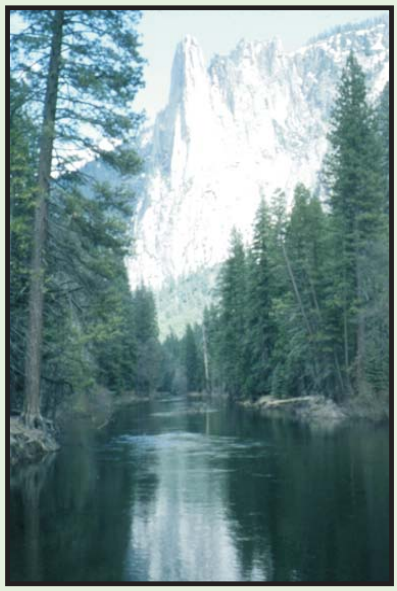
FY 2005
Plant Materials Project Summary Reports

From the

Natural Resources Conservation Service

To the

National Park Service



Native Plants For National Parks

A Cooperative Program between the
National Park Service, U.S. Department of the Interior
and Natural Resources Conservation Service,
U.S. Department of Agriculture

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

FY 2005

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April 2006

Compiled By

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National Park Service, Denver Service Center, Lakewood Colorado

INTRODUCTION

This is the 2005 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, Planning and Site Design, PO Box 25287, Lakewood CO. 80225. E- Mail russ_haas@nps.gov or Phone 303- 969-2172.

The comprehensive 2005 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.

NATIONAL PARK SERVICE

And

NATURAL RESOURCES CONSERVATION SERVICE

INTERAGENCY PLANT MATERIALS PROGRAM

2005 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 4 National Parks in addition to those with interagency agreements.
- On site program technical assistance was provided by NRCS NTA and the NPS NTA at 15 National Parks.
- Technical assistance in addition to that agreed to Interagency Agreements was provided by Plant Materials Center staff or Specialists to 4 National Parks.

Development and Administration of Interagency Agreements

- Five new agreements and 6 IA amendments to agreements were developed this Fiscal Year.
- There were 46 active projects at 29 National Park units in cooperation with 12 Plant Materials Centers.
- 75% of the projects are Federal Lands Highway Program (FLHP) related. The remainders involve bioengineering, exotic species control, riparian/wetland restoration and revegetation of campgrounds, new visitor's facilities, parking lots, utility corridors etc.

Native Seed and Plant Production

- 10 NRCS Plant Materials Centers
- **29 National Parks**
- **1,973 PLS pounds of seed**
- 71,208 transplants
- 184 park indigenous species (73 grass, 32 forb, 47 shrub and 32 tree)

Native Seed/Plant Deliveries

- **8** NRCS Plant Materials Centers
- 13 National Parks
- 881 PLS pounds of seed
- 57,263 transplants (container and bareroot)
- 229 park indigenous species (53 grass, 77 forb, 355 shrub and 39 tree)

Processing of Park Collected Seed

- 4 National parks
- 254 pounds of seed
- 118 species (37 grass, 67 forb and 13 shrubs, 1 tree)

Preparation of Revegetation Plans

NRCS NTA assisted 3 National Parks develop required plans for revegetation of upcoming highway projects

Interagency Program Reviews

Reviews were held at:

- National Parks: Bryce Canyon NP, Grand Canyon NP and Hubbell Trading Post
- Plant Materials Centers: Meeker, Colorado; Los Lunas, New Mexico; Corvallis, Oregon and Bridger Montana

Technology Transfer and Research

- Data entry into the interagency website, "Native Plants Network" (http://nativeplantnetwork.org) continues to grow. NPS and NRCS contributions make up approximately 50% of the 2250 entries of 1500 species/ecotypes in the database.

- 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. 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 in early summer 2006

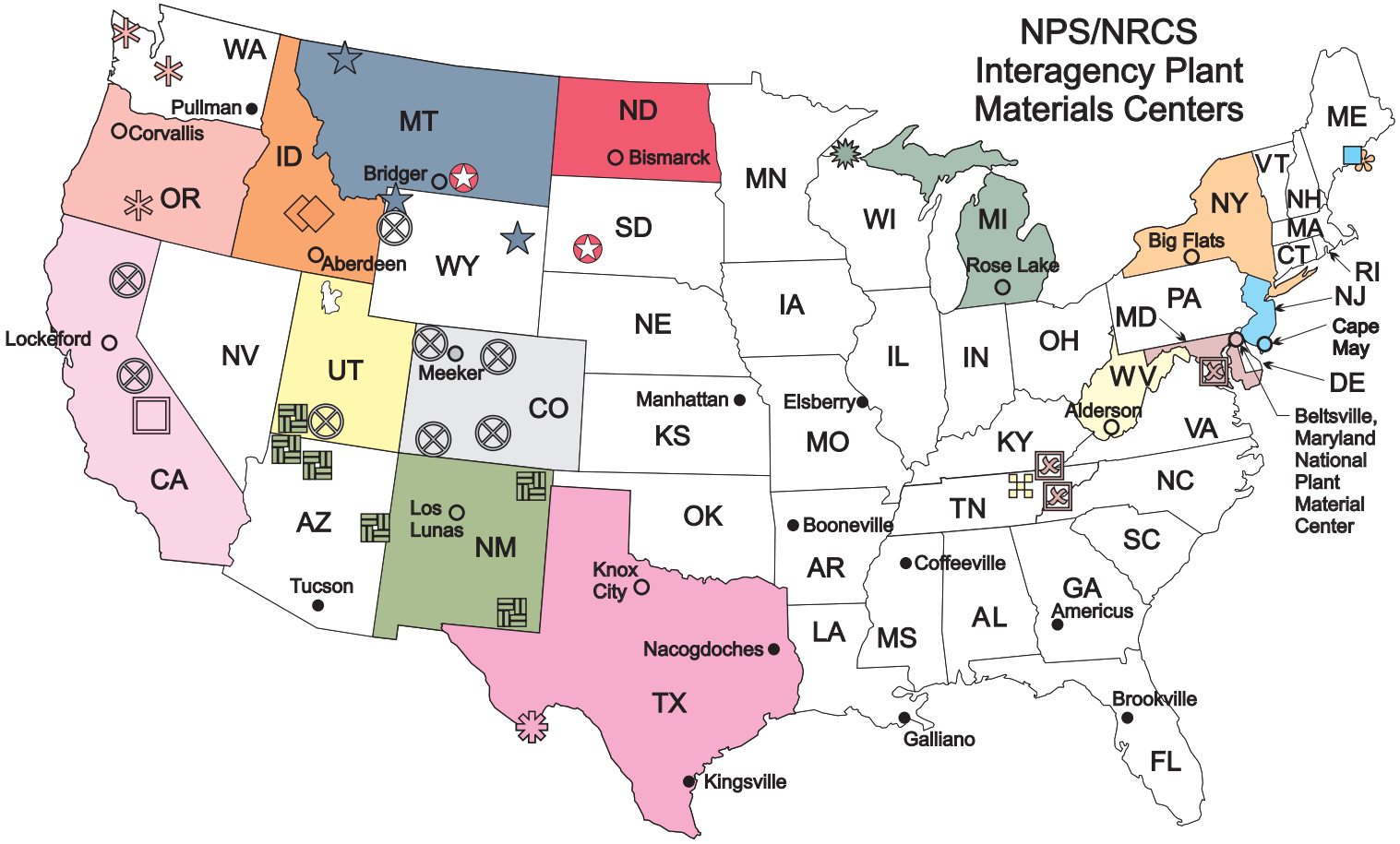
- Wetland/Riparian and Bioengineering Technical Assistance to Intermountain parks. Technical assistance and training workshops were provided at Grand Teton NP.

- NRCS NTA made three formal oral presentations at professional society meetings and interagency workshops.

- NRCS NTA and program staff prepared and distributed to cooperating Parks/PMCs and key NPS and NRCS personnel, the 2005 Annual Interagency Program Report.

- Revegetation program staff are developing a standard protocol and data base to record revegetation planting establishment and monitoring

- Progress is being made by DSC staff towards the development of a revegetation planning worksheet. The calculation worksheet will provide the user a data base of native species with their seeding rates and seeds per pound, seed mixture component options and a location to record planning and implementation documents.



Plant Materials Center		In cooperation with these National Parks	
Aberdeen, ID	●	◆	Craters of the Moon NM, Grand Teton NP
Alderson, WV	○	✣	Stones River NB
Beltsville, MD	●	⊠	Cumberland Gap NHP, George Washington MP, 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	●	✳	Crater Lake NP, Mt. Rainier NP, Olympic NP
Knox City, TX	●	✸	Big Bend NP, Chickasaw NRA
Lockford, 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, Zion NP
Meeker, CO	●	⊗	Bryce Canyon NP, Dinosaur NM, Grand Teton NP, Great Sand Dunes NM, Lassen Volcanic NP, Mesa Verde NP, Rocky Mountain NP, Yosemite NP
Rose Lake, MI	●	✹	Apostle Islands NL

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Southeast Region

Wetland Establishment Research Studies

BIG BEND NATIONAL PARK

2005 Annual Summary Report
Prepared by

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 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.

Big Bend NP

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.

Seed Production and Available Inventory

Common Name	Area (ac)	2005 Prod./lbs.*	PLS Inventory on Hand
Alkali sacaton	-	-	329.0
Sideoats grama	-	-	105.0
Green sprangletop	-	-	114.0
Cane bluestem	.50	58.5	22.0
Showy menodora	.50	-	118.00
Whiplash pappusgrass	Increase	.55	increase
Chino grama	.75	2.5	15.0
Tobosa	.10	.75	Increase
Limoncillo	-	-	-

* bulk material wt.

Chino grama at Knox City PMC

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

BRYCE CANYON NATIONAL PARK

2005 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 has been amended twice in 2005. Amendment No. 1 outlined field production of 2.5 acres of a single species, slender wheatgrass, *Elymus trachycaulus*, for 2005. The original agreement calls for the production of 2.0 acres of slender wheatgrass in 2006. Amendment No. 2, signed September, 2005, calls for the production of containerized material in 2006.

Primrose at Bryce Canyon

Accomplishments: For the first time in six years, our area experienced average or above average precipitation. Bryce slender wheatgrass produced a significant amount of seed in 2005. We estimated 700 pounds of harvested product. However, for reasons unknown, a substantial amount of water was found in one of the two bins in which the seed was stored. One bin was nearly a total loss.

The second bin was fine, producing 189 pounds of clean seed from the 0.5 acre planted August 12, 1998, 0.8 of an acre that was planted September 5, 2000, and 1.2 acres that were planted August 13, 2004. After harvest, the 0.5 acre planting from 1998 was removed. Also removed was the 0.5 acre nodding brome field. Russ Haas, National Plant Materials Technical Liaison, viewed the fields in early July and concurred with UCEPC that the nodding brome field should be removed prior to harvest.

Bryce Canyon Road 2003

Bryce Canyon Road 2005

The one half-acre nodding brome field was planted August 29, 2001, and produced one year longer than was expected. One seed shipment, 103 bulk pounds (60 PLS) of slender wheatgrass, was sent to Bryce Canyon on August 4, 2005. The new 1.2 acres of slender wheatgrass and the 0.8 acre planted in 2000 will be in production for 2006. In addition, 7,000 grass plugs and 100 native shrubs will be produced in 2006.

Bryce Slender wheatgrass

Technology Development: Nodding brome behaves as a short lived perennial species in cultivation. If it is to be used in lengthy revegetation projects, periodic field establishment may be necessary. The Bryce Canyon nodding brome field was established with seed that had an estimated germination of 20% and that was treated with Vitavax, a seed treatment used to reduce head smut in some grasses. No noticeable head smut was observed in the nodding brome field in three years of production.

CAPULIN VOLCANO NATIONAL MONUMENT

2005 Annual Summary Report
Prepared by

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

Project #: NMPMC-S-0404-RA

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. Seed will be used by the park for revegetation of areas disturbed by visitor activity and drainage problems on the main park road

Portion of main road rehab

Reveg after road drainage repair

Accomplishments:

Seed Production: In 2005, the LLPMC established seed fields using transplants grown from seed collected in 2004 at CVNM:

Common Name	*Scientific Name*	Agreement Acreage	2005 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	N/A
Little bluestem	*Schizacharium scoparium*	0.50 acre	0.50 acre	N/A
Western wheatgrass	*Pascopyrum smithii*	0.50 acre	0.14	N/A
Sideoats gram	*Bouteloua curtipendula*	0.50 acre	0.00 acre	N/A

No seed was harvested from these seed fields in 2005.

Technology Development:

- Mountain muhly – The seed that was collected at CVNM in 2004 had good fill.
- Blue grama – The seed that was collected at CVNM in 2004 had good fill.
- Little bluestem – The seed that was collected at CVNM in 2004 had good fill.
- Western wheatgrass – This seed was harvested at the CVNM in 2004. Western wheatgrass seed will have to be harvested in 2006 from the CVNM in order to expand the western wheatgrass seed production field at the LLPMC.

Sideoats grama–The seed collected at the CVNM in 2004 had poor seed fill. As a result, the LLPMC could not grow transplants and was not able 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 2006.

CARLSBAD CAVERNS NATIONAL PARK

2005 Annual Summary Report
Prepared by

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

Project #: NMPMC-S-0403-RA

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.

Example of Park Vegetation

Plains Bristlegrass

Accomplishments:

Seed Production

The LLPMC established production seed fields using transplants grown from seed collected at CCNP in 2004:

Common Name	*Scientific Name*	Agreement Acreage	2005 LLPMC Acreage	Harvest (Bulk lbs.)
Sideoats grama	*Bouteloua curtipendula*	0.50 acre	0.25 acre	88.66
Blue grama	*Bouteloua gracilis*	0.50 acre	0.50 acre	N/A
Three-awn	*Aristida purpurea*	0.50 acre	0.25 acre	N/A

Carlsbad sideoats seed increase field at Los Lunas PMC

Technology Development:

- Sideoats grama – This seed will be used to grow transplants in 2006 in order to expand the seed field to a full half acre.
- Blue grama – No seed was produced from the blue grama field in 2005.
- Three-awn – This seed was harvested in 2005 and was processed. The harvested three-awn seed will be used to expand the seed field in 2006 to a full half acre.

Greg Fenchel, Manager of the LLPMC, traveled to CCNP in the fall of 2005 and collected two new species:

- Plains bristlegrass (*Setaria vulpiseta*) – This species has been added to the agreement. The collected Plains bristlegrass seed will be processed by the LLPMC and used to establish a 0.50 acre production field in 2006.
- Green sprangletop (*Leptochloa dubia*) – If green sprangletop is added to the agreement, a 0.50 acre production field will be established in 2006 at the LLPMC.

DINOSAUR NATIONAL MONUMENT

2005 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 (*Psuedoroegneria 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.

Dinosaur basin wildrye

Accomplishments:

Personnel from Dinosaur National Monument came to the plant center in 2005, and a decision was made to remove the original 8 rows of bluebunch wheatgrass, which was done after harvest in 2005. Seed was harvested from all seed fields in 2005 but was not cleaned at the time of writing this report.

Seed Harvested		**Seed Fields**	
Name	**Harvest Date**	**Name**	**Size**
Indian ricegrass	July 12	Basin wildrye	0.24 acre
Basin wildrye	Aug 4-5	Bluebunch wheatgrass**	0.42 acre
Bluebunch wheatgrass	July 20-21	Indian ricegrass *	0.24 acre
Alkali sacaton	Aug 9	Alkali sacaton *	0.18 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

2005 Annual Summary Report
prepared by

NATURAL RESOURCES CONSERVATION SERVICE
BRIDGER 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 2005, 60 seed lots representing 31 individual species and totaling 8.46 pounds (3.84 kg) were delivered to GNP or used for BPMC production. The 2005 seed distribution included 12 grass lots (8 species), 41 forb lots (20 species), and 7 shrub lots (3 species). In addition, a total of 4,700 container plants representing 5 collections (4 species) were either planted at the BPMC for seed increase or delivered to GNP for restoration activities.

Low cloud formation over Going to the Sun Road Glacier NP

No old seed lots were shipped to GNP in 2005 since nearly all GNP seed lots in storage are now 10 years or less in age.

In 2005, 91 wildland collections were sent to the BPMC and cleaned: 36 collections of grasses, sedges, and rushes (15 species); 44 forb collections (34 species); and 11 shrub and tree collections (8 species). A total of 48.11 lbs. (21.822 kg) of clean seed were processed; 32.38 lbs. (14.686 kg) of grass and grass-like, 15.25 lbs. (6.916 kg) of forbs, and 0.48 lbs. (0.220 kg) of trees and shrubs. A total of 35 new species: collection sites were identified and accessioned representing 13 grass or grass-like (8 species), 19 forb (18 species), and 3 woody plant (3 species) lots.

Glacier Yarrow seed increase

Five established seed production fields remained active in 2005, including *Carex athrostachya* (9078591-Camas); *Carex athrostachya* (9081443-Avalanche); *Carex pachystachya* (9078645-Avalanche); a combined field of two lots of *Symphyotrichum laeve* (*Aster laevis)* (9081447-Avalanche) and *Phleum alpinum* (9054559-Logan Pass). These fields produced a total of 9.08 lbs. (4.119 kg) of seed. No seed was harvested from *Carex athrostachya* (9078591-Camas) because of poor fill. In addition, a total of six new seed production fields were installed in 2005, two fields were direct seeded and four were established from 1-0 plugs. Fields of *Festuca idahoensis* (9075848-Saint Mary) and *Achnatherum nelsonii* (9081995-Two Dog Flats) were field sown on April 15, 2005 in Field 6. A total of 4,250 plugs were grown in the greenhouse and then field planted at the BPMC in 2005 for seed increase including 1,650 *Achillea millefolium* (9063640-Cut Bank), 1,750 *Pseudoroegneria spicata* (9076127-Two Medicine), 250 *Pseudoroegneria spicata* (9081993-Two Dog), and 600 *Eurybia conspicua* (9087433-Lake McDonald).

Seed germination tests are currently being conducted on four accessions (four species) grown at the BPMC in 2005 including *Carex athrostachya* (9081443-Avalanche), *Carex pachystachya* (9078645-Avalanche), *Symphyotrichum laeve* (*Aster laevis)* (9081447-Avalanche), and *Phleum alpinum* (9054559-Logan Pass). Results will be presented in the Glacier National Park 2005 Annual Technical Report.

Glacier aster
(Mark Majerus)

A total of 450 *Mahonia repens* (9054489-Apgar) plants were delivered to GNP on August 9, 2005. A total of 2,346 container plants remained in cold storage at the BPMC at the end of 2005 including 1,646 *Achnatherum nelsonii* (9081995-Two Dog Flats), 467 *Pseudoroegneria spicata* (9081993-Two Dog Flats), 132 *Pseudoroegneria spicata* (9076127-Two Medicine), 80 *Eurybia conspicua* (9087433-Lake McDonald), and 21 *Mahonia repens* (9054489-Apgar). Seeds of *Geum macrophyllum* (9076144-Lake McDonald) are currently being stratified for 2006 production.

Technology Developments: Replicated seed germination tests were conducted for GNP in late summer on 12 lots of grass (12 species) stored at the Park and needed for upcoming restoration projects. Seeds per pound data collected at the BPMC on various wildland and cultivated lots were sent to GNP in support of a report summarizing seeds per pound of numerous species indigenous to the Park.

An abstract titled, “Effects of Erosion Control Blanket on the Germination of Six Native Species” was submitted to the 2006 Billings Land Reclamation Symposium for presentation in Billings, Montana in July 2006. A coordination and project inspection visit was conducted at GNP from August 10-11, 2005.

GRAND CANYON NATIONAL PARK

2005 Annual Summary Report
Prepared by

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

Project #'s: NMPMC-S-0003-RA, NMPMC-S-0004-WO, NMPMC-S-0403-WO

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. Subsequent amendments provide for continued production of two native grass species.

Accomplishments:

Seed Production

The LLPMC produced the following seed in 2005 for the GCNP:

Common Name	*Scientific Name*	Agreement Acreage	2005 LLPMC Acreage	Harvest (PLS lbs.)
Blue grama	*Bouteloua gracilis*	0.50	.054	8.26
Muttongrass	*Poa fendleriana*	1.00	1.65	30.58

Grand Canyon Blue grama 2005

Transplant Production

No transplants were distributed to GCNP in 2005.

Trees and shrubs grown by Los Lunas planted at new Visitors Information Plaza

Technology Development:

- Blue grama – This production field was harvested in 2005, and seed production declined slightly from the 2004 harvest. The field was burned during the dormant period, and this could account for the decline. The field will not be burned in 2006, and it will receive high rates of fertilizer and water to evaluate the effect on seed production. The blue grama from GCNP continues to produce a low amount of forage and seed. There is a possibility the output from this collection might not change.
- Muttongrass – The three fields were harvested in 2005 and they produced a good amount of seed. The field established in 2003 had the best production. The muttongrass continues to receive high rates of fertilizer and irrigation to maintain seed production.

GRAND TETON NATIONAL PARK

2005 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 new agreement will extend through fiscal year 2005, and called for the production of five grass species. One species, basin wildrye, had been established for production in an earlier agreement. One other species, bluebunch wheatgrass, had been produced in an earlier agreement as well. From seed tests, there was adequate viability to establish a field. Two other species, blue wildrye and slender wheatgrass, were collected from the park in 2001, cleaned, tested, and were established in July 2002. Because of drought conditions, a fifth material, prairie Junegrass did not produce good collectible populations of seed for seed increase as targeted in the agreement. Discussions of producing a substitute material occurred, and during the summer of 2003, showy goldeneye was collected by park personnel for increase.

Grand Teton Basin wildrye
(Rodney Dunham & Russ Haas)

Grand Teton Bluebunch wheatgrass

Accomplishments:

In the final year of the agreement, seed of three species was harvested. Seventy pounds of blue wildrye, 293 pounds of slender wheatgrass and an as yet to be cleaned quantity of basin wildrye were harvested in July. Indications are that the basin production is the best it has been since being established. Bluebunch wheatgrass was infested with substantial amounts of downy brome, so it was not harvested. The fifth material, showy goldeneye, was direct seeded on 0.3 acre July 28, 2004. Establishment was poor and there was not enough plants producing seed to warrant continued production efforts. 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.

Two separate seed shipments were made to Grand Teton National Park. On May 11, seed of basin wildrye, slender wheatgrass, and blue wildrye was shipped. The second shipment was made on October 19, 2005 and included the above species and bluebunch wheatgrass.

Technology Development: Black grass bug infestation occurred in the basin wildrye field in 2004 and reduced production by nearly 75% from the previous year. Bob Hammon, Colorado State University Extension Entomologist, provided information on the life cycle of black grass bugs and treatment options for control. Black grass bugs were noted in the basin field with early inspection, and on May 19, 2005, the field was sprayed with the insecticide Lorsban at the labeled rate. From a field inspection on May 31, no black grass bugs were found.

GREAT SAND DUNES
NATIONAL MONUMENT AND PRESERVE

2005 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.

Great Sand Dunes Indian ricegrass
(photo by M. Rosales)

Great Sand Dunes Ring muhly
(photo by M. Rosales)

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) and ring mulhly failed to establish a good stand.

The half an acre of Indian ricegrass was harvested in August 12, 2005. The amount of clean seed (bulk weight) resulting from this harvest was 2.6 pounds. The plantings of blue grama and ring muhly were successful and as of today are progressing well (see attached pictures). Hopefully we will secure some seed of both materials this year, 2006.

Great Sand Dunes Blue grama
(Picture by M. Rosales- Sept. 2005)

Technology Development: Standard cleaning and planting protocols were utilized to clean the Indian ricegrass harvested in 2005.

HUBBELL TRADING POST NATIONAL HISTORIC SITE

2005 Annual Summary Report
Prepared by

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

Project #: NMPMC-0201-RA

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. The plants will be used to restore riparian areas to native species after eradication of invasive species such as Russian olive and salt cedar.

Nancy Stone Superintendent, examines survival and growth of cottonwood seedlings

Park restoration site. All olive and salt cedar removed with only stumps remaining. Note PVC pipe for irrigation system.

Accomplishments:

Transplant production

The LLPMC provided the HTPNHS with 80, one-gallon transplants in 2005. The shipment consisted of 20 skunkbush sumac, 20 stretchberry, 20 Woods' rose and 20 netleaf hackberry.

Technology Development:

This agreement has expired. Transplants will continue to be grown for HTPNHS by the LLPMC until the monies allocated in the agreement are exhausted. The Park has gained significant amount of experience in techniques to remove and treat these species and also developed a unique irrigation system.

MESA VERDE NATIONAL PARK

2005 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 through 2005. Eight species, seven shrubs and one tree, were to be delivered in September, 2005.

Utah service berry

Pinion

Bitterbrush

Accomplishments:

The table below identifies the targeted numbers of container grown materials delivered to the park on September 28, 2005. Because UCEPC was 672 plants short of the agreement, additional materials will be produced in 2006 to make up for the shortfall. In addition, two small production agreements were made directly between Mesa Verde National Park and UCEPC to produce most of the same species with the same delivery date. Production of approximately 330 additional shrubs will be conducted in 2006 to complete these agreements. Present inventory (11/15/05) consists of 628 containerized shrubs for 2006 delivery. Germination of several species continues.

Common Name	*Scientific Name*	Targeted Quantity	Delivered Quantity	Short-Fall	Adjusted Number
Gambel oak	*Quercus gambelii*	875	1130		255
Utah serviceberry	*Amelanchier utahensis*	875	477		398
Mountain mahogany	*Cercocarpus montanus*	260	237		23
Mountain snowberry	*Symphoricarpos oreophilus*	675	285		390
Fourwing saltbush	*Atriplex canescens*	100	35		65
Woods' rose	*Rosa woodsii*	175	133		42
Chokecherry	*Prunus virginiana*	175	266		91
Douglas fir	*Pseudotsuga menziesii*	100	0		100
	Total:	**3235**	**2563**	672	

Rabbit brush loaded for shipment to park

On May 5, 2005, a shipment of 20 species of Mesa Verde collected seed was sent to the park. A second shipment of seed was made to James Ranch Landscaping on October 20, 2005. This seed was field produced by UCEPC in a previous agreement. Mesa Verde personnel also picked up 900 container grown shrubs from UCEPC on September 1, 2005, as partial completion of the two production contract with Mesa Verde.

Technology Development: There is no technology development to report at this time.

PIPE SPRING NATIONAL MONUMENT

2005 Annual Summary Report
Prepared by

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

Project #: NMPMC-S-0402-WO

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 **that** will be used for restoring areas of the Monument back to native vegetation.

Pipe Spring Galleta in Los Lunas PMC greenhouse

Accomplishments:

Seed Production: All seed production fields will be expanded as much as possible in 2006 depending upon the amount of available seed.

Common Name	*Scientific Name*	Agreement Acreage	2005 LLPMC Acreage	Harvest (Bulk lbs.)
Galleta	*Pleuraphis jamesii*	0.50	0.08	N/A
Indian ricegrass	*Achnatherum hymenoides*	0.50	0.42	N/A
Bottlebrush squirreltail	*Elymus elymoides*	0.50	.022	N/A

Technology Development:

- Galleta – the LLPMC harvested seed from the small galleta production field at the LLPMC in 2005. This seed will be processed during the winter months
- Indian ricegrass – The seed collected in 2004 at PSNM was used to increase the 0.25 acre production field to 0.42 acre. In December 2005, the LLPMC used a plot drill to plant the seed. As a result of this dormant seeding, approximately 70 percent of the seed was established. No seed was harvested in 2005 from the Indian ricegrass field, but a small amount of seed heads were produced which should enable harvesting in 2006.
- Bottlebrush squirreltail – This species was collected from the PSNM in 2004, and was added to the agreement in 2005. In 2005, this seed was used to grow transplants and to establish a 0.22 acre production field at the LLPMC. If viable seed is harvested at the PSNM in 2006, the 0.22 acre bottlebrush squirreltail production field will be expanded to 0.50 acre.

ROCKY MOUNTAIN NATIONAL PARK

2005 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. 1211-03-003) in June 2003. This agreement involves seed production of four forbs and four grass species for revegetation of the Bear Lake Road Project.

Rocky Mountain Blue grama ready for harvest

Harvest time!

"Use of "diaper" to collect all seed

Rocky Mountain Oxytropis lambertii

Rocky Mountain Thermopsis

Accomplishments:

This year, seven of eight materials were harvested for use in the revegetation of the Bear Lake Road construction project. Three forbs, hairy golden aster, purple locoweed, and golden spreading bean, all produced at or near their productive potential based on three years of observation. Fringed sage produced about half of what it produced in 2004, but remains healthy. The four grasses have produced little seed, with blue grama producing a little more than 10 pounds this year. Small quantities of seed were harvested from mountain muhly and needle-and-thread in its first production year. Prairie Junegrass was established by plugs in 2004 and did not produce seed in 2005. The experimental plot (25' by 35') of mountain muhly, established in 1997, produced a small amount of seed again this year.

The production of containerized stock was again conducted to improve the stands of previously planted fields. On June 30, approximately 5,500 plugs of needle-and-thread were transplanted with a modified Holland single row transplanter. In August, an additional 5,500 blue grama, 2,500 mountain muhly, 2,000 golden aster and 45 purple locoweed plugs were hand transplanted in areas with thin stands. All of this effort should improve production in each of these fields in the future.

Because of the necessity to use the harvested seed for revegetation in the fall of 2005, 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 near the end of September and delivered to Rocky Mountain National Park on October 5, 2005.

Technology Developments: Two developments that will necessitate a repeated application to further confirm the efficacy of the treatment, involved the application of herbicides. While blue grama was dormant, a spring application of glyphosate was used to control winter annual broadleaf weeds and cheatgrass. While the control was good on the targeted materials, seed production for blue grama was much less than expected. It is not known whether the herbicide application affected seed production of blue grama. A small trial will help confirm the observations. A second project involved the use of Buctril and 2-4-D as a mix applied to the needle-and-thread field. Prostrate pigweed, a summer annual, is a very difficult weed to control in seed production fields. Because it germinates after many grass species are preparing to head out or produce seed, herbicide application is often not an option with traditional herbicides such as straight 2-4-D. In addition, many herbicides are ineffective after prostrate pigweed has formed a 6"-7" pad. The Buctril and 2-4-D mix was applied as a test to larger prostrate pigweeds in a field we had already harvested to see if it had any different results. The application had excellent control, and because Buctril is considered to be less harmful to non-target plants than 2-4-D, we may be able to apply it to prostrate pigweed in seed production fields between the boot and seed formation.

YELLOWSTONE NATIONAL PARK

2005 Annual Summary Report
Prepared By

NATURAL RESOURCES CONSERVATION SERVICE
BRIDGER 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 2005, 8 allocations of 100 seed lots from 46 species were distributed to YNP, YNP-contracted growers, or to the PMC totaling 233 pounds (106 kg). This included 40 grass lots (10 species) weighing 215 pounds (98 kg); 52 forb lots (29 species) weighing 2.3 pounds (5 kg); and 8 woody lots (7 species) weighing 7 pounds (3 kg). This includes the distribution of 12 grass lots (5 species) to the PMC for planting seed increase fields.

Yellowstone Mountain brome

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 2005, 97 collections were made from 42 species: 51 grasses (13 species) at 58 pounds (29 kg); 44 forbs (27 species) at 7.4 pounds (3.3 kg); and 2 woodies at 0.3 pound (0.137 kg). The wildland seed collections totaled 71 pounds (32 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 2005, YNP personnel spent more than 261 person hours in the activity of seed collection on 17 different sites. There were 154 hours (approximately 3 hours per collection) dedicated to collecting grass seed on 17 sites, 104 hours (approximately 2.4 hours per collection) for forbs on 13 sites, and 4 hours for woody species on 2 sites.

Yellowstone Basin wildrye

There were 6 grass increase blocks of 5 species planted on 1.11 acres (.45 ha) in 2005. Seed increase blocks of 5 grasses on 1.3 acres (.5 ha) and a forb on .07 acre (0.03 ha) were removed due to natural decline in production or poor establishment. Currently there are 3.9 acres planted with 19 accessions of 10 grass species, and 0.21 acres (.08 ha) with 2 forb species in seed increase blocks at the Bridger PMC.

During the past growing season, 14 grass accessions (6 species) and 1 forb species were harvested on 3.2 acres (1.3 ha), producing 337 pounds (153 kg) of clean seed. Grass seed production averaged approximately 106 pounds-per-acre (119 kg ha^{-1}).

Purity analysis and tetrazolium viability tests were conducted on PMC seed increase production for 11 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 81 to 99 and averaged 95.

The wildland collection and seed increase inventory contains 604 lots (97 species) totaling 1,804 pounds (818 kg). This is comprised of 317 grass lots (28 species) at 1,727 pounds (783 kg), 279 forb lots (62 species) at 60 pounds (27 kg), and 8 woody lots (7 species) weighing 17 pounds (8 kg).

Technology Transfer: 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.

ZION NATIONAL PARK

2005 Annual Summary Report
Prepared by

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

Project #: NMPMC-S-0301-WO

Introduction: On September 12, 2002, an agreement was made between the Zion National Park (ZNP) of the U.S. Department of Interior (USDI) and the Natural Resources Conservation Service (NRCS) of New Mexico. This agreement declares that the Los Lunas Plant Materials Center (LLPMC) will produce seed for the riparian restoration, invasive species control and revegetation of areas disturbed by road construction.

Accomplishments:

Seed Production 2005

Common Name	*Scientific Name*	Agreement Acreage	2005 LLPMC Acreage	Harvest (Bulk lbs.)
Sand bluestem	*Andropogon hallii*	0.50	0.50	N/A
Cane bluestem	*Bothriochloa barbinodis*	0.50	0.50	2.56
Bottlebrush Squirreltail	*Elymus elymoides*	0.50	0.41	65.54
Galleta	*Pleuraphis jamesii*	0.33	0.50	N/A
Muttongrass	*Poa fendleriana*	0.50	0.50	N/A
Indian ricegrass	*Achnatherum hymdnoides*	0.50	0.42	N/A

Zion Bottle brush squirreltail

Zion Indian ricegrass

Zion Galleta plugs

Technology Development:

- Sand bluestem – The seed harvested in 2004 from the 0.16 acre production field at the LLPMC was used to grow transplants to expand the seed production field to 0.50 acre in 2005.
- Cane bluestem – Seed was harvested in 2005.
- Bottlebrush squirreltail – The seed collected in 2004 at the ZNP was used to grow transplants to continue the expansion of the LLPMC production field to 0.50 acres. On 10/4/2005, eight new rows (0.17 acres) of transplants were installed, increasing the bottlebrush squirreltail production field to 0.41 acres.
- Galleta – The seed collected in 2004 was used to grow transplants to establish a 0.25 acre production field for a total of 0.33 acres. The seed harvested in 2005 will be used to continue expansion of the production field in 2006.
- Muttongrass – The seed collected in 2004 at ZNP was used to grow transplants to establish a 0.50 acre seed production field. No seed of the muttongrass was harvested in 2005.
- Indian ricegrass – The seed collected at ZNP in 2004 was direct seeded on 12/30/2005, increasing the seed production field from 0.25 acres to 0.42 acres. The Indian ricegrass was not harvested in 2005, but will be harvested 2006 and used to expand the production field in 2007 to a full 0.50 acre.

APOSTLE ISLAND NATIONAL PARK

FY2005 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
ROSE LAKE PLANT MATERIALS CENTER
EAST LANSING, MICHIGAN

Introduction: The Apostle Island 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 cold 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 revegetating at Apostle Islands National Park.

Installing vegetative log crib wall

Repairing slope failures on Raspberry Island

The Park Service entered into several reimbursable agreements with the Natural Resources Conservation Service and the Rose Lake Plant Materials Center (PMC) to provide technical assistance and to assist with collecting and growing plants. Under a Memorandum of Agreement grass, forb, and shrub species (Table 1) were selected for propagation based on the material's availability, viability, and site adaptability for the intended use.

The Rose Lake PMC is growing more plants and the Plant Materials Specialist continues to provide technical assistance for the installation of bioengineered structures. Project completion is expected in 2006.

Accomplishments:

Table 1. Species propagated and number of plants delivered by Rose Lake Plant Materials Center to apostle Island National Park in 2005.	
American Beachgrass – 581	Poverty Oatgrass – 101
Allegheny Blackberry – 65	Prickly Rose – 96
Beach Pea – 21	Red Elderberry – 122
Beachgrass – 95	Redosier Dogwood – 319
Bluejoint – 581	Redtop – 151
Bunchberry Dogwood – 172	Sandcherry – 356
Canada Goldenrod – 697	Shrubby Fivefingers – 155
Canada Wildrye – 962	Smooth Rose – 650
Common Juniper – 136	Speckled Alder – 181
Dwarf Scouring Rush – 76	Thimbleberry – 868
Evening Primrose – 190	Wavy Hairgrass – 861
Fireweed – 184	Western Pearly Everlasting – 539
Grayleaf Red Raspberry – 487	Willow – 8
Lowbush Blueberry – 206	Virginia Strawberry – 1104
Oakes' Evening Primrose – 157	Yellow Avens – 34
Pin Cherry - 62	

Technology Development: The Rose Lake Plant Materials Specialist has provided training to the Apostle Island National Park employees on several slope stabilization techniques. In April the park staff constructed their first vegetative crib wall on Raspberry Island under the direction of the Plant Materials Specialist. They also received guidance on the installation of a vegetative crib wall and slope grid system for Outer Island.

LITTLE BIGHORN BATTLEFIELD NATIONAL MONUMENT

2005 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
BISMARCK 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.

Common Name	*Scientific Name*	PLS pounds
Green needlegrass	*Nassella viridula*	100
Bluebunch wheatgrass	*Pseudoroegneria spicata*	100
Sideoats grama	*Bouteloua curtipendula*	50
Blue grama	*Bouteloua gracilis*	10

Battlefield mass grave site

Park personnel collecting green needlegrass

Accomplishments:

Melana Rapp, biological technician provided supervision to permanent and part time park personnel to collect seed of the specified species in the summer and fall of 2005. The seed was cleaned in the fall of 2005 using an office sized debearder, hammermill, fanning mill, and pan screens. The bulk amounts of seed after cleaning the wildland collections are as follows: green needlegrass -4.5 pounds; bluebunch wheatgrass-3.9 pounds; blue grama-51 grams; and sideoats grama-uncleaned at this time. Germination and purity of green needlegrass and bluebunch was tested by the North Dakota State Seed Department. A small flat of seed was also planted in the greenhouse to evaluate dormancy and emergence.

Due to its very high seed dormancy, green needlegrass was planted as a dormant seeding (approximately ½ acre) on November 23, 2005 at the Bismarck PMC.

Future Plans: Approximately 100 plants of each species will be planted in the greenhouse in January/February 2006. These seedlings will be used to fill any field skips. Bluebunch wheatgrass, sideoats grama, and blue grama will be seeded in the spring of 2006 in fields adjacent to the green needlegrass. Approximately ½ acre will be seeded to bluebunch wheatgrass, and sideoats grama. The minute amount of viable seed after cleaning of blue grama will be seeded to a much smaller area. Fields will be maintained and seed will be harvested, cleaned and distributed to LIBI. Any information pertinent for growing the species will be shared with park personnel.

WIND CAVE NATIONAL PARK

2005 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
BISMARCK 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. Following is a table of the species and seed amounts requested.

Common Name	*Scientific Name*	PLS pounds
Western wheatgrass	*Pascopyrum smithii*	5
Big bluestem	*Andropogon gerardii*	5
Blue grama	*Bouteloua gracilis*	5
Sideoats grama	*Bouteloua curtipendula*	5
Purple three-awn	*Aristida purpurea*	2
Prairie junegrass	*Koeleria macrantha*	2
Bottlebrush squirreltail	*Elymus elymoides*	2
Wavyleaf thistle	*Circium undulatum*	.5
Purple prairieclover	*Dalea purpurea*	.5
Scarlet globemallow	*Sphaeralcea coccinea*	.5
Missouri milkvetch	*Astragalus missouriensis*	.5

*species substituted, see Accomplishment section.

Accomplishments:

Wind Cave National Park personnel collected small amounts of seed of most of the specified species. Seed of Missouri milkvetch and scarlet globemallow were not collected due to poor seed set of the species in 2005. Species collected by the Park as substitutes were slender crazyweed (*Oxytropis campestris*) and Lambert's crazyweed (*Oxytropis lambertii*). Green needlegrass was not on the list but was also collected.

As seed collected was in very small quantities (1-10 grams), the seed was picked through by hand to remove awns, glumes or stems or to knock it out of the seed head.

Future Plans: Seed will be planted to cone-tainers™ in the greenhouse in January 2006. The goal will be to produce 300-400 seedlings of each species. The seedlings will be planted to field rows at the PMC in May/June of 2006. Seed will be harvested from these rows and distributed to Wind Cave National Park.

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ACADIA NATIONAL PARK

2005 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
BIG FLATS 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.

Accomplishments:

Seed was collected on September 21-24, 2005 (arrowwood viburnum, white birch, wild raisin, mountain holly, mapleleaf viburnum, bayberry, Red Oak, dogwood, huckleberry, highbush cranberry, and Sambucus). The seed was shared with Cape May Plant Materials Center to assist them with the Blackwoods Campground revegetation project.

One delivery of plant materials were made in September 2005. This included 602 plants in one gallon pots (17 species) and 2290 plugs (4 species).

Revegetation Sign

Three legged wooden fence barriers

Trailhead planting with signage

At Acadia, plant materials were utilized to revegetate disturbed areas with the summer crew. Roped off areas and the posting of re-vegetation signs has helped keep visitors out of the

plantings, giving the plants a chance to grow. At the Seawall Campground, three-legged wooden fence barriers were added to protect the plantings. All the plantings were mulched and watered with excellent survival of the plantings. The campers have been staying in the designated campsite areas allowing the plants to grow relatively undisturbed. A great idea of the reveg crew campers brush their teeth they learn about the reveg work in their campsite.

Carriage Road Bridge seeding

Revegetating sites in campgrounds

Planting with rock steps along abutment

The plantings done in the past two years at the carriage road bridges are growing well and stabilizing/revegetating the steep slopes. Placement of rock steps/trail along the bridge abutments have kept hikers from trampling the plants.

Planting at Carriage Road Bridge entrance

Roped area

Seeding of shoulder after repavement

Technology Transfer: Forb seed production using the weed fabric has worked well in controlling weeds. The re-vegetation signs have minimized the trampling of plants as well as educated the public on how the park service is utilizing native plants. Many of the plantings in the park are growing well where wood mulch was applied to assist in retaining moisture in the soil. Two posters were presented in 2005. 'Native Plants for Acadia National Park' authored by NRCS and the Park was presented in March at the George Wright Society's Biennial Conference in Philadelphia, PA. 'Native Plants for National Parks' was presented in July at the Soil and Water Conservation Society's Annual Meeting in Rochester, NY attended by 800 participants.

ACADIA NATIONAL PARK

2005 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
CAPE MAY 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.

Master Nurseryman Russ Haas inspects large leaf aster.

Russ Haas inspecting outdoor nursery stock with propagator Betty Marshall

PMC Technician Noel Murray unloads an Acadia delivery trailer.

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 2004, 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.

One delivery of 1,250 assorted plants was made in the summer of 2005. The delivery included an assortment of bayberry, winterberry, large leaf aster and some goldenrods.

Technology Development and Transfer: We initiated a new study titled "Growth Response of Selected Native Plants to Variations in Potting Soil Treatments". Unfortunately Mother Nature had other plans. The summer of 2005 will be remembered as one of the hottest summers Cape May has experienced in recent times. Temperatures were near 100 for extended periods of time with a heat index well over 100. While most staff time was spent moving irrigation piping to keep the nursery alive, we did find limited time to compare the effects of several different potting soils on the root and top growth of Virginia rose.






Results: There were definite differences in both root and top growth bio-mass on a dry weigh basis. However, another year's data will be collected before publishing the findings.

CRATERS OF THE MOON NATIONAL MONUMENT

2005 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
ABERDEEN 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:

During the summer of 2005, technicians from CNM hand collected additional seed for those species with inadequate seed supplies from the prior year collections. These materials were dried, bagged and transported to the PMC. In November 2005, PMC technicians cleaned the seed using the small-lot-seed-cleaning facilities at Aberdeen. The 2005 collection of needlegrass could not be identified to a single species and most likely represents a composite of *Achnatherum* species. In the fall of 2005 the PMC began propagation of limber pine in the greenhouse.

In late November, he PMC was notified that construction work and revegetation is delayed indefinitely. The PMC will continue to maintain the limber pine plants to the end of September and then make them available to CNM and hold all collected seed in cold storage until further notice.

Limber pine

Antelope bitterbrush

Species	*Scientific Name*	Estimated minimum (lbs)	Collected 2004 (lbs)	Collected 2005 (lbs)	Total (lbs)
Antelope bitterbush	*Purshia tridentata*	0.60	0.82	19.00	19.82
Rubber rabbitbrush	*Chrysothamnus nauseosus*	0.60	.022	0.00	0.22
Mountain big sagebrush	*Artemisia tridentata* ssp.*vasseyana*	0.88	Not collected	0.00	0.00
Limber pine	*Pinus flexilis*	2.70 (cones)	1.58 (seed)	0.00	1.58
Sulphurflower buckwheat	*Eriogonum umbellatum*	0.50	1.00	0.96	1.96
Hotrock penstemon	*Penstemon deustrus* var. *deustus*	0.06	0.34	0.00	0.34
Dwarf buckwheat	*Eriogonum ovalifolium* var. *depressum*	4.14	0.12	0.03	0.15
Thurber's needlegrass	*Anhnatherium thurberianum*	25.04	0.50	0.00	0.50
Indian ricegrass	*Achnatherum hymenoides*	25.04	1.40	2.60	4.00
Sandberg bluegrass	*Poa secunda*	8.03	4.68	1.20	5.88
Dusty maiden	*Chaenactis douglassii*	33.60	1.84	0.00	1.84
Scorpion weed	*Phacelia hastata*	25.60	0.70	1.10	1.80
Dwarf monkey flower	*Mimulus nanus*	0.80	0.11	0.00	0.11
Needlegrass mix	*Achnatherum* spp.	N/A	0.00	0.90	0.90

Technology Development: None

LASSEN VOLCANIC NATIONAL PARK

2005 Annual Summary Report
Prepared by

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

Introduction: An agreement was made between Lassen Volcanic National Park and Upper Colorado Environmental Plant Center (UCEPC) June 2001. The agreement, as signed, called for the production of one material, blue wildrye. An amendment to the agreement, signed in September 2001, added production of California brome to the list of contracted species. An additional amendment, executed in the fall of 2002, allowed for the cleaning and testing of wild collected seed from Lassen Volcanic National Park. A third and fourth amendment extended production of California brome and blue wildrye through 2005. The agreement was not renewed or extended for production in 2006.

Accomplishments:

On September 4, 2001, a one-acre field of blue wildrye was planted using a hand pushed Planet Junior and on November 16, 2001, a 0.18-acre field of California brome was planted utilizing the same method. An additional 0.70 of an acre was planted on May 29, 2003 bringing the total production acreage to 0.88 acres, or twenty-six 480-foot rows. The seed for the new seeding had been collected by Bitterroot Growers in 2002. Seed was treated with Vitavax for head smut control prior to planting all but the four southern most rows, which were not treated for head smut. On June 30, 2003, 64 pounds of clean *Bromus carinatus* seed were harvested while 205 pounds of blue wildrye were harvested July 21, 2003.

California brome seed increase

Strong production of both products continued in 2004. The blue wildrye produced 285 clean pounds of seed while the California brome produced 200 pounds.

In 2005, 83 clean pounds of blue wildrye seed were produced. The Lassen California brome is not cleaned at the time of this report.

On September 14, 2005, a single seed shipment was made to Lassen Volcanic National Park. Two materials, 32 pounds (20 PLS) of California brome and 60 pounds (33.4 PLS) of blue wildrye were sent for park revegetation needs. On October 28, UCEPC received 52 pounds of blue wildrye and 23 pounds of California brome from Lassen that had not been used as planned.

Technology Development: Head smut in the California brome field was again a problem for the untreated rows. For the second year, this section was so infected that it was not harvested. The plantings done in May and July with treated seed still had some head smut. Only the November planting remained relatively smut free.

MOUNT RAINIER NATIONAL PARK
State Road 123 Revegetation Project

2005 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 a new agreement with Mount Rainier National Park (NPS) 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 of 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 2005.

Swathing blue wildrye at Corvallis PMC

Accomplishments:

Seed increase fields that were established in 2003 and 2004 grew vigorously in the mild spring and summer of 2005 were harvested in late June and July. The fields of blue wildrye and California brome produced 221 lbs (bulk) and 35 lbs (bulk), respectively. NPS staff collected seed again in 2005 and amounts were large enough to seed directly into fields at the PMC in September and October. Fields will not be expanded in future years. In September 2005, 123 lbs (bulk) were shipped to the Park. There are 158 lbs (bulk) of blue wildrye remaining in storage at the PMC.

Technology Development: This year's blue wildrye field was very impressive. It stood six feet tall in most places and produced more than average seed for a first year field. The field was swathed one foot from the ground and combined using the new HEGE plot combine. The combine made harvest very efficient. This half acre field produced over 250 lbs (bulk). Swathing high also prevented the seeds of the low-growing weed *Poa annua* from contaminating the harvested blue wildrye seed.

Sprayed "control" plot before burning

Burning of FERU field.

In September, the seed increase field of *Festuca rubra* was burned to promote higher seed yields in 2006. Three one-meter plots were watered heavily before the burning. These plots did not burn and seed yields will be compared between burned and non-burned plots.

OLYMPIC NATIONAL PARK
Elwha River Ecosystem and Fisheries Restoration

2005 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 (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 2005 included collecting seed of 16 species (19 lbs total seed collected); establishment and maintenance of seed production fields including five grasses, seven forbs, and two sedges; containerized stock production of eight species; maintenance of cutting blocks of nine shrubs and one forb.

Over 4000 containerized plants were produced to expand or create seed increase fields of three forbs, one sedge, three rushes, and two legumes. Cutting blocks of nine species of shrubs were installed in 2005. These blocks had very high survival rates and first-year growth of up to five feet!

Table 1.Total acres in production and 2005 Seed Yields for the Elwha River Restoration project by species.

Scientific Name	**Field size in 2004 (ac)**	**Yield in 2005**	**Area added in 2005 (ac)**	**Total ac**
Achillea millifolium	0.5	70 lbs	0	0.5
Agrostis exarata	0	--	0.45	0.45
Anaphalis margaritacea	0.02	61 g	0.08	0.1
Bromus sp.	0.1	38 lbs	0.31	0.42
Bromus vulgari	0.1	6 lbs	0.56	0.66
Carex dewayana	0.02	35 g	0.22	0.25
Carex pachystachya	0.085	376 g	0.13	.022
Deschampsia elongate	0.25	82 lbs.	0.18	0.43
Elymus glaucu	0.05	10.5 lbs	0.51	0.56
Epilobium angustifolium	0	2 g	0.1	0.1
Epilobium ciliatum	0.1	26 lbs	0	0.1
Juncus bolanderi	0.03	5 g	0	0.03
Juncus effuses	0.03	--	0	0.03
Lupinus latifolius	0	--	0.1	0.1
Vicia Americana	0.01	--	0.1	0.1
TOTAL	1.38	228 lbs	2.29	3.8

Technology Development: Our *Epilobium ciliatum* field grew and flowered profusely. Weed fabric had been placed in between the rows to prevent weed growth, but it also became a very effective tool for harvesting. Seeds fell onto the fabric and collected in large, fluffy piles. A leaf-blower, used in reverse as a vacuum, was maneuvered down the rows of weed fabric. The blower removed the seeds and compacted them into the sac attached to the leaf-blower. The sac was emptied into large poly bags. They were placed in an open greenhouse to dry. This method was extremely effective and efficient. It also made cleaning the seed very simple. Most harvest methods collect a large amount of plant material along with the seed. Vacuuming left the plants fully intact on the field and the harvested seed was relatively free of plant material. Vacuumed material was emptied into a brush machine to rub the hairs off the seed. An air screen machine was used to sift the seed and blow out any remaining hairs.

OLYMPIC NATIONAL PARK
Hurricane Ridge Road Project

2005 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 revegetation of Hurricane Ridge Road. It was agreed that the PMC would propagate a minimum of 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.

***Artemisia ludoviciana* seed increase field**

The project is expected to be completed in 2007.

Accomplishments:

PMC staff collected 18 lbs of seed of the six species (seven accessions) that have been chosen for seed increase. The seed was cleaned and germination tests were performed prior to sowing. Four grass fields (two blue wildrye fields, Columbia brome and sitka brome) and two forb fields (wooly sunflower and white sage) were seeded in early October. Broad-leaf lupine seed was sown into cone-tainers in fall of 2005 and the resulting plants will be transplanted out into a seed increase field in 2006. PMC staff also collected over 4 lbs of seed of four forb species (8 accessions: high elevation and low elevation of each). This seed will be sown directly at the restoration site. Seed increase fields that were sown in the fall of 2004 were maintained and harvested in 2005. Results are shown below.

Table 1. Seed Increase Field Production for 2005.

Scientific Name	**Area Harvested**	**Yield**
Elymus glaucus (low elevation)	0.11 acres	10.5 lbs
Bromus vulgaris	0.13 acres	7 lbs
Bromus sitchensis	0.033 acres	333 g
Elymus glaucus (high elevation)	0.06 acres	363 g
Eriophyllum lanatum	0.046 acres	107 g

Technology Developments: Lupine species are difficult to harvest efficiently due to their indeterminate ripening and easily shattering pods. To aid in seed collection, 2ft-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.

LULA4 field after sowing September 25, 2004

LULA4 field one year later, September 30, 2005.

Seeding depths were investigated for white sage in fall of 2005. Rows were sown at 1/2", 1/4" and on the surface. The rows will be analyzed and compared in the spring of 2006. These sowing depths will repeated in spring of 2006 to compare spring vs. fall sowing. Results will be shared in the 2006 report of activities.

SEQUOIA/KINGS CANYON NATIONAL PARK

2005 Annual Summary Report
prepared by

NATURAL RESOURCES CONSERVATION SERVICE
LOCKEFORD PLANT MATERIALS CENTER
LOCKEFORD, CALIFORNIA

Introduction: During FY2005, five different species were grown at the Lockeford PMC for maximum seed production. A total of 36.32 pounds of pure live seed (PLS) was produced at the PMC. **The project total is now 226.13 pounds of PLS**. The PMC propagated 4000 plugs of one species 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 FY2003 and will be completed in FY2005. The overall goal of the project is to produce a minimum of 150 PLS pounds of seed form six species. The PMC produced 76.13 PLS pounds over the goal.

Sequoia Bromus carinatus

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., one foot spacing) of three species (Trifolium ciliolatum, Lupinus bicolor, Poa secunda) and direct seed three species (Melica californica, Elymus glaucus, Bromus carinatus) on 30 inch rows .5 acre ea. . The three species on the fabric were had harvested and shattered seed was vacuumed off the fabric. The three direct seeded species were harvested using a FailVac or combine harvester. All seed was cleaned and tested. The Melica and Poa were poor seed producers.

Species & PLS lbs.	FY03	FY04	FY05	TOTAL
Trifolium ciliolatum 9083009 TRCI	22.93	6.5	12.85	**42.28**
Lupinus bicolor 9083008 LUBI	28.37	32.75		**61.12**
Poa secunda 9083007 POSE	.15	.59	.14	**.88**
Melica californica 9083006 MECA	.54	.70	.58	**1.82**
Elymus glaucus 9083005 ELGL	26.70	35.0	14.75	**76.45**
Bromus carinatus 9083004 BRACA	9.58	26.0	8.00	**43.58**
			PLS lbs.	**226.13**

Sequoia Trifolium cilioatum

Technology Development: All seed cleaning was documented and screen size and air flow for each species was determined. The weed control fabric was successfully used to control weeds and allow shattered seed to be vacuumed up with out soil.

CUMBERLAND GAP NATIONAL HISTORIC PARK

2005 Annual Summary Report
prepared by

NATURAL RESOURCES CONSERVATION SERVICE
BELTSVILLE NATIONAL PLANT MATERIALS CENTER
BELTSVILLE, MARYLAND

Introduction: Cooperative agreements between the Cumberland Gap National Historical Park (CUGA) and the National Plant Materials Center (NPMC) have been in place since 1990. Currently, the fourth cooperative agreement with the Park covers the replanting of the Gap restoration areas, visitor areas and other revegetation needs. This agreement was initiated in 2002 and continued through 2005. The final plant deliveries were completed in the spring of 2005 and utilized the remaining live plant materials at the NPMC. The plantings in 2005 completed the obligations for the agreement and the remaining revegetation work required by the park. All herbaceous seeds required for the agreement have been delivered, but additional seed has been harvested and conditioned in 2005.

Preplant walk through

October 2004

Accomplishments:

In the spring of 2005 the NPMC staff coordinated two plantings at the park. All areas planted this year were in high visibility locations including the Visitor Information Center (VIC). The VIC was also the only area needing planting that had not been planted previously. The remaining plantings were used to further enhance other high visibility areas that had already been planted in previous years and would benefit from additional plantings. The slide area adjacent to the Thomas Walker parking area was the only area not planted due to repairs being foreseen for the area.

In March, seven students from Cumberland Mountain Research Center, Lincoln Memorial University in Harrogate, TN were hired to help plant 2,154 bare-root and 508 container-grown woody plants. Bare-root woody plants consisted of 7 tree species and 3 shrub species. Container-grown woody plants consisted of 20 species of trees and 10 species of shrubs. An estimated total of 5 acres were planted. Most of the large containerized trees and shrubs were planted at the VIC.

VIC herbaceous plug and woody transplant installation

In April, herbaceous plugs were planted. This later planting allowed for better survival in the warmer weather after planting. A group of ten volunteers were recruited by the park to plant 6,050 herbaceous plugs consisting of 5 species of wildflower and 2 species of grass. The plugs were planted around the VIC, Daniel Boone parking area, and in the saddle of the gap.

About 14 bulk pounds of grass and wildflower seed were produced and conditioned in 2005, bringing the amount of bulk seed in the inventory to approximately 144 lbs.

Technology Developments and Observations: A project report was submitted to CUGA in February, 2005 describing the planting work that was completed at the vernal pool wetland mitigation site, and the progress of the site towards the goal of providing habitat for the rare four-toed salamander and other amphibians. Growth and survival of planted trees, shrubs and sphagnum moss has been outstanding. The trees will eventually provide the shade required by certain amphibian species. The sphagnum moss has established well and is expanding. The sphagnum moss provides the preferred nesting habitat for the four-toed salamander.

Extensive deer-rub damage to a large number of trees planted around the Daniel Boone and Thomas Walker parking areas was observed after the fall 2003 breeding season. White polypropylene fabric tree wrap from DeWitt was determined to be the most acceptable deterrent, being both easy to apply and cost effective. The color of the white tree wrap discourages rubbing, but offers limited protection against very determined deer. The tree wrap was applied to previously planted trees in early fall of 2004 and to newly planted trees in March 2005. Trees were inspected in March 2005 and only one previously protected tree was observed with significant damage.

GREAT SMOKY MOUNTAINS NATIONAL PARK

2005 Annual Summary Report
prepared by

NATURAL RESOURCES CONSERVATION SERVICE
BELTSVILLE NATIONAL PLANT MATERIALS CENTER
BELTSVILLE MARYLAND

Introduction: The current cooperative agreement between the Great Smoky Mountains National Park (GRSM) and the National Plant Materials Center (NPMC) was signed in May, 2000, for Fiscal Years 2001–2005. Approximately 300 lbs. of grass/forbs seed, 30,000 grass/forbs plugs, 4,200 bare root and 800 containerized trees and shrubs were to be supplied under the agreement for revegetation of approximately 2 acres yearly in the Foothills Parkway. GRSM staff will collect 530 pounds of seed from within the Park and ship it to NPMC for conditioning, testing, storage, and plug production. It will also continue to produce plugs for the GRSM grass and wildflower seed production fields. The fields were established in Cades Cove in 1998 because of delays in the Foothills Parkway (FHP) construction, the need to utilize materials produced by NPMC per the interagency agreement, and to ensure availability of native plants when construction on the FHP resumes.

Big bluestem field established at park by plugs from Beltsville PMC

The Park plans to be able to handle the 2-acre per year revegetation efforts for the Foothills Parkway beyond 2005 by raising its own plugs and seed and increasing its own seed cleaning and storage

Accomplishments:

- **Woody Plant Materials:** 69 containers (Mountain laurel, Sourwood, and Flame Azalea) were delivered to the park in October 2005. The total amount of woody plant material required by the 2001 – 2005 interagency agreement has been met.

- **Herbaceous Plug Production**: The total amount of plugs required by the 2001 – 2005 interagency agreement has been met.

- **Seed Production, Conditioning and Delivery**: 96 pounds of cleaned seed (Bushy bluestem, Little bluestem, Narrowleaf silkgrass, Sugarcane Plumegrass, and Indiangrass) were produced from Cades Cove seed increase fields and NPMC seed increase fields in 2005. Approximately 570 pounds, PLS, of cleaned GRSM herbaceous and woody seed is presently stored at the NPMC. The total amount of seed supplied to the park required by the 2001 – 2005 interagency agreement has been met.

Miscellaneous: A surplus 1989 Norlake refrigeration unit, from the New Jersey Plant Materials Center, was looked at for shipment to the park. Unfortunately a suitable site in the park could not be found to house the refrigerator. The refrigerator would have greatly assisted park staff in their ability to store seed lots on site plus alleviate shipping costs of seed from the National Plants Materials Center to GRSM.

With the autumn 2005 delivery, the NPMC has fulfilled all of its obligations for the 2001 - 2005 interagency contract, and a new contract was authorized for 2006 - 2010.

STONES RIVER NATIONAL BATTLEFIELD

2005 Annual Summary Report
Prepared by John Vandevender

NATURAL RESOURCES CONSERVATION SERVICE
ALDERSON 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. 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.

Typical Present Day Stones River Cedar Glade

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 2005 marked the third year of this agreement. During 2005, 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 26,000 seedlings were produced at the PMC and delivered to Stones River for transplanting into their seed production fields.

Typical A*ndropogon ternarius* Seed Production Field at Stones River

Seedlings produced during 2005 included: *Schizachyrium scoparium,* little bluestem; *Sporobolus compositus,* composite dropseed; *Chasmanthium latifolium,* river oats; *Andropogon gyrans,* Elliott's bluestem; *Andropogon ternarius,* splitbeard bluestem; *Rudbeckia hirta,* black eyed susan; *Dicanthelium* spp., dicanthelium; *Carex* spp., sedges; and *Leersia virginica,* white grass.

Technology Development: During the year, the Alderson PMC presented poster papers about native plant restoration activities at Stones River National Battlefield at the Fourth Eastern Native Grass Symposium which was held in Lexington, Kentucky and at The George Wright Society Biennial Conference on Parks, Protected Areas, and Cultural Sites in Philadelphia, Pennsylvania.

Additionally, oral presentations on native plant restoration activities at Stones River were given at The George Wright Society Biennial Conference on Parks, Protected Areas, and Cultural Sites in Philadelphia, Pennsylvania and at the first Native Plant Restoration for NPS Managers Workshop held at Manassas National Battlefield in Manassas, Virginia.

NATIONAL PARK SERVICE
WETLAND ESTABLISHMENT RESEARCH STUDY

2005 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
ABERDEEN PLANT MATERIALS CENTER
ABERDEEN, IDAHO

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

Accomplishments:

In 2005, the PMC made 15 seed collections from wetland species throughout the PMC service area. Collections included 4 Nebraska sedge (*Carex nebrascensis*), 4 Baltic rush (*Juncus balticus*), 3 creeping spikerush (*Eleocharis palustris*), 2 hardstem bulrush (*Schoenoplectus acutus*) and 2 common threesquare (*Schoenoplectus pungens).*

Submerseed™ particle with *Juncus* seedlings

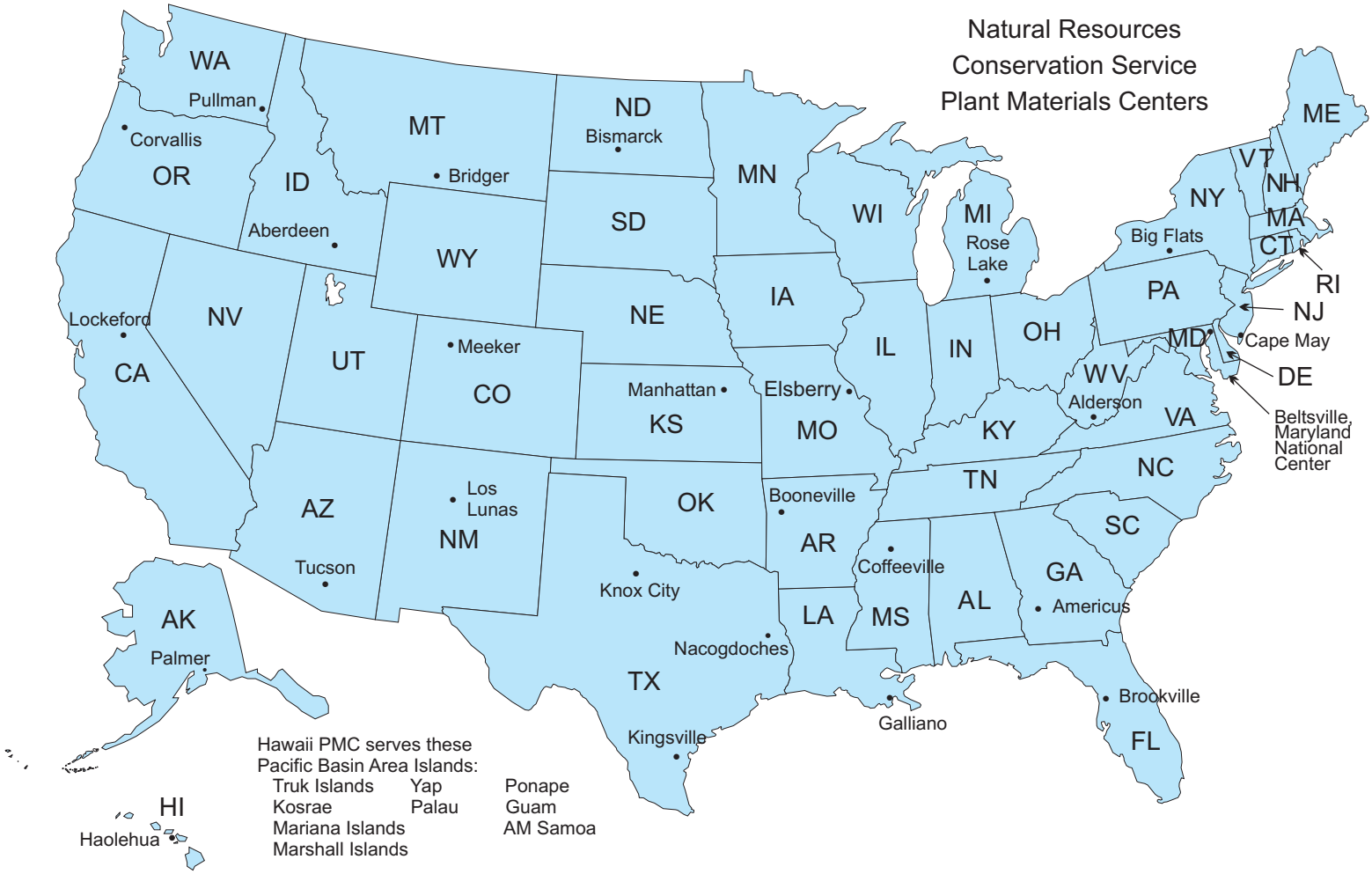
Artificial wetland tank with greenhouse flats (six days after planting).

Technology Development: In 2005, the PMC established a greenhouse trial to evaluate four different methods of direct seeding of Nebraska sedge and Baltic rush. The four methods tested were: 1) tackifier, 2) Submerseed pellets, 3) broadcast and pressed, and 4) drilled to ¼ inch. Plots were planted and subsequently flooded to allow for dispersal of loose seed. The analyzed data indicated that Submerseed, tackifier and broadcasting followed by pressing or imprinting effectively held acceptable amounts of seed in place and allowed for germination in both species. The percentage of seed that remained in place and germinated was significantly higher in the Submerseed plots which equates to fewer seeds necessary to establish plants in desired locations. Other methods can be successful provided one uses enough seed. A report of these data has been accepted for publication in the *Native Plants Journal*.

The PMC also attempted to establish a similar trial in the constructed wetland ponds on the PMC farm however, due to water control difficulties and the presence of volunteer plants in the ponds, the study was discontinued. The trial will be attempted again in 2006, but instead of using the wetland

ponds the PMC will establish plots in much smaller ponds. This will allow complete water control as well as prevent recruitment from the seed bank.

In 2006, the PMC also plans to address problems involving the stratification of seed prior to planting. Numerous stratification methods are currently used by greenhouses, nurseries and other agencies. The PMC intends to look at these and other new possibilities in a replicated trial to determine which, if any, are significantly better.



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
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