

FY 2006 Plant Materials Project Summary Reports



Native Plants For National Parks



FY 2006

Plant Materials Project Summary Reports

from the

Natural Resources Conservation Service

to the

National Park Service

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Compiled By

Russell J. Haas

NRCS Plant Materials Technical Advisor to NPS

and

Linda Leidecker

National Park Service Revegetation Technician

National Park Service, Denver Service Center, Lakewood Colorado

INTRODUCTION

This is the 2006 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 projects. 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 NRCS Plant Materials Centers have prepared two types of reports. (1) Brief One Page Summary (attached) and (2) A comprehensive Annual Technical Report.

The "One Page Summary Report" is sent to parks with current projects, to respective NPS field areas and associated park resource managers and respective NRCS offices. Additional 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 2006 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
2006 PROGRAM SUMMARY

Technical Assistance

- NRCS NTA provided assistance to Landscape Architects, Job Captains and Project Managers at the NPS Denver Service Center relative to revegetation project needs with 3 National Parks in addition to those with interagency agreements.
- On site program technical assistance was provided by NRCS NTA and the NPS 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 3 National Parks.

Development and Administration of Interagency Agreements

- Twelve new agreements and 10 amendments to agreements were developed this year. A total of 27 active interagency agreements were administered and coordinated.
- There were 48 active projects at 29 National Park units in cooperation with 14 Plant Materials Centers.
- 80% of these are FLHP projects; 10% are line item construction projects; 10% meet other park needs such as forest fire restoration, campground rehab, invasive plant control.

Native Seed and Plant Production

- 14 National Parks
- 2,363 PLS pounds of seed
- 34,862 transplants
- 142 park indigenous species (76 grass, 39 forb, 21 shrub and 6 tree)

Native Seed/Plant Deliveries

- 8 National Parks
- 683 PLS pounds of seed
- 41,869 transplants (container and bareroot)
- 185 park indigenous species (48 grass, 87 forb and 47 shrub)

Processing of Park Collected Seed

- 3 National parks
- 560 pounds of seed
- 171 species (32 grass, 101 forb and 37 shrubs, 1 tree)

Preparation of Revegetation Plans

NRCS NTA prepared 4 and assisted Denver Service Center and 7 national parks develop revegetation plans. In total the revegetation program prepared plans for 6 national parks and reviewed 10 park developed plans.

Interagency Program Reviews

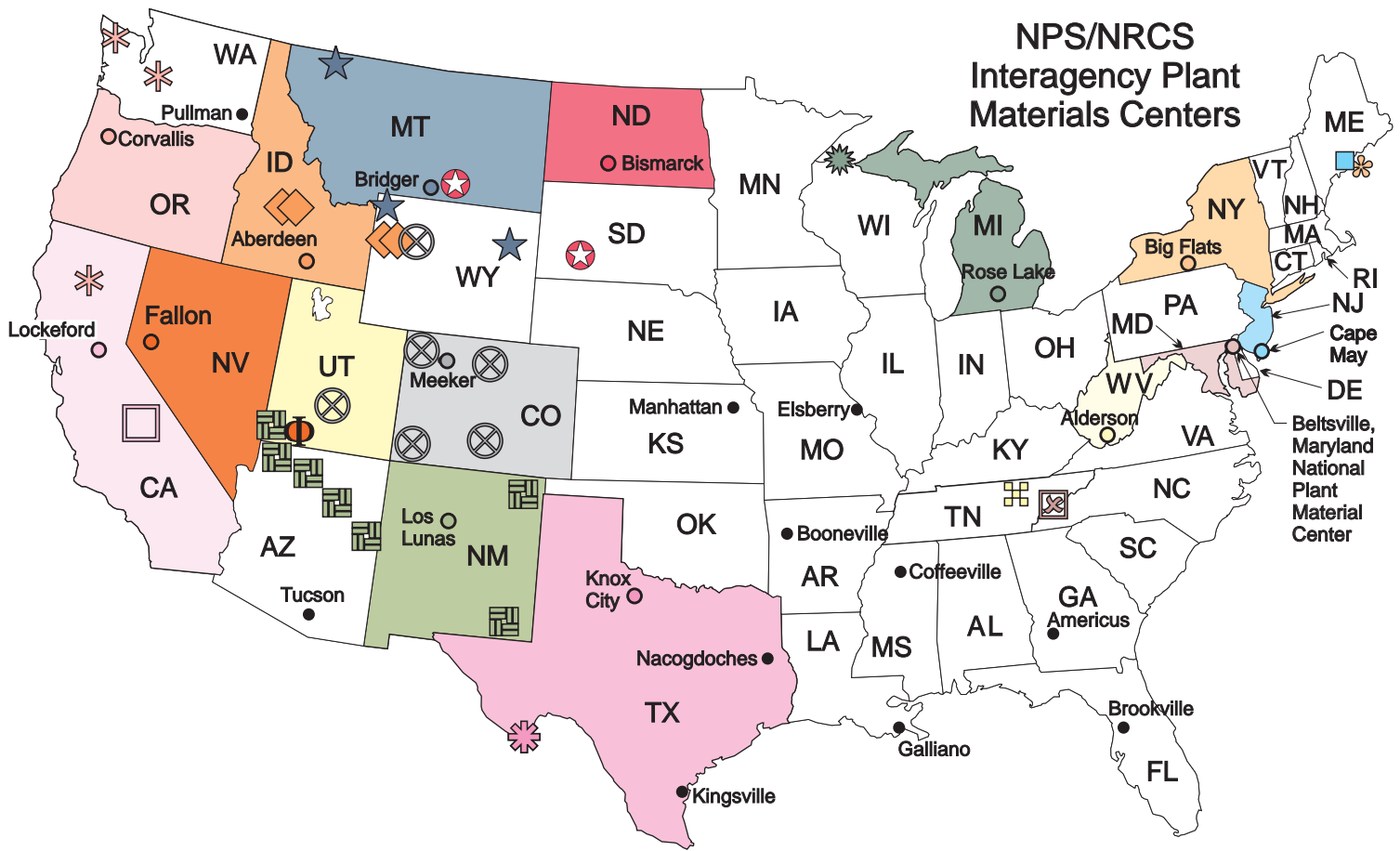
Reviews were held at:





























- National Parks: Bryce Canyon NP, Crater Lake NP, Rocky Mountain NP, Carlsbad Caverns NP, Saguaro NP, Badlands NP, Yosemite NP, Mesa Verde NP, Yellowstone NP
- Plant Materials Centers: Meeker Colorado, Los Lunas New Mexico, Corvallis Oregon, Bridger Montana and Tucson Arizona

Technology Transfer and Research

- NRCS/NPS NTA and program staff coordinated with Denver Service Center Operations Information/Technology staff to continue down load of revegetation program related information to the *Inside NPS* intranet website. Some 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 is planned for early summer 2007.
- NRCS NTA made three formal oral presentations at professional society meetings and NPS workshops.
- Jointly funded and participated in an NPS-NRCS Bridger Plant Materials Center workshop for parks titled “Native Plant Propagation and Nursery Management Workshop: From Project Planning to Monitoring” attended by 28 park staff from 8 parks.
- Defined monitoring protocols to be used with FLHP projects
- NRCS NTA and program staff prepared and distributed to cooperating Parks/PMCs and key NPS and NRCS personnel, the FY2005 Annual Interagency Program Summary Report.

NPS/NRCS Interagency Plant Materials Centers



<u>Plant Materials Center</u>		<u>In cooperation with these National Parks</u>	
Aberdeen, ID			Craters of the Moon NM, Grand Teton NP
Alderson, WV			Stones River NB
Beltsville, MD			Great Smoky Mountains NP
Big Flats, NY			Acadia NP
Bismarck, ND			Little Bighorn Battlefield NM, Wind Cave 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
Los Lunas, NM			Carlsbad Caverns NP, Capulin Volcano NP, Grand Canyon NP, Hubbell Trading Post NHS, 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
Rose Lake, MI			Apostle Islands NL
Fallon, NV			Zion NP

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TABLE OF CONTENTS

<u>Park</u>	<u>NRCS Plant Center</u>	<u>Page No.</u>
Intermountain Region		
Big Bend National Park, TX	Knox City, TX	1
Bryce Canyon National Park, UT	Meeker, CO	3
Capulin Volcano National Park, NM	Los Lunas, NM	5
Carlsbad Caverns National Park, NM	Los Lunas, NM	7
Devils Tower National Monument, WY	Bridger, MT	9
Dinosaur National Monument, CO	Meeker, CO	11
Glacier National Park, MT	Bridger, MT	13
Grand Canyon National Park, AZ	Los Lunas, NM	15
Grand Teton National Park, WY	Aberdeen, ID	17
Grand Teton National Park, WY	Meeker, CO	19
Great Sand Dunes NM & P, CO	Meeker, CO	21
Hubbell Trading Post NHS, AZ	Los Lunas, NM	23
Mesa Verde National Park, CO	Meeker, CO	25
Pipe Spring National Monument, UT	Los Lunas, NM	27
Rocky Mountain National Park, CO	Meeker, CO	29
Wupatki National Monument, AZ	Los Lunas, NM	31
Yellowstone National Park, WY	Bridger, MT	33
Zion National Park, UT	Fallon, NV	35
Zion National Park, UT	Los Lunas, NM	37
Midwest Region		
Apostle Island National Lakeshore, WI	E. Lansing, MI	39
Little Bighorn National Battlefield, MT	Bismarck, ND	41
Northeast Region		
Acadia National Park, ME	Big Flats, NY	43
Acadia National Park, ME	Cape May, NJ	45
Pacific West Region		
Craters of the Moon National Monument, ID	Aberdeen, ID	47
Lassen Volcanic National Park, CA	Corvallis, OR	49
Mount Rainier National Park, WA	Corvallis, OR	51
Olympic National Park, WA (Elwha River)	Corvallis, OR	53
Olympic National Park, WA (Hurricane Ridge)	Corvallis, OR	55

Southeast Region

Great Smoky Mountains National Park, TN	Beltsville, MD	57
Stones River National Battlefield, TN	Alderson, WV	59

Wetland Establishment Research Studies

NPS Service Wide	Aberdeen, ID	61
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Revegetation Training

NPS Service Wide – Revegetation Workshop	Bridger, MT	63
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APPENDIX	Plant Materials Center Map	65
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BIG BEND NATIONAL PARK

2006 Annual Summary Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
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 2001 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 2001 thru 2005.

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 2005, the park had received a total of 2742 bulk pounds of seed totaling 1188 PLS lbs. The park did not receive any plant seeds in 2006.



Seed Production and Available Inventory

Common Name	Area(ac)	2006 Prod./Lbs *	PLS Inventory On Hand
Alkali sacaton	-	-	332.70
Sideoats grama	-	-	104.66
Green sprangletop	-	-	114.0
Cane bluestem	.50	65	38.88
Showy menodora	-	-	118.00
Whiplash pappusgrass	.25	49.5	increase
Chino grama	-	-	13.78
Tobosa	.10	-	increase

* Bulk material wt.

Conclusion:

At the end of FY 2006 seed production fields being maintained and harvested included cane bluestem, tobosagrass, and whiplash pappusgrass. The agreement signed in 2001 addressing post weed control revegetation has been modified to run into 2005.

BRYCE CANYON NATIONAL PARK

FY2006 Annual Summary Report

Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

Introduction: Bryce Canyon National Park and Upper Colorado Environmental Plant Center 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.



Bryce Slender wheatgrass



Bryce Indian ricegrass

Accomplishments: In 2006, two plant deliveries and one seed shipment were made to Bryce Canyon for restoration work in the park. As called for in the agreement, containerized production of 7,000 plugs of three species was initiated in May, and two deliveries were made in order to provide stock that was appropriately rooted for transplanting. Plugs of slender wheatgrass and needle-and-thread were delivered to the park in July, and in September, Indian ricegrass plugs were delivered to Green River, Utah, where Bryce Canyon personnel met UCEPC half way for the second plant shipment. In all, 7950 plugs were delivered. In addition, 343 pounds of seed of nodding brome and slender wheatgrass were shipped to the park in September. Propagation of several species of shrubs is being conducted in the greenhouse for delivery to the park in 2007.

The field of slender wheatgrass produced 267 clean pounds of seed. Seed test results are not available at this time. A third amendment will be needed to continue production of slender wheatgrass in 2007 and beyond. Otherwise, seed production and grass plug production is completed for this agreement as amended.

Technology Development: Indian ricegrass seed that was collected by park personnel in 2005 was used for plug production as was needle and thread seed. However, only 18 of 1000 cells of Indian ricegrass had germinated 21 days after seeding while good germination of needle and thread had occurred. Indian ricegrass has the reputation of having substantial seed dormancy. However, some old Indian ricegrass seed that was produced for Bryce Canyon remained on inventory at UCEPC, and

had reasonably good germination in trials. This seed was used to successfully fill the order. Specific information about germination trials, soil preparation, seeding rates, equipment, seedling establishment methods, or any other seed processing or handling techniques are available upon request.

CAPULIN VOLCANO NATIONAL MONUMENT

Project #: NMPMC-S-0404-RA

2006 Annual Summary Report

Prepared by

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

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

Accomplishments: The LLPMC produced the following seed in 2006 for CVNM:

Common name	Scientific name	Agreement Acreage	2006 LLPMC Acreage	Harvest (Bulk lbs.)
Mountain muhly	<i>Muhlenbergia montana</i>	0.50 acre	0.50 acre	14.06
Blue grama	<i>Bouteloua gracilis</i>	0.50 acre	0.50 acre	13.26
Little bluestem	<i>Schizachyrium scoparium</i>	0.50 acre	0.50 acre	23.80
Western wheatgrass	<i>Pascopyrum smithii</i>	0.50 acre	0.14 acre	N/A
Sideoats grama	<i>Bouteloua curtipendula</i>	0.50 acre	0.00 acre	N/A

Technology Development:

- Mountain muhly–The seed production field looked healthy and vigorous in 2006. Seed was harvested in 2006.
- Blue grama–The blue grama field was harvested in 2006. The planting looked good and will be harvested again in 2007.
- Little bluestem–The production field was harvested in 2006 and the planting is established. The field will be harvested in 2007.
- Western wheatgrass–The western wheatgrass field was removed due to limited funding as discussed with Russ Haas.
- Sideoats grama–The seed collected at the CVNM in 2004 had poor seed fill. As a result, the LLPMC has been unable to establish a seed production field. If sideoats grama is to remain in the agreement, the seed will have to be collected from CVNM in 2007. No seed was harvested in 2006 at CVNM.

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CARLSBAD CAVERNS NATIONAL PARK
Project #: NMPMC-S-0403-RA

2006 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.



Carlsbad Caverns cave entrance area

Accomplishments: The LLPMC established production seed fields using transplants grown from seed collected at CCNP in 2005.

The LLPMC produced the following seed in 2006 for CCNP:

Common name	Scientific name	Agreement Acreage	2006 LLPMC Acreage	Harvest (Bulk lbs.)
Sideoats grama	<i>Bouteloua curtipendula</i>	0.50 acre	0.50 acre	88.66
Blue grama	<i>Bouteloua gracilis</i>	0.50 acre	0.50 acre	84.12
Three-awn	<i>Aristida purpurea</i>	0.50 acre	0.50 acre	11.78
Green sprangletop	<i>Leptochloa dubia</i>	0.50 acre	0.50 acre	62.52
Plains bristlegrass	<i>Setaria vulpiseta</i>	0.50 acre	0.10 acre	2.20

Technology Development:

- Sideoats grama–Transplants were grown in 2006 and were used to expand the LLPMC production field to a full half acre. Seed was harvested from the sideoats in 2006.
- Blue grama–Seed was harvested from the blue grama in 2006.
- Three-awn–Transplants were grown in 2006 and were used to expand the LLPMC production field to a full half acre. Seed was harvested from the three awn field in 2006.
- Green sprangletop–This species has been added to the agreement. Transplants were grown from seed collected at CCNP in 2005 and were used to establish a 0.50 acre production field at the LLPMC. Seed was harvested in 2006.
- Plains bristlegrass– This species has been added to the agreement. Transplants were grown from seed collected at CCNP in 2005 and were used to establish a 0.10 acre production field at the LLPMC. Seed was harvested in 2006 and will be used to expand the production in 2007.

DEVIL'S TOWER NATIONAL MONUMENT

2006 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 Devil's Tower National Monument, Wyoming in 2006 for Fiscal Years 2006 and 2007. The work involves the production and installation of containerized nursery stock of plant materials indigenous to park boundaries. Wildland seed collections were made by park personnel and Russ Haas, NRCS Revegetation Advisor to the National Park Service, at Devil's Tower and forwarded to the Bridger Plant Materials Center for further cleaning and use in April 2006.



Maturing sage containerized plants



Sage seedlings at Bridger
Plant Materials Center

Accomplishments: In 2006, seed lots of fringed sage *Artemisia frigida* and rubber rabbitbrush *Ericameria nauseosa* (formerly *Chrysothamnus nauseosus*) were collected at Devil's Tower National Monument from within Park boundaries and forwarded to the Bridger Plant Materials Center for further processing. Cleaned seed lots were used to sow 40-cubic-inch Deepots[®] on April 17, 2006. Multiple seeds were surface-sown in each container filled with Sunshine Mix #1[®] and then irrigated. All containers of both species were placed directly in a greenhouse maintained at 75⁰ to 80⁰F days and 60⁰ to 65⁰F nights. Seed of both species germinated very well without any dormancy-breaking treatment. All plants were moved outdoors and stored on wooden benches on June 5, 2006. Plants were fertilized periodically with low levels (approximately 100 to 150 ppm) of Plant Starter[®] (9-45-15 and 8-45-14) over the course of the growing season. Rapid growth of both species required pruning in late July 2006. All plants were moved to a coldframe on October 25, 2006.

A total of 480 fringed sage and 138 rubber rabbitbrush are currently being over-wintered in a coldframe maintained between 35⁰ and 45⁰F at the Bridger Plant Materials, Bridger, Montana. Plants are inspected and irrigated as needed while in storage. All surviving plants will be transported to Devil's Tower Monument and installed by BPMC staff sometime in late summer to early fall of 2007 or spring of 2008.

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DINOSAUR NATIONAL MONUMENT

FY2006 Annual Summary Report

Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

Introduction: The 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 (*Pseudoroegneria spicata* ssp. *spicata* - 9070952), alkali sacaton (*Sporobolus airoides* - 9070954), sand dropseed (*Sporobolus cryptanderus*), 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 8 rows of bluebunch wheatgrass, which was done after harvest in 2005.



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

Accomplishments: Dinosaur National Monument personnel did not visit the plant center in 2006. Seed was harvested from all seed fields in 2006 but was not cleaned at the time of writing this report.

Seed Harvested	Harvest Date	Name Seed Fields	Field Size
Alkali sacaton	July 18	Alkali sacaton *	0.18 acre
Basin wildrye	July 24	Basin wildrye	0.24 acre
Bluebunch wheatgrass	July 5	Bluebunch wheatgrass**	0.24 acre
Indian ricegrass	July 3	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

2006 Annual Summary Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
BRIDGER, MONTANA

Introduction: 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.



Glacier Geum macrophyllum

Accomplishments: In 2006, 73 seed lots representing 52 individual species and totaling 13.61 pounds (6.17 kg) were delivered to GNP or used for BPMC production. The 2006 seed distribution included 12 grass lots (2 species), 47 forb lots (39 species), and 14 shrub lots (11 species). In addition, a total of 1,440 container plants representing 2 collections (2 species) were either planted at the BPMC for seed increase or delivered to GNP for restoration activities. No old seed lots were shipped to GNP in 2006 since nearly all GNP seed lots in storage are now 10 years or less in age.

In 2006, 113 wildland collections were sent to the BPMC and cleaned: 18 collections of grasses, sedges, and rushes (15 species); 58 forb collections (38 species); and 37 shrub and tree collections (24 species). A total of 11.01 lbs. (4.99 kg) of clean seed were processed; 4.16 lbs. (1.89 kg) of grass and grass-like, 2.37 lbs. (1.07 kg) of forbs, and 4.47 lbs. (2.03 kg) of trees and shrubs. A total of 36 new species: collection sites were identified and accessioned representing 2 grass or grass-like (2 species), 20 forb (20 species), and 14 woody plant (13 species) lots.

Eleven established seed production fields produced seed in 2006, including *Achillea millefolium* (9063640-Cut Bank); *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); and a combined field of two lots of *Symphyotrichum laeve* (*Aster laevis*) (9081447-Avalanche). The declining *Phleum alpinum* (9054559-Logan Pass) field also produced seed in 2006 but was removed after harvest. Seed production fields produced a total of 59.71 lbs (27.08 kg) of seed in 2006. In addition, 440 supplemental 2-0 seedlings were planted in the *Pseudoroegneria spicata* (9081993-SM/Two Dog Flats) field and 1,000 *Geum macrophyllum* (9087654-Lake McDonald) 1-0 seedlings used to establish a new seed production field of this species. The *Geum macrophyllum* field also produced a small amount of seed in 2006.

Seed germination tests are currently being conducted on seven accessions (six species) grown at the BPMC in 2006 including *Achillea millefolium* (9063640-Cut Bank), *Achnatherum nelsonii* (9081995-Saint Mary), *Carex athrostachya* (9078591-Lake McDonald), *Carex pachystachya* (9078645-Avalanche), *Carex athrostachya* (9081443-Avalanche), *Festuca idahoensis* (9075848-Saint Mary), and *Symphyotrichum laeve* (*Aster laevis*) (9081447-Avalanche). Results will be presented in the Glacier National Park 2006 Annual Technical Report.

Twenty-one *Mahonia repens* (9054489-LM/Apgar) remain in cold storage as of January 1, 2007.

Technology Development: Preliminary germination trials were established for production of beargrass *Xerophyllum tenax* and plant samples sent to Montana State University for analysis in late 2006. A presentation titled, "Effects of Erosion Control Blanket on the Germination of Six Native Species" was given on June 8, 2006 at the 2006 Billings Land Reclamation Symposium in Billings, Montana, and the abstract published in the symposium proceedings. A training workshop titled "Native Plant Propagation and Nursery Management Workshop: From Project Planning to Monitoring" was sponsored by NRCS, the National Park Service, and the Soil and Water Conservation Districts of Montana, Inc., and held at the BPMC from June 12-15, 2006.

GRAND CANYON NATIONAL PARK
Project #'s: NMPMC-S-0003-RA, NMPMC-S-0004-WO, NMPMC-S-0403-WO

2006 Annual Summary Report
Prepared by

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

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



Accomplishments: In 2006, the LLPMC grew transplants to establish seed production fields.

The LLPMC produced the following seed in 2006 for the GCNP:

Common Name	<i>Scientific Name</i>	Agreement Acreage	2006 LLPMC Acreage	Harvest (PLS lbs.)
Blue Grama	<i>Bouteloua gracilis</i>	0.50	0.54	35.46
Muttongrass	<i>Poa fendleriana</i>	1.00	2.40	N/A
Bottlebrush squirreltail	<i>Elymus elymoides</i>	0.50	0.48	N/A

Transplant Production

No transplants were distributed to GCNP in 2006.

Technology Development:

- Blue grama – This production field was harvested in 2006. Seed harvest was up substantially from 2005. The field continues to receive high rates of fertilizer and water to evaluate the effect on seed production. Transplants were grown in 2006 and were used to establish a new 0.50 acre production field at the LLPMC
- Muttongrass – No seed was harvested in 2006 from the muttongrass fields. Prior to harvest the LLPMC experienced several days of high winds, which caused shattering of the mature muttongrass seedheads. Seed will be harvested in 2007. Transplants were grown in 2006 and were used to establish a new 1.0 acre production field at the LLPMC.
- Bottlebrush squirreltail – Transplants were grown by the LLPMC from seed collected at GCNP in 2005 and was used to establish a 0.48 acre production field.

GRAND TETON NATIONAL PARK

FY2006 Annual 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 will be harvested in 2007 and 2008.

Accomplishments: GTNP personnel delivered processed seed to the PMC on February 7, 2006 as listed below:

Species	Scientific Name	Bulk Weight (lbs)	Acreage Seeded
Slender wheatgrass	<i>Elymus trachycaulis</i>	5.6	1.0
Blue wildrye	<i>Elymus glaucus</i>	14.6	2.7
Mountain brome	<i>Bromus marginatus</i>	7.0	1.0
Sandberg bluegrass	<i>Poa secunda</i>	0.8	0.25

PMC personnel inspected each seed lot for purity and estimated germination for each of the species. Based on inspection and germination, mountain brome and Sandberg bluegrass seed was processed further to improve germination and purity. 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 establishment is spotty.

Seed harvest will begin from these fields in 2007.



**Grand Teton National
Park Seed Increase.
Blue wildrye. Aberdeen
Plant Materials Center,
September 6, 2006.**



**Grand Teton National
Park Seed Increase.
Mountain brome.
Aberdeen Plant
Materials Center,
September 6, 2006.**



**Grand Teton National
Park Seed Increase.
Slender wheatgrass.
Aberdeen Plant
Materials Center,
September 6, 2006.**



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

GRAND TETON NATIONAL PARK

2006 Annual Summary Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
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.

Accomplishments: From conversations with Kelly McCloskey, ecologist for Grand Teton National Park, it was determined that UCEPC would produce slender wheatgrass in 2006 to make up for the bluebunch wheatgrass that was not harvested. A new one-acre field was planted on August 23, 2005. This field produced 21 clean pounds of seed in its first production year in 2006.

One seed shipment was made to Grand Teton National Park on September 20, 2006 that included grass seed that was previously produced by UCEPC and one species that was collected by Grand Teton personnel and cleaned by UCEPC for park uses.

Technology Development: Any specific seed cleaning, testing, or planting methods are available upon request.



Grand Teton slender wheatgrass

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**GREAT SAND DUNES
NATIONAL MONUMENT AND PRESERVE**

**FY2006 Annual Summary Report
Prepared by**

NATURAL RESOURCES CONSERVATION SERVICE
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

Accomplishments: As per agreement, half an acre of Indian ricegrass was planted on July 27, 2004. In addition, half an 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 (see attached pictures).

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. In addition, 25 straw bales of 'San Luis' slender wheatgrass were delivered, along with the seed for use in the revegetation project.

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).

Technology Developments: Standard planting, harvest, and cleaning protocols were utilized to handle the Indian ricegrass, blue grama and ring muhly.



Blue grama & ring muhly on September 25, 2005



Blue grama & ring muhly on April 12, 2006



Blue grama & ring muhly on August/September, 2006

Photos courtesy of Manuel Rosales

HUBBELL TRADING POST NATIONAL HISTORIC SITE

Project #: NMPMC-0201-RA

2006 Annual Summary Report

Prepared by

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

Introduction: On August 13, 2004 an agreement was made between Hubbell Trading Post National Historic Site (HTPNHS) 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 plants and cuttings of agreed upon native species for HTPNHS.

Accomplishments:

Transplant production

In 2006, the LLPMC provided the HTPNHS with 120, one-gallon transplants consisting of 10 stretchberry, 10 chokecherry, 7 banana yucca, 10 plains false willow, 10 New Mexico locust, 5 squawthorn, 20 *Quercus pauciloba*, 10 sacahuista, 10 silver buffaloberry and 10 redosier dogwood.

Technology Development

This agreement has expired.

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MESA VERDE NATIONAL PARK

FY2006 Annual Summary Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
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 4380 plants are to be produced for Mesa Verde National Park in order to complete these contracts.

Accomplishments: The table below identifies the targeted numbers of container grown materials ordered by the park. It lists the quantities delivered to MVNP in 2005, delivery in 2006 and quantities picked up by the park personnel. Additional materials, in various stages of production, consist of 204 containerized shrubs in the greenhouse. Also seven roses, which are field planted. These plants will be ready for delivery in 2007.

On Aug 15, 2006, a shipment of four bags containing six species of Mesa Verde seed, were weighed, blended, sacked, and sent to the park. Some seed lots were sent in their entirety. This seed was field produced by UCEPC in previous agreements.



Mesa Verde Douglas fir



Mesa Verde Mountain mahogany

Common Name	Targeted Quantity	Quantity Del. '05	Quantity Del. '06	Quantity P/U '06	Total To MVNP
Bitterbrush	40				
Chokecherry	250	266			266
Douglas-fir	100				
Fendlerbush	150		226	258	484
Fourwing saltbush	100	35	258		293
Gambel oak	875	1130			1130
Mountain mahogany	260	237			237
Mountain snowberry	880	285	25		310
Penstemon			7		7
Pinyon pine	35		49		49
Rabbitbrush	160			310	310
Rocky MT. Juniper	20			21	21
Squaw apple	135			80	80
Utah juniper	35		13		13
Utah serviceberry	875	477	51		528
Woods' rose	320	133			133
Yucca	185		58	231	289
Totals	4420	2563	687	900	4150

Technology Development: Available nursery protocols were used to germinate and grow all plant materials.

PIPE SPRING NATIONAL MONUMENT
Project #: NMPMC-S-0402-WO

2006 Annual Summary Report
Prepared by

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

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



Accomplishments: Seed production fields were established in 2006 using transplants grown at the LLPMC.

The LLPMC produced the following seed in 2006 for PSNM.

Common name	Scientific name	Agreement Acreage	2006 LLPMC Acreage	Harvest (Bulk lbs.)
Galleta	<i>Pleuraphis jamesii</i>	0.50	0.58	2.04
Indian ricegrass	<i>Acnatherum hymenoides</i>	0.50	0.42	40.96
Bottlebrush squirreltail	<i>Elymus elymoides</i>	0.50	0.22	N/A



Technology Development:

- Galleta–Seed was harvested in 2006. Transplants were grown in 2006 and were used to establish a 0.50 acre production field at the LLPMC.
- Indian ricegrass–Seed was harvested in 2006. The direct seeding completed in late 2005 was not successful.
- Bottlebrush squirreltail– This species was added to the agreement in 2005. Seed was harvested in 2006.

ROCKY MOUNTAIN NATIONAL PARK

FY2006 Annual Summary Report

Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
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 2008. This agreement, as amended, involves seed production of four forbs and four grass species for revegetation of the Bear Lake Road Project.

Accomplishments: This year, each of the eight materials was harvested for use in the revegetation of the Bear Lake Road construction project. Three forbs, hairy golden aster, purple locoweed, and fringed sage all produced at or near their productive potential based on three years of production. A fourth forb, golden spreading bean, did not produce seed. There were three nights of freezing temperatures recorded from May 29-May 31. We believe this dramatically affected seed formation and set as the plants were just blooming at the time. The four grasses have produced little seed, with blue grama producing a little more than 11 PLS pounds this year. Small quantities of seed were harvested from mountain muhly, needle-and-thread, and in its first production year, prairie Junegrass.



Blue Grama



Mountain Muhly

On April 25, staff from UCEPC, Rocky Mountain National Park and National Park Service, Denver Service Center, met at the Visitor Center in Estes Park to discuss the project. A review of accomplishments, field status and future revegetation needs were identified, and it was concluded that a visit by park personnel to UCEPC would be beneficial to determine the status of the fields and future production needs.

On July 24, Rocky Mountain National Park personnel visited UCEPC to inspect the production fields and to pick up some seed that had been produced under a previous agreement and some that had been collected in the park for use on various park projects. UCEPC also provided three production years of oatgrass, two years of sulphur buckwheat and one year's production of Rydberg's penstemon to the park free gratis. After the meeting in April and the visit to UCEPC, the amendment to the agreement was initiated and signed.



Oytropis



Fringed Sage

Because of the necessity to use the harvested seed for revegetation in the fall of 2006, Rocky Mountain National Park requested that UCEPC clean all the harvested products and have them tested via the tetrazolium method in order to expedite the delivery of the seed to the park for planting. The seed was cleaned, tested and delivered to Rocky Mountain National Park staff in person on September 15, 2006.

TECHNOLOGY DEVELOPMENTS - As agreed to in correspondence with Russ Haas, one half of the golden banner field was sprayed with a mix of Buctril, Select and Pursuit herbicide for broadleaf and weedy grass control of an established legume. The herbicide application did not look like it had adverse effects on plant vigor or survival, but because of the freezing temperatures of late May, no seed was produced on the treated or the untreated portion of the field. Further trials will be necessary to assess effectiveness of herbicide use on this native legume.

**WUPATKI NATIONAL MONUMENT
Project #: NMPMC-S-0601-CR**

**2006 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.



Seed production fields were established in 2006 using transplants grown by the LLPMC.

The LLPMC produced the following seed in 2006 for WNM.

Common name	Scientific name	Agreement Acreage	2006 LLPMC Acreage	Harvest (Bulk lbs.)
Bottlebrush squirreltail	<i>Elymus elymoides</i>	1.00	N/A	N/A
Galleta	<i>Pleuraphis jamesii</i>	2.0	.32	N/A
Needle and thread	<i>Hesperostipa comata</i>	1.0	.24	N/A

Technology Development:

- Bottlebrush squirreltail–Transplants were grown from seed collected at WNM in 2005. Unfortunately the seed collected at WNM was not bottlebrush and as a result, the production field was removed. Bottlebrush seed will have to be collected again in 2007 at WNM.
- Galleta–Transplants were grown from seed collected at WNM in 2005 and were used to establish a 0.32 acre production field at the LLPMC. Seed from this field will be used to expand the planting to a full acre in 2007.
- Needle and thread–Transplants were grown from seed collected at WNM in 2005 and were used to establish a 0.24 acre production field at the LLPMC. Seed from this field will be used to expand the planting in 2007.

YELLOWSTONE NATIONAL PARK

2006 Summary Report prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER,
BRIDGER, MONTANA

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

In 2006, 8 allocations of 89 seed lots from 42 species were distributed to YNP, YNP-contracted growers, or to the PMC totaling 414 pounds (188 kg). This included 48 grass lots (13 species) weighing 390 pounds (177 kg); 38 forb lots (26 species) weighing 7.5 pounds (3.4 kg); and 3 woody lots (3 species) weighing 16 pounds (7.3 kg). This includes the distribution of 5 grass lots (5 species) to the PMC for planting seed increase fields.



Yellowstone needle and thread

Accomplishments: Yellowstone National Park has identified future road projects allowing collection and production efforts to begin at least 3 years in advance of each project.

Wildland seed collections are made by Yellowstone National Park crews, dried, and either delivered to the Bridger PMC, or picked up by PMC personnel. In 2006, 58 collections were made from 38

species: 17 grasses (12 species) at 9.6 pounds (4.4 kg); 40 forbs (25 species) at 7.4 pounds (3.3 kg); and 1 tree at 0.2 pound (0.09 kg). The wildland seed collections totaled 17 pounds (7.8 kg).

Records are maintained by the PMC of person-hours to collect each seed lot, from which the approximate cost of collecting native seed can be estimated. In 2006, YNP personnel spent more than 137 person hours in the activity of seed collection on 12 different sites. There were 38 hours (approximately 2.2 hours per collection) dedicated to collecting grass seed on 7 sites, 97 hours (approximately 2.4 hours per collection) for forbs on 12 sites, and 2 hours at 1 site for a tree species.

There were 5 grass increase blocks planted on 1.6 acres (.58 ha) in 2006. Seed increase blocks of 9 grasses on 1.54 acres (.62 ha), and a forb on 0.18 acre (0.07 ha), were removed due to natural decline in production or poor establishment. Currently there are 3.8 acres planted with 16 accessions of 10 grass species and 0.03 acres (.01 ha) of 1 forb species in seed increase blocks at the Bridger PMC.

During the past growing season, 19 grass accessions (10 species) and 2 forb species were harvested on 3.5 acres (1.4 ha), producing 505 pounds (229 kg) of clean seed. Grass seed production averaged approximately 147 lb ac⁻¹ (165 kg ha⁻¹).

Purity analysis and tetrazolium viability tests were conducted on PMC seed increase production for 15 grass accessions. All samples were cleaned to exceed purity standards set forth for foundation seed class as established by the Association of Official Seed Certifying Agencies. The percentage viability ranged from 89 to 99 and averaged 94.

The wildland collection and seed increase inventory contains 599 lots (103 species) totaling 1,964 pounds (891 kg). This is comprised of 309 grass lots (35 species) at 1,906 pounds (865 kg), 284 forb lots (63 species) at 57 pounds (26 kg), and 6 woody lots (5 species) weighing 1 pound (0.5 kg).

Technology Development: All plant material collections are assigned accession numbers and inventoried in a database. The lot identification numbers have been upgraded to include identification by individual construction projects. Detailed field instructions were completed for the vegetation monitoring protocols developed in 2004. An abstract and digital summary, *The Taming of Yellowstone's Native Plants*, was presented at the 10th Billings Land Reclamation Symposium.

ZION NATIONAL PARK

FY2006 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. It is anticipated that the full amount of seed will be delivered to Zion National Park by the end of 2008.



Planting bottlebrush squirreltail (Harry Buck operating the tractor)

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. On Oct. 25, 2006, the fields were flood-irrigated. By November 14, 2006, many of the seeds had germinated. As of January 23, 2007, many of the grasses are at the 2-3 leaf stage and appear to be doing well.

Technology Developments: 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
Project #: NMPMC-S-0301-WO

2006 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.



Accomplishments: Seed production fields were expanded in 2006 using transplants grown by the LLPMC.



Zion bluestem at Los Lunas PMC 2003



Zion bluestem at Los Lunas PMC 2005

The LLPMC produced the following seed in 2006 for ZNP.

Common name	Scientific name	Agreement Acreage	2006 LLPMC Acreage	Harvest (Bulk lbs.)
Sand bluestem	<i>Andropogon hallii</i>	0.50	0.50	9.80
Cane bluestem	<i>Bothriochloa barbinoides</i>	0.50	0.50	N/A
Bottlebrush squirreltail	<i>Elymus elymoides</i>	0.50	0.50	28.72
Galleta	<i>Pleuraphis jamesii</i>	0.33	0.50	1.76
Muttongrass	<i>Poa fendleriana</i>	0.50	0.50	1.84
Indian ricegrass	<i>Acnatherum hymenoides</i>	0.50	0.42	53.10

Technology Development:

- Sand bluestem–Seed was harvested in 2006.
- Cane bluestem–Seed was harvested in 2006.
- Bottlebrush squirreltail–The seed harvested in 2005 at the LLPMC was used to grow transplants to continue the expansion of the LLPMC production field to a full half acre.
- Galleta– Seed was harvested in 2006. Transplants grown at the LLPMC in 2006 were used to expand the production field to a full half acre.
- Muttongrass –Only a small amount of seed was harvested from the production field in 2006. The LLPMC experienced several days of high winds just as the muttongrass seed was maturing causing most of the seed to be shattered from the plants.
- Indian ricegrass–Seed was harvested in 2006. The 2005 direct seeding had a fair germination and should produce seed in 2007. No seeding is scheduled for 2006.

APOSTLE ISLAND NATIONAL LAKESHORE

2006 Annual Summary Report

Prepared by

NATURAL RESOURCES CONSERVATION SERVICE

ROSELAKE PLANT MATERIALS CENTER

EAST LANSING, MICHIGAN

Introduction: The Apostle National Park is comprised of Raspberry Island, Outer Island, and others in Lake Superior near Bayfield, Wisconsin. Several of these islands have historic lighthouses that once guided mariners through the rough waters of Lake Superior. Continuous erosion of steep slopes has jeopardized these historic facilities. This project was initiated in 2000 to produce native plant stock for stabilizing slopes, preventing erosion, preserving native plant resources, and revegetation at Apostle Islands National Park.

The Park Service entered into several reimbursable agreements with NRCS and the Rose Lake PMC to provide technical assistance and to assist with collecting and growing plants. Under a Memorandum of Agreement grass, forb, and shrub species were selected for propagation based on the material's availability, viability, and site adaptability for the intended use.

Accomplishments: Following is a list of species propagated and number of plants delivered to Apostle Island National Park in 2006:

Species Propagated	Number of plants
American Beachgrass	237
Arborvitae	49
Beach Wormwood	19
Canada Goldenrod	697
Canada Wildrye	23
Dwarf Scouring Rush	89
Evening Primrose	194
Field Stagwort	498
Fireweed	203
Grayleaf Red Raspberry	60
Hairgrass	186
Prickly Rose	35
Red Elderberry	2181
Redtop	238
Smooth Rose	10
Wavy Hairgrass	340
Western Pearly Everlasting	277

Technology Development: The NRCS Great Lakes Region Plant Materials Specialist has provided training to the Apostle Island National Park employees on several soil bioengineering slope

stabilization techniques including guidance on the installation of vegetative crib walls and slope grids for Outer Island. Park staff constructed several vegetative crib walls on Outer and Raspberry Islands.

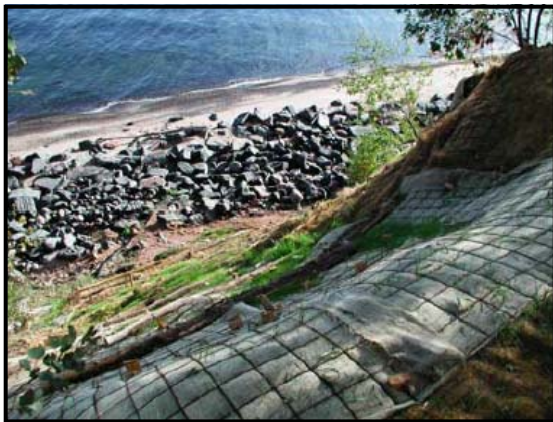
Outer Island slope stabilization project:



Untreated slope



Vegetative crib wall and slope grid installed



Stabilized slope with vegetative crib wall and slope grid



Fully stabilized and vegetated slope

LITTLE BIGHORN NATIONAL BATTLEFIELD

2006 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 revegetation 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 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 four species of grasses collected by personnel at LIBI. The seed produced will be distributed back to the park. Following is a table of the species and seed amounts requested.

Species	Common Name	PLS pounds
<i>Nassella viridula</i>	Green needlegrass	100
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	100
<i>Bouteloua curtipedula</i>	Sideoats grama	50
<i>Bouteloua gracilis</i>	Blue grama	10

Accomplishments:

2005

- Seed of targeted species was collected by park personnel
- Collected seed was cleaned by the Bismarck PMC
- Seed samples of cleaned seed were tested by NDSU Seed Testing Laboratory
- 1/2 acre field of green needlegrass was planted as a dormant seeding on 11/23/2005 at the PMC

2006

- 1/2 acre field of bluebunch wheatgrass was seeded at the PMC
- 1/2 acre field of sideoats grama was seeded at the PMC
- 6' X 180' plot of blue grama was seeded at the PMC
- small hand harvest of blue grama
- small hand harvest of sideoats grama
- small number of seedlings were propagated in greenhouse and used to fill openings in fields

Technology Transfer:



Dormant seeding of green needlegrass into clean black field, followed by a winter with no snow cover, produced a poor field stand.

-Atrazine effectively controlled weeds in sideoats grama



ACADIA NATIONAL PARK

2006 Annual Summary Report Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
BIG FLATS, NEW YORK

Introduction: The USDA, Natural Resources Conservation Service, Big Flats Plant Materials Center, entered into an interagency agreement with the USDI, National Park Service, Acadia National Park: IA Project No. 4500-06-001 (Cadillac Mountain Summit Trail). The Natural Resources Conservation Service agreed to:

- 1) Collect seed and plant materials of selected species within Acadia National Park boundaries.
- 2) Use these seeds and plant materials to establish isolated seed increase fields of grasses and forbs, to produce plugs and transplants of grasses, forbs, trees and shrubs.
- 3) Make available seed, plugs and transplants to Acadia National Park for re-vegetation of the Cadillac Mountain Summit Trail in 2006.

The park will use the plant materials for trail re-vegetation after completion of the summit trail on Cadillac Mountain, and seeding/planting areas disturbed during the reconstruction project in the park. The PMC activities have focused on seed and plant collections in the Acadia National Park, seed production, processing and conditioning, seed/plant propagation of plugs and transplants at the plant materials center, maintaining seed increase fields, propagating materials vegetatively and delivering the plant materials back to the Park.

Accomplishments: Deliveries were made on June 21, 2006. This included 3,055 plugs of grasses (red fescue, hairgrass, poverty oatgrass); 2,825 plugs of forbs (large leaf aster, white flattop aster, New York Aster, rough stemmed goldenrod, Canada goldenrod); one gallon potted plants of balsam fir (54), white spruce (39), fly honeysuckle (4), and arrowwood viburnum (6); and 104.7 lbs. of red fescue seed.

Seed increase fields of red fescue grew fairly well this year, with wetter than normal weather conditions. For forb production, in 2001 we established the new seed production blocks, using weed fabric that has worked well in controlling weeds. Seed of goldenrods (Canada and rough stemmed) and asters (large leaf and white flat-topped) were harvested in 2006, using both combine and hand harvest methods. The desired weed control from the weed fabric is still being attained. The weed fabric is still structurally strong after six years of use. The small, light seed is still challenging to harvest and clean. A brush seed cleaning machine has assisted us in seed cleaning by being able to remove the awns from the fluffy seeds. All seed in 2006 is being tested at the Kansas Seed Improvement Cooperative Lab in Manhattan, KS. We found that deer like NY Aster, eating the entire production area down again this year, to a one foot height.

At Acadia, plant material was planted in September on Cadillac Mountain along the summit trail after the construction work was completed. Areas were covered first with topsoil and wood chips in late summer with the park staff and summer crew, followed by planting/seeding of grasses, forbs and shrubs. Also this summer, plant materials were utilized to revegetate disturbed areas in the park. Roped off areas, three-legged wooden fence barriers and the posting of re-vegetation signs has helped keep visitors out of the plantings, giving the plants a chance to grow. All plantings were

mulched and watered with excellent survival of the plantings. The plantings done in the past 2 to 3 years at the Carriage Road Bridges and the Seawall Campground are growing well and revegetating the disturbed areas. The extra attention given to these plantings by the dedicated park staff has definitely affected the success of these plantings.

Technology Development/ Transfer: The poster “Native Plants for National Parks” was presented at the Society of American Foresters Annual Conference in Pittsburgh, PA on October 26-28, 2006 that had 1430 participants and at the 5th Eastern Native Grass Symposium in Harrisburg, PA on October 11-13, 2006 that had 266 participants. After using weed fabric for our seed production blocks of forbs for several years it was still working very well for weed control, and allows for easier seed harvesting, either by hand or combine. Many of the plantings in the park area are growing well, especially where wood mulch was applied to assist in retaining moisture in the soil. With so many park visitors, revegetation signs have minimized the trampling of plants as well as educate the public on how the park service is restoring disturbed areas with native plants. This was the final year of the agreement.



Trail construction on Cadillac Mountain



Educational sign by the trail on Cadillac Mountain



Protecting the fragile environment on Cadillac



Stabilizing a steep trail path

ACADIA NATIONAL PARK

2006 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, 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 vegetatively and delivering the plant material back to the Park.



Accomplishments: Seed was collected September through November (pasture rose, arrowwood, viburnum, white birch, wild raisin, mountain holly, winterberry, maple leaf viburnum, bayberry, Mountain ash, hawthorn), in mid-September (bayberry, arrowwood viburnum, sheep laurel, fly honeysuckle, pasture rose, wild raisin, mountain holly, hobblebush and maple leaf viburnum), and early November (winterberry, meadowsweet, pasture rose, downy goldenrod, sweet gale, grass-leaved goldenrod, while flat-topped aster and staghorn sumac). No vegetative materials were collected at this time.

During the first week of October 2005 seed of trees and shrubs were stratified by directly seeding propagation trays, placing them into black plastic bags, placing these into large Rubbermaid storage bins and then placed the bins into the seed cooler. After a 60 day stratification materials were transferred to the greenhouse. In late spring seedlings were potted into 4" square quart size pots and placed in a shaded nursery holding area. Young plants from the previous years planting activities were re-potted into 1 gallon containers. Species included winterberry, white birch, pasture rose, bayberry, spruce, meadowsweet and white pine.

Four deliveries of plant materials were made during the summer of 2006 bringing the contract delivery totals to 9,506 plants. The remaining 7,000 plants will be transferred with at least 6 shipments during the spring and summer season of 2007.

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

CRATERS OF THE MOON NATIONAL MONUMENT

2006 Annual Summary Report

Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

Introduction: In 2004 the Aberdeen Plant Materials Center (PMC) entered into an agreement with Craters of the Moon National Monument (CNM) to produce seed and plants of thirteen native plant species for use in revegetation of disturbed areas following construction.

Accomplishments: In the fall of 2005 the PMC began propagation of limber pine and antelope bitterbrush in 40 cubic inch conetainers in the greenhouse. In late November, the PMC was notified that construction work and revegetation projects were delayed indefinitely. The PMC maintained the seedlings through September 2006. On September 11, the PMC delivered approximately 200 antelope bitterbrush and 120 limber pine seedlings to CNM for transplanting.



Limber pine seedling

Transplanted species and destinations within Craters of the Moon National Monument						
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Species	Destination	#	Species	Destination	#	TOTAL
Limber pine	Highway row	53	Antelope Bitterbrush	Waterline	130	
	Boneyard	34		Parking lot islands	33	
	cg vault	4		Visitor Center	6	
	Resources office	6		Campground by fee booth	14	
	Other	17				
Total		114			183	297

Due to the mild and dry fall, planting was postponed until October. Despite the application of "liquid fence" repellent the seedlings were damaged by wildlife browsing and also experienced some desiccation during the delay in planting. Survival of the transplants will be determined in spring 2007.

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LASSEN VOLCANIC NATIONAL PARK
Kings Creek Revegetation Project

2006 Annual Summary Report
Prepared by Amy Bartow

NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON

Introduction: The Corvallis Plant Materials Center (PMC) entered into a new agreement with Lassen Volcanic National Park in 2006 to provide native plant materials for revegetation 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 is should be completed in 2008.



Figure 1. Lassen Peak, Lassen Volcanic National Park, October 13, 2006.

Accomplishments: PMC staff traveled to the Park on October 12, 2006 to collect manzanita cuttings and seed of any species on the collection lists that were ripe. Over 500 cuttings were collected as well as a small amount of seed of tufted hairgrass and satin lupine. PMC staff traveled to the park again to collect manzanita cuttings on October 26, 2006. Approximately 2000 cuttings were taken from about 7000 ft elevation, just ahead of snowfall. Target material was mature, 1-year-old (current season's growth) cuttings of good vigor and caliper. Cuttings were packed into moist vermiculite in polyethylene bags packed in ice and shipped to the PMC at Corvallis. These were then stored in a walk-in cooler at 38 F for 12 weeks. They will be propagated in the spring of 2007.



Figure 2. A very nice *Arctostaphylos nevadensis* cutting.

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.* will undergo two stratification treatments: 45 days and 90 days. *Carex sp.* will be removed at 90 days and 120 days. The grass and legume will be removed after two weeks and four weeks. Results will be included in the 2007 annual report.

MOUNT RAINIER NATIONAL PARK
State Road 123 Revegetation Project

2006 Annual Summary Report
Prepared by Amy Bartow

NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON



Figure 1. Mount Rainer from Paradise, Mount Rainier National Park.

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 2006.

Accomplishments: In 2006, three grass seed increase fields were maintained and harvested. In the fall, two of the fields (California brome and red fescue) were expanded using seed collected from the park. A total of 298 lbs (PLS) (316 lbs bulk) were produced in 2006 and 123 lbs (PLS) were delivered to the park in the fall. All of the red fescue and California brome were delivered but only 82 lbs of the blue wildrye was delivered. Extra blue wildrye seed produced in 2005 and 2006 remains in storage at the PMC (325 lbs (PLS)).

Table 1. Seed produced for the Mount Rainier SR123 Road Project at the Corvallis PMC in 2006.

Species	Area Harvested	Date(s)	Method	Yield (bulk)	Comments
California brome	0.045 acre	June 26	Seed stripper	20 lbs	Fair stand, high vigor
Red fescue	0.12 acre	June 23	Moon rover	26 lbs	Excellent stand, high vigor
Blue wildrye	0.58 acre	June 29	Swath/combine	270 lbs	Excellent stand, high vigor

Technology Developments: A new harvester was implemented this year. Informally named the “moon rover”, it is a hand-built, self-propelled swather. It has a conveyor belt that moves all material that has been cut and loads it into bags. Two people operate it; one person drives and the other helps feed the material into bags. The moon rover has all the benefits of hand harvesting but severely reduces the labor involved. Once material was bagged, it was placed onto tarps to dry and cure. It was then fed through a plot thresher and cleaned as usual.

After harvest in 2005, FERU field was burned using drip torches. Three one-meter plots were sprayed with water prior to burning to act as control plots. These plots remained unburned as the fire passed, and were evaluated for seed yields in 2006. Vegetation and seed was harvested from six plants in unburned plots and six plants in the burned area of the field. Plants in the unburned plots had more vegetation than the burned plants. Burned plants produced, on average, 10g more seed per plant than unburned plants.



Figure 2. PMC staff harvesting California brome with the “moon rover,” June 16 2006.

OLYMPIC NATIONAL PARK
Elwha River Ecosystem and Fisheries Restoration

2006 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.



Figure 1. Goblin Gates on the Elwha River, Olympic National Park, July 7, 2006.

Accomplishments: Activities in 2006 included collecting seed of 16 species (19 lbs total seed collected); establishment and maintenance of seed production fields including five grasses, seven forbs, two rushes, two legumes, and two sedges; containerized stock production of eight species; maintenance of cutting blocks of nine shrubs and one forb.

Table 1. Total acres in production and 2006 Seed Yields for the Elwha River Restoration project by species.

Common name	Species Code	Seed Yielding area in 06	Seed Yield for 2006	Total acres in production in fall 2006
Common yarrow	ACMI	0.25	50 lbs	0.7
Pearly everlasting	ANMA	0.1	255 g	0.1
Coastal wormwood	ARSU	0	-	0.25
Spiked bentgrass	AGEX	0	-	0.35
Brome complex	BR sp.	0.42	195 lbs	0.42
Columbia brome	BRVU	0.66	124 g	0
Dewey's sedge	CADE	0.2	216 g	0.1
Thick-headed sedge	CAPA	0.085	6.4 lbs	0.22
Slender hairgrass	DEEL	0.43	90 lbs	0.43
Blue wildrye	ELGL	0.56	52 lbs	0.56
Tall fireweed	EPAN	0.1	252 g	0.1
Fringed willowherb	EPCI	0	-	0.1
Woolly sunflower	ERLA	0	-	0.1
Bolander's rush	JUBO	0	-	0.03
Common rush	JUEF	0	-	0.03
Pacific woodrush	LUCO	0.01	65 g	0.01
Broadleaf lupine	LULA	0	2 g	0.1
Small-flowered woodrush	LUPA	0	-	0.1
Common selfheal	PRVU	0	-	0.11
American vetch	VIAM	0	-	0.01
		Totals	396 lbs	3.82



Figure 2. Yarrow plants display uneven ripening. Multiple harvests are needed for maximum yields.

Technology Developments: Harvest methods were developed for common yarrow. A 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 moderately effective for the yarrow. It didn't remove all of the seed, so multiple passes were needed. The harvester can be adjusted for height; therefore it can avoid weedy species that grow very close to the ground. 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

OLYMPIC NATIONAL PARK
Hurricane Ridge Road Project

2006 Annual Summary Report
Prepared by Amy Bartow

NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON



Figure 1. Corvallis PMC summer intern, Henri Compoare, collecting seed near Hurricane Ridge Visitors Center, Olympic National Park, July 9, 2006.

Introduction: 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. The project is expected to be completed in 2007.

Accomplishments: In 2006, four grass and three forb seed increase fields were maintained and harvested. At the end of 2006, 1 acre of grasses was in cultivation as well as a half acre of forbs. Plants grew vigorously in the spring and flowered in early summer. New harvesting techniques were implemented for the woolly sunflower, sitka brome, and lupine. Wild collections were also performed in the fall. A total of 128 lbs of seed were produced in 2006 bringing the total seed in storage for this project to 160 lbs. Seed is being held at the PMC until fall of 2007 when road construction is to be completed.

Table 1. Seed increase field production for 2006 and total seed in storage.

Species	Area (ac)	Method	2006 Yield	2006 wild collection	Total Seed in Storage
Blue wildrye (low elevation)	0.25	swath/ combine	106 lbs	0	120 lbs
Columbia brome	0.25	hand	152 g	1956 g	5 lbs
Sitka brome	0.2	moon rover	3 lbs	0	4 lbs
Blue wildrye (high elevation)	0.06	moon rover	9 lbs	0	9 lbs
White sagebrush	0.02	hand	160 g	100 g	1.5 lbs
Broadleaf lupine	0.04	hand	1 lb	2 lbs	7 lbs
Woolly sunflower	0.046	moon rover	8 lbs	0.5 lb	8.5 lbs
Tall fireweed		Not in production		240 g	0.5 lb
Cow parsnip		Not in production		0	4 lbs
Pearly everlasting		Not in production		150 g	0.5 lbs

Technology Development:

Woolly sunflower field was harvested using a self propelled swather equipped with a conveyor belt that moves the swathed material into bags. Bags were emptied out onto tarps to dry the material. It was then fed through a plot thresher and cleaned using air-screen machines. This harvest technique was very efficient. Large fields of woolly sunflower can be harvested in a small amount of time. Processing time could be reduced by using a stationary combine to thresh the material once it had dried rather than a small plot thresher. Lupine species are difficult to harvest efficiently due to their indeterminate ripening and easily shattering pods. To aid in seed collection, 2 ft wide strips of weed fabric were tacked down between the rows of lupine to control weeds and to act as a passive seed collector. Seeds can be swept from the weed fabric as the seeds shatter.



Figure 2. Woolly sunflower seed increase field at the Corvallis PMC, June 8, 2006.



Figure 3. Broadleaf lupine seed increase field at the Corvallis PMC, May 30, 2006.

GREAT SMOKY MOUNTAINS NATIONAL PARK

FY2006 Annual Report

Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
NATIONAL PLANT MATERIALS CENTER
BELTSVILLE, MD

Introduction: The current cooperative agreement between the Great Smoky Mountains National Park (GRSM) and the National Plant Materials Center (NPMC) was signed in September 2005, for Fiscal Years 2006–2010. A total of approximately 1750 lbs. of grass/forbs seed will be supplied under the agreement. The GRSM staff will harvest and provide the resulting bulk seed to the NRCS for processing, cleaning, and testing. The NRCS NPMC will provide technical expertise and information necessary to assist the GRSM staff in their re-vegetation efforts in Great Smoky Mountains National Park and Foothills Parkway. The NPMC will also provide facilities and equipment in the cleaning, processing, testing and storage of plant materials required by the NPS under this program. Arrange for and incur shipping costs of plant materials to the Park, and have all seed tested for purity, noxious weed seed and viability.



Accomplishments: 515 lbs. (bulk) of grass and forb seed was harvested by GRSM staff, and then shipped to the NPMC in October 2006. This consisted of 12 different lots and 9 different species of seed. The 520lbs. of bulk seed was cleaned (de-bearded and ran through a clipper), by NPMC staff, to yield 253 lbs of seed. All seed lots were then tested for viability, purity, and noxious weeds by the Kansas Crop Improvement Association. It was decided to have the Kansas Crop Improvement Association test the seed this year as the amount of time needed to complete testing at the New York State Agricultural Experiment Station was excessive.

Name	Common Name	Accession #	Lot #	Weight (Bulk lbs.)	Weight (Cleaned lbs.)
<i>Andropogon gerardi</i>	Big bluestem	9077163	SWC-05-GRSMINCRS	149.8	41.5
<i>Andropogon glomeratus</i>	Bushy bluestem	9078720	SWC-05-GRSMINCRS	40.8	6.3
<i>Helianthus angustifolius</i>	Swamp Sunflower	9094170	SWC-05-GRSMINCRS	8.1	.5
<i>Lespedeza capitata</i>	Roundheaded Lespedeza	9077164	SWC-05-GRSMINCRS	3.4	.078
<i>Panicum anceps</i>	Panic grass	9078711	SWC-05-GRSMINCRS	63.9	46.5
<i>Pityopsis graminifolia</i>	Narrowleaf Silkgrass	9077020	SWC-05-GRSMFHP	1.4	.1
<i>Pityopsis graminifolia</i>	Narrowleaf Silkgrass	9061474	SCO-05-GRSMD1	11.3	2.5
<i>Saccharum giganteum</i>	Sugarcane plumegrass	9078716	SWC-05-GRSMINCRS	24	4
<i>Sorghastrum nutans</i>	Indiangrass	9077021	SWC-05-GRSMINCRS	150.2	62
<i>Sorghastrum nutans</i>	Indiangrass	9061477	SCO-05-GRSMLOCST	133.7	65
<i>Veronia noveboracensis</i>	New York Ironweed	9078714	SWC-05-GRSMCADE	4.8	2.6
<i>Schizachyrium scoparium</i>	Little bluestem	9078712	SWC-05-GRSMINCRS	53.5	20.9
Total				514.9	253

**USDI-NATIONAL PARK SERVICE
STONES RIVER NATIONAL BATTLEFIELD**

**2006 Annual Summary Report
Prepared by John Vandevender**

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ALDERSON, WEST VIRGINIA

Introduction: 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.



***Andropogon ternarius* Seed Production Field at Stones River**

Accomplishments: Fiscal year 2006 marked the fourth year of this agreement. During 2006, 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 18,000 seedlings were produced at the PMC and delivered to Stones River for transplanting into their seed production fields.

Seedlings produced during 2006 included: *Panicum anceps*, flat-stemmed panic grass; *Elymus virginicus*, Virginia wildrye; *Andropogon ternarius*, splitbeard bluestem; *Andropogon gyrans*,

Elliott's bluestem; *Rudbeckia hirta*, black eyed susan; *Forestiera ligustrina*, privet; *Eragrostis spectabilis*, purple lovegrass; *Bouteloua curtipendula*, sideoats grama; and *Lespedeza virginica*, slender lespedeza.

In fiscal year 2007, production of seedlings for establishment of seed production fields and restoration of the park's floristic authenticity is expected to continue. Species of interest for 2007 are as follows: *Dichantheium spp.*, deertongue; *Panicum anceps*, flat-stemmed or beaked panic grass; *Eragrostis spectabilis*, purple lovegrass; *Andropogon ternarius*, splitbeard bluestem; *Elymus riparius*, riverbank wildrye; *Elymus villosus*, hairy wildrye; *Elymus virginicus*, Virginia wildrye; *Chasmanthium latifolium*, river oats; *Cornus drummondii*, roughleaf dogwood; *Philadelphus pubescens*, hoary mock orange; *Ostrya virginiana*, hop hornbeam; and *Cephalanthus occidentalis*, common buttonbush.

**NATIONAL PARK SERVICE
WETLAND ESTABLISHMENT RESEARCH STUDY**

**2006 Annual Summary Report
Prepared by**

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

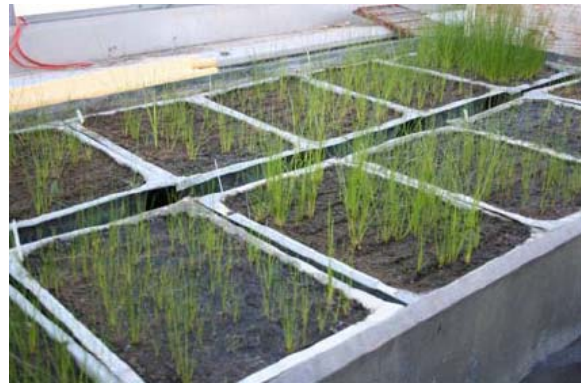
Introduction: In 2003 the Aberdeen Plant Materials Center entered into an agreement with the National Park Service to evaluate the efficacy of different methods of direct seeding wetland plant species. Currently, wetland restoration is best accomplished using greenhouse grown or wildland collected plugs.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

Accomplishments: A report summarizing the wetland seeding research conducted by the Aberdeen PMC during 2005 was published in the spring 2006 edition of *Native Plants Journal* under the title: *Comparison of methods for seeding Nebraska sedge (Carex nebrascensis) and Baltic rush (Juncus balticus)*.

Technology Development: In 2006, direct wetland seeding research continued in the form of a greenhouse experiment examining inert broadcast carriers and hydroseeding mulches. Our commonly used wetland species produce very small seed, several million seeds/pound in the case of Baltic rush, and are extremely difficult to seed. The trial examined eight seeding treatments. There were four dry methods: no carrier, rice hulls, shop dry (a clay material for soaking up spills), and sand; in addition, there were four wet treatments, Fertile Fibers®, straw mulch, wood mulch and straight tackifier in water. Greenhouse trays were seeded and placed in wetland tanks and subsequently flooded. Plant density data indicate that Fertile Fibers® hydromulch and the use of a straight tackifier/water mix provide significantly better establishment than the other treatments.



Treatments prior to flooding



Juncus seedlings after 21 days.

The following data were collected from the study.

Seedling Germination		
Treatment	Plants/ft² after 1 flood	Plants/ft² after 2 floods
Fertile Fibers	311 a	300 a
Tackifier	211 b	206 a
Straw mulch	74 c	100 b
Rice hulls	67 c	71 b
Shop dry	52 c	55 b
Sand	45 c	48 b
No carrier	44 c	50 b
Wood mulch	31 c	42 b

In 2007 the PMC plans to evaluate the top performing seeding methods in an outdoor trial.

NATIONAL PARK SERVICE TRAINING WORKSHOP

2006 Annual Summary Report prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
BRIDGER, MONTANA

In August 2005, Bridger Plant Materials Center staff traveled to Glacier National Park (GNP) for a site visit and coordinating meeting. While reviewing propagation and nursery management practices in the native plant nursery, Joyce Lapp, Restoration Biologist for GNP, suggested a training session so that the entire GNP revegetation staff could participate. The idea was then presented to program coordinators Sarah Wynn (National Park Service [NPS]) and Russ Haas (NRCS), who both supported the proposal and addressed logistical issues to obtain approval and funding for the workshop. Invitations were extended to western parks with revegetation programs, as well as the Confederated Salish and Kootenai Tribes, and Salish Kootenai College.



Evaluation of seedbed preparation techniques

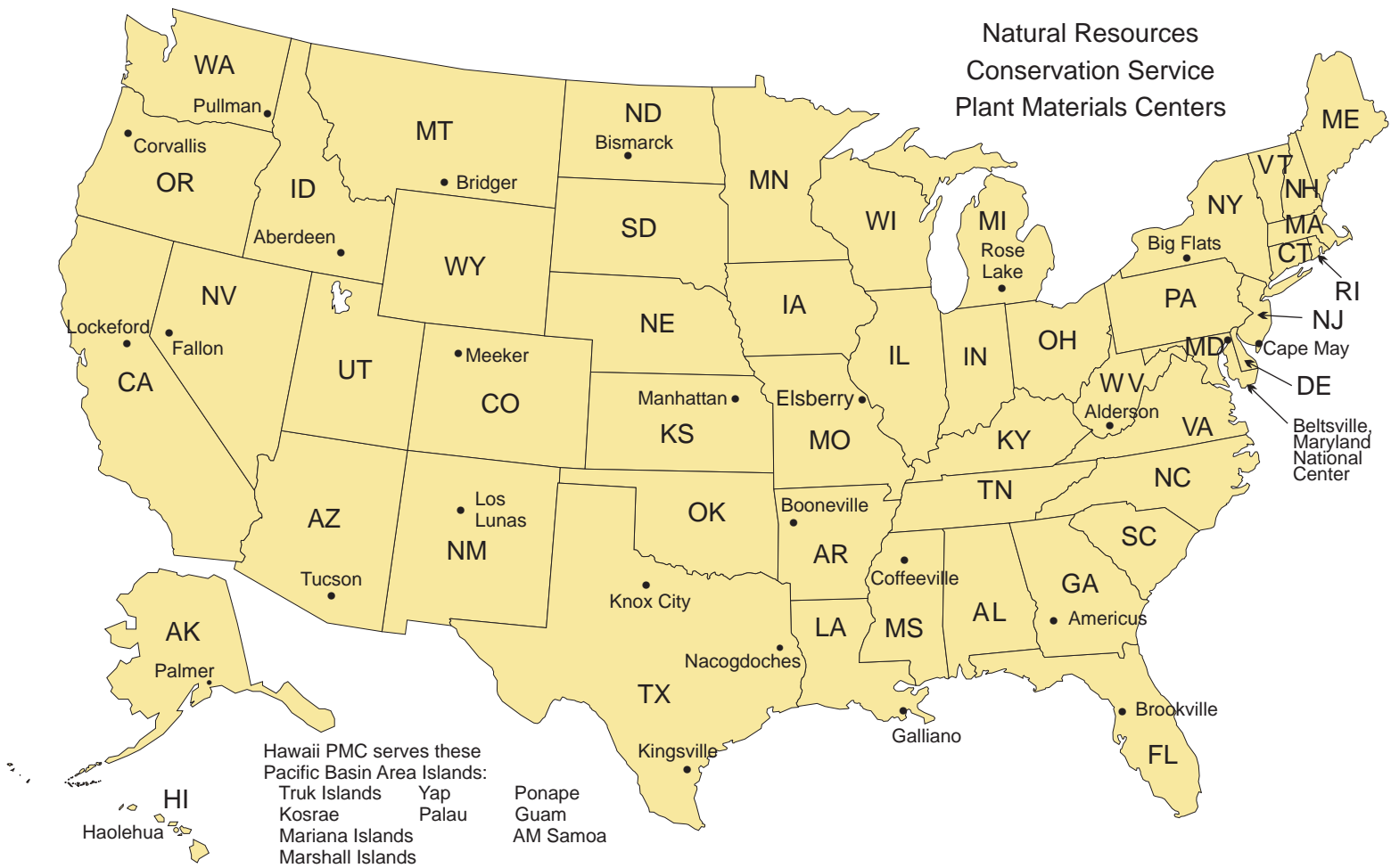
On June 13-15, 2006, the BPMC conducted the first formal plant materials training for NPS employees by hosting the “Native Plant Propagation and Nursery Management Workshop.” A total of 30 participants from Glacier, Zion, North Cascades, Joshua Tree, Sequoia, Yellowstone, Rocky Mountain, and Lassen National Parks, as well as the Confederated Salish and Kootenai Tribes, and Salish Kootenai College attended.



Greenhouse propagation/ growth media and fertilization

The three day workshop featured speakers Sarah Wynn and Russ Haas (program overview), Joyce Lapp (restoration project planning; monitoring results), Mark Majerus, Manager, BPMC (direct field seeding), Tara Luna, botanist and horticulturist (Target Seedling Concept; breaking seed dormancy), Dave Baumbauer, Plant Growth Center Manager, Montana State University (MSU) (managing greenhouse insects and disease; container crop fertility), Cheryl Moore-Gough, Extension Horticulture Specialist, MSU (asexual plant propagation), Dr. Tracy Dougher, Assistant Professor of Horticulture, MSU, (greenhouse lighting), and Joe Scianna, Research Horticulturist, BPMC (nursery stock storage and handling; planting and maintenance). In addition, Phil Johnson with the Montana Department of Transportation conducted an afternoon tour of the massive revegetation efforts along the famous Beartooth Highway, a road that incurred extensive damage from mud and rock slides caused by heavy rains in the spring of 2005. Field demonstrations and exercises covering seedbed preparation, container fertility, seed increase, and asexual plant propagation were also conducted over the course of the workshop, participant feedback indicated that the subject matter was extremely appropriate and timely for support of park restoration activities and that future workshops should be held on a rotational basis in various regions of the country.

Natural Resources
Conservation Service
Plant Materials Centers



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	Nocogdoches, 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