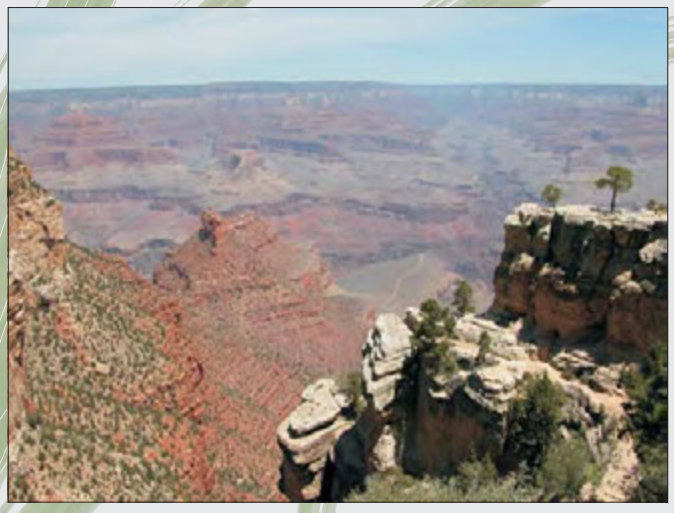
Native Plants For National Parks



FY 2007 Plant Materials Project Summary Reports

NATIONAL PARK SERVICE

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service
Plant Materials Program

FY 2007

Plant Materials Project Summary Reports

from the

Natural Resources Conservation Service

to the

National Park Service

April 2008

Compiled by

Russell J Haas
NRCS Plant Materials Technical Advisor to NPS
and
Linda Leidecker
Revegetation Technician (DSC)

National Park Service, Denver Service Center, Lakewood, Colorado

INTRODUCTION

This is the 2007 NRCS Plant Materials Centers annual progress report on cooperative project agreements between the National Park Service (NPS) and the Natural Resources Conservation Service (NRCS), formerly the Soil conservation Service. These projects relate to development of native plant materials for park roads and restoration project. The NPS and NRCS have been cooperating in testing and increasing of native plants under a Memorandum of Understanding and interagency agreement since 1989.

The NCRS 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 copies of the "one page summary report" are available on request. This report can be requested from Russ Haas, NRCS National Technical Advisor, National Park Service, Denver Service Center, Transportation Division , PO Box 25287, Lakewood, CO 80225, E-mail russ_haas@nps.gov Or phone 303 969-2172.

The comprehensive 2007 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 Russ Haas or Sarah Wynn, NPS National Technical Advisor at 303 969-2292, e-mail: sarah_wynn@nps.gov.

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NATIONAL PARK SERVICE
And
NATURAL RESOURCES CONSERVATION SERVICE

INTERAGENCY PLANT MATERIALS PROGRAM

2007 PROGRAM SUMMARY

Technical Assistance

- NRCS NTA (National Technical Advisor) provided assistance to Landscape Architects, Job Captains and Project Managers at the NPS Denver Service Center relative to revegetation project needs with 7 National Parks in addition to those with interagency agreements.
- On site program technical assistance was provided by NRCS NTA at 13 National Parks.
- Technical assistance in addition to that agreed to Interagency Agreements was provided by Plant Materials Center staff or Specialists to 2 National Parks.

Development and Administration of Interagency Agreements

- Fifteen new agreements and 9 amendments to agreements were developed this year. A total of 38 active interagency agreements were administered and coordinated.
- There were 51 active projects at 30 National Park units in cooperation with 13 Plant Materials Centers.

Native Seed and Plant Production

- 18 National Parks
- 1,880 PLS pounds of seed
- 14,760 container transplants
- 90 park indigenous species (48 grass, 16 forb, 5 legume, 3 sedge, 13 shrub and 5 tree)

Native Seed/Plant Deliveries

- 10 National Parks
- 1802 PLS pounds of seed
- 21,105 container transplants
- 135 park indigenous species (55 grass, 63 forb, 3 sedge and 13 shrub, 1 tree)

Processing of Park Collected Seed

- 3 National parks
- 217 pounds of seed
- 64 species (40 grass, 24 forb)

Preparation of Revegetation Plans

NRCS NTA prepared 6 plans and assisted DSC and 3 national parks develop revegetation plans.

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 NP, Canyon de Chelly NM, Olympic NP, Yellowstone NP, Wupatki NM, Sunset Crater NM.

- Plant Materials Centers: Meeker Colorado, Los Lunas New Mexico, Bismarck, North Dakota, Aberdeen Idaho, Fallon Nevada, Lockeford California and Tucson Arizona

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* intranet website. Most of the information will soon be placed on a NPS internet website.

  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 are also available. An official rollout to NPS personnel occurred in early summer 2007.

- NRCS NTA made a formal oral presentation at the Biennial Conference of Research on the Colorado Plateau, Flagstaff Arizona.

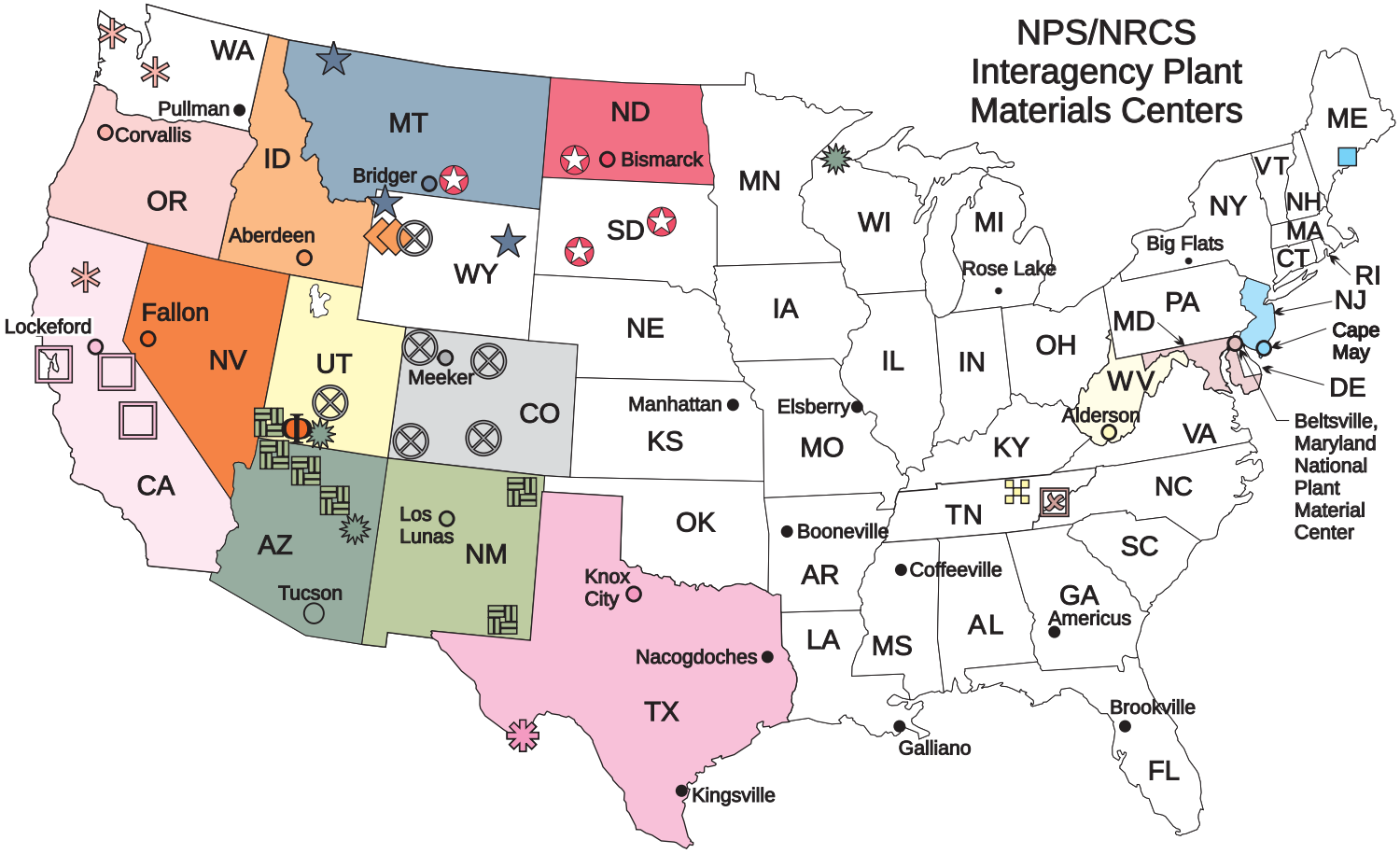
- NRCS NTA assisted in preparation for a Revegetation Workshop for NPS Southwest Region Parks.

- Consulted with selected parks to further define protocols to be used to monitor FLHP revegetation projects

- NRCS NTA, revegetation program and other DSC staff finalized the electronic seeding calculation worksheet and distributed it to six parks for testing.

- NRCS NTA and revegetation program staff completed development and testing of an electronic revegetation project cost estimation guide and posted it on the DSC Revegetation Internet Website for use by park personnel.

- NRCS NTA and program staff prepared and distributed to cooperating Parks/PMCs and key NPS and NRCS personnel, the FY2006 annual Interagency Program Summary Report.



Plant Materials Center			In cooperation with these National Parks
Aberdeen, ID	●	◆	Grand Teton NP
Alderson, WV	●	▪	Stones River NB
Beltsville, MD	●	▪	Great Smoky Mountains NP
Bismarck, ND	●	★	Little Bighorn Battlefield NM, Wind Cave NP, 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
Knox City, TX	●	✳	Big Bend 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, Dinosaur NM, Grand Teton NP, Great Sand Dunes NM, Mesa Verde NP, Rocky Mountain NP
Tucson, AZ	●	✸	Zion NP, Canyon de Chelly NM
Fallon, NV	●	Φ	Zion NP

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Southeast Region

Wetland Establishment Research Studies

BIG BEND NATIONAL PARK

FY2007 Annual Summary Report
Prepared by

USDA – NATURAL RESOURCES CONSERVATION SERVICE
JAMES E. "BUD" SMITH PLANT MATERIALS CENTER
KNOX CITY, TEXAS

INTRODUCTION-The original agreement with Big Bend National Park and the James E. `Bud' Smith Plant Materials Center (PMC) was developed and signed in 1989. Early agreements involve seed and/or plant collection at the Park and seed increase at the PMC. Materials produced were used for roadside revegetation within the park. Plant materials (seeds) were drilled and/or broadcast along road shoulders following construction. The first agreement was completed in 1993. The second agreement scheduled for completion in 1997 was modified to incorporate an additional study to look at techniques for road slope revegetation. In 1998 an additional agreement was put into place to provide materials for the next phase of road construction. This agreement originally scheduled from 1998 - 2001 was amended in 1999 and placed on hold through 2001, pending the rescheduling of construction activities. Currently there are no active agreements targeting roadside revegetation projects.

In 2005 a new agreement was prepared between the Park and PMC addressing the need to revegetate areas after removal of invasive plants. The Park has funded this agreement from 8-17-2005 thru 9-30-2008.

ACCOMPLISHMENTS- Since 1989 nine different species have been produced for the Park and three species evaluated to determine production and propagation techniques.
At the end of 2006, the Park had received a total of 2742 bulk pounds of seed totaling 1188 PLS lbs. The Park did not receive any seed in 2007.

Seed Production and Available Inventory

Common Name	Area(ac)	2007 Prod./Lbs. *	PLS Inventory On Hand
Alkali sacaton	-	-	329.0
Sideoats grama	-	-	105.0
Green sprangletop	-	-	114.0
Cane bluestem	.50	36.25	**
Showy menodora	-	-	118.00
Whiplash pappusgrass	.28	18.5	**
Chino grama	-	-	13.78
Tobosa	.11	.45	**

- *bulk material wt.
- **as of 2-15-08-08, 2007 production has not been cleaned, therefore unanalyzed

CONCLUSION- At the end of FY 2007 seed production fields being maintained and harvested included cane bluestem, tobosagrass, and whiplash pappusgrass. The agreement signed in 2005 addressing post weed control revegetation has been modified to run into 2008.

BRYCE CANYON NATIONAL PARK

FY2007 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION - Bryce Canyon National Park and Upper Colorado Environmental Plant Center (UCEPC) signed a formal Inter-Agency agreement in January 2004. This agreement was amended twice in 2005. Amendment No. 1 outlined field production of 2.5 acres of a single species, slender wheatgrass *Elymus trachycaulus* for 2005, and production of 2.0 acres of slender wheatgrass in 2006. Amendment No. 2, signed September 2005, called for the production of containerized grasses and shrubs in 2006. Amendment No. 3, signed April 2007, provided a two year extension for production of the slender wheatgrass through 2008.

ACCOMPLISHMENTS - In 2006, UCEPC delivered 343 pounds of nodding brome and slender wheatgrass seed to Bryce Canyon National Park. The 7950 plugs, consisting of slender wheatgrass, needle and thread, and Indian ricegrass were also delivered. Amendment No.1 for the above agreement has been completed at this time. In 2007, propagation of several species of shrubs had begun in the greenhouse for delivery that fall. Due to minimal growth the shrubs were held over for spring delivery in 2008. The 1.5 acre field of slender wheatgrass produced 499 lbs of clean seed. The seed has not been tested at this time. Bryce Canyon National Park employees collected seed this fall to supplement the shrubs we are now growing.

Bryce slender wheatgrass

Bryce black sagebrush

TECHNOLOGY DEVELOPMENT – The black sagebrush, bitterbrush, and rabbitbrush all had good germination. Survival rate was excellent on sagebrush and rabbitbrush. The bitterbrush had only a 25% survival due to damping off**.** 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.

CAPULIN VOLCANO NATIONAL MONUMENT

2007 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.

Little bluestem seed production field for Capulin Volcano National Monument: Los Lunas Plant Materials Center, Field 23S.

ACCOMPLISHMENTS

Seed Production

The LLPMC produced the following seed in 2007 for CVNM.

Common name	Scientific name	Agreement Acreage	2007 LLPMC Acreage	Harvest (Bulk lbs.)
Mountain muhly	*Muhlenbergia montana*	0.50 acre	0.50 acre	N/A
Blue grama	*Bouteloua gracilis*	0.50 acre	0.50 acre	1.64
Little bluestem	*Schizachyrium scoparium*	0.50 acre	0.50 acre	N/A
Western wheatgrass	*Pascopyrum smithii*	0.50 acre	0.00 acre	N/A
Sideoats grama	*Bouteloua curtipendula*	0.50 acre	0.00 acre	N/A

TECHNOLOGY DEVELOPMENT

- Mountain muhly – The seed production field looked healthy and vigorous in 2007. There was no seed harvested in 2007, and it appears that insect damage may have prevented any seed formation.
- Blue grama – Seed was harvested in 2007. The planting was healthy and the plants produced many seedheads, but seed formation was found to be low.
- Little bluestem – Seed was harvested in 2007. The planting was vigorous and plants were in good growing condition.. Seed will be harvested again in 2008.
- Western wheatgrass – No seed was harvested in 2007, and the production field has been removed as per the agreement with CVMN. The LLPMC does not plan to establish another field at this time.
- Sideoats grama – No seed was received from CVNM in 2007; as a result the LLPMC has not established a production block of this species.

CARLSBAD CAVERNS NATIONAL PARK

2007 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.

Plains bristlegrass seed production field for Carlsbad Caverns National Park: Los Lunas Plant Materials Center, Field 20S.

ACCOMPLISHMENTS

Seed Production

In 2007, the LLPMC grew plains bristlegrass transplants to establish a seed production field.

The LLPMC produced the following seed in 2007 for CCNP.

Common name	Scientific name	Agreement Acreage	2007 LLPMC Acreage	Harvest (Bulk lbs.)
Sideoats grama	*Bouteloua curtipendula*	0.50 acre	0.50 acre	N/A
Blue grama	*Bouteloua gracilis*	0.50 acre	0.50 acre	13.16
Three-awn	*Aristida purpurea*	0.50 acre	0.50 acre	N/A
Green sprangletop	*Leptochloa dubia*	0.50 acre	0.50 acre	104.22
Plains bristlegrass	*Setaria vulpiseta*	0.50 acre	0.50 acre	N/A

TECHNOLOGY DEVELOPMENT

- Sideoats grama – Seed was harvested in 2007.
- Blue grama – Seed was harvested in 2007.
- Three-awn – Seed was harvested in 2007.
- Plains bristlegrass – Seed was harvested in 2007. Transplants were grown from the harvested seed and were planted to expand the production field to 0.50 acre.
- Green sprangletop – Seed was harvested in 2007.

DEVILS TOWER NATIONAL MONUMENT

FY 2007 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 involves 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.

Devils Tower rabbitbrush

Devils Tower sagebrush

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 75^0 to 80^0F days and 60^0 to 65^0F 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.

A total of 374 fringed sage and 136 rubber rabbitbrush are currently being over-wintered in a coldframe maintained between 35^0 and 45^0F at the Bridger Plant Materials, Bridger, Montana. Plants are inspected and irrigated as needed while in storage. In addition, a total of 1,200 'Rosana' western wheatgrass (*Pascopyrum smithii*) containers are currently being cold:moist chilled in a walk-in cooler in anticipation of spring 2008 out-planting. All surviving plants will be transported to Devils Tower Monument and installed by BPMC and Devils Tower staff sometime in late spring or early summer of 2008.

TECHNOLOGY DEVELOPMENT: No specific technology development activities were conducted at the Bridger Plant Materials Center on behalf of Devil's Tower National Monument in 2007.

DINOSAUR NATIONAL MONUMENT

FY2007 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 September of 1996 and amended the agreement in August of 1997. A new agreement was developed in 2002. These agreements involve the collection and seed production of four grass species native to Dinosaur National Monument. Targeted species are: Western wheatgrass (*Pascopyron smithii* - 9070955), Indian ricegrass (*Oryzopsis hymenoides* - 9070953), basin wildrye (*Leymus cinereus* - 9070951), bluebunch wheatgrass (*Psuedoroegneria spicata ssp. spicata* - 9070952), alkali sacaton (*Sporobolus airoides* - 9070954), sand dropseed (*Sporobolus cryptandrus),* and salina wildrye (*Leymus salinus ssp. salinus*). The last two species were not collected. An additional species was added in 2002, squirreltail (*Elymus elymoides*); however, no seed field has been planted. The grasses will be used for restoration and to prevent non-indigenous weedy plants from invading. The western wheatgrass seed field was plowed in 1999, due to numerous off types. Two seed fields (Indian ricegrass and alkali sacaton) were interseeded to improve stands in 1999. An additional planting of bluebunch wheatgrass was planted in 2001, since no seed was produced on the original planting for that year (2001). This new planting had a good stand in 2002 and was harvested with the original planting in 2004 and 2005. A decision was made in 2005 to remove the original eight rows of bluebunch wheatgrass, which was done after harvest in 2005.

Dinosaur Basin Wildrye

ACCOMPLISHMENTS - Dinosaur National Monument personnel did not visit the plant center in 2007. Seed was harvested from all seed fields in 2007 but, was not cleaned at the time of writing this report.

Seed Harvested		Seed Fields	
Name	**Harvest Date**	**Name**	**Size**
Alkali sacaton	July 13 – 19	Alkali sacaton *	0.18 acre
Basin wildrye	July 21	Basin wildrye	0.24 acre
Bluebunch wheatgrass	July 9 - 13	Bluebunch wheatgrass**	0.18 acre
Indian ricegrass	July 13	Indian ricegrass *	0.24 acre

* Interseeded in 1999

** Increased in 2001, original 8 rows (0.24 acre) removed 2005.

TECHNOLOGY DEVELOPMENT - Specific information on procedures and methods for seed cleaning etc., can be requested for each species.

GLACIER NATIONAL PARK

FY 2007 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 re-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. Wildland seeds are collected by GNP staff, dried, and then mailed to the BPMC where they are cleaned, weighed, accessioned, inventoried, and stored until needed. Wildland and cultivated seed may be used by the BPMC or commercial growers for seed increase or plant production, or sent back to GNP for direct field seeding or plant production.

ACCOMPLISHMENTS: In 2007, 239 seed lots representing 90 individual species and totaling 141.1 pounds (64.0 kg) were delivered to GNP or used for BPMC production. The 2007 seed distribution included 57 grass lots (22 species), 107 forb lots (41 species), and 75 shrub lots (27 species). In addition, a total of 540 containerized *Rosa woodsii* (9063260) and 21 *Mahonia repens* (9054489-LM/Apgar) were shipped or delivered to GNP for restoration activities. No old seed lots were shipped to GNP in 2007 since nearly all Glacier seed lots in storage at the BPMC are now 10 years or less in age. All wildland collections collected in GNP in 2007 are currently being processed. All wildland production data will be presented in the Glacier National Park 2007 Annual Technical Report.

Glacier NP Thimbleberry

Glacier NP *Arctostaphylos uva-ursi*

Ten established seed production fields produced seed in 2007, including *Achnatherum nelsonii* (9081995-SM/Two Dog Flats); *Carex athrostachya* (9078591-LM/Camas); *Carex athrostachya* (9081443-LM/Avalanche); *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 *Symphyotrichum laeve* (*Aster laevis)* (9081447-Avalanche). Seed production data from field increase in 2007 at the BPMC is unavailable as seed processing was still occurring at report time. No new seed production fields were established at the BPMC for Glacier Park in 2007.

Seedlings of five seed sources of *Arctostaphylos uva-ursi* and three seed sources of *Rubus parviflorus* were produced in 2007 for Glacier Park. See Table 1 for an inventory of containerized material over-wintered at the BPMC.

Table 1. Glacier National Park production currently stored at the BPMC, January, 2008.

Species Symbol	GNP Lot No.	Accession Number	Location	Number
ARUV	06-113	9063635	Saint Mary	304
ARUV	02-254	9082135	Two Medicine	20
ARUV	99-180	9054544	Sunpoint	33
ARUV	04-165	9078619	LM-Camas	421
ARUV	04-258	9078265	LM-Fish Creek	410
RUPA	06-044	9078329	Two Medicine	143
RUPA	04-065	GNP Inventory	Saint Mary	358
RUPA	06-038	9078268	LM-Apgar	278

Seed germination tests are currently being conducted on all accessions grown at the BPMC in 2007. Results will be presented in the Glacier National Park 2007 Annual Technical Report.

TECHNOLOGY DEVELOPMENT AND TRANSFER: Staff from the BPMC traveled to Glacier National Park on June 3 through 6, 2007 to provide training for park personnel. On June 5, nursery management and plant propagation training was conducted at the Glacier Park Native Plant Nursery. On June 6, PowerPoint presentations were given on nursery stock storage and handling, as well as proper planting technique. Glacier Park and BPMC staff partnered in 2007 to present *Developing and Transferring Technology: From Plant Materials to Glacier National Park* at the Fourth Pacific Northwest Native Plant Conference in Eugene, Oregon, on November 27-29, 2007.

GRAND CANYON NATIONAL PARK

2007 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERV ICE
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 was replanted in 2007 for Grand Canyon National Park: Los Lunas Plant Materials Center, Field 20N.

ACCOMPLISHMENTS

Seed Production

In 2007, the LLPMC grew muttongrass transplants to establish seed production fields.

The LLPMC produced the following seed in 2007 for the GCNP:

Common Name	Scientific Name	Agreement Acreage	2007 LLPMC Acreage	Harvest (Bulk lbs.)
Blue Grama	*Bouteloua gracilis*	0.50	0.54	53.44
Muttongrass	*Poa fendleriana*	1.00	1.50	21.52
Bottlebrush squirreltail	*Elymus elymoides*	0.50	0.50	N/A
Sideoats grama	*Bouteloua curtinpendula*	0.50	0.50	N/A

TECHNOLOGY DEVELOPMENT

- Blue grama – Seed was harvested in 2007.
- Muttongrass – Seed was harvested in 2007, and transplants were grown from the harvested seed. The transplants were used to replant a section of the production field.
- Bottlebrush squirreltail – Seed was harvested in 2007.

GREAT SAND DUNES
NATIONAL PARK AND PRESERVE

FY2007 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION - In April of 2003, an interagency agreement was signed that calls for Upper Colorado Environmental Plant Center (UCEPC) to produce seed of two species, one acre of blue grama and one half acre of Indian ricegrass, through 2005. These products will be utilized for revegetation projects in and around the headquarters area of the monument in 2006. In 2004, an amendment to the above interagency agreement was signed. The amendment stipulates that UCEPC will establish two-tenths of an acre seed increase field of ring muhly. In 2006, a second amendment was added to the agreement. The second amendment provides for an extension of the agreement through 2008 and reimbursement to UCEPC for cost incurred in FY06.

Great Sanddunes Indian ricegrass. **(Fred Bunch and Phyllis Bovin GRSA)**

ACCOMPLISHMENTS (2004-2007) - As per agreement, half an acre of Indian ricegrass was planted on July 27, 2004. In addition, one acre of blue grama was planted on July 27, 2004, and two tenths of an acre of ring muhly was planted on July 30, 2004. The blue grama and ring muhly had to be replanted in July 2005 due to unsuccessful establishment of both plantings: The blue grama was damaged by frost heaving (lifting and lateral movement of soil due to freezing)

during the winter of 2004-2005 and ring muhly failed to establish a good stand. The plantings done in 2005 germinated well and were progressing very well during the growing season, however, during the winter of 2005-2006, ring muhly and blue grama suffered severe winter damage to the point that we thought we had lost them. Most plants were uplifted from the ground.

Despite the damage incurred during the winter, we were able to harvest and clean 20 pounds of blue grama, 31 pounds of Indian ricegrass and 14 grams of ring muhly for the 2006 growing season. In addition, six more rows of blue grama were replanted on August 2, 2006.

On November 16, 2006, a mixture of 18.1 pounds of pure live seed of Indian ricegrass (all the seed harvested in 2006) and 10.9 pounds of pure live seed of "San Luis" slender wheatgrass were delivered to the park to re-vegetate a four acre field.

Seed from Indian ricegrass and blue grama collected at the park and sent for cleaning at UCEPC during 2006, resulted in 4.2 pounds of clean seed for Indian ricegrass and no seed for blue grama (seed heads were empty or had immature seed).

Growing Season of 2007

On August 21, about 500 plugs of blue grama were hand-transplanted to fill gaps in the original field. In addition, on September 4, five rows of blue grama were inter-seeded to fill the gaps in the north side of the field. Thrips (insects) were found on some of the blue grama field and will be monitored closely during the growing season of 2008 since they can reduce the amount of seed produced. The following table presents production by species for 2007.

Species	Scientific name	Establishment Acres	Harvest Date	Clean weight
Blue grama	*Bouteloua gracilis*	1.0	10/9	17 lb
Indian ricegrass	*Achnatherum hymenoides*	0.5	7/5	38 lb
Ring muhly	*Muhlenbergia torreyi*	0.2	10/10	0.8

Seed from Indian ricegrass and blue grama collected at the park and cleaned at UCEPC during 2007, resulted in 3.5 pounds of clean seed for Indian ricegrass and 27 grams for blue grama.

Great Sanddunes indian ricegrass before harvest

GRAND TETON NATIONAL PARK

FY2007 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. The fields will be harvested again in 2008.

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.

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 total annual precipitation. Weeds were controlled as needed during the growing season. All species with the exception of Sandberg bluegrass established well. Sandberg bluegrass plants were established but overall field establishment is spotty.

The following table lists the species, field acreage and seed yields from 2007 harvest (at time of report, seed had not been tested):

Species	Scientific Name	Acres	Clean seed (lbs)
Slender wheatgrass	*Elymus trachycaulis*	1.0	1031
Blue wildrye	*Elymus glaucus*	2.7	1052
Mountain brome	*Bromus marginatus*	1.0	217
Sandberg bluegrass	*Poa secunda*	0.25	13

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

Seed harvest will occur again from these fields in 2008.

Grand Teton National Park Seed Increase. Blue wildrye.
Aberdeen Plant Materials Center, July 9, 2007.

Grand Teton National Park Seed Increase. Mountain brome.
Aberdeen Plant Materials Center, June 1, 2007.

Grand Teton National Park Seed Increase. Slender wheatgrass.
Aberdeen Plant Materials Center, July 9, 2007

Grand Teton National Park Seed Increase. Sandberg bluegrass.
Aberdeen Plant Materials Center, September 6, 2006.

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GRAND TETON NATIONAL PARK

FY2007 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 September of 2001. This agreement called for the production of five grass species through 2005. In 2005, it was agreed to produce a new field of slender wheatgrass at least through 2006 for additional park use. In April of 2007, a new agreement was executed for the continued production of slender wheatgrass through 2009.

ACCOMPLISHMENTS - A new one-acre field was planted on August 23, 2005. This field produced 617 clean pounds of seed in 2007. Seed test results are not available at this time, but the seed appears to be of good quality from observations during cleaning.

Two seed shipments were made to Grand Teton National Park this fall. A shipment on September 28, 2007, included grass seed of five species that was produced under a previous agreement and one shipment on October 24 of a single species, bluebunch wheatgrass, for park uses.

Grand Teton slender wheatgrass

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LITTLE BIGHORN BATTLEFIELD NATIONAL MONUMENT

FY2007 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 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 2007.

Species	Common name	PLS lbs (goal)	2007 harvest (lbs)
Nassella viridula	Green needlegrass	100	2.88 (clean)
Pseudoroegneria spicata	Bluebunch wheatgrass	100	55 (dirty)
Bouteloua curtipendula	Sideoats grama	50	36 (clean)
Bouteloua gracilis	Blue grama	10	4 (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 feet^2 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 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.

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.

Harvest of bluebunch wheatgrass in 2007

MESA VERDE NATIONAL PARK

FY2007 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION - Upper Colorado Environmental Plant Center (UCEPC) signed an amendment to an agreement with Mesa Verde National Park September 24, 2003, for the production of containerized materials. Two additional agreements were made directly between Mesa Verde National Park (MVNP) and UCEPC for the production of another 320 similar containerized materials. A total of 4420 plants are to be produced for Mesa Verde National Park in order to complete these contracts. In addition to the above, a seed increase contract has been added. UCEPC is to produce a native erosion seed mix for the revegetation of the disturbed areas due to new road construction.

Mesa Verde Douglas fir

ACCOMPLISHMENTS – On July 7th, 2007, the UCEPC received Indian ricegrass and stipa comata from collections made during the summer by MVNP employees. The seeds were cleaned this December producing 185 grams of Indian ricegrass and 63 grams of stipa comata. Six new fields were planted this fall to increase seed for the revegetation project. The UCEPC sent 20 seed lots to be updated for germination. All material had been previously produced by UCEPC for MVNP. On September 10th, 2007, a total of 178 containerized plants were delivered to the park. Propagation of additional material continues in the greenhouse. Six Woods' rose *Rosa woodsii* planted for rooting stock, still remain on site. The table below identifies the targeted numbers of container grown materials ordered by MVNP. It lists quantities received by MVNP in 2005, 2006, and 2007. In October, an inquiry was made from the Federal Highways Administration about acquiring seed for the road project. On the 25th of October, 17 PLS lbs of seed was shipped to MVNP.

	Plants				
Common Name	**Target Qty.**	**Qty. 2005**	**Qty. 2006**	**Qty. 2007**	**Total To MVNP**
Bitterbrush	40			15	15
Chokecherry	250	266		31	297
Douglas-fir	100			39	39
Fendlerbush	150		484	5	489
Fourwing saltbush	100	35	258		293
Gambel oak	875	1130		36	1166
Mountain mahogany	260	237			237
Mountain snowberry	880	285	25		310
Penstemon			7		7
Pinyon pine	35		49		49
Rabbitbrush	160		310		310
Rocky Mtn. juniper	20		21		21
Squaw apple	135		80	5	85
Utah juniper	35		13		13
Utah serviceberry	875	477	51	46	574
Woods' rose	320	133		1	134
Yucca	185		289		289
Totals	**4420**	**2563**	**1587**	**178**	**4328**

TECHNOLOGY DEVELOPMENT - Available nursery protocols were used to germinate and grow all plant materials.

PIPE SPRING NATIONAL MONUMENT

2007 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.

Bottlebrush squirreltail seed production field for Pipe Spring National Monument: Los Lunas Plant Materials Center, Field 23N.

ACCOMPLISHMENTS

Seed Production

The LLPMC produced the following seed in 2007 for PSNM.

Common name	Scientific name	Agreement Acreage	2007 LLPMC Acreage	Harvest (Bulk lbs.)
Galleta	*Pleuraphis jamesii*	0.50	0.58	4.92
Indian ricegrass	*Acnatherum hymenoides*	0.50	0.50	N/A
Bottlebrush squirreltail	*Elymus elymoides*	0.50	0.22	50.86

TECHNOLOGY DEVELOPMENT

- Galleta – Seed was harvested in 2007.
- Indian ricegrass – Seed was harvested in 2007. The 2005 direct seeding resulted in an 85% field germination. No further direct seeding will be required.
- Bottlebrush squirreltail – After harvesting seed, 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

FY2007 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. 1211-03003) in June 2003. In September 2006, the agreement was amended to continue production of the same plant materials through 2007. This agreement, as amended, involves seed production of four forbs and four grass species for revegetation of the Bear Lake Road Project. A new amendment will be necessary for production of materials beyond 2007.

A separate agreement for a different project was executed in August of 2007 for the production of materials for the relocation of a power line within Rocky Mountain National Park.

ACCOMPLISHMENTS - This year, each of the eight materials was harvested for use in the revegetation of the Bear Lake Road construction project. Seed production of hairy golden aster, purple locoweed, and fringed sage all produced good quantities of seed for the species. A fourth forb, golden banner, produced a limited amount of seed. There were three nights of freezing temperatures recorded in late May during full bloom. It is believed this dramatically affected seed formation. The four grasses have produced small quantities of seed, with blue grama producing a little more than 13 pounds this year. In addition, small quantities of seed were harvested from mountain muhly (7 lb), needle-and-thread (10 lb), and prairie Junegrass (5 lb).

Golden Banner

Purple loco weed

Hairy Golden Aster

On June 26, Russ Haas, Lonnie Pilkington, Pat Davey and Steve Parr met at Rocky Mountain National Park and reviewed the Colorado River Power Line Revegetation Project and located plant populations of identified species for targeted seed collection and increase. After a field session, a review of identified and unidentified species that looked to have merit for seed increase was conducted, 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.

No seed was shipped to the Park in 2007.

TECHNOLOGY DEVELOPMENTS – In order to improve seed production of the forb fields, three of which are believed to be insect-pollinated, a cooperative effort was conducted with Colorado State University Extension entomologist Bob Hammon to place some 10,000 bees and bee boards at UCEPC this year. While it is unknown at this time how good bee survival was, there did not appear to be an appreciable improvement with seed production of the forb species.

WUPATKI NATIONAL MONUMENT

2007 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.

Galleta seed production field for Wupatki National Monument: Los Lunas Plant Materials Center, Field 20S.

ACCOMPLISHMENTS

Seed Production

In 2007, the LLPMC grew galleta transplants to establish seed production fields.

The LLPMC produced the following seed in 2007 for WNM.

Common name	Scientific name	Agreement Acreage	2007 LLPMC Acreage	Harvest (Bulk lbs.)
Bottlebrush squirreltail	*Elymus elymoides*	1.00	N/A	N/A
Galleta	*Pleuraphis jamesii*	2.00	2.00	N/A
Needleandthread	*Hesperostipa comata*	1.00	0.24	N/A

TECHNOLOGY DEVELOPMENT

- Bottlebrush squirreltail – No seed was received from the park in 2007.
- Galleta – Seed was harvested in 2007. Transplants were grown from the harvested seed and were used to establish a 2.00 acre production field at the LLPMC.
- Needleandthread – Seed was harvested in 2007.

ZION NATIONAL PARK

FY2007 Annual Summary Report
Prepared By

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

INTRODUCTION

The National Park Service is providing 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, and work on the project was initiated at the Great Basin Plant Materials Center farm in the fall of 2006.

2007 Bottle brush squirreltail seeding

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 belonged to an accession that had been collected locally at Zion National Park and which had been produced at the Los Lunas Plant Materials Center. Due to unanticipated problems with the equipment procurement process, weed control equipment was not obtained until after weeds had become well established in the fields. The high density of weeds negatively impacted establishment of squirreltail. These fields will continue to be maintained through spring, but may be abandoned in early summer if squirreltail density is too low for effective squirreltail seed production.

In September 2007, squirreltail was planted on 3 additional acres. A cultivator has been used to mechanically control weeds on these fields, and a broadleaf herbicide will be applied in the spring to control the dominant weeds. A pre-emergent herbicide will also be applied to suppress establishment of weedy grasses. In spring of 2008, squirreltail will be planted on 3 more acres.

TECHNOLOGY DEVELOPMENT

Traditional cultivation methods and techniques were used in planting bottlebrush squirreltail at the Great Basin Plant Materials Center farm. Currently, there have been no new techniques or methods developed, and trial results are not yet available. No reports or papers have been developed or presented on this trial, and no technical assistance has been provided.

ZION NATIONAL PARK

2007 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 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.

Sand bluestem seed production field for Zion National Park: Los Lunas Plant Materials Center, Field 27N

ACCOMPLISHMENTS

Seed Production

In 2007, the LLPMC grew bottlebrush squirreltail transplants to establish seed production fields.

The LLPMC produced the following seed in 2007 for ZNP.

Common name	Scientific name	Agreement Acreage	2007 LLPMC Acreage	Harvest (Bulk lbs.)
Sand bluestem	*Andropogon hallii*	0.50	0.50	N/A
Cane bluestem	*Bothriochloa barbinodis*	0.50	0.50	N/A
Bottlebrush squirreltail	*Elymus elymoides*	0.50	0.50	3.64
Galleta	*Pleuraphis jamesii*	0.50	0.50	N/A
Muttongrass	*Poa fendleriana*	0.50	0.50	N/A
Indian ricegrass	*Acnatherum hymenoides*	0.50	0.42	N/A

TECHNOLOGY DEVELOPMENTS

- Sand bluestem – Seed was harvested in 2007.
- Cane bluestem – Seed was harvested in 2007.
- Bottlebrush squirreltail – Seed was harvested in 2007. In July 2007, the 0.50 acre production field at the LLPMC was removed. Transplants grown from the harvested seed were used to establish a new 0.25 acre production field of squirreltail in October 2007.
- Galleta – Seed was harvested in 2007.
- Muttongrass – Seed was harvested in 2007.
- Indian ricegrass – Seed was harvested in 2007.

BADLANDS NATIONAL PARK

FY2007 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. Following is Table 1 listing the species and seed amounts requested.

Table 1.

Species	Common name	PLS pounds
Nassella viridula	green needle grass	100
Pascopyrum smithii	western wheatgrass	200
Elymus trachycaulus	slender wheatgrass	100
Bouteloua gracilis	blue grama	10
Sporobolus cryptandrus	sand dropseed	5

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 is currently being cleaned by staff at the Bismarck PMC. Once a lot is cleaned, a seed sample will be taken and sent to the NDSU Seed Testing Laboratory located at Fargo, North Dakota, for purity and germination tests. See Table 2 for seed amounts and completed test results.

A 0.41- acre field of green needlegrass was planted as a dormant seeding on 11/30/2007 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. Seedings at the PMC, of western wheatgrass, slender wheatgrass, blue grama, and sand dropseed are planned for May of 2008.

Collecting seed in Badlands National Park

Table 2.

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)	Planted field size (ac)
						Germ (%)	Dormant (%)	Total (%)		
9092167	green needlegrass	5.4	2.08	1.75	99.91	4	92	96	1.68	0.41
9092165	western wheatgrass	22.0	20.86	8.25	85.40	83	2	85	5.99	
9092166	slender wheatgrass	4.0	4.41	TBD						
9092168	blue grama	1.8	0.99	TBD						
9092169	sand dropseed	0.2	0.22	TBD						

THEODORE ROOSEVELT NATIONAL PARK

FY2007 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.

Little Missouri River. North Unit of Theodore Roosevelt NP

Table 1. Species and seed amounts requested.

Species	Common name	PLS pounds
Pascopyrum smithii	western wheatgrass	200
Nassella viridula	green needlegrass	100
Elymus trachycaulus	slender wheatgrass	100
Bouteloua curtipendula	sideoats grama	100
Bouteloua gracilis	blue grama	10
Koeleria macrantha	prairie junegrass	5

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 is currently being cleaned by staff at the Bismarck PMC. Once a lot is cleaned, a seed sample will be taken and sent to the NDSU Seed Testing Laboratory located at Fargo, North Dakota, for purity and germination tests. See Table 2 for seed amounts and test results.

A 0.49-acre field of green needlegrass was planted as a dormant seeding on 11/30/2007 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. Seedings at the PMC of western wheatgrass, slender wheatgrass, sideoats grama, blue grama, and prairie junegrass are planned for May of 2008.

Table 2. Collected seed amounts and test results

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)	Planted field size (ac)
						Germ (%)	Dormant (%)	Total (%)		
9092171	green needlegrass	5.4	4.40	2.80	92.00	2	72	74	1.9	0.49
9092172	western wheatgrass	22.0	17.68	3.25	92.24	87	0	87	2.6	
9092175	slender wheatgrass	4.0	3.59	TBD						
9092173	blue grama	1.8	1.40	TBD						
9092174	sideoats grama	5.4	3.60	TBD						
9092176	prairie junegrass	1.3	0.98	TBD						

WIND CAVE NATIONAL PARK

FY2007 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 & 2007 (Clean amount)**	
Pascopyrum smithii	Western wheatgrass	5	13	lbs
Andropogon gerardii	Big bluestem	5	157	gm
Bouteloua gracilis	Blue grama	5	1	lbs
Schizachyrium scoparium	Little bluestem	5	4	lbs
Bouteloua curtipendula	Sideoats grama	5	No PMC planting	
Aristida purpurea	Purple three awn	2	(dirty) 4	lbs
Koeleria macrantha	Prairie junegrass	2	5	lbs
Elymus elymoides	Bottlebrush squirreltail	2	12	lbs
Circium undulatum	Wavyleaf thistle	.5	473	gm
Dalea purpurea	Purple prairieclover	.5	39	gm
*Sphaeralcea coccinea**	Scarlet globemallow	.5	No PMC planting	
*Astragalus missouriensis**	Missouri milkvetch	.5	No PMC planting	
Oxytropis campestris	Slender crazyweed		326	gm
Oxytropis lambertii	Lambert's crazyweed		2	gm
Nassella viridula	Green needlegrass		2.15	lb

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 (*Nasella viridula*). Seed was cleaned at the PMC using hand screens, office mill, and rub boards.

2006 -Seed was planted into containers 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 in 2007. Seed production was good for all species except *Oxytropis campestris, Oxytropis lambertii, Dalea purpurea,* and *Andropogon gerardii.* Seed was hand harvested, hand harvested and fed through a plot combine or combined straight from the field. Seed harvested in 2007 is currently being cleaned. Germination and purity tests will be run after bulking cleaned seed from all harvest years of a species.

TECHNOLOGY DEVELOPMENT:

- Seed heads of *Elymus elymoides* were large and heavy in 2007. Lodging was severe. Heads were hand clipped and fed through a plot combine. This method was also used for *Koeleria macrantha*, as heads were very short and of varying heights. Though this is time consuming, time needed for cleaning is shorter when thrashed. This may be a method to consider when working with small plots.
- *Circium undulatum* is a biennial species that produces rosettes and no seed heads the year of planting. Once seed heads form, many insects visit the flowers, and birds attack the heads when seed is ripe. This may be a species that should be considered when seeking pollinator species. Insects were found inside some of the harvested seed, so fumigation may be necessary for this species.
- Hand harvest of *Schizachyrium scoparium* was slow. As a way to speed the process, hair combs were used to strip the seed.

Wavyleaf thistle

Harvesting prairie junegrass

ACADIA NATIONAL PARK

FY2007 Annual Summary Report

Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
CAPE MAY, NEW JERSEY

INTRODUCTION - The USDA, Natural Resources Conservation Service, Cape May Plant Materials Center, entered into an interagency agreement in 2003, IA 4500-03-002 Rehabilitation of Blackwoods Campground, with the USDI, National Park Service, Acadia National Park.

The Natural Resources Conservation Service agrees to:

(A) Collect seed and plant materials of selected species within Acadia National Park boundaries.
(B) Use these seeds and plant materials to produce plugs and transplants of forbs, trees and shrubs.
(C) Make available plugs and transplants to Acadia National Park for re-vegetation of the Blackwoods Campground.

The PMC activities have focused on seed and plant collections in the Acadia National Park, seed collection, processing and conditioning, seed/plant propagation of plugs and transplants at the plant materials center, propagating materials and delivering the plant material back to the Park.

ACCOMPLISHMENTS - A total of 8147 plants were delivered in 2007. This included 5147 trees and shrubs (an assortment of winterberry holly, wild raisin, fly honeysuckle, bayberry, pasture rose, red maple, paper birch, striped maple, and mountain ash). and 3,000 forbs including big-leaf aster, flat-topped aster, and Canada goldenrod.

The remaining 1,065 plants will be delivered in early summer 2008. This will complete our contractural obligation with the Park.

TECHNOLOGY DEVELOPMENT – No new technologies have been realized nor will be developed for the remainder of this contract.

Spruce and Birch planted 2005

Large leaf aster planting-2006

Blackwoods Campground
Planting area. Planted 2006
to separate group sites.

GOLDEN GATE NATIONAL RECREATION AREA

FY2007 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
LOCKEFORD, CALIFORNIA

INTRODUCTION - During FY2007, one specie, Nassella pulchra, was grown at the Lockeford PMC for maximum seed production. A total of 160 grams of pure live seed (PLS) was produced at the PMC. The first year seed production was expected to be low.

This project started in FY2007 and will be completed in FY2008. The overall goal of the project is to produce a minimum of 150 PLS pounds of seed. This goal was adjusted to 90 PLS pounds due to the .60 acre field size.

A foggy day at Golden Gate

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 initial cleaned seed was then used to direct seed one species, Nassella pulchra, on 30 inch rows. The area planted was .60 acre. The agreement goal was to direct seed one acre; however, all seed cleaned was used to plant the .60 acre field. The 160 grams of seed grown, harvested and cleaned at the PMC in FY07 was not enough to plant the additional .40 acre in FY08, (Oct. 2007). The field area was harvested using a FailVac harvester. All seed was cleaned and tested.

Species &	**PLS Lbs.**	**FY07**	
Nassella pulchra NAPU 9083073		.35	
		.35	**Total PLS Lbs.**

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

LASSEN VOLCANIC NATIONAL PARK

Kings Creek Revegetation Project

2007 Annual Summary Report
Prepared by Amy Bartow

NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON

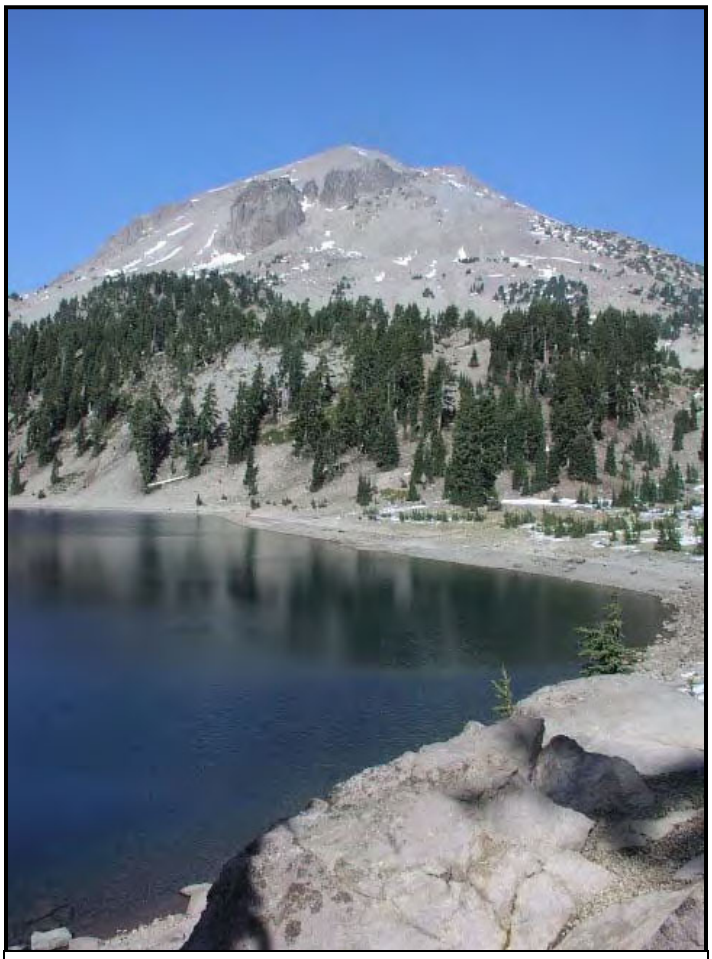

Figure 1. Lassen Peak from Lake Helen, Lassen Volcanic National Park, October 23, 2007.

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 along roadsides in the Lake Helen and Kings Creek Meadow 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. The project should be completed in 2008.

ACCOMPLISHMENTS- Cuttings that were collected in the fall of 2006 were propagated in the spring of 2007. Rooting success was 82%. After rooting, cuttings were potted up into 40cc containers and placed in a shadehouse. The potted cuttings also had an 82% survival rate. A total of 1340 manzanita plants were produced this year and all were delivered to the Park on September 12, 2007. PMC staff traveled to the Park on October 12, 2006 to collect more manzanita cuttings. Not all of the roadsides were ready for plants to be transplanted into so PMC staff took 260 manzanita plants back to the PMC to overwinter them. Approximately 800 cuttings were taken from about 7000 ft elevation, just ahead of snowfall. They will be propagated in the spring of 2008.

TECHNOLOGY DEVELOPMENTS-

Most species involved in this project are ones that have never been propagated at the Corvallis PMC. Informal germination tests were set up on all of the species. Three 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. *Juncus* sp. underwent two stratification treatments: 45 days and 90 days. *Carex* sp. Were removed from stratification after 90 days and 120 days. All of the *Carex* sp. showed the highest percent germination after the 120 days of cold-moist stratification. The seeds need to be placed in warm greenhouse (80° F) after stratification, to obtain the highest percent germination. Stratification treatments did not improve germination percentages of the *Juncus* sp. Both *Juncus* sp. germinated readily in a warm greenhouse (80° F).

Figure 2. *Arctostaphylos nevadensis* rooted cuttings growing in the PMC greenhouse, March 30, 2007.

LASSEN VOLCANIC NATIONAL PARK

Visitors' Center Landscape Project

2007 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 to establish the landscape 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.

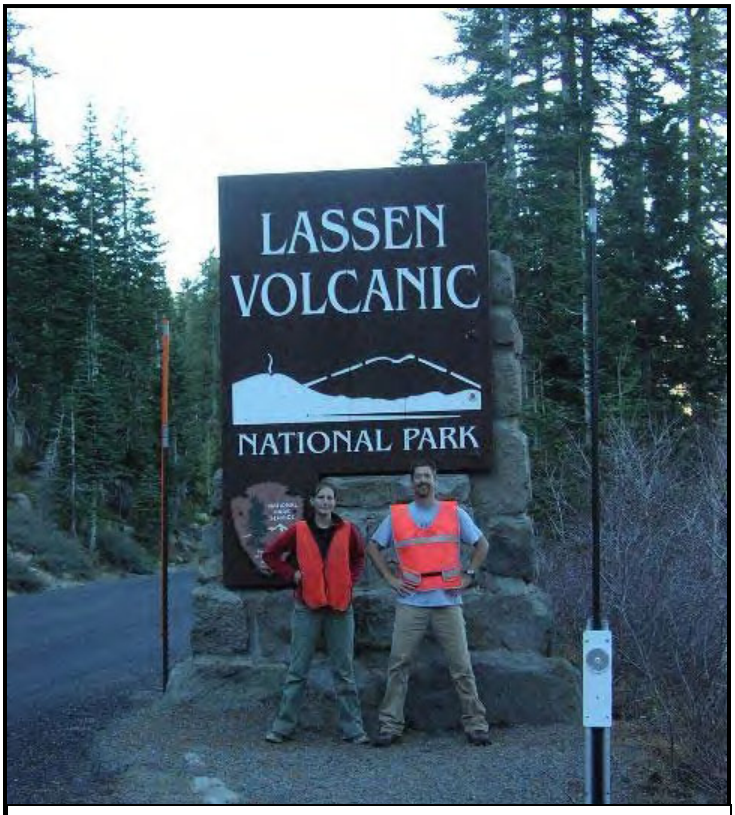

Figure 1. PMC staff members Jenny Freitag and Joe Williams ready to collect cuttings at Lassen Volcanic National Park, October 23, 2007.

ACCOMPLISHMENTS- Activities in 2007 included collection and propagation of two shrubs and germination trials on five sedges, two shrubs, and three forbs. *Arctostaphylos nevadensis* cuttings were collected at the Park by PMC staff on October 23-24, 2007. Staff collected 4000 cuttings from this area.

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. Results are pending and will be released in the 2008 report.

The PMC is to provide 100 containers of *Ceanothus cordulatus*. This species has not been propagated previously at the PMC. Seeds were collected by park staff and delivered to the PMC. Seed was cleaned and placed in hot water (180°F) and left to cool/soak for 24 hours. Seeds were then mixed with moistened sand in a plastic zip-lock bag and placed in a walk-in cooler. Seeds will be monitored weekly for germination.

Figure 2. *Arctostaphylos nevadensis* cuttings are rooted using heat mats underneath the boxes of moistened perlite. Seeds of this species are difficult to collect and germinate; therefore vegetative propagation is the most reliable way to produce plants for small-scale NPS projects.

MOUNT RAINIER NATIONAL PARK

State Road 123 Revegetation Project

2007 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. This project is expected to be complete in 2009 and all of the seed that is produced in 2008 and 2009 will be delivered in the fall of 2009.

ACCOMPLISHMENTS- Activities in 2007 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. Seven pounds of cleaned seed of five accessions (three species) were collected. These seeds were used to establish seed increase fields. A total of one acre was planted in the fall.

Figure 1. High elevation meadow near Steven's Canyon Rd, Mount Rainier National Park, August 21, 2007.

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 colleted seed.

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MOUNT RAINIER NATIONAL PARK

State Road 123 Revegetation Project

2007 Annual Summary Report
Prepared by Amy Bartow

NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON

Figure 1. PMC staff collecting seed Mount Rainier National Park, August 30, 2007.

INTRODUCTION- The Corvallis Plant Materials Center (PMC) entered a new agreement with Mount Rainier National Park in 2004 to provide native plant materials for the ecological restoration of State Road 123. It was agreed that the PMC would produce a minimum total of 100 lbs pure live seed (PLS) including: 25 lbs (PLS) of blue wildrye, 50 lbs (PLS) of California brome, and 25 lbs (PLS) of red fescue for delivery in the fall of 2007. The Park experienced heavy flooding in the fall of 2006 and consequently the road construction was not completed in 2007. All seed is being held in the PMC seed storage facilities until requested by the Park.

ACCOMPLISHMENTS- In 2007, three grass seed increase fields were maintained and harvested. A total of 131 lbs (PLS) were produced in 2007 and 68 lbs (PLS) were delivered to the park in the fall to be used in some of the flood-damaged areas. All of the 2007 seed production and 293 lbs (PLS) from previous years remains at the PMC seed storage facilities. The Brome and fescue fields are entering their peak production years, but the blue wild rye field is getting old and should be removed.

Table 1. Seed produced for the Mount Rainier SR123 Road Project at the Corvallis PMC in 2007.

Species	Area Harvested	Date(s)	Method	Yield	Comments
Bromus carinatus	0.18 acres	July 2	"Moon rover"	55 lbs	Good stand, high vigor
Festuca rubra	0.12 acres	June 27	Seed stripper	53 lbs	Excellent stand, high vigor
Elymus glaucus	0.58 acres	July 6/ July 23	Swath/ combine	38 lbs	Excellent stand, medium vigor

TECHNOLOGY DEVELOPMENTS-

Festuca rubra field was harvested this year using a Woodward flail-vac seed stripper. It uses a high speed brush to strip seed off the heads of grasses and dry flower stalks of forbs. The spinning brush creates a vacuum and seed is sucked up into a hopper. It is mounted like the bucket on a front end loader and is adjustable in height. Multiple harvests can be performed on species that ripen from the upper sections first, and then subsequent passes can be made on the lower sections as they mature. This method was very efficient and reduced seed cleaning time. This harvester works best on grasses that have panicles rather than spike or spike-like heads.

OLYMPIC NATIONAL PARK

Elwha River Ecosystem and Fisheries Restoration

2007 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 removal of two dams on the Elwha River. It was agreed that the PMC would propagate a minimum of 300 lbs pure live seed (PLS) and 60,000 containers of shrubs; 900 lbs (PLS) and 46,000 containers of herbs and forbs; and 2,020 lbs of grasses, sedges, and rushes. A more detailed production list will be determined by PMC and NPS staff as restoration plans are finalized.

ACCOMPLISHMENTS- Activities in 2007 included collecting seed of 1 species; establishment and maintenance of seed production fields including five grasses, seven forbs, three rushes, one legume, and three sedges; containerized stock production of eight species; and maintenance of cutting blocks of nine shrubs. The Corvallis PMC produced 246 lbs of grasses, 13 lbs of sedges, 1 lb of rushes, and 1 lb of forbs. Dam removal was delayed again 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 2008 and future years. Production on all other species will be halted.

Figure 1. *Artemisia suksdorfi* seed increase field at the Corvallis PMC.

Figure 2. Slender hairgrass seed increase field at the Corvallis PMC.

TECHNOLOGY DEVELOPMENTS-Harvest methods were developed for slender hairgrass. The Corvallis PMC has tried many different harvest methods for this species, and Woodward flail-vac seed stripper was implemented this year. It uses a high speed brush to strip seed off the heads of grasses and dry flower stalks of forbs. It is mounted like the bucket on a front end loader. The unit has proven to be effective for harvesting several species. It was very effective for the slender hairgrass. It removed all of the seed easily and the harvester can be adjusted for height; therefore it can avoid weedy species that grow very close to the ground. The most common weed in the slender hairgrass fields is annual bluegrass (*Poa annua*). It is lower in stature than the slender hairgrass and could be avoided while harvesting by keeping the flail-vac two feet off the ground.

OLYMPIC NATIONAL PARK

Hurricane Ridge Road Project

2007 Annual Summary Report
Prepared by Amy Bartow

NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON

Figure 1. *Eriophyllum lanatum* seed increase field at the Corvallis Plant Materials Center, June 14, 2007.

INTRODUCTION- The Corvallis Plant Materials Center (PMC) entered into a new agreement with Olympic National Park in 2004 to provide native plant materials for revegetation of Hurricane Ridge Road. It was agreed that the PMC would propagate a minimum of 400 lbs of pure live seed (PLS) including: 255 lbs (PLS) of two lower elevation grasses, 100 lbs (PLS) of two upper elevation grasses, and 45 lbs of three upper elevation forbs. The PMC is also responsible for collecting a minimum of 3.5 lbs of seed of four native forbs. Delivery was planned to occur in the fall of 2007. Due to funding constraints, the construction has not begun and is now scheduled to be complete in the fall of 2009. Seed will be held at the PMC until it is needed by the Park.

ACCOMPLISHMENTS- In 2007, four grass and three forb seed increase fields were maintained and harvested. Some of the older high elevation fields are struggling at the low, wet Corvallis PMC location. Since this was the last year of the agreement, the grass fields were removed after they were harvested. The *Eriophyllum lanatum* field is thriving and will be retained for harvest in 2008. Wild collections were also performed in the fall. A total of 99 lbs of seed were produced and another 4 lbs were collected in 2007 bringing the total seed in storage for this project to 265 lbs. This amount falls short of project goals, but the *E. lanatum* field will be continued into 2008 to help make-up for the lack of production from the high elevation grass fields.

Table 1. Seed increase field production in 2007.

Species	Method	Harvest date	Yield	Comments
Elymus glaucus (Low)	Swath/combine	July 6	65 lbs	excellent stand, high vigor
Elymus glaucus (High)	moon rover	July 24	11 lbs	poor stand, low vigor
Bromus sitchensis	hand	June 19, July 2	8 lbs	fair stand, low vigor
Eriophyllum lanatum	moon rover	August 1	16 lbs	excellent stand, high vigor
Lupinus latifolius	hand	May 27- June 28	1 lb	poor stand, high vigor
Artemisia ludoviciana	hand	June 26, August 6	3.5 lbs	fair stand, low vigor

TECHNOLOGY DEVELOPMENTS- One of the forbs that were targeted for wild collection is pearly everlasting. Its seed is very tiny and has pappas attached to it to help it travel in the wind. These two attributes make it quite difficult to clean. This year, PMC staff experimented with cleaning techniques to make cleaning more efficient and to increase rates of seed recovery from hand collections. A large Westrup brush machine was used to separate the larger plant material from the seed. The seed and fluff was run through a small, lab-sized Westrup brush machine. Instead of using a screen mantle inside the machine, a scarifier mantle was used (solid mantle lined with sandpaper). This helped break up the fluff but did not separate any of the material. A small oscillating fan was placed to the side of the brush machine and it was set up to blow across the material as it came out of the machine. It was set so it blew the pappas out of the collection bin but did not blow the seeds out. This greatly reduced the amount of pappas left in the seeds. Once the pappas was removed, the seeds could be screened using and air-screen machine.
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SEQUOIA/KINGS CANYON NATIONAL PARKS

FY2007 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER LOCKEFORD, CALIFORNIA

INTRODUCTION - During FY2007, four accessions of two grass species were grown at the Lockeford PMC for maximum seed production. A total of 45.8 pounds of pure live seed (PLS) was produced at the PMC.

This project started in FY2007 and will be completed in FY2008. The overall goal of the project is to produce a minimum of 27 PLS pounds of seed form four species.

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 initial cleaned seed was then used to direct seed two species (two accessions each, Elymus glaucus and Bromus carinatus) on 30 inch rows, 1/4 acre each for a total of one acre. The four field areas were harvested using a FailVac or combine harvester. All seed was cleaned and tested. Also, a number of small seed collections were cleaned for later use in park restoration seeding.

Species &	**PLS Lbs.**	**FY07**	
Elymus glaucus ELGL			
9083064		14.6	
9083062		2.0	
Bromus carinatus BRACA			
9083063		13.9	
9083061		15.3	
		45.8	**Total PLS Lbs.**

Elymus glaucus

Bromus carinatus.

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YOSEMITE NATIONAL PARK

FY2007 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
LOCKEFORD, CALIFORNIA

INTRODUCTION - During FY2007, four different species were grown at the Lockeford PMC for maximum seed production. A total of 37.61 pounds of pure live seed (PLS) was produced at the PMC. The PMC propagated 8000 legume plugs for transplanting on an area which was covered with weed control fabric. The fabric allowed shattered seed to be vacuumed up with no soil.

This project started in FY2007 and will be completed in FY2009. The overall goal of the project is to produce 140 PLS pounds of seed.

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 initial cleaned seed was then used to propagate plants for placement on fabric (5000 S.F. area) of two species (Lupinus grayi - LUGR 9083072 and Lotus crassifolius LOCR - 9083071). The PMC propagated 1200 Lupinus and had enough plants to plant 2500 sq. feet. Thirty percent died in the field and the rest had poor seedling vigor. PMC used all of the seed and the park will need to collect more. This species did not produce seed in FY07.

The PMC propagated 8000 Lotus plugs, the seed lot from the park had 0% germination, 25% hard seed, so the PMC seeded heavy. Very few plants came up (131 plants) after trying three seed treatments (hot water and scarification). The plants that did come up had poor seedling vigor but did improve when they were planted on the fabric. There was 500 sq. feet planted. Park needs to collect more seed. This species did not produce seed in FY07. The PMC will plant additional species on the fabric area in FY08.

Direct seed two species (Poa secunda - .25 acre and Bromus carinatus - .75 acre) on 30 inch rows, one acre total. The two species planted in the fabric area did not produce seed the first year. The two direct seeded species were harvested using a FailVac or combine harvester. All seed was cleaned and tested. The Poa was a poor seed producer.

Species &	**PLS Lbs.**	**FY07**	**Total**
Poa secunda		.41	
9383070 POSE			
Bromus carinatus		37.2	
9083069 BRACA			**37.61**

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Bromus carinatus

Poa secunda

Lotus crassifolius

Lupinus grayi

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

GREAT SMOKY MOUNTAINS NATIONAL PARK

F.Y. 2007 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.

ACCOMPLISHMENTS

407 lbs. (bulk) of grass and forbs seed was harvested by GRSM staff, and then shipped to the NPMC in November 2006. The following table lists the 6 different lots of seed which was harvested from the GRSM's Cades Cove increase fields. The 407 lbs of bulk seed was cleaned (de-bearded and then run through a clipper) by NPMC staff to yield 200 lbs of cleaned seed. Also included in the table are the species, amounts of seed harvested, and the resulting cleaned seed weights. Five of the lots had enough seed to be tested for viability, purity and for noxious weed seed content.

<u>2007 Revegetation projects</u>
November 2006 - 5.5 lbs (PLS) Virginia Wildrye shipped for revegetation of .25 Acre in Cades CoveJune 2007 – 32 lbs (PLS) of various grasses and forbs shipped for revegetation of 2 -3 acres in Cades Cove<u>Westrup Brush Machine Seed Cleaning Equipment Purchase</u>

Currently the GRSM is harvesting several hundred pounds of native grass and forb seed annually from the seed production fields in Cades Cove. This future quantity of seed harvested in the park production fields will be increasing as the current plants mature and as the park staff continues planting additional plugs of other species. A major goal for the GRSM is to become self-sufficient and clean and store this seed in house. An essential step in achieving this goal is to have the necessary equipment to reach this goal instead of the current method of mailing it back and forth between the GRSM in Tennessee and the National Plant Materials Center in Beltsville, Maryland. In 2007 funds were allocated to purchase necessary seed cleaning equipment.

After consulting with NPMC staff as well as other NRCS PMC and park service staff a LA-H Westrup Brush Machine and air filtration equipment was purchased. This will be installed and made operational in the very near future.

ADDENDUM –

A major concern is the amount and age of GRSM seed which is being stored at the Plant Materials Center. Currently a large amount, over 1400 pounds (bulk), of seed is in storage at the NPMC, and every year more and more seed is generated in the Cades Cove increase fields. The current rate of seed is sown is much less than what is being produced.

While the conditions that the seed is being stored are optimal, it is unavoidable that the viability of this seed is declining. It is our opinion that much more seed should be used for revegetation in Cades Cove and when possible along the Foothills Parkway so that the efforts and funds that have been used to produce this seed are not wasted.

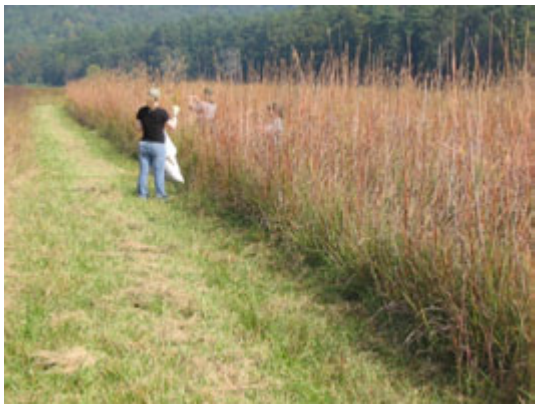
To help alleviate the high amount of seed in storage we are currently consolidating many lots and further cleaning those lots to improve the P.L.S./bulk seed ratio.

Seed Produced in the GRSM Cades Cove Increase Fields F.Y. 2007

Botanical Name	Common Name	Lot #	Bulk Weight (lbs.)	Cleaned Weight (lbs.)	Purity (%)	Viability (%)	Pure Live Seed (lbs.)
Andropogon gerardii	Big bluestem	SWC-06 - GRSMINCRS	134	107.3	29.96	55	17.6
Andropogon glomeratus	Bushy Bluestem	SWC-06 - GRSMINCRS	24	2.9	74.42	89	1.8
Helianthus angustifolia	Swamp sunflower	SWC-06 - GRSMINCRS	12	1.5	36.44	60	.33
Lespedeza capitata	Round headed lespedeza	SWC-06 - GRSMINCRS	3	0.3			
Monarda fistulosa	Bee balm	SWC-06 - GRSMINCRS	8	0.25			
Saccharum giganteum	Beard Grass	SWC-06 - GRSMINCRS	35	16.6	99.36	67	11
Schizachyrium scoparium	Little bluestem	SWC-06 - GRSMINCRS	191	71.2	40	35	9.8
		Total	407	200.05			20.8

Steven Shaper and volunteers shown left are planting plugs in the Cades Cove. Increase fields and Sneezeweed plants growing in the Cades Cove Increase fields. The seed produced from these plants will be used to re-vegetate existing fescue fields in the cove.

A close up of the wildflowers, *Sneezeweed Helenium autumnale* and Swamp Sunflower *Helianthus angustifolius*, growing in cades Cove.



GRSM staff and a volunteer hand harvesting Sugarcane plouegrass *Saccharum giganteum* and the seed stripper with a full load of seed which was then dried in the park and then transported to the NPMC for cleaning and processing

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STONES RIVER NATIONAL BATTLEFIELD

FY2007 Annual Summary Report
Prepared by
John Vandevender

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ALDERSON, WV

INTRODUCTION: Stones River National Battlefield is located in South-Central Tennessee on the outskirts of the City of Murfreesboro. Historically, this park is the location of the first major battle in the Union's effort to divide the Confederacy by mounting an eastward moving campaign through the South to the Atlantic Ocean. The battle fought here between December 31, 1862 and January 2, 1863 ranged over 4,000 acres, of which 10 to 12 percent is preserved within the current Stones River National Battlefield. Many battlefield accounts of the difficult terrain exist, especially of the cedar thickets, cedar brakes, and rock ledges and outcroppings that presented major obstacles to the movement of troops and equipment. Cedar glades, another component of the battlefield terrain, are also mentioned in battlefield records.

In addition to its' historical significance, Stones River National Battlefield is also ecologically important. Stones River is one of the top twenty-six calcareous glades in Tennessee and one of the top 40 glades in the Southeast. Calcareous glades of the Southeastern United States contribute to the biodiversity of the region through their unique habitat and the species that colonize that habitat. In Tennessee, the Division of Natural Heritage has found that 10 percent of the listed rare plants are found in limestone glades. A glade is identified as an open area of relatively shallow, often rocky soil surrounded by cedar woods. Some examples of rare taxa that inhabit Stones River glades are: *Echinacea tennesseensis*, Tennessee coneflower, and *Talinum calcaricum*, limestone fameflower

In 1995, the Natural Resources Staff at Stones River conducted a vascular plant inventory of the calcareous glades of the battlefield. This inventory established a vegetative baseline for monitoring vegetative changes within the Stones River glades. The data also provided information about the direction of change for major glade indicators with the increase in woody, that is, cedar cover. Population trends for major glade indicator species have declined with increasing cedar cover. Thus, the Stones River National Battlefield opted to enter into an agreement with the USDA-NRCS Plant Materials Center in Alderson, WV to produce seed and/or seedlings of some 20 species of glade indicator plants in order to preserve and/or improve cedar glade floristic authenticity. Plants are produced by the Plant Materials Center from Stones River ecotype seeds and used to establish seed production fields within the park. Seed harvested from these fields will then be used to enhance floristic authenticity within the Park's calcareous glades.

ACCOMPLISHMENTS –

Fiscal year 2007 marked the fifth and scheduled final year of this agreement. During 2007, PMC personnel continued to harvest and condition seeds from native species of interest to the Stones River Natural Resource Staff and produce seedlings for establishment of seed production fields at the battlefield park. Approximately 10,500 seedlings were produced at the PMC and delivered to Stones River for transplanting into their seed production fields. Seedlings produced and delivered to the park during 2007 included: *Panicum anceps,* flat-stemmed panic grass; *Eragrostis spectabilis,* purple lovegrass; and *Chasmanthium latifolium,* river oats.

In fiscal year 2007, the PMC also conditioned seed that had been produced and harvested from seed production fields established at the park. The PMC returned 3.8 pounds of clean *Andropogon ternarius,* splitbeard bluestem seed; 22 pounds of *Schizachyrium scoparium,* little bluestem seed; and a small quantity of *Chasmanthium latifolium,* river oats seed to the Natural Resources Staff at Stones River National Battlefield.

NATIONAL PARK SERVICE
WETLAND ESTABLISHMENT RESEARCH STUDY

FY2007 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION - In 2003 the Aberdeen Plant Materials Center entered into an agreement with the National Park Service to evaluate the efficacy of different methods of direct seeding wetland plant species. Currently, wetland restoration is best accomplished using greenhouse grown or wildland collected plugs. An effective means of direct seeding is highly desirable for ease in planting and potential cost savings.

ACCOMPLISHMENTS - This project was designed in incremental steps for ease of evaluation and development of seeding rates. The first experiment (trial 1) was conducted in the PMC greenhouse during the summer of 2006. Trial 1 compared seedling establishment from four hydroseed mulches and four dry, inert carriers. The second trial occurred in 2007 with the most promising treatments from trial 1 and compare each treatment with Submerseed™ pellets, a promising treatment from an earlier trial (Tilley and Hoag 2006), in a controlled outdoor seeding in 4' X 8' tanks. These studies are the precursors to field testing the best methods of direct seeding into the PMC wetland ponds. Due to volunteer wetland seed contamination, the ponds were chemically treated in 2006 and 2007 to ensure a clean, weed-free seed bed for use in seeding evaluations that will take place in 2008.

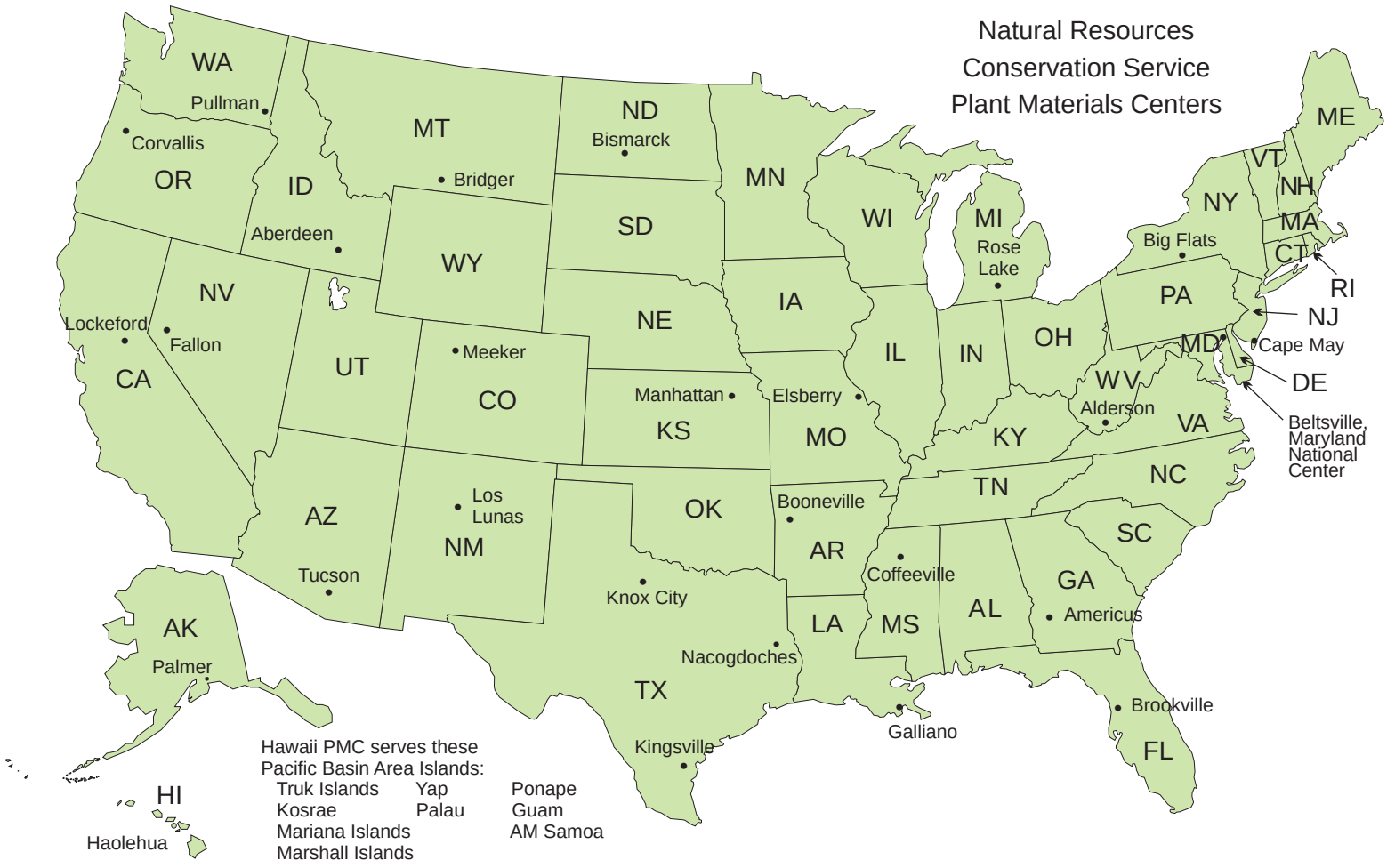
TECHNOLOGY DEVELOPMENT – Four treatments were planted in a replicated trial in five 4' X 8' wetland tanks placed outside at the PMC farm: Fertil Fibers, Broadcast with rice hulls, tackifier alone, and Submerseed pellets. Fertil Fibers had significantly better emergence than tackifier alone and Submerseed at the seeded rate ($p=0.001$). At the adjusted seeding rate of 100 PLS/ft, Fertil Fibers had significantly better establishment than the Submerseed treatment ($p=0.027$).

Table 3. Establishment in 2007 outdoor trial.

	Plants/ft² @ seeded rate	Plants/ft² adjusted for 100 PLS/ft²	2006 GH means adjusted for 100 PLS/ft²
Fertil Fibers	42 a	18 a	60
Broadcast (rice hulls)	25 ab	10 ab	14
Tackifier alone	21 bc	9 ab	41
Submerseed	6 c	6 b	66 (Tilley & Hoag 2006)
Critical value (0.05)	18	10	na

Wetland tank divided into 2X4’ plots for treatments.

Establishment in 2007 outdoor trial.



Plant Materials Centers (PMC)

Palmer, AK	Alaska PMC	HC 04, Box 7440	Palmer, AK 99645	(907) 745-4469
Tucson, AZ	Tuscon PMC	3241 North Romero Road	Tucson, AZ 85705	(520) 292-2999
Booneville, AR	Booneville PMC	6883 S. State Highway 23	Boonville, 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
Hoolehua, HI	Hoolehua PMC	4101 Maunaloa Highway	Hoolehua, HI 96729	(808) 567-6885
Aberdeen, ID	Aberdeen PMC	PO Box 296, 1691A South 2700 West	Aberdeen, ID 83210	(208) 397-4133
Manhattan, KS	Manhattan PMC	3800 S. 20th Street	Manhattan, KS 66502	(785) 539-8761
Galliano, LA	Golden Meadows PMC	438 Airport Road	Galliano, LA 70354	(985) 475-5280
Beltsville, MD	National PMC	Building 509, BARC-East, E. Beaver Dam Road	Beltsville, MD 20705	(301) 504-8175
East Lansing, MI	Rose Lake PMC	7472 Stroll Road	East Lansing, MI 48823	(517) 641-6300
Coffeeville, MS	Jamie L. Whitten PMC	2533 County Road 65	Coffeeville, MS 38922	(662) 675-2588
Elsberry, MO	Elsberry PMC	2803 N. Highway 79	Elsberry, MO 63343	(573) 898-2012
Bridger, MT	Bridger PMC	99 South River Road, Route 2, Box 1189	Bridger, MT 59014	(406) 662-3579
Cape May, NJ	Cape May PMC	1536 Route 9 North	Cape May Court House, NJ 08210	(609) 465-5901
Los Lunas, NM	Los Lunas PMC	1036 Miller Street, SW	Los Lunas, NM 87031	(505) 865-4684
Big Flats, NY	Big Flats PMC	3266A State Route 352	Corning, NY 14830	(607) 562-8404
Bismarck, ND	Bismarck PMC	3308 University Drive	Bismarck, ND 58504	(701) 250-4330
Fallon, NV	Great Basin PMC	2055 Schurz Highway	Fallon, NV 89406	(775) 217-0864
Corvallis, OR	Corvallis PMC	3415 NE Granger Avenue	Corvallis, OR 97330	(541) 757-4812
Nocogdoches, TX	East Texas PMC	6598 Fm2782	Nocogdoces, TX 75962	(936) 564-4873
Kingsville, TX	Kika De La Garza PMC	3409 N. Fm1355	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) 335-7376
Alderson, WV	Alderson PMC	PO Box 390	Alderson, WV 24910	(304) 445-3005

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