was found to be low.
- Little bluestem – Seed was harvested in 2008. The planting was vigorous and plants were in good growing condition.
- Sideoats grama – No seed was received from CVNM in 2007; as a result the LLPMC has not established a production block of this species.
- Western wheatgrass – This species was removed from the contract.

¹ Seed has been harvested but not yet cleaned.

CARLSBAD CAVERNS NATIONAL PARK

2008 Annual Summary Report

Prepared by

NATURAL RESOURCES CONSERVATION SERVICE PLANT MATERIALS CENTER LOS LUNAS, NEW MEXICO

INTRODUCTION: On August 23, 2004 an agreement was made between Carlsbad Caverns National Park (CCNP) of the U.S. Department of Interior (USDI) and the Natural Resources Conservation Service (NRCS) of New Mexico. This agreement declares that the Los Lunas Plant Materials Center (LLPMC) will produce seed for CCNP for use in revegetation and restoration projects.

ACCOMPLISHMENTS:

A. Seed Production

The LLPMC produced the following seed in 2008 for CCNP:

Common name	Scientific name	Agreement Acreage	2008 LLPMC Acreage	Harvest (Bulk lbs.)
Sideoats grama	<i>Bouteloua curtipendula</i>	0.50 acre	0.50 acre	81.18
Blue grama	<i>Bouteloua gracilis</i>	0.50 acre	0.50 acre	29.46
Three-awn	<i>Aristida purpurea</i>	0.50 acre	0.50 acre	16.50
Green sprangletop	<i>Leptochloa dubia</i>	0.50 acre	0.50 acre	65.84
Plains bristlegrass	<i>Setaria vulpiseta</i>	0.50 acre	0.90 acre	224.50

B. Transplant production

In 2008 the LLPMC grew 1,600 transplants of five CCNP grass species; blue grama, sideoats grama, plains bristlegrass and green sprangletop. The transplants were picked up in September of 2008 by the CCNP.

TECHNOLOGY DEVELOPMENT:

- Sideoats grama – Seed was harvested in 2008.
- Blue grama – Seed was harvested in 2008.
- Three-awn – Seed was harvested in 2008.
- Green sprangletop – Seed was harvested in 2008.

- Plains bristlegrass – Seed was harvested in 2008. In September of 2008, twenty-nine bristlegrass forage bales were provided to CCNP from the seed production fields at the LLPMC. The bristlegrass bales were to be used at the CCNP as mulch for seeding projects.
- Plains bristlegrass – Seed was harvested in 2008. In September of 2008, twenty-nine bristlegrass forage bales were provided to CCNP from the seed production fields at the LLPMC. The bristlegrass bales were to be used at the CCNP as mulch for seeding projects.



Three-awn seed production field for Carlsbad Caverns National Park

DEVILS TOWER NATIONAL MONUMENT

2008 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
BRIDGER, MONTANA

INTRODUCTION: The Bridger Plant Materials Center (BPMC) initiated a cooperative agreement with Devils Tower National Monument, Wyoming, in 2006 for Fiscal Years 2006 through 2008. The work involved the production and installation of containerized nursery stock of plant materials indigenous to park boundaries. Wildland seed collections were made by Russ Haas, NRCS Revegetation Advisor to the National Park Service, at Devils Tower and forwarded to the Bridger Plant Materials Center for further cleaning and use in April 2006.



Planting of sage and rabbitbrush- roadside



Sage and rabbitbrush- meadow restoration

ACCOMPLISHMENTS: In 2006, seed lots of fringed sage *Artemisia frigida* and rubber rabbitbrush *Ericameria nauseosa* (formerly *Chrysothamnus nauseosus*) were collected at Devils Tower National Monument from within Park boundaries and forwarded to the Bridger Plant Materials Center for further processing. Cleaned seed lots were used to sow 40-cubic-inch Deepots[®] on April 17, 2006. Multiple seeds were surface-sown in each container filled with Sunshine Mix #1[®] and then irrigated. All containers of both species were placed directly in a greenhouse maintained at 75⁰ to 80⁰F days and 60⁰ to 65⁰F nights. Seed of both species germinated very well without any dormancy-breaking treatment. All plants were moved outdoors and stored on wooden benches on June 5, 2006. Plants were fertilized periodically with low levels (approximately 100 to 150 ppm) of Plant Starter[®] (9-45-15 and 8-45-14) over the course of the growing season. Rapid growth of both species required pruning in late July 2006. All plants were moved to a coldframe on October 25, 2006 and over-wintered. As a result of construction schedule delays at Devils Tower, all container production was transplanted to 2-gallon pots in the spring of 2007 and held over at the BPMC for one additional growing season. Plants were pruned multiple times over the 2007 growing season in order to reduce top growth and produce a manageable container product.

A total of 374 fringed sage and 136 rubber rabbitbrush were stored in a coldframe maintained between 35⁰ and 45⁰F at the Bridger Plant Materials, Bridger, Montana, over the winter of 2007 – 2008. Plants were inspected and irrigated as needed while in storage. In addition, a total of 1,200 ‘Rosana’ western wheatgrass (*Pascopyrum smithii*) plants were produced in 4-cubic-inch containers in spring 2008 for out-planting. All plants were delivered to Devils Tower Monument and installed by BPMC and Devils Tower staff on May 29 and 30, 2008. Excess plants were retained by Devils Tower staff and utilized for various restoration projects around the park.



Installation of Western Wheatgrass plugs for erosion control

TECHNOLOGY DEVELOPMENT: No specific technology development activities were conducted at the Bridger Plant Materials Center on behalf of Devils Tower National Monument in 2008.

DINOSAUR NATIONAL MONUMENT

2008 Annual Summary Report Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER MEEKER, COLORADO

INTRODUCTION: Upper Colorado Environmental Plant Center entered into an agreement with Dinosaur National Monument in 1996 and was most recently amended in 2008. The agreements in general involve the collection and seed production of grass species native to Dinosaur National Monument. Targeted species are: Western wheatgrass (*Pascopyrum smithii* - 9070955), Indian ricegrass (*Achnatherum hymenoides* - 9070953), basin wildrye (*Leymus cinereus* - 9070951), bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata* - 9070952), and alkali sacaton (*Sporobolus airoides* - 9070954). The grasses will be used for restoration and to prevent non-indigenous weedy plants from invading. Personnel from Dinosaur came to the plant center in 2008. Seed fields were observed and the seed stored for Dinosaur was reviewed. Also, at that time a decision was made to remove the alkali sacaton field and plant a new field of western wheatgrass (9092278).

ACCOMPLISHMENTS: In September, a new field (0.30 acre) of western wheatgrass was planted at the plant center. Seed was harvested from all seed fields in 2008 and cleaned, but test results were not available at the time of writing this report. Germination was updated on three seed materials and provided to Dinosaur along with the test results of the 2007 bluebunch wheatgrass so they could be used for fall plantings. In addition, an amendment to the agreement was prepared in 2008.

Name	<u>Seed Harvested</u>		Name	<u>Seed Fields</u>	
	Harvest Date	Clean Seed		Size	
Alkali sacaton	July 18	160.0 g	Alkali sacaton *	0.18 acre	
Basin wildrye	July 28	36.0 lb	Basin wildrye	0.24 acre	
Bluebunch wheatgrass	July 16	18.5 lb	Bluebunch wheatgrass	0.18 acre	
Indian ricegrass	July 10	6.6 lb	Indian ricegrass	0.24 acre	
			Western wheatgrass	0.30 acre	

* To be removed

TECHNOLOGY DEVELOPMENT: Specific information can be requested for each species regarding procedures and methods for seed cleaning etc.



Dinosaur Basin Wildrye seed production planting at
Upper Colorado Environmental Plant Center

GLACIER NATIONAL PARK

2008 Annual Summary Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE PLANT MATERIALS CENTER BRIDGER, MONTANA

INTRODUCTION: The Bridger Plant Materials Center (BPMC) has maintained a cooperative agreement with Glacier National Park (GNP) 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 2008, 219 seed and plant lots representing 82 individual species and totaling 66.02 pounds (29.95 kg) were delivered to GNP or used for BPMC production. The 2008 seed distribution included 54 grass lots (21 species), 82 forb lots (39 species), and 53 shrub lots (22 species). In addition, a total of 1,575 containerized plants were delivered to GNP in June (see Table 1). There was no purging of aging/low viability seeds lots from inventory in 2008 since nearly all GNP material stored at the BPMC is now 10 years or less in age. Wildland seed collections sent to the BPMC in 2008 (150 to 200 collections) are currently being processed. All wildland production data will be presented in the Glacier National Park 2008 Annual Technical Report.

Eight established seed production fields produced seed in 2008, including *Achnatherum nelsonii* (9081995-SM/Two Dog Flats); *Carex pachystachya* (9078645-LM/Avalanche); *Eurybia conspicua* (9087433-Lake McDonald); *Festuca idahoensis* (9075848-Saint Mary); *Pseudoroegneria spicata* (9081993-SM/Two Dog Flats); *Pseudoroegneria spicata* (9076127-Two Medicine); *Geum macrophyllum* (9087654-Lake McDonald), and a combined field of two lots of *Symphotrichum laeve* (*Aster laevis*) (9081447-Avalanche). Field seed increase at the BPMC in 2008 is currently being processed and will be reported in the Glacier National Park 2008 Annual Technical Report. In addition, four new seed production fields were planted in April at the BPMC for Glacier Park (see Table 2).

A total of 2,400 containers of *Mahonia repens* (9063248-Saint Mary) were sown in July 2008 and are currently in cold-moist stratification in order to break dormancy.

Table 1. Container plants delivered to Glacier Park in 2008.

Species Symbol	GNP Lot No.	Accession Number	Location	Number
ARUV	06-113	9063635	Saint Mary	289
ARUV	02-254	9082135	Two Medicine	16
ARUV	99-180	9054544	Sunpoint	30
ARUV	04-165	9078619	LM-Camas	303
ARUV	04-258	9078265	LM-Fish Creek	377
RUPA	04-065	9087795	Saint Mary	179
RUPA	06-038	9078268	LM-Apgar	98
ROWO	NA	9063260	North Fork	283

Table 2. Glacier Park seed production fields planted at the Bridger PMC in 2008.

			BPMC	Number	
	Accession	GNP	Field	of	Field
Species	Number	Location	Location	Rows	Area
					acres
<i>Festuca idahoensis</i>	9058298	Camas	F20	16	0.54
<i>Festuca occidentalis</i>	9087751	LM	F22N	24	0.35
<i>Elymus glaucus</i>	9087348	LM	F22S	28	0.41
<i>Elymus glaucus</i>	9087348	LM	F3	12	0.12

TECHNOLOGY DEVELOPMENT AND ASSISTANCE: Staff from the BPMC traveled to GNP on June 2 through 5, 2008 to install a multi-zone irrigation system in the Glacier Park Nursery greenhouse. All PVC pipe, control valves, shut-off valves, and drains were installed during this visit.

GRAND CANYON NATIONAL PARK

2008 Annual Summary Report

Prepared by

NATURAL RESOURCES CONSERVATION SERVICE PLANT MATERIALS CENTER LOS LUNAS NEW MEXICO

INTRODUCTION: In July 1990, an agreement was made between the Grand Canyon National Park (GCNP) of the U.S. Department of Interior (USDI) and the Natural Resources Conservation Service (NRCS) of New Mexico. This agreement declares that the Los Lunas Plant Materials Center (LLPMC) will produce seed and propagate plants for the GCNP. Amendment No. 1 of 1999 and Amendment No. 2 of 2001 provides for seed production of two native grass species, and for growing transplants of 10 native tree and shrub species. Of the 10 native tree and shrub species, the LLPMC agreed to deliver 900 transplants to the GCNP. All transplants will be grown from seed collected from indigenous ecotypes at the GCNP.



Muttongrass seed production field planted in 2008 for Grand Canyon

ACCOMPLISHMENTS:

A. Seed Production

The LLPMC produced the following seed in 2008 for the GCNP:

Common Name	Scientific Name	Agreement Acreage	2008 LLPMC Acreage	Harvest (Bulk lbs.)
Blue grama	<i>Bouteloua gracilis</i>	0.50	0.54	18.76
Muttongrass	<i>Poa fendleriana</i>	1.00	1.50	47.44
Bottlebrush squirreltail	<i>Elymus elymoides</i>	0.50	0.50	2.42
Sideoats grama	<i>Bouteloua curtinpendula</i>	0.50	0.50	44.50

In September of 2008, the LLPMC delivered the following seed to GCNP:

Common Name	Scientific Name	Pure live seed (lbs) delivered in September 2008
Blue grama	<i>Bouteloua gracilis</i>	94.32
Muttongrass	<i>Poa fendleriana</i>	59.71
Bottlebrush squirreltail	<i>Elymus elymoides</i>	7.46

B. Transplant Production

In September of 2008, the LLPMC delivered 1,180 transplants of three grass species and 3,171 wildflower and shrub transplants to the GCNP. These transplants were grown using seed collected at the GCNP and from seed production fields located at the LLPMC.

TECHNOLOGY DEVELOPMENT:

- Blue grama – Seed was harvested in 2008.
- Muttongrass – Seed was harvested in 2008. The LLPMC used seed from the 2007 harvest of the GCNP muttongrass to grow transplants in 2008. The transplants were then used to establish a 0.25 acre seed production planting in field 21S at the LLPMC.
- Bottlebrush squirreltail – Seed was harvested in 2008. The GCNP bottlebrush squirreltail seed production fields exhibited poor forage and seed production in 2008. This collection of squirreltail does not appear to be very well adapted to the climate at the LLPMC.
- Sideoats grama – Seed was harvested in 2008.

GRAND TETON NATIONAL PARK

2008 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION: The Aberdeen Plant Materials Center (PMC) entered into an interagency agreement with Grand Teton National Park (GTNP) in 2006 to produce seed of four native grasses for use in revegetation of disturbed areas following road construction. Seed fields were planted in 2006 and seed was harvested in 2007 and 2008. New fields of Idaho fescue (*Festuca idahomensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) were planted in May, 2008. Seed from these fields will be harvested in 2009 through 2010.



Grand Teton Blue Wildrye



Grand Teton Mountain Brome

ACCOMPLISHMENTS: Seed fields were planted the last week of May 2006. Slender wheatgrass was planted in Field 27E at the PMC Fish and Game Farm. Mountain brome and Sandberg bluegrass were planted in Fields 2W and 13N respectively at the PMC Home Farm. Blue wildrye was planted in Field 6E at the PMC Pearl Farm. Idaho fescue (0.3 acres) and bluebunch wheatgrass (0.17 acres) were planted May 23, 2008 and are located in Field 21, Fish and Game Farm.

Soil at the Home Farm and Fish and Game Farm is Declo silt loam with pH of 7.4 to 8.4. Soil at the Pearl Farm is Kimama silt loam with pH of 7.4 to 9.0. Average annual precipitation is 9.39 inches and seed fields are sprinkler irrigated to supplement natural precipitation to approximate 16 to 24 inches of total annual moisture. Weeds were controlled as needed during the growing season. All species with the exception of Sandberg bluegrass established well. Some Sandberg bluegrass plants were established but overall field establishment is spotty. Substantial effort was also required to rogue Kentucky bluegrass out of the Sandberg bluegrass field.

The following table lists the species, field acreage and seed yields from 2008 harvest (at time of report, seed had not been tested):

Species	Scientific Name	Acres	Clean seed (lbs)
Slender wheatgrass	<i>Elymus trachycaulis</i>	1.0	650
Blue wildrye	<i>Elymus glaucus</i>	2.7	417
Mountain brome	<i>Bromus marginatus</i>	1.0	200
Sandberg bluegrass	<i>Poa secunda</i>	0.25	15

Seed samples from each lot were submitted to the Idaho State Seed Laboratory for purity and viability testing.

GTNP has requested that seed production continue from the slender wheatgrass and Sandberg bluegrass in 2009.



Grand Teton National Park -Slender wheatgrass

GRAND TETON NATIONAL PARK

2008 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION: An agreement between Grand Teton National Park and Upper Colorado Environmental Plant Center (UCEPC) was formally approved April of 2007. This agreement called for the continued production of a single grass species through 2008.

ACCOMPLISHMENTS: A one-acre field of slender wheatgrass was planted on August 23, 2005. This field produced 449 clean pounds of seed in 2008. Seed test results are not available at this time. An amendment to the agreement is pending for future production.

No seed shipments were made to Grand Teton National Park in 2008.

TECHNOLOGY DEVELOPMENT: Any specific seed cleaning, testing, or planting methods are available upon request.



Grand Teton slender wheatgrass

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**GREAT SAND DUNES
NATIONAL PARK AND PRESERVE**

**2008 Annual Summary Report
Prepared by**

**UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO**

INTRODUCTION: In April of 2003, an interagency agreement was signed between Great Sand Dunes National Park and Upper Colorado Environmental Plant Center (UCEPC) to produce seed of two species, one acre of blue grama and one half acre of Indian ricegrass. These products will be utilized for revegetation projects in and around the headquarters area. Two amendments were added to the original agreement, one to add two-tenths of an acre seed increase field of ring muhly, and the second was to extend the agreement through 2008.

ACCOMPLISHMENTS: The fields of blue grama, Indian ricegrass, and ring muhly were maintained as in previous years. Ring muhly and blue grama were maintained at no cost to the park. There is interest in keeping the Indian rice grass field for at least another three years (2009-2011); however, the fields of blue grama and ring muhly will be discontinued. A small section of the blue grama and ring muhly will be saved for the park for the purpose of transplanting some plants (sod) at the new park visitor center. Personnel from the park will collect the sod in spring of 2009.

UCEPC managed to harvest the fields of ring muhly and Indian ricegrass for 2008; however, no seed was produced in the field of blue grama. Seed production for 2008 is presented in the following table.

Species	Scientific name	Establishment Acres	Harvest Date	Clean Seed Weight
Blue grama	<i>Bouteloua gracilis</i>	1.0	No harvest	
Indian ricegrass	<i>Achnatherum hymenoides</i>	0.5	7/21/08	9.5
Ring muhly	<i>Muhlenbergia torreyi</i>	0.2	10/8/08	14.0

TECHNOLOGY DEVELOPMENT: Standard planting, cultural practices, harvest and cleaning protocols were utilized to handle the Indian ricegrass, blue grama, and ring muhly.



Ring Muhly September-2008
Photos by Manuel Rosales

MESA VERDE NATIONAL PARK

2008 Annual Summary Report

Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER MEEKER, COLORADO

INTRODUCTION: Upper Colorado Environmental Plant Center (UCEPC) signed an agreement with Mesa Verde National Park on February 2, 2000. IA No. 1211-00-003 was implemented for the development of seed and plants to revegetate the area disturbed by road construction into the park. Two amendments were later added increasing the numbers for production of containerized trees and shrubs. Mesa Verde's new housing and CCC Camp revegetation contracts increased that number again. On August 27, 2007, a new agreement was signed. This agreement called for UCEPC to propagate approximately 415 PLS pounds of seed from the following species; muttongrass *Poa fendleriana*, slender wheatgrass *Elymus trachycaulus*, western wheatgrass *Pascopyrum smithii*, salina wildrye *Leymus salinus*, Indian ricegrass *Achnatherum hymenoides*, needle and thread *Hesperostipa comata*, yarrow *Achillea millefolium*, and Louisiana sage *Artemisia ludoviciana*. This agreement allows for production through September 30, 2009.

ACCOMPLISHMENTS: Several species of shrubs including Antelope bitterbrush *Purshia tridentata*, and woods' rose *Rosa woodsii*, continue to be propagated in the greenhouse in order to complete the above contracts. Two fields planted in 2007, western wheatgrass *Pascopyrum smithii* and slender wheatgrass *Elymus trachycaulus*, produced seed. The 0.02 acre fields, yarrow *Achillea millefolium* and Louisiana sage *Artemisia ludoviciana* have been replanted. Although no seed was produced from the muttongrass *Poa fendleriana*, it continues to thrive and shows good promise.

TECHNOLOGY DEVELOPMENT: Specific information about germination trials, soil preparation, seeding rates, equipment, or other seeding establishment methods are available upon request.



Bitterbrush at Meeker EPC

PIPE SPRING NATIONAL MONUMENT

2008 Annual Summary Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE PLANT MATERIALS CENTER LOS LUNAS NEW MEXICO

INTRODUCTION: On September 12, 2002, an agreement was made between Pipe Spring National Monument (PSNM) of the U.S. Department of Interior (USDI) and the Natural Resources Conservation Service (NRCS) of New Mexico. This agreement declares that the Los Lunas Plant Materials Center (LLPMC) will produce seed for PSNM.

ACCOMPLISHMENTS:

Seed Production

The LLPMC produced the following seed in 2008 for PSNM:.

Common name	Scientific name	Agreement Acreage	2008 LLPMC Acreage	Harvest (Bulk lbs.)
Galleta	<i>Pleuraphis jamesii</i>	0.50	0.58	3.12
Indian ricegrass	<i>Achnatherum hymenoides</i>	0.50	0.50	64.14
Bottlebrush squirreltail	<i>Elymus elymoides</i>	0.50	0.00	None



2008 Galleta seed production field for Pipe Spring National Monument

TECHNOLOGY DEVELOPMENT:

- Galleta – Seed was harvested in 2008.
- Indian ricegrass – Seed was harvested in 2008.
- Bottlebrush squirreltail – The seed production field was removed in August 2007 as per the agreement with PSNM. At this time, the LLPMC does not plan to establish a new seed production field.

ROCKY MOUNTAIN NATIONAL PARK

2008 Annual Summary Report Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER MEEKER, COLORADO

INTRODUCTION: Upper Colorado Environmental Plant Center (UCEPC), Rocky Mountain National Park (ROMO), and the USDA Natural Resources Conservation Service (NRCS), signed a cooperative plant materials agreement (IA Project No. 1211-08-001) in May 2008. This agreement involves seed production of five forbs and five grass species for revegetation of the Bear Lake Road Project. UCEPC and Rocky Mountain National Park have an additional agreement for seed production for restoration work on the west side of the park where a new underground powerline will be installed, and the overhead line and the existing transmission poles will be removed. This agreement was signed in August of 2007.

ACCOMPLISHMENTS: This year, two new species were seeded for the Bear Lake Road Project and three products were seeded for the Powerline project. The seeding efforts this year bring the total number of seed increase products for Rocky Mountain National Park to 13, ten for Bear Lake Road and three for the Powerline. Six of the eight established Bear Lake Road project materials were harvested in 2008. Seed was not produced for blue grama, and less than one pound of golden banner seed was harvested. Small quantities of seed were harvested from mountain muhly (14 lb), needle-and-thread (10 lb), prairie Junegrass (4 lb), purple locoweed (3 lb), fringed sage (8 lb), and hairy golden aster (27 lb).

On August 26, Lonnie Pilkington and Jim Cheatham from Rocky Mountain National Park traveled to UCEPC to review the Colorado River Power Line Revegetation Project and the Bear Lake Road Project production fields. After a field session, a review of species that looked to have merit for seed increase for yet another project, and estimates of seed collection efforts and size of production fields were discussed. The revegetation needs were identified for both the Colorado River Power Line Project as well as the future revegetation needs of the Bear Lake Road Project and a potentially new project for the production of materials thought to provide competition for cheatgrass.

No seed was shipped to the Park in 2008.

TECHNOLOGY DEVELOPMENTS: A new prototype hand propelled sickle-bar harvester was manufactured by UCEPC Field Technician Johnnie Barton for small plot clipping. This was used very successfully in the harvesting of two Rocky Mountain National Park products.



Sickle-bar harvester by Field Technician Johnnie Barton



WUPATKI NATIONAL MONUMENT

2008 Annual Summary Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE PLANT MATERIALS CENTER LOS LUNAS NEW MEXICO

INTRODUCTION: On May 16, 2006, an agreement was made between the Wupatki National Monument (WNM) of the U.S. Department of Interior (USDI) and the Natural Resources Conservation Service (NRCS) of New Mexico. This agreement declares that the Los Lunas Plant Materials Center (LLPMC) will produce seed for the WNM.

ACCOMPLISHMENTS:

A. Seed Production

The LLPMC produced the following seed in 2008 for WNM.

Common name	Scientific name	Agreement Acreage	2008 LLPMC Acreage	Harvest (Bulk lbs.)
Bottlebrush squirreltail	<i>Elymus elymoides</i>	1.00	0.00	None
Galleta	<i>Pleuraphis jamesii</i>	2.00	2.00	6.12
Needleandthread	<i>Hesperostipa comata</i>	1.00	0.24	Not Available ²



Needle and thread seed production field for Wupatki National Monument

¹ Seed has been harvested but not yet cleaned.

TECHNOMOLOGY DEVELOPMENT:

- Bottlebrush squirreltail – A seed production field has not been established because the LLPMC did not receive seed from WNM in 2008.
- Galleta – Seed was harvested in 2008.
- Needleandthread – Seed was harvested in 2008.

YELLOWSTONE NATIONAL PARK

2008 Annual Summary Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE PLANT MATERIALS CENTER BRIDGER MONTANA

INTRODUCTION: The Bridger PMC has maintained a cooperative agreement with Yellowstone National Park (YNP) since FY 1986. The agreement facilitates the collection, increase, and reestablishment of indigenous plant material for restoration of disturbances resulting from road construction and other improvement projects within Park boundaries.

ACCOMPLISHMENTS: In 2008, eight allocations of 68 seed lots from 39 species were distributed to YNP, YNP-contracted growers, or to the PMC totaling 312 pounds (141 kg). This included 53 grass lots (25 species) weighing 310 pounds (141 kg); 13 forb lots (12 species) weighing one pound (0.4 kg); and two woody lots weighing 0.4 pound (0.2 kg). The distribution included nine grass lots (4 species) and one tree species to the BPMC for planting seed increase fields and container production.

Yellowstone National Park has identified future road projects allowing collection and production efforts to begin at least three years in advance of each project.

Wildland seed collections are made by YNP and BPMC crews, dried, and either delivered to the Bridger PMC, or picked up by PMC personnel. In 2008, 42 collections were made from 33 species: 36 grasses (19 species) at 57 pounds (26 kg), 16 forbs (9 species) at five pounds (2.2 kg), and three trees/shrubs two species) at 0.5 pound (0.25 kg). The wildland seed collections totaled approximately 63 pounds (28 kg).

Records are maintained by the PMC of person-hours to collect each seed lot, from which the approximate cost of collecting native seed can be estimated. In 2008, YNP and BPMC personnel spent more than 253 person hours in the activity of seed collection on 10 different sites. There were 195 hours (approximately 8.5 hours per collection) dedicated to collecting grass seed on nine sites, 51 hours (approximately 3.2 hours per collection) for forbs on seven sites, and seven hours (approximately 2.3 hours per collection) for shrubs on two sites.

There were four grass increase blocks planted at the PMC on 0.96 acres (0.39 ha) in 2008. Seed increase blocks of six grasses on 1.13 acres (0.46 ha), were removed due to natural decline in production, project completion, or poor establishment. Currently there are two acres (0.8 ha) planted with seven accessions of six grass species in seed increase blocks at the Bridger PMC.

During the past growing season, eight grass accessions (three species) were harvested on two acres (0.8 ha). The total amount of seed produced was 226 pounds (103 kg), with the best grass stands yielding 150 lb ac (168 kg ha).

Purity analysis and tetrazolium viability tests were conducted on PMC seed increase production for five grass accessions. All samples were cleaned to exceed purity standards set forth for foundation

seed class as established by the Association of Official Seed Certifying Agencies. The samples averaged 97% viability, 98% purity, and 95% pure-live-seed.

The wildland collection and seed increase inventory contains 516 lots (88 species) totaling 1,596 pounds (725 kg). This is comprised of 252 grass lots (25 species) at 1,532 pounds (695 kg), 256 forb lots (58 species) at 63 pounds (29 kg), and eight woody lots (five species) weighing approximately one pound (0.5 kg).



Seed collection for native restoration of Gardiner Basin Ag land

TECHNOLOGY DEVELOPMENT: All plant material collections are assigned accession numbers and inventoried in a database. The lot identification numbers have been upgraded to include identification by individual construction projects. Extensive assistance was provided in seed collection and study site selection for revegetating the Northern Boundary. A presentation, *Plant Materials in the Greater Yellowstone and Beyond*, was given on May 7th at the Weed Subcommittee of the Greater Yellowstone Coordinating Committee in Red Lodge, Montana.

YELLOWSTONE NATIONAL PARK WETLAND PLANT PROPAGATION

2008 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION: In 2008, the Natural Resources Conservation Service (NRCS), Plant Materials Center (PMC), Aberdeen, Idaho entered into an interagency agreement with the National Park Service (NPS), Yellowstone National Park (YNP) to propagate and deliver approximately 35,000 plants in 10 cubic inch containers. Delivery is to take place over a three year period (approximately 12,000 plants per year) beginning in the fall of 2009. Species to be grown include *Carex aquatilis*, *C. microptera*, *C. rostrata*, *C. utriculata*, *Juncus ensifolius*, and *Deschampsia caespitosa*. Due to limited availability of information regarding the propagation of the desired species, it was determined that the PMC would conduct propagation research studies on available seed during 2008. Seed used for these studies came from YNP collections being stored at the Bridger, Montana, PMC.

ACCOMPLISHMENTS: Propagation studies were conducted on seed from identified species. Two irrigation regimes were tested. The first technique was overhead irrigation with sprinklers programmed to water 2 minutes per hour from 8:00am to 3:00pm, plus a 60 minute weekly deep soak to flush accumulated salts. The second technique was subsurface irrigation by placing the containers in 4'x8'x1' tanks filled with 4 to 8 inches of water.

Juncus species were planted on April 25, 2008. *Deschampsia* was seeded on April 30. *Carex* seed was stratified from May 5 to June 9. *Deschampsia* and *Carex* were seeded with 5 to 20 seeds per cone. Seed of all species was sprinkled on the soil surface and pressed by hand. *Deschampsia* seed was additionally covered with a thin layer of soil. Soil used was a 1:1:1 mixture of peat, sand and perlite with the addition of 18g 11-15-11 fertilizer and 16ml Redimil fungicide per cubic foot. Germination counts of cones with established plants were taken on July 28, 2008.

TECHNOLOGY DEVELOPMENT: Initial establishment tests show that the species desired to be propagated are germinable at satisfactory levels using standard propagation protocols. *J. ensifolius* and *D. caespitosa* are easily propagated without stratification. *Carex* species require the removal of the perigynia to germinate and also require a 30 day stratification period. Although no *C. microptera* was tested, it is likely that this species will perform similarly to other *Carex* species examined.



Unidentified species grown out in 12"x18" flats.



Carex species grown in 10 cubic inch containers under overhead irrigation.



Deschampsia caespitosa seedlings grown with subsurface irrigation (top plant) and with overhead irrigation (bottom plant) after 90 days of growth.

ZION NATIONAL PARK

2008 Annual Summary Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE GREAT BASIN PLANT MATERIALS CENTER FALLON, NEVADA

INTRODUCTION: The National Park Service provided funding to the Great Basin Plant Materials Center to produce 3000 pounds of bottlebrush squirreltail (*Elymus elymoides*) seed which will be provided to Zion National Park for use in revegetating burned areas. An agreement between the National Park Service and Natural Resources Conservation Service was formalized in 2006.

ACCOMPLISHMENTS: In early and mid-October, 2006, the soil bed was prepared for planting. This included disking, harrowing, and irrigation to prepare a seed bed that would be suitable for planting bottlebrush squirreltail. On October 23 and 24, 2006, bottlebrush squirreltail was planted on approximately 7.5 acres at a seeding rate of 4.5 pounds pure live seed per acre. The bottlebrush squirreltail seed that was planted had been produced at the Los Lunas Plant Materials Center from an accession that had been collected at Zion National Park. Herbicide spray equipment was not obtained until after weeds had become well established in the field. The high density of weeds stunted the squirreltail and prevented adequate stand establishment. The fields were abandoned because weed density was too high for effective squirreltail seed production.

In September 2007, squirreltail was planted again on 3 acres, in rows on 3 ft spacing. A cultivator was used to control weeds, and 2,4-D was applied Feb 12, 2008 to control the broadleaf weeds. On May 21, and again on June 5, 2,4-D was applied to control broadleaf weeds. During the time from May 12 to June 4, 2008, the planting was hand weeded, requiring nearly full-time effort of two people, to remove grass weeds. On June 9, Surflan was applied to control germinating weeds, but due to a canal break upstream from the PMC, the field was not irrigated to incorporate and activate the herbicide until June 22.

The seed was harvested using a Flail-Vac on July 10. The seed was spread on a tarp to cure, then wrapped in the tarp for transport to a seed cleaning facility to be de-awned and further cleaned and conditioned. The raw harvest weight is approximately 140 lb. of seed plus awns. A preliminary germination test conducted in October showed approximately 40 % germination from an uncleaned sample. After seed harvest, the field was mowed on July 30 and rototilled on August 27.



Ready to harvest Zion bottlebrush @ Fallon, NV PMC

TECHNOLOGY DEVELOPMENT - Future plans are to establish the squirreltail from transplanted plugs to enable more effective weed control options to be used. A native grass seed production herbicide trial is being conducted at Great Basin Plant Materials Center in cooperation with UNR in 2009. Results from the study may provide effective weed control treatments for bottlebrush squirreltail seed production in direct seeded fields.

ZION NATIONAL PARK

2008 Annual Summary Sheet Report
Prepared by
Natural Resources Conservation Service
Los Lunas Plant Materials Center
Project #: NMPMC-S-0301-WO

INTRODUCTION: On September 12, 2002, an agreement was made between the Zion National Park (ZNP) of the U.S. Department of Interior (USDI) and the Natural Resources Conservation Service (NRCS) of New Mexico. This agreement declares that the Los Lunas Plant Materials Center (LLPMC) will produce seed for the ZNP.

ACCOMPLISHMENTS:

A. Seed Production

In 2008, the LLPMC grew bottlebrush squirreltail transplants to establish seed production fields.

The LLPMC produced the following seed in 2008 for ZNP:

Common name	Scientific name	Agreement Acreage	2008 LLPMC Acreage	Harvest (Bulk lbs.)
Sand bluestem	<i>Andropogon hallii</i>	0.50	0.50	16.48
Cane bluestem	<i>Bothriochloa barbinodis</i>	0.50	0.00	
Bottlebrush squirreltail	<i>Elymus elymoides</i>	0.50	0.50	Not Available ³
Galleta	<i>Pleuraphis jamesii</i>	0.50	0.50	Not Available ²
Muttongrass	<i>Poa fendleriana</i>	0.50	0.50	0.86
Indian ricegrass	<i>Achnatherum hymenoides</i>	0.50	0.42	79.04

B. Transplant Production

Transplant production is not part of this agreement.

TECHNOLOGY DEVELOPMENT:

- Sand bluestem – Seed was harvested in 2008.
- Cane bluestem – The cane bluestem production field was removed in April of 2008. No new seed production field was established in 2008.
- Bottlebrush squirreltail – Seed was harvested in 2008. Transplants grown from the 2007 seed harvest were used to establish a 0.25 acre production field of squirreltail in October 2008.
- Galleta – Seed was harvested in 2008.
- Muttongrass – Seed was harvested in 2008.

³ Seed has been harvested but not yet cleaned.

- Indian ricegrass – Seed was harvested in 2008.



Indian ricegrass seed production field for Zion National Park:
Los Lunas Plant Materials Center, Field 26N

ZION NATIONAL PARK

2008 Annual Summary Report

Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
TUCSON, ARIZONA

INTRODUCTION: This project involves the production of 900 PLS lbs of *Sporobolus cryptandrus* to be used for revegetation of disturbed areas in Zion National Park. The last signature on the agreement was the 8th of January, 2007 with the project extending until the 30th of September, 2009. Production fields were established at the center in October of 2007. An extension of one year may be necessary to meet the production goals.

ACCOMPLISHMENTS: Seed (6 lbs 4 oz pre-clean; 3 lbs 12 oz post clean) was received from park service personnel in November of 2006. Plugs for field establishment were germinated in the spring of 2007 with planting planned for the summer. Work to deepen the irrigation well at the center began in July 2007 with completion expected by the 30th of August. Due to complications with the well drilling, the well was not completed until the 25th of October, 2007. *Sporobolus cryptandrus* plugs, maintained in the greenhouse/lathhouse complex throughout the summer, were planted into production fields that same month. The total acreage planted is approximately 1.68 acres. Due to the late planting date, no harvest was conducted in 2007.

Throughout the spring and summer of 2008, plants were underdeveloped and showed more vegetative growth than reproductive growth. Due to their poor performance, weed control proved to be more difficult than expected. It was also noted that many of the plants were *Sporobolus contractus* rather than *Sporobolus cryptandrus*. The former manager of the center reported this information to Park Service personnel. The first harvest was conducted in September of 2008 with a bulk weight of approximately 35 lbs and a cleaned weight of 16 lbs. Samples of the first harvest have been sent to New Mexico State University for germination testing.

Due to the inadequate harvest amounts up to this point, production fields at the center will be increased from 1.68 acres to approximately 5.25 acres this summer. Plugs for the increase are in the process of being germinated at the time of this report. With the increase in total acreage dedicated to this project, the center hopes to reach production goals within the original agreement timeframe.

TECHNOLOGY DEVELOPMENT: None at this time.



Current production fields



Close up of *Sporobolus cryptandrus* plant

BADLANDS NATIONAL PARK

2008 Annual Summary Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE PLANT MATERIALS CENTER BISMARCK, NORTH DAKOTA

INTRODUCTION: The Bismarck Plant Materials Center (PMC) entered into a cooperative agreement in May 2007 to provide seed and technical information needed for revegetation of areas disturbed by construction activities of FLHP PMIS 78257, Rehab Loop Road Phase III and IV in the Badlands National Park in South Dakota. The agreement is between the National Park Service, Badlands National Park of the U.S. Department of Interior, and the USDA Natural Resources Conservation Service. This agreement is in effect from FY 2007 through FY 2010. The Bismarck Plant Materials Center (PMC) has agreed to produce native grass seed of five species collected in the Park by Park personnel and PMC staff. The seed produced at the PMC will be distributed to the Park for their revegetation work. The following are targeted species being increased for this project; green needlegrass (*Nassella viridula*), western wheatgrass (*Pascopyrum smithii*), slender wheatgrass (*Elymus trachycaulus*), blue grama (*Bouteloua gracilis*) and sand dropseed (*Sporobolus cryptandrus*). See Table 1 for additional information on each species.

2007 ACCOMPLISHMENTS: Seed of the five targeted species was collected by Park and PMC staff. Each of the species collected was assigned an accession number by PMC staff for identification and tracking purposes. This seed was cleaned by staff at the Bismarck PMC. Seed samples were taken and sent to the NDSU Seed Testing Laboratory located at Fargo, North Dakota, for purity and germination tests.

A 0.41-acre field of green needlegrass was planted as a dormant seeding on November 30, 2007, in panel G-4 at the PMC. The seedbed was prepared using a small 6-foot S-tined cultivator and spring tooth harrow. The field was firmly packed with a Brillion packer and seeded in 42-inch rows with a modified Truax grass drill.



Badlands National Park Crew
collecting seed in



700 sand dropseed plants in the field

2008 ACCOMPLISHMENTS: Seedbeds were prepared the same for all four plantings using a 6 foot S-tined cultivator and a spring tooth harrow. The fields were firmly packed with a Brillion packer and seeded in 42-inch rows with a modified Truax grass drill. A 1.5-acre field of western wheatgrass and a 0.95-acre field of slender wheatgrass were seeded on May 6, 2008, in panel G-2 of the PMC. Due to limited seed amounts of blue grama, a plot drill was used to plant a 6- x 270-foot bed (0.04 acres) on June 10, 2008, in panel G-2. Seed amounts of sand dropseed were limited. It was decided to grow plants in the greenhouse for establishing a field. The plants were allowed to grow in the greenhouse until May 12, when they were moved to the lathhouse to harden off for transplanting into the field. On May 22, a field in panel G-2 was tilled and a specialized chisel bar with two chisel shovels spaced 42 inches apart was used to make 2 rows. Approximately 700 plants were transplanted into these rows on May 22, 2008. Survival was excellent and a small harvest of approximately 3 pounds was taken using a Wintersteiger plot combine. A small harvest of approximately 5 pounds of slender wheatgrass was also harvested.

Table 1.

Accession number	Species	Targeted bulk seed collection weights (lbs)	Dirty seed collected weight (lbs)	Clean seed weight (lbs)	Purity (%)	Germination (%)			Pure live seed weight available for seeding (lbs)	Targeted field size (ac)	Actual planted field size (ac)	Targeted seed amt (lbs)	Actual seed amount produced (lbs)
						Germination (%)	Dormant (%)	Total (%)					
9092167	green needlegrass	5.4	2.08	1.75	99.91	4	92	96	1.68	0.5	0.41	100	
9092165	western wheatgrass	22.0	20.86	8.25	85.40	83	2	85	5.99	1.5	1.5	200	
9092166	slender wheatgrass	4.0	4.41	2.0	77.92	78	6	84	1.32	0.5	0.95	100	
9092168	blue grama	1.8	0.99	0.30	80.28	85	0	85	0.21	0.5	0.04	10	
9092169	sand dropseed	0.2	0.22	-	No test	No test	No test	No test	700 plants	0.25	700 plants	5	

LITTLE BIGHORN BATTLEFIELD NATIONAL MONUMENT

2008 Annual Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
BISMARCK, NORTH DAKOTA

INTRODUCTION: The Bismarck Plant Materials Center (PMC) entered into a cooperative agreement in October 2005 to provide seed and technical information for revegetating areas disturbed by construction activities at Little Bighorn Battlefield National Monument (LIBI) in eastern Montana. The specific project involves Route 10, Entrance Road. The agreement is between the National Park Service, Little Bighorn Battlefield National Monument of the U.S. Department of Interior, and the USDA Natural Resources Conservation Service. The duration of the agreement is FY 2006 through FY 2008. The PMC has agreed to produce specified amounts of four species of grasses collected by personnel at LIBI. The seed produced will be distributed to the Park. Following is a table of the species and seed amounts requested, as well as the amounts harvested in 2008



Harvest of green needlegrass in 2008

Species	Common name	PLS lbs (goal)	2008 harvest (lbs)
<i>Nassella viridula</i>	Green needlegrass	100	127 (clean)
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	100	73.5 (clean)
<i>Bouteloua curtipendula</i>	Sideoats grama	50	42.5 (clean)
<i>Bouteloua gracilis</i>	Blue grama	10	4.5 (clean)

ACCOMPLISHMENTS:

2005

Seed of targeted species was collected by park personnel and shipped to the PMC. The collected seed was cleaned by Bismarck PMC, after which samples of cleaned seed were tested by NDSU Seed Testing Laboratory. A 0.5 acre field of green needlegrass was planted as a dormant seeding on 11/23/2005.

2006

A 0.5-acre field of bluebunch wheatgrass was seeded on 5/04/2006. A 0.5 acre field of sideoats grama was seeded on 5/30/2006. Some seed was harvested in the fall. A plot of blue grama of about 1,100 feet² was seeded on 6/02/2006. Some seed was harvested. A thin stand of green needlegrass emerged, most likely due to drought and high seed dormancy. Weeds were a problem in the bluebunch wheatgrass and the green needlegrass.

2007

All fields were maintained using cultivation and herbicides. Spring growing conditions were excellent. In 2007, the PMC received about 9 inches of rain in the period of April, May and June. This compares with 3 inches for the same period in 2006. The excellent growing conditions were especially beneficial for the field of green needlegrass. Many new plants germinated and a good stand has developed. Seed was harvested from all fields.

2008

All fields were maintained using cultivation and herbicides. After an open winter, April and May were dry, but excellent rains came for the rest of the growing season. The rain for April-June was 5.6 inches, which was less than during that same period in 2007. However we received 16 inches during the complete growing season. We received excellent harvests of cool season crops.

TECHNOLOGY DEVELOPMENT:

High seed dormancy and dry, hot growing conditions in 2006 likely contributed to a poor stand in the green needlegrass. In 2007, much more seed germinated during the excellent growing conditions. The plants which germinated in 2007 remained vegetative. There was very little fall green-up on the bluebunch wheatgrass after harvest. Following the harvest of the sideoats grama in early August, a second flush of seed culms formed. In 2008, the green needlegrass plants which remained vegetative in 2007 produced many seed culms. No fungicide was used on the bluebunch wheatgrass, as there was no sign of disease.

THEODORE ROOSEVELT NATIONAL PARK

2008 Annual Report

Prepared by

NATURAL RESOURCES CONSERVATION SERVICE PLANT MATERIALS CENTER BISMARCK, NORTH DAKOTA

INTRODUCTION: The Bismarck Plant Materials Center (PMC) entered into a cooperative agreement in May 2007 to provide seed and technical information needed for revegetation of areas disturbed by construction activities in the North Unit Scenic Route 10 of the Theodore Roosevelt National Park in western North Dakota. The agreement is between the National Park Service, Theodore Roosevelt National Park of the U.S. Department of Interior, and the USDA Natural Resources Conservation Service. This agreement is in effect from FY 2007 through FY 2010. The Bismarck Plant Materials Center (PMC) has agreed to produce native grass seed of six species collected in the Park by Park personnel and PMC staff. The seed produced at the PMC will be distributed to the Park for their revegetation work. The following are targeted species being increased for this project: western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), thickspike wheatgrass (*Elymus lanceolatus*), sideoats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua gracilis*), and prairie junegrass (*Koeleria macrantha*). During the collection process, thickspike wheatgrass was substituted for slender wheatgrass. See Table 1 for additional information on each species.

2007 ACCOMPLISHMENTS:

Seed of the six targeted species was collected by Park and PMC staff. Each of the species collected was assigned an accession number by PMC staff for identification and tracking purposes. This seed was cleaned by staff at the Bismarck PMC. Seed samples were taken and sent to the NDSU Seed Testing Laboratory located at Fargo, North Dakota, for purity and germination tests.

A 0.49-acre field of green needlegrass was planted as a dormant seeding on November 30, 2007, in panel G-4 at the PMC. The seedbed was prepared using a small 6-foot S-tined cultivator and spring tooth harrow. The field was firmly packed with a Brillion packer and seeded in 42-inch rows with a modified Truax grass drill.

2008 ACCOMPLISHMENTS:

Fields were prepared the same for western wheatgrass and thickspike wheatgrass by using a 6-foot S-tined field cultivator and a spring tooth harrow. The fields were firmly packed with a Brillion packer and seeded in 42-inch rows with a modified Truax grass drill. A 0.57-acre field of western wheatgrass and a 0.5-acre field of thickspike wheatgrass were seeded on May 1, 2008, in panel G-4 of the PMC. Due to the limited seed amounts of sideoats grama and blue grama, a plot drill was used to plant a 6- x 189-foot bed (0.03 acres) of sideoats grama and a 6- x 158-foot bed (0.02 acres) of blue grama on June 10, 2008, in panel G-4 of the PMC. Seed amounts of prairie junegrass were also limited. It was decided to grow plants in the greenhouse for establishing a field. The plants were grown in the greenhouse and were moved to the lathhouse May 12, 2008, to harden off for transplanting into the field. A field in panel G-4 was tilled May 22, 2008, and a specialized chisel bar with two chisel shovels spaced 42 inches apart was used to make two rows. Approximately 700

plants were transplanted into these rows on May 22, 2008. Survival of the junegrass plants was excellent. The western wheatgrass and thickspike wheatgrass fields established well by the end of the summer. The sideoats grama and blue grama beds were slower to establish and a fair stand was noted by the end of the summer.



Prairie junegrass planting July 1, 2008

Table 1.

Accession number	Species	Targeted seed collection weights (lbs)	Dirty seed collected weight (lbs)	Clean seed weight (lbs)	Purity (%)	Germination (%)			Pure live seed weight available for seeding (lbs)	Targeted field size (ac)	Actual planted field size (ac)	Targeted seed amounts (lbs)	Actual seed amounts (lbs)
						Germination (%)	Dormant (%)	Total (%)					
9092171	green needlegrasses	5.4	4.40	2.80	92.00	2	72	74	1.91	0.5	0.49	100	
9092172	western wheatgrass	22.0	17.68	3.25	92.24	87	0	87	2.64	1.5	0.57	200	
9092175	thickspike wheatgrass	4.0	3.59	1.89	98.19	89	0	89	1.66	0.5	0.50	100	
9092173	blue grama	1.8	1.40	0.42	35.72	78	1	79	0.13	0.5	0.02	10	
9092174	sideoats grama	5.4	3.60	2.8	61.62	5	24	29	0.51	0.5	0.03	100	
9092176	prairie junegrass	1.3	0.98	0.13	No test	No test	No test	No test	700 plants	0.25	0.02	5	

WIND CAVE NATIONAL PARK

2008 Annual Summary Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE PLANT MATERIALS CENTER BISMARCK, NORTH DAKOTA

INTRODUCTION: The Bismarck Plant Materials Center (PMC) entered into a cooperative agreement in October 2005 to provide seed and technical information for vegetating disturbed sites at Wind Cave National Park (WICA), in southwestern South Dakota. The agreement is with U.S. Geological Survey Northern Prairie Wildlife Research Center and the Natural Resources Conservation Service, North Dakota. The duration of the agreement is FY 2006 through FY 2008. The PMC has agreed to produce specified amounts of twelve species of grasses and forbs collected by personnel at Wind Cave National Park. The seed produced will be distributed back to WICA. Table 1 lists the species, seed amounts requested, and seed amounts produced to date.

Table 1. Targeted Species and PMC Harvest Amounts

Species	Common Name	Target (PLS) lbs	PMC Harvest 2006-2008 (Bulk Clean)	PLS	unit
<i>Pascopyrum smithii</i>	Western wheatgrass	5	31	25.6	lbs
<i>Andropogon gerardii</i>	Big bluestem	5	1.3	0.6	lbs
<i>Bouteloua gracilis</i>	Blue grama	5	1.59	pending	lbs
<i>Schizachyrium scoparium</i>	Little bluestem	5	4.45	pending	lbs
<i>Bouteloua curtipendula</i>	Sideoats grama	5	No planting	0	
<i>Aristida purpurea</i>	Purple three awn	2	8.5(dirty)	pending	lbs
<i>Koeleria macrantha</i>	Prairie junegrass	2	13.2	pending	lbs
<i>Elymus elymoides</i>	Bottlebrush squirreltail	2	16.4	pending	lbs
<i>Cirsium undulatum</i>	Wavyleaf thistle	0.5	1.1	pending	lbs
<i>Dalea purpurea</i>	Purple prairieclover	0.5	39	39*	gm
<i>Sphaeralcea coccinea</i>	Scarlet globemallow	0.5	No planting	0	
<i>Astragalus missouriensis</i>	Missouri milkvetch	0.5	No planting	0	
<i>Oxytropis campestris</i>	Slender crazyweed	0.5	4.9	4.4	lbs
<i>Oxytropis lambertii</i>	Lambert's crazyweed	0.5	2	2*	gm
<i>Nassella viridula</i>	Green needlegrass	5	12.3	11	lb

* No seed tests to be conducted

ACCOMPLISHMENTS:

2005 Seed was collected by Wind Cave National Park personnel. Seed of *Astragalus missouriensis* and *Sphaeralcea coccinea* were not collected due to poor seed set of the species in 2005. Seed of *Bouteloua curtipendula* that was collected was not viable. Species collected by the Park as substitutes were slender crazyweed (*Oxytropis campestris*), Lambert's crazyweed (*Oxytropis lambertii*), and green needlegrass (*Nassella viridula*). Seed was cleaned at the PMC using hand screens, office mill, and rub boards.

2006 Seed was planted into conetainers™ in the greenhouse beginning in January 2006. Seedlings (approximately 200-400 of each species) were planted June 8-12, 2006, in paired trenches in a clean tilled field. Slow growing species were held in the lath house until late July. These included the two *Oxytropis* species, *Dalea purpurea*, and *Andropogon gerardii*. Survival of seedlings in the field for all species was greater than 90 percent. Seed production was minimal in 2006.

2007 Growth and vigor were good for most species in the established field rows. Weeds were controlled by hand hoeing and shallow tilling. Western wheatgrass, a notoriously poor seed producer, had abundant seed heads and forage. Seed production was good for all species except *Oxytropis campestris*, *Oxytropis lambertii*, *Dalea purpurea*, and *Andropogon gerardii*. Seed was harvested using one of the following methods: (1) hand clipping heads, (2) hand clipping heads and stems and feeding through a plot combine, or (3) cutting and threshing using a plot combine.

2008 The cool-season grasses were vigorous and generally had good seed production and seed fill. Western wheatgrass again produced abundant seed. Warm-season grass species were vigorous, but seed fill was poor for little bluestem and blue grama. Wavy-leaf thistle, a biennial, reseeded and produced a few plants. These were infected with weevils, causing poor seed viability. Purple prairieclover produced no seed due to rabbit and deer predation. Seed of all species was cleaned, except *Aristida purpurea*. Germination and purity tests are in progress.

TECHNOLOGY DEVELOPMENT:

- Seed heads of *Elymus elymoides* are large, heavy and often lodged. *Koeleria macrantha* heads were short and of varying heights. The heads of these species were hand clipped and fed through a plot combine. This method should be considered when harvesting small plots with varied height or lodged plants.

- *Cirsium undulatum*, a biennial species, attracts various insects and birds when flowering. This species should be considered when seeking pollinator species. Weevils, however, can reduce seed production.

- *Aristida purpurea* seed has pliable awns. We found no method of removing them.



Slender crazyweed



Western wheatgrass

GOLDEN GATE NATIONAL RECREATION AREA

2008 Annual Report

Prepared by

NATURAL RESOURCES CONSERVATION SERVICE PLANT MATERIALS CENTER LOCKEFORD CALIFORNIA

INTRODUCTION: In August 2006, an agreement was made between Golden Gate National Recreation Area (GGNRA) and the California Plant Materials Center (CAPMC). CAPMC was to produce 150 lbs pure live seed (PLS) of resident native germplasm purple needlegrass (*Nassella pulchra*). Initial seed collections were made by the GGNP staff. CAPMC agreed to grow, clean, and deliver the seed to the Park in the fall of 2008.

On November 21, 2006 seed from the original germplasm was planted out into a 0.6 acre field in 30 inch rows. The planting established well, but seed production for years one and two, though typical for the species, was well below yields anticipated for fulfillment of the agreement. In late summer 2008, CAPMC and GGNRA reached an agreement to amend the original contract. The amendment allows for the continuation of the original 0.60 acre field through 2009, and the addition of another 0.70 acres, through the 2011 growing season.

Anticipated total yields for the plantings are 20 pounds PLS for the original 0.60 acre field and 120 pounds PLS for the additional 0.70 acres.

ACCOMPLISHMENTS: The 0.60 acre field of *Nassella pulchra* produced approximately 0.4 lbs PLS in 2007 and 3.3 lbs in 2008.

Pounds seed produced	2007	2008	Total
<i>Nassella pulchra</i> 9083073	0.4	3.3	3.7

TECHNOLOGY DEVELOPMENT: All seed cleaning was documented and screen size and air flow for each species was determined.

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**LASSEN VOLCANIC NATIONAL PARK
Kings Creek Revegetation Project**

**2008 Annual Summary Report
Prepared by Amy Bartow**

**NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON**

INTRODUCTION- The Corvallis Plant Materials Center (PMC) entered into a new agreement with Lassen Volcanic National Park in 2006 to provide native plant materials for revegetation in the King's Creek area. It was agreed that the PMC would produce a minimum of 3700 container plants including 700 legume plugs, 2500 sedge and rush plugs, 500 grass plugs and 1800 containers of one shrub species.



PMC staff member, Vanessa East, taking cuttings at Lassen Volcanic National Park, October 16, 2008.

ACCOMPLISHMENTS - In 2008, the PMC produced 3671 plants (1273 rush plugs, 1070 sedge plugs, 646 legume plugs, 556 grass plugs, and 126 shrub containers) for this project in 2008. Plants were delivered to the Park on September 3, 2008. The PMC has met all goals of the contract except for some of the shrub production, 646 containers of Manzanita will be produced in 2009 to complete the project. In October 2008, PMC staff traveled to the park and collected approximately 1000 cuttings from about 7000 ft elevation, just ahead of snowfall. They will be propagated in the spring of 2009.

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**LASSEN VOLCANIC NATIONAL PARK
Visitors' Center Landscape Project**

**2008 Annual Summary Report
Prepared by Amy Bartow**

**NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON**

INTRODUCTION: The Corvallis Plant Materials Center (PMC) entered into a new agreement with Lassen Volcanic National Park in 2007 to provide native plant materials for planting around the new visitors' center. It was agreed that the PMC would produce a minimum of 6200 container plants including: 2000 grass plugs, 1000 sedge and rush plugs, and 3200 containers of shrubs. In the original contract, containers of red fir, mountain hemlock and chinquapin were ordered, but due to lack of seed, these species were replaced by an appropriate number of forb containers.

ACCOMPLISHMENTS: The PMC produced and delivered a total of 5609 plants, exceeding the number needed for the project. The PMC will complete this project in 2009. Approximately 2000 more manzanita containers will be produced and delivered in 2009. In October 2008, PMC staff traveled to the park and collected approximately 4000 cuttings, just ahead of snowfall. They will be propagated in the spring of 2009.

Table1. Plants delivered to Lassen Volcanic National Park, September 3, 2008.

Species	Code	Accession Number	Amount Delivered	Amount ordered
<i>Elymus glaucus</i>	ELGL	9079530	1171	1000
<i>Bromus carinatus</i>	BRCA5	9079531	1086	1000
<i>Holodiscus microphyllus</i>	HOMI3	9079548	486	100
<i>Ceanothus cordulatus</i>	CECO	9079553	20	100
<i>Arctostaphylos nevadensis</i>	ARNE	9079554	579	2800
<i>Senecio triangularis</i>	SETR	9079545	172	100
<i>Anaphalis margaritacea</i>	ANMA	9079547	196	150
<i>Carex jonesii</i>	CAJO	9079541	287	100
<i>Carex microptera</i>	CAMI7	9079543	680	400
<i>Juncus balticus</i>	JUBA	9079555	488	400
<i>Juncus ensifolius</i>	JUEN	9079549	53	100
<i>Wyethia mollis</i>	WYMO	9079546	269	250
<i>Eriogonum sp</i>	ERIOG	9079573	6	0
<i>Potentilla sp</i>	POTEN	9079574	46	0
<i>Ribes sp</i>	RIBES	9079572	10	0
<i>Lupinus arbustus</i>	LUAR6	9079551	60	60

TECHNOLOGY DEVELOPMENTS: Informal germination tests were set up on *Juncus* and *Carex* species that have never been propagated at the Corvallis PMC. For each species, nine sets of 100 seeds were counted, weighed and placed in plastic germination boxes on moistened germination paper and stored in a growth chamber set at 8°(C) days and 4°(C) nights with 8 hours of light. Treatments include 45 or 90 days cold-moist stratification or no cold-moist stratification. Each treatment has three replications per species.

Table 2. Results of germination trials of select species for the Visitor’s Center agreement in 2008.

Species	Treatment	Average germination per treatment
<i>Carex jonesii</i>	Warm	56
	45 day cold moist stratification	61
	90 day cold-moist stratification	45
<i>Carex microptera</i>	Warm	86
	45 day cold moist stratification	86
	90 day cold-moist stratification	82
<i>Wyethia mollis</i>	Warm	35
	45 day cold moist stratification	40
	90 day cold-moist stratification	44
<i>Potentilla sp</i>	Warm	35
	90 day cold-moist stratification	71



Plants delivered to the new Visitor’s Center

**MOUNT RAINIER NATIONAL PARK
Steven's Canyon Road Revegetation Project**

**2008 Annual Summary Report
Prepared by Amy Bartow**

**NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON**

INTRODUCTION: The Corvallis Plant Materials Center (PMC) entered into a new agreement with the National Park Service (NPS) in 2007 to provide native plant materials for ecological restoration along Steven's Canyon Road following road construction. It was agreed that the PMC would establish and maintain seed increase fields of three grasses (five accessions). The PMC will deliver 195 lbs (PLS) of upper elevation grasses and 135 lbs (PLS) of lower elevation grasses. The project is expected to be complete in the fall of 2010.

ACCOMPLISHMENTS: Activities in 2008 included wild seed collection and seed increase field establishment of high and low elevation ecotypes of three grasses. PMC staff and volunteers traveled to the Park twice in August to collect wild seed. Five pounds of cleaned seed of five accessions (three species) were collected. These seeds were used to expand the seed increase fields in the fall of 2008. A total of 2.3 acres are now in production for this project. The high elevation California brome field and the low elevation red fescue and blue wildrye fields that were established in the fall of 2007 produced seed in 2008. A total of 41 lbs of seed were produced this year.

Table 1. Seed Harvested for Steven's Canyon Road Revegetation Project at Corvallis Plant Materials Center in 2008.

Species	Accession Number	Field size (ac)	Harvest method	Harvest Date	Yield
Upper Elevation					
Bromus carinatus	9079531	0.01	seed stripper	13-Jul	2 lbs
Lower Elevation					
Elymus glaucus	9079520	0.2	seed stripper	7-Jul	33 lbs
Festuca rubra	9079521	0.37	seed stripper	10-Jul	6 lbs

TECHNOLOGY DEVELOPMENTS: In September and October, fields were sown using the PMC's new precision cone-seeder. This type of seeder is calibrated to drill a specific amount of seed over a specific sized area. The PMC staff set the seeder for intervals of 24ft. Pre-weighed packets were fed into the seed drill at 24ft intervals. It is very precise and is a good choice for drilling limited amounts of wild-collected seed. This new seeder is a huge improvement over the old Plantet Jr seeder.



The Corvallis PMC's new precision cone-seeder equipped with a carbon-banding unit.

**MOUNT RAINIER NATIONAL PARK
State Road 123 Revegetation Project**

**2008 Annual Summary Report
Prepared by Amy Bartow**

**NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON**

INTRODUCTION: The Corvallis Plant Materials Center (PMC) entered into a new agreement with Mount Rainier National Park in 2004 to provide native plant materials for the ecological restoration of the State Road 123 construction area. It was agreed that the PMC would produce a minimum of 25 lbs (PLS) of *Elymus glaucus*, 50 lbs (PLS) of *Bromus carinatus*, and 25 lbs (PLS) of *Festuca rubra*. A final seed delivery was scheduled for the fall of 2007. The project was delayed and final delivery occurred in 2008.



California brome seed increase field.

ACCOMPLISHMENTS: In 2008, two grass seed increase fields were maintained and harvested. A total of 272 lbs (PLS) were produced in 2008 and 295 lbs (PLS) were delivered to the park in the fall. All of the seed produced in previous years and some of the seed that was produced in 2008 was delivered. The 2008 harvest was so large and unexpected that 202 lbs of seed remains at the PMC seed storage facilities and will be held until requested by the Park.

Table 1. Seed produced for the Mount Rainier SR123 Road Project at the Corvallis PMC in 2008.

Scientific Name	Accession #	Size of field (ac)	Harvest Date	Method	Yield
<i>Bromus carinatus</i>	9079309	0.18	6/25, 6/30	seed stripper	145 lbs
<i>Festuca rubra</i>	9079348	0.2	6/25, 7/8	swath/ combine	127 lbs

TECHNOLOGY DEVELOPMENTS:

Festuca rubra field was too thick this year to be harvested with the seed stripper. It was swathed and then combined using a small Wintersteiger plot combine. It gently picks up the swaths and shatters less seed than the PMC's larger Hege combine. The seed yields were very high from this field and seed cleaning times were reduced by using the small efficient combine. The settings could be calibrated to eliminate most of the plant material without losing seed.

**MOUNT RAINIER NATIONAL PARK
Nisqually Entrance Revegetation Project**

**2008 Annual Summary Report
Prepared by Amy Bartow**

**NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON**

INTRODUCTION: The Corvallis Plant Materials Center (PMC) entered into a new agreement with the National Park Service (NPS) in 2008 to provide native plant materials for ecological restoration along the Nisqually Entrance Road following road construction. It was agreed that the PMC would establish and maintain seed increase fields of three grasses. The PMC will deliver 355 lbs (PLS) of grass seed. The project is expected to be complete in the fall of 2011.



Red fescue seed increase field.

ACCOMPLISHMENTS: Activities in 2008 included wild seed collection and seed increase field establishment three grasses. PMC staff and volunteers traveled to the Park once in August to collect wild seed. Six pounds of cleaned seed of were collected. These seeds were used to establish the seed increase fields in the fall of 2008. A total of 0.35 acres are now in production for this project. Seed will be collected again in 2009 and the seed increase fields will be expanded.

TECHNOLOGY DEVELOPMENTS: No specific technology developments were conducted in 2008 for this project.

OLYMPIC NATIONAL PARK
Elwha River Ecosystem and Fisheries Restoration

2008 Annual Summary Report
Prepared by Amy Bartow

NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON

INTRODUCTION: The Corvallis Plant Materials Center (PMC) entered into a new agreement with Olympic National Park in 2004 to provide native plant materials for the ecological restoration of Lake Mills and Lake Aldwell following the removal of two high head dams on the Elwha River. It was agreed that the PMC would propagate a minimum of 4000 lbs of grass and forb seed. A more detailed production list will be determined by PMC and NPS staffs as restoration plans are finalized. Dam removal was again delayed in 2007. Plans now estimate that the dams might be removed in 2012. Most of the fields that are now in production will not survive until 2012 and the seed that is produced from the existing fields (and from previous years) will not be viable in 2012. Possible exceptions are the sedges and legumes. These plants and seeds are long-lived. Seed production on these species will continue in 2009 and future years. Production on all other species will be halted until dam removal plans have been finalized and demolition has begun.

ACCOMPLISHMENTS: Activities in 2008 included wild seed collection of seed of two grasses and one forb; establishment and maintenance of three seed production fields including one forb and two sedges. A total of 78 lbs of seed was produced this year and over 15 lbs of seed was collected from the Park. This seed will be used to establish seed increase fields in 2009. The PMC is storing seed that was produced in previous years.

Table 1. Current seed inventory for the Elwha River Restoration.

Scientific name	Common name	Amount in storage
Forbs		
<i>Achillea millefolium</i>	yarrow	120 lbs
<i>Anaphalis margaritacea</i>	pearly everlasting	0.5 lbs
<i>Artemisia suksdorfii</i>	coastal wormwood	2 lbs
<i>Epilobium ciliatum</i>	fringed willowherb	26 lbs
<i>Epilobium angustifolium</i>	tall fireweed	0.5 lbs
<i>Aruncus dioiceous</i>	goastbeard	0.5 lbs
Grasses, sedge, and rushes		
<i>Agrostis exarata</i>	spiked bentgrass	18 lbs
<i>Bromus complex</i>	brome species	309 lbs
<i>Bromus vulgaris</i>	Columbia brome	10 lbs
<i>Carex deweyana</i>	Dewey's sedge	8 lbs
<i>Carex hendersonii</i>	Henderson's sedge	0.1 lbs
<i>Carex pachystachya</i>	thick-headed sedge	80.4
<i>Deschampsia elongata</i>	slender hairgrass	192 lbs
<i>Elymus glaucus</i>	blue wildrye	214.5

		lbs
<i>Juncus bolanderi</i>	Bolander's rush	0.2 lbs
<i>Luzula parviflora</i>	Many-flowered woodrush	0.1 lbs
<i>Luzula comosa</i>	common woodrush	0.2 lbs

TECHNOLOGY DEVELOPMENTS: Weed seeds are often a problem when farming native plants. Some weeds cannot easily be removed from the field or be avoided during harvest. Some of these weed seeds can be removed with seed cleaning machines. In 2008, the PMC acquired a gravity table. This machine was able to separate weeds seeds such as *Poa annua* from the sedge seed lots.



A lab-sized gravity table was added to the PMC's seed cleaning facilities this year.

SEQUOIA AND KINGS CANYON NATIONAL PARKS

2008 Annual Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
LOCKEFORD CALIFORNIA

INTRODUCTION: This project was started in 2007 and completed in 2008. The overall goal of the agreement was to produce a minimum of 27 lbs PLS of seed from two species, with a target of 12 lbs blue wildrye (*Elymus glaucus*) and 15 lbs California brome (*Bromus carinatus*).

ACCOMPLISHMENTS: Two accessions of each species were provided to the PMC. The seed was cleaned by PMC staff and subsequently tested for purity and germination by a seed laboratory. Each accession was then planted in 0.125 acre fields at 30 inch row spacing. The fields were harvested for seed in 2007 and 2008 using a Flail Vac or combine harvester. All seed was cleaned at the PMC and tested.

An additional number of small seed collections were also cleaned by the PMC for use in park restoration seeding.



Elymus glaucus



Bromus carinatus

Pounds seed produced	2007	2008	Total
<i>Elymus glaucus</i>			
9083064	14.6		14.6
9083062	2.0	1.6	3.6
Total			18.2
<i>Bromus carinatus</i>			
9083063	13.9	2.9	16.8
9083061	15.3	4.4	19.7
Total			36.5

TECHNOLOGY DEVELOPMENT: All seed cleaning was documented and screen size and air flow for each species was determined.

YOSEMITE NATIONAL PARK

2008 Annual Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
LOCKEFORD CALIFORNIA

INTRODUCTION : In 2006 the Lockeford PMC entered into an agreement with Yosemite National Park (YNP) to produce seed of two grasses, Sandberg bluegrass (*Poa secunda*) and California brome (*Bromus carinatus*), and two forbs Sierra lupine (*Lupinus grayi*) and big deer vetch (*Lotus crassifolius*). Target amounts of pure live seed (PLS) for each species are 100 lbs brome, 10 lbs bluegrass, 20 lbs lupine and 10 lbs deer vetch. This agreement will continue through 2009



Bromus carinatus



Poa secunda



Lupinus grayi

ACCOMPLISHMENTS: All initial seed collection was accomplished by the park staff. The seed was then cleaned by PMC staff and tested by a seed laboratory.

The PMC direct seeded 0.25 acres of bluegrass and 0.75 acres of brome on 30 inch rows. These were harvested in 2007 and 2008 using a Flail Vac or combine harvester. All seed was cleaned and tested. The bluegrass field had a poor stand and produced little seed, so a new 0.5 acre field was established in the fall of 2008. High winds prior to harvest in 2008 dramatically reduced brome seed production.

In 2007 the PMC seeded 1200 plugs of Sierra lupine. From that planting we had 40% germination, and the resulting 478 plugs were then transplanted to weed barrier fabric. In February 2008, the remainder of the weed barrier fabric was direct seeded to Sierra lupine for a total of 6080 ft². As of 2008, 2.2 lbs bulk seed of Sierra lupine were delivered to YNP.

In January 2009 the Lotus seed was direct seeded to 4560 ft² of weed barrier fabric.

Pounds seed produced			
	2007	2008	Total
<i>Bromus carinatus</i> 9083069	37.2	24.8	62.0
<i>Poa secunda</i> 9083070	0.4	0.07	0.47
<i>Lupinus grayi</i> 9083072	--	2.2	2.2
<i>Lotus crassifolius</i> 9083110	--	--	00.0

TECHNOLOGY DEVELOPMENT: All seed cleaning procedures were documented.

GREAT SMOKY MOUNTAINS NATIONAL PARK

2008 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
NATIONAL PLANT MATERIALS CENTER
BELTSVILLE, MARYLAND

INTRODUCTION : The current cooperative agreement between Great Smoky Mountains National Park (GRSM) and the National Plant Materials Center (NPMC) was signed in September 2006, for the fiscal years 2006-2010. The Great Smoky Mountains National Park and Foothills Parkway, has a need to preserve the native plant resources and revegetate parklands. The NPS requires that restoration of native plants will be accomplished using germplasm from populations as closely related genetically and ecologically as possible to park populations. The Great Smoky Mountains National Park has harvested seed from indigenous populations, but does not have the personnel, expertise, facilities or equipment needed to clean process, test and store the seed. The NRCS, National Plant Materials Center (NPMC) does have the personnel and is equipped to clean, process and store quantities of seed sufficient to meet the NPS needs within the required time frame. Technical expertise as necessary to achieve this goal will be provided by the NPMC under this agreement.



A mixture of annual and perennial grasses and native grass, wildflower, and tree seed being hydro seeded on the cut slope

ACCOMPLISHMENTS: 2008 was a lower than average year for rainfall in the Cades Cove increase fields. The amount of seed harvested from the increase fields directly correlates to the amount of rainfall. The low rainfall resulted in only 239 lbs. (bulk) of grass and wildflower seed harvested. In 2006, 500 lbs. of seed was harvested and in 2007 over 400 lbs. (bulk) was harvested. The trend of lower seed harvest amounts runs opposite to the fact that every year more plugs are being planted in the increase fields and existing plants will produce increasing seed yields.

The following table lists the 9 different lots of seed which was harvested. The seed was cleaned (de-bearded and then run through a clipper) by NPMC staff to yield 99 lbs of cleaned seed. Also included in the table are the species, amounts of seed harvested, and the resulting cleaned seed weights.

SEED PRODUCED IN THE GRSM CADES COVE INCREASE FIELDS FY 2008

Botanical Name	Common Name	Lot #	Bulk Weight (lbs)	Cleaned wt.(lbs)
1. <i>Andropogon gerardii</i>	Big bluestem	SWC-08 - GRSMINCRS	68.3	25.4
2. <i>Andropogon glomeratus</i>	Bushy Bluestem	SWC- 08- GRSMINCRS	3.5	.8
3. <i>Lespedeza capitata</i>	Roundheaded lespedeza	SWC-08 - GRSMINCRS	3	0.6
4. <i>Monarda fistulosa</i>	Bee balm	SWC-08 - GRSMINCRS	10.4	1.1
5. <i>Parthenium integrifolium</i>	Wild quinine	SWC-08 - GRSMINCRS	7.4	0.9
6. <i>Saccharum giganteum</i>	Beard Grass	SWC-08 - GRSMINCRS	16.2	2.3
7. <i>Schizachyrium scoparium</i>	Little bluestem	SWC-08 - GRSMINCRS	18.9	0.7
8. <i>Sorghastrum nutans</i>	Indiangrass	SWC-08 - GRSMINCRS	71.4	38.5
9. <i>Tridens flavus</i>	Purple top	SWC-08 - GRSMINCRS	40.7	29.8
total			239.8	99.3

2008 Re-vegetation projects

While 2008 was lower in seed production, it was a very productive year for re-vegetation projects. A total of approximately 1000 lbs. of seed was delivered to the park for:

- Foot Hills Parkway - 115 pounds Gatlinburg Spur and FHP Bridge #8
- Cades Cove - 154 pounds
- Crisp and Crisp - Tennessee Valley Authority (electricity transmission lines) - 727 pounds

The increased amount of seed distributed to the park resulted in greatly decreasing the amount of seed in storage at the PMC from over 1400 lbs. (bulk) in 2007 to a current amount of 800 lbs. Using this seed was badly needed as many of the lots were old and losing viability.

Over 300 plants were distributed to the GRSM for stabilization of the piers of Foothills Parkway Bridge #8. The construction of these piers caused areas around the piers to be denuded of all vegetation. To stop soil erosion Black Locust, Redbud and Aromatic Sumac, all pioneer species of plants which can grow in dry, hot growing conditions, were chosen to be planted.

Seed Re-Cleaning and Consolidation

In January 2008 a total of 547 lbs. (bulk weight) of Aster, Virginia Wildrye, Path rush, Panic Grass, Goldenrod, and Indian Grass seed was re-cleaned and consolidated. The age, purity and viability were determining factors in deciding which lots were re-cleaned and consolidated. The cleaning resulted in 304 lbs (bulk weight); a total of 242.5 lbs of unviable seed, weed seed, and chaff was cleaned from those seed lots. This will diminish distribution costs, seed testing costs and save the amount of effort needed in all re-vegetation projects by using more viable, cleaner seed.

Options and Cost Breakdown for Direct Seeding Wetlands with Baltic Rush
Study Number: IDPMC-T-0604-WE
Derek J. Tilley
October 22, 2008

INTRODUCTION:

Direct seeding of wetlands species typically results in low establishment rates and is generally not recommended. Because seed from many wetland species are buoyant and also require light for germination, broadcast seeding has been unsuccessful because seed tends to float and wash away from the seeded area after flooding. Small scale direct seeding experiments evaluating other techniques have indicated however, that there may be methods available that could produce better establishment of seeded wetland species.

This trial incorporates greenhouse and small-scale test results obtained from experiments conducted from 2004 through 2007 at the Aberdeen Plant Materials Center (PMC), and tests them in a “real-life” field setting. Four seeding methods were tested: 1) Submerseed™ pellets (Aquablok 2007), 2) broadcasting seed mixed with rice hulls as an inert carrier followed by packing with a lawn roller, 3) a hydroseed application of Fertil Fibers™ hydromulch with tackifier, and 4) a second hydroseed application with the addition of straw mulch at one-half the industry rate used for lawn seedings.

Materials and Methods

The trial was conducted at a constructed pond at the Plant Materials Center (PMC) home farm in Aberdeen, ID. The pond measured approximately 50 X 60’ and was lined with a plastic liner. Weeds were controlled with multiple treatments of Roundup applied in 2007 and 2008. The soil was lightly cultivated and watered to field capacity prior to seeding. Plots were 8’ x 10’ arranged in a randomized complete block design with four replications.

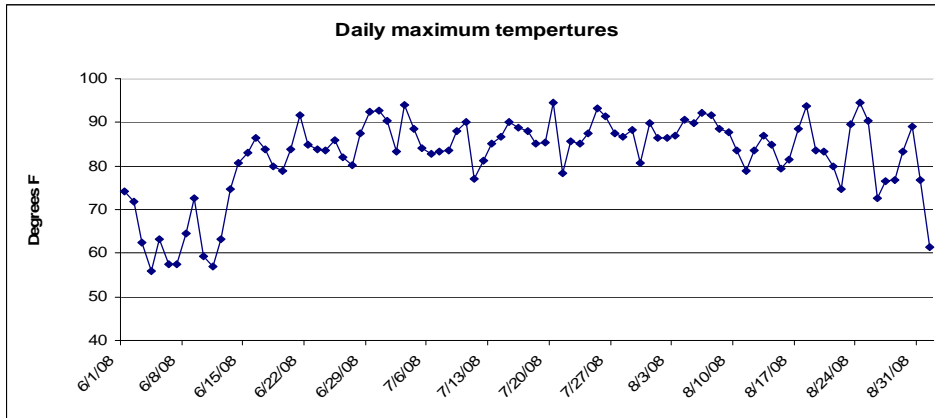
The trial was planted on July 31, 2008 using Sterling Selection Baltic Rush (*Juncus balticus*). Hydroseed treatments were mixed and applied by Frank McClure of Mountain West Hydroseeding. Hydroseed component rates followed the industry standards (see table) with the exception of the straw mulch which was applied at one-half the normal rate. This was done due to results shown by Tilley (2007) that indicated the industry straw mulch rate was possibly too thick for wetland applications involving *Juncus*. Seed was applied at a target rate of 100 PLS/ft². Rice hulls were mixed according St. John et al. (2005).

Amounts	/ft²	/plot	/treatment	/ac
Submerseed	20 pellets	3.75lb	15lb	2000lb
Fertil Fibers	20.8g	3.7lb	14.6lb	2000lb
Tackifier	0.03g	2.5g	10.0g	3lb
Rice hulls	1.35g	0.25lb	1lb	130lb
Seed (100PLS/ft)	0.002g	0.17g	0.68g	0.19lb
Water	2gal	160gal	640gal	87120gal
Straw mulch	10.4g	1.85lb	7.3lb	1000lb

The pond was kept dry for one day following planting to allow for all hydroseed tackifier to dry and adhere to the soil surface. The pond was watered using a perforated irrigation pipe laid at the base of the first replication, so that the water flowed evenly across all four replications. The water was allowed to rise to 0.5 to 1.0 inches above the soil surface and then shut off. The pond was allowed to

partially dry to field capacity and then refilled to the previous level to promote germination. This process was completed throughout the length of the trial.

Daily temperatures reached the mid-nineties for approximately two weeks following planting providing good conditions for the germination of *Juncus* seedlings. The graph below shows daily maximum temperatures from June 1 through August 31, 2008. Daily high temperatures during the study ranged from 61 to 95° F, but averaged in the mid 80s. In the latter part of the study there were greater variations in daily maximum temperatures.



Results and Discussion

The trial was evaluated visually on September 5, 2008 (36 days after planting). No seedlings of *Juncus* were seen in any plot. The reasons for the failure of the trial are unknown. There are a few theories for the lack of success. First, 100 PLS/ft² may not be enough seed to establish *Juncus* and obtain visible stands. Pouring 0.68g of seed into 640 gallons of water in the hydroseeder tank seemed like an extremely small amount of seed compared to that amount of carrier. It is possible that a significant amount of seed remained stuck to the inside of the hydroseeder tank. Second, though the daily temperatures reached the 90's for several days, better establishment may have been achieved with even hotter temperatures. *Juncus* germinates readily at temperatures in excess of 100 degrees. An earlier planting date (early July) may provide more days above 90 degrees and produce germinants.

With these reasons in mind, it may be advisable to re-attempt this study with more seed and earlier in the summer when temperatures are hotter. Another idea is to broadcast the seed by hand and follow with a hydroseed application of tackifier. This would eliminate the risk of losing seed in the hydroseed equipment.

Acknowledgements

The PMC would like to thank Frank McClure and the crew of Mountain West Hydroseeding for their assistance, expertise and the donation of materials. The PMC also thanks the U.S.D.I. National Park Service for funding and cooperation on this project.

Planting images



Hydroseed application of Fertil Fibers treatment.



Hydroseed application of Fertil Fibers and straw mulch treatment.



Pressing the rice hull and seed broadcast mix with a lawn roller.



Rice hulls and seed pressed into soil with roller.



Submersed pellets partially submerged at time of flooding.



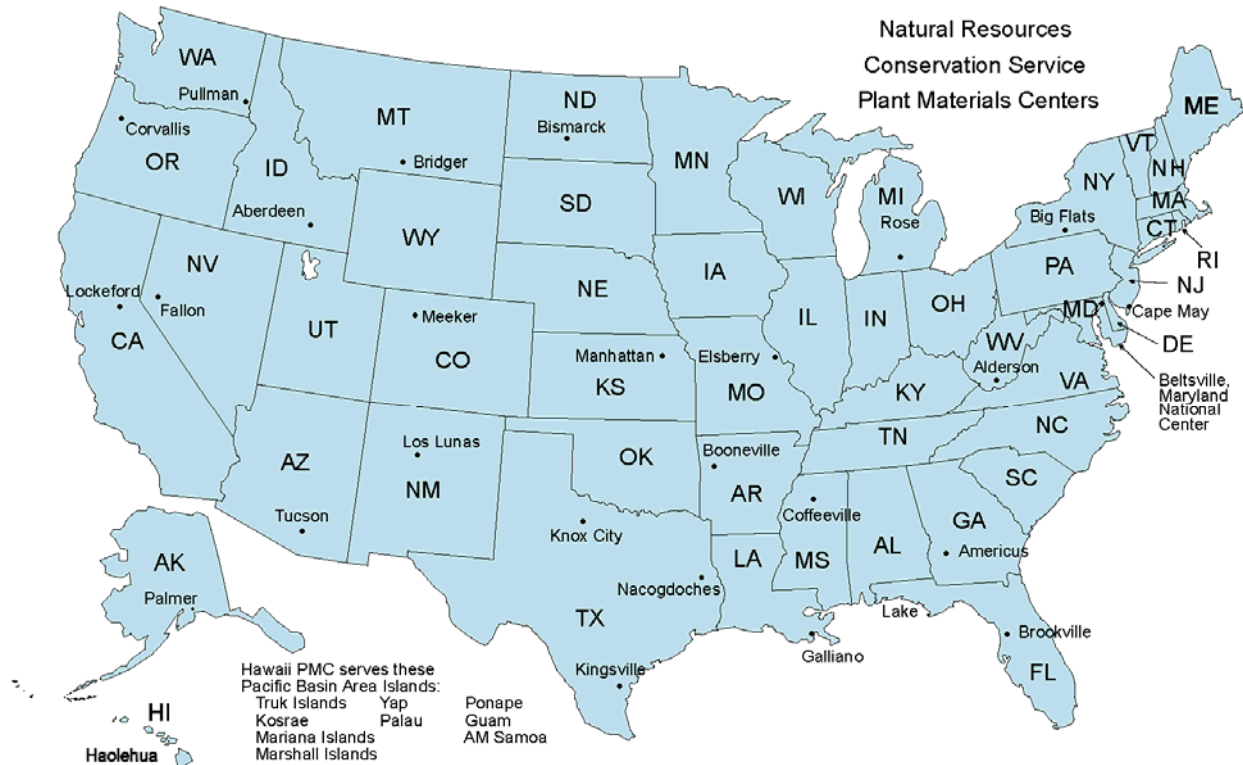
Perforated irrigation pipe watering the pond.

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Aquablok. 2007. Submerseed Composite Seeding Technology. URL: <http://www.aquablokinfo.com/> (accessed 20 Nov, 2007).

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Tilley, DJ. 2007. Juncus direct seeding method evaluation, 2006-2008. Progress report. USDA-NRCS Idaho Plant Materials Center. Aberdeen, ID. 8p.



Plant Materials Centers (PMC)				
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. Elliott 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
Hoelehua, HI	Hoelehua PMC	P.O. Box 236	Hoelehua, 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, MD 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, 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	Coming, 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
Nocogdoches, TX	East Texas PMC	6598 FM 2782	Nocogdoches, 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 PMC	PO Box 646211, WSU	Pullman, WA 99164	(509) 335-8892
Alderson, WV	Alderson PMC	PO Box 390, Old Prison Farm Road	Alderson, WV 24910	(304) 445-3005

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