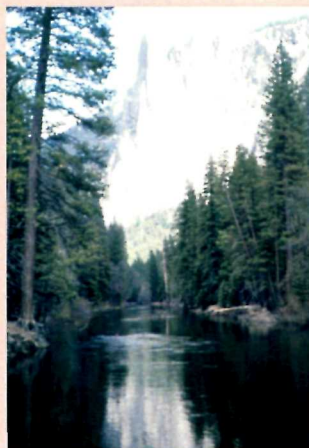


Native Plants for Parks



FY 2000

Plant Materials Project Summary Reports

From the

Natural Resources Conservation Service

To the

National Park Service



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



FY 2000
Plant Materials Project Summary Reports
from the
Natural Resources Conservation Service
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February 2001

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INTRODUCTION

This is the 2000 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, P.O. Box 25287, Lakewood CO. 80225. E- Mail russ_haas@nps.gov or Phone 303- 969-2172.

The comprehensive 2000 Annual Technical reports are also available at the above address or from respective plant material centers.

Below is the "Table of Contents" which lists the projects that were active at parks in 2000. If you have any questions or comments to improve the use and distribution of these reports, please contact Russ Haas or Nancy Dunkle at NPS/DSC.

NATIONAL PARK SERVICE
and
NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS PROGRAM

OVERVIEW OF FY 2000 ACTIVITIES

Development and Administration of Interagency Agreements. Thirteen new agreements and 8 agreement extensions were developed this fiscal year. At this time there are 33 active projects at 23 National Parks in cooperation with 9 Plant Materials Centers.

Plant and Seed Production. The PMCs produced approximately 1,350 pounds of seed and 43,725 transplants of 334 indigenous native grass, forb, shrub and tree species (84 grass, 99 forb, 104 shrub, and 47 tree species) in 2000.

Technical Assistance. Technical assistance was provided to DSC Landscape Architects and Project Managers; and regional specialists, park natural resources personnel relative to weed/ exotic plant control, bioengineering concepts and recommendations, plant species, irrigation, seeding and erosion control specifications, monitoring and development of interagency agreements.

Technology Transfer.

- Significant progress was made towards a joint NPS, NRCS, NFS and University of Idaho effort to document native plant propagation protocols on an interagency website. The website called "Native Plants Network" (<http://native.plants.for.uidaho.edu>) provides a location where native plant propagators can register, share information and be recognized for the techniques they have developed for some of the native species that are not commercially available. Over 500 protocols have been entered. Of these approximately 300 are NPS and 150 are NRCS. The goal is to eventually use this information to revise the 1993 publication "Native Plant Propagation Techniques for National Parks"
- Coordinated and conducted a Bioengineering /Wetland Workshop for DSC personnel utilizing an NRCS Plant Materials Wetland Ecologist.
- Developed, published and distributed a program brochure and report to all NRCS PMCs, PMS, and State Conservationists. This was also distributed to selected National Parks and revegetation personnel.
- Technology development related to Acadia National Park was reported by the Big Flats New York PMC in two "Native Plant Journal" articles and a poster presentation at the Second Eastern Native Grass Conference.
- The Knox City Texas PMC described the development of indigenous seed/plants for the Big Bend National Park at the annual meeting of the Texas Society of Ecological Restoration.

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INTERMOUNTAIN REGION

**Big Bend National Park
2000 Annual 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. 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 pending the rescheduling of construction activities. All agreements involve seed and/or plant collection at the Park and seed increase at the PMC. Materials produced are used for roadside revegetation along section of the Ross Maxwell Scenic Drive. Plant materials (seeds) are drilled and/or broadcast along road shoulders following construction.

Accomplishments:

Since 1989 nine different species have been produced for the park and three species are being looked at to determine production and propagation techniques.

At the end of 2000, the park had received a total of 2108 bulk pounds of seed totaling 840 PLS lbs.

Seed Production and Available Inventory . 2000

Common Name	Area(ac)	2000 Prod./Lbs	PLS Inventory On Hand
Alkali sacaton	1.0	-	379.7
Sideoats grama	-	-	209.3
Green sprangletop	-	-	461.1
Cane bluestem	-	-	81.0
Showy menodora	.50	15.75	225.9
Chisos bluebonnet	-	-	-
Chino grama	.75	7.75	62.0
Tobosa	.10	increase	-
Limoncillo	-	-	30.0*

* bulk material wt

Conclusion:

At the end of FY 2000 the only seed production fields that are currently being maintained includes alkali sacaton, showy menodora, Chino grama, and a new increase of tobosagrass. The center will continue to increase the tobosagrass in the anticipation of future needs at Big Bend NP. FY2001 will be the last year that funds will be available to maintain increase fields for Big Bend National Park.

**BRYCE CANYON NATIONAL PARK
2000 ANNUAL REPORT
prepared by
UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO**

INTRODUCTION

Bryce Canyon National Park and the Upper Colorado Environmental Plant Center entered into an agreement which was formally approved in June, 1998. Preliminary steps have been initiated to amend the agreement to increase target production quantities to 1500 pounds and extend the agreement into Fiscal Year 2002. Two species, slender wheatgrass, *Elymus trachycaulus*, and nodding brome, *Bromus anomalus*, were identified for seed increase.

ACCOMPLISHMENTS

Approximately 34 pounds of nodding brome, 9 PLS pounds, were produced in 2000 on a field established July 20, 1998. In its second year of production, a one half acre field of slender wheatgrass, established August 12, 1998, produced 103 clean pounds, 78 PLS pounds, of seed. Current inventory of Bryce Canyon Seed is estimated at 450 PLS pounds.

TECHNOLOGY DEVELOPMENTS

Specific information about germination trials, soil preparation, seeding rates or seeding establishment methods are available upon request.

**Chickasaw National Recreation Area
2000 Annual Report
prepared by the
Natural Resources Conservation Service
James E. 'Bud' Smith Plant Materials Center**

Introduction

The original agreement with Chickasaw National Recreation Area and the James E. 'Bud' Smith Plant Materials Center was developed and signed in 1990. The first phase for revegetating of the Buckhorn Area was completed in 1995. The second phase for revegetating the Guy Sandy Area was completed in 1999. Phase three of the project for revegetating of the Veterans Lake Area will occur between the years 2000-2002. Phase four of the project for revegetating of the Point Campground will occur between the years of 2000-2002. Phase five of the project for revegetating of the Point/Perimeter Roads will occur between the years 2001-2002. Phase one and two included seed and woody productions. Phases three through five will include seed production of ten native grasses (buffalograss, nimblewill, sideoats grama, Indiangrass, little bluestem, big bluestem, hairy grama, canada and virginia wildrye, purpletop) and several shrub/woody transplant production. Phase three for Veterans Lake Area will also include seed production of several forbs and a legume.

Accomplishments

From 1993 to 2000 the Park had received a total of 1,041 bulk pounds of grass seed totaling 640 PLS lbs, and 3,398 woody transplants (container and bareroot) of black willow, blackjack oak, Carolina buckthorn, bur oak, Chickasaw plum, cottonwood, post oak, redbud, red oak, sycamore, smooth sumac and persimmon.

Seed and Plant Production Inventory Dec. 2000

Common Names	Units	2000 Prod. or lbs.	PLS or # of Plants On Hand
Sideoats grama	.33 ac.	214.5*	93.5
Hairy grama	.25 ac.	23.25*	2.32
Big bluestem	.25 ac.	55.50*	5.48
Little bluestem	.15 ac.	126.00*	17.88
Indiangrass	.75 ac.	0.0*	201.32
Blackjack oak	ea	53	53
Buttonbush	ea	283	283
Carolina buckthorn	ea	0	0
Mexican plum	ea	3	3
Eastern redbud	ea	21	55
Red oak	ea	150	250
Black willow	ea	60	80
Cottonwood	ea	150	150
Sycamore	ea	500	500
Skunkbush	ea	300	300
Smooth sumac	ea	200	200
Persimmon	ea	300	300
Purple coneflower	.03 ac.	0	0
Mexican hat	.03 ac.	0	0
Indian blanket	.03 ac.	0	0
Purple prairie clover	.03 ac.	1.25*	0
Blackeye susan	.03 ac.	.5*	0
Clasping-leaved coneflower	.03 ac.	0	0
Gayfeather	.03 ac.	1.5*	0

Bulk lbs.*

DINOSAUR NATIONAL MONUMENT
Annual Report
2000 prepared by
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. This agreement involves the collection and seed production of five grass species native to Dinosaur National Monument. Targeted species are: Western wheatgrass (*Pascopyron smithii* - 9070955), Indian ricegrass (*Oryzopsis hymenoides* - 9070953), Great 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*). These grasses will be used for restoration and to reduce pressure from non-indigenous weedy plants found in the National Monument. 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. Dinosaur personnel made three trips to the plant center in 2000. One trip was to deliver seed to the center for cleaning and another was to pick up the cleaned seed. The third trip was to introduce Fish and Wildlife personnel from Utah to the plant center products and services.

ACCOMPLISHMENTS: Seed was harvested from each of the seed fields in 2000, and one field (Alkali sacaton) was harvested twice (July 12 and September 11).

<u>Seed Harvested</u>		<u>Seed Fields</u>	
Name	Amount	Name	Size
Indian ricegrass	0.97 lb	Basin wildrye	0.24 acre
Basin wildrye	5.50 lb	Bluebunch wheatgrass	0.24 acre
Bluebunch wheatgrass	1.40 lb	Indian ricegrass *	0.24 acre
Alkali sacaton	2.40 lb	Alkali sacaton *	0.18 acre

* Interseeded in 1999

TECHNOLOGY DEVELOPMENTS: Specific information on procedures and methods for seed cleaning can be requested for each species.

GLACIER NATIONAL PARK 2000 SUMMARY REPORT

prepared by

Natural Resources Conservation Service Bridger Plant Materials Center

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. It has been mutually agreed that BPMC personnel will spend at least 1 week each year in Glacier National Park observing restoration efforts and consulting with the Park science staff.

In 2000, 113 lots of seed representing 58 individual species were delivered to GNP or used for BPMC production totaling 255.1 pounds (115.7 kg). The 2000 distribution included 35 grass lots (18 species), 37 forb lots (23 species), and 41 shrub lots (17 species).

ACCOMPLISHMENTS: GNP identifies their seed and plant needs for each project allowing 2 to 3 years of lead time in most cases. Wildland seed is collected by GNP employees and volunteers, dried, and then mailed to the BPMC where they are cleaned, weighed, accessioned, inventoried, and stored until requested. In 2000, 86 total collections were sent to the BPMC and cleaned: 13 collections of grasses, sedges, and rushes (11 species); 48 forb collections (33 species); and 25 shrub collections (12 species). A total of 29.27 lbs. (13.276 kg) of clean seed were processed; 7.01 lbs. (3.181 kg) of grass and grass-like, 20.08 lbs. (9.11 kg) of forbs, and 2.17 lbs. (0.986 kg) of trees and shrubs. A total of 28 new species:collection sites were identified and accessioned representing 5 grasses (3 species), 10 forb (7 species), and 13 woodies (8 species).

In Spring 2000, 3 new grass seed production fields (3 species) were established at the BPMC. The species that were planted include *Elymus glaucus* (Many Glacier), *Pseudoroegneria spicata* (Many Glacier), and *Stipa nelsonii* (Rising Sun). A total of 13 grass or grass-like (9 species) and one forb (1 species) seed production fields remained active in late 2000. The grass and grass-like production fields produced 64.67 lbs. (29.33 kg) of clean seed. One forb (*Aster laevis*) field produced 1.2 lbs. (0.545 kg) of clean seed. Five grass production fields have been removed from production since late 1999.

Seed germination tests are currently being conducted on 10 accessions (9 species) grown in 2000 including *Carex* sp. (Avalanche), *Carex athrostachya* (Camas Road), *Carex douglasii* (Avalanche), *Carex hoodii* (Avalanche), *Elymus glaucus* (2 collections) (Bowman Lake and McGinnis Creek), *Festuca idahoensis*, (Big Prairie), *Phleum alpinum* (Logan Pass), *Poa alpina* (Logan Pass), and *Aster laevis* (Avalanche). Results are unavailable at this time.

No bareroot or containerized material was delivered to GNP in 2000. In November 2000, woody seed stratifications were initiated for three species for container production: *Rosa woodsii* (Quarter Circle Bridge), *Rubus parviflorus* (North Fork), and *Symphoricarpos albus* (Avalanche). Combinations of acid scarification and warm, moist stratification are being compared for the *Rosa woodsii* and *Symphoricarpos albus* lots.

TECHNOLOGY DEVELOPMENT: A cost matrix was used in 2000 to verify that the BPMC was meeting contractual obligations for GNP projects at the 2000 funding level. A statistical analysis of the alpine light study was completed in 2000.

GRAND CANYON NATIONAL PARK
2000 Annual Summary Sheet Report
 Prepared by
Natural Resources Conservation Service
Los Lunas Plant Materials Center

I. Introduction

The Agreement between the Grand Canyon National Park, Arizona and the Natural Resources Conservation Service was executed July 1990 and provides for the collection, propagation, and increase of grasses, forbs, shrubs, and trees.

II. Accomplishments

Seed Production 2000

There was not a seed production contract with the park this year. However, we still maintained a previously contracted 1/2 acre field of muttongrass and a 1/2 acre field of blue grama. Neither field produced seed and probably both will be plowed in the spring. New 1/2 acre fields of blue grama and muttongrass were established in October 2000 using seedling transplants. Both fields are doing well and we expect to have a seed harvest in 2001.

Seed Delivered 2000

Species	PLS Pounds
Western wheatgrass	55.49
Blue grama	3.5
Bottlebrush Squirreltail	0.5
Penstemon	0.4
Total	59.8

Transplant Production 2000

Common name	Treepots delivered
Mexican Cliffrose	38
Fernbush	258
Rubber Rabbitbrush	152
Apache Plume	298
Big Sagebrush	164
Pinon Pine	130
Ponderosa Pine	252
Currant	95
Desert Barberry	209
Curl-leaf Mountain Mahogany	116
Morman Tea	107
Mountain Snowberry	80
Utah Serviceberry	61
NM Locust	178
Gambel Oak	92
Total	2230

III. Technology Development

Originally the muttongrass seedling transplants were installed in May 2000. It was unusually hot during this period and this cool season species went dormant within two weeks after planting. Because the seedlings had shallow root systems, water was applied about every four days to prevent the planting from drying out. Unfortunately, with these hot temperatures, coupled with the regular irrigation, the seedlings displayed root rotting, maybe pythium fungus, and we lost the planting. The same planting technique was applied in October 2000 during cool temperatures with success as previously reported.

**GRAND TETON NATIONAL PARK
2000 ANNUAL REPORT
prepared by
UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO**

INTRODUCTION

An agreement between Grand Teton National Park and Upper Colorado Environmental Plant Center (UCEPC) was formally approved in October of 1998. The agreement called for the production of 200 pounds of mountain brome, *Bromus marginatus*, seed in a single production year. However, due to a late planting date in the fall of 1998 and serious head smut problems with the crop during the 1999 production year, the seed production was far short of the goal. UCEPC took it upon themselves to maintain the field for an additional year to attain target production. The seed source for the planting was from an original Grand Teton Park collection which was increased under a previous contract and maintained as inventory by UCEPC.

ACCOMPLISHMENTS

It was hoped that the targeted 200 pounds would be reached after FY 2000 production. However, a total of 68 pounds was produced. A rather severe hail storm occurred on June 19, just prior to seed harvest on June 28, and head smut was a serious problem once again. It was estimated by UCEPC personnel that over 60% of the seed heads were in fact smut heads rather than seed and over 50% of the crop was lost in the hail storm. Nonetheless, the field is robust and vigorous and is capable of producing large quantities of seed.

Park personnel had collected basin wildrye during the fall of 1998 and had sent it to UCEPC for cleaning. It was mutually decided to produce basin wildrye as a likely more reliable seed producer than the smutted brome. A 1.1 acre field was planted on October 5, 1999. Because of the late planting date in 1999, no seed was produced from the basin wildrye field in 2000. Curation was conducted during the entire growing season to take full advantage of seed production potential during FY 2001.

TECHNOLOGY DEVELOPMENTS

Specific information about seed treatment, seeding rates, irrigation schedules or other production methods are available upon request. Work is continuing with head smut transfer, longevity, and relationship through time to infected and resistant plants alike.

**MESA VERDE NATIONAL PARK
2000 Annual Report
prepared by**

UPPER COLORADO ENVIRONMENTAL PLANT CENTER, MEEKER, COLORADO

INTRODUCTION: The Upper Colorado Environmental Plant Center (UCEPC) entered into an agreement with Mesa Verde National Park on September 26, 1990. This agreement was amended in 1995 and involves a total of 19 species, with 1342 lb. of seed production and 5172 live plants. Targeted species with (PLS) pounds and number of transplants (T) desired are: 9024897 *Pascopyron smithii* (western wheatgrass) 160 PLS, 9024892 *Elymus trachycaulus* spp. *trachycaulus* (slender wheatgrass) 840 PLS, 9024893 *Leymus salinus* (salina wildrye) 67 PLS, 9024881 *Poa fendleriana* (muttongrass) 104 PLS, 9024883 *Achillea millefolium* (yarrow) 50 PLS, 9024870 *Aster glaucodes* (blueleaf aster) 3 PLS, 9024873 *Chrysopsis villosa* (hairy golden aster) 38 PLS, 9024886 *Artemisia ludoviciana* (Louisiana sage) 65 PLS, 9070862 *Penstemon linarioides* (low penstemon) 500 (T), *Lupinus caudatus* (spur lupine) 500 (T), *Oenothera caespitosa* (evening primrose) 500 (T), 9024869 *Amelanchier, utahensis* (Utah Serviceberry) 25 (T), 9024874 *Cercocarpus montanus* (mountain mahogany) 3 PLS and 500 (T), 9024898 *Symphoricarpos oreophilus* (snowberry) 4 PLS and 700 (T), 9024895 *Quercus gambelii* (gambel oak) 10 PLS and 250 (T), 9024878 *Atriplex canescens* (fourwing saltbush) 950 (T), 9024872 *Purshia tridentata* (antelope bitterbrush) 13 PLS and 800 (T), 9024899 *Pinus edulis* (pinyon pine) 10 PLS and 445 (T), and 9024880 *Juniperus osteosperma* (Utah juniper) 2 (T). The agreement was put on hold in 1997 and no new work was initiated for live plant production. The agreement remained on hold in 1998. Two amendments to the agreement were approved in 1999. A new Interagency Agreement and an amendment were approved in 2000. One trip to the park was made by plant center personnel in 2000, to provide information, deliver seed and help with a planting. All seed lots of Mesa Verde materials were updated for germination in 1999. Large lots of the 25 species collected by the park in 1999 were cleaned and all lots were returned to the park in 2000. Live plant production for the park in 2000 involved; gambel oak, Utah serviceberry, mountain mahogany, mountain snowberry, blueleaf aster and fourwing saltbush. The contract seed production for the park does not continue beyond 2000.

ACCOMPLISHMENTS: Seed was harvested from the following species at the UCEPC in 2000. Seed was provided for the park three times in 2000.

<u>SEED HARVEST</u>		<u>SEED PROVIDED FOR THE PARK</u>	
Species	Clean seed		Seed PLS
Muttongrass	29.0 lb	Slender wheatgrass	16.7 lb
Slender wheatgrass	13.0 lb	Muttongrass	14.1 lb
Yarrow	52.0 g	Western wheatgrass	10.3 lb
Salina wildrye	3.0 g	Salina wildrye	10.3 lb
Hairy golden aster	19.0 g	Louisiana sage	6.9 lb
		Yarrow	4.6 lb
		Hairy golden aster	4.6 lb
		Mountain mahogany	0.2 lb
		Utah serviceberry	0.3 lb

TECHNOLOGY DEVELOPMENTS: Native Plant Mats grown in the plant centers greenhouse were placed on soil in 2000. Two soil materials were used and notes were taken on species of grasses and forbs present, canopy cover, type of mat used, rooting and suitability for rolling and unrolling.

**PETRIFIED FOREST NATIONAL PARK
2000 Annual Summary Report
Prepared by**

**Natural Resources Conservation Service
Los Lunas, New Mexico Plant Materials Center**

INTRODUCTION: The NRCS Los Lunas Plant Materials Center entered into an agreement with the Petrified Forest National Park in December of 2000. The purpose of the agreement is to propagate and install indigenous native plants for revegetation of areas disturbed by replacement of the Jim Camp Wash Bridge and obliteration of the Long Longs Road. A total of 500 container plants of sand sage (*Artemisia filifolia*), four wing saltbush (*Artemisia canadensis*) dune broom, (*Parryella filifolia*), jimmy weed (*Applopappus heterophylus*) and desert globe mallow (*Sphaeralcea ambigua*) will be produced, delivered to the park and planted by the PMC.

ACCOMPLISHMENTS: Seed was collected by park personnel in 1999 and provided to the PMC. The seed was processed in 2000 and conditioned to begin propagation during the winter/spring of 200-2001.

TECHNOLOGY DEVELOPMENTS: No new technological developments or significant observations have been noted or completed. Specific information on procedures and methods can be requested for each species.

ROCKY MOUNTAIN NATIONAL PARK
2000 Annual Report
 prepared by
UPPER COLORADO ENVIRONMENTAL PLANT CENTER
 Meeker, Colorado

INTRODUCTION:

Upper Colorado Environmental Plant Center (UCEPC) Project No. O8S211 (IA No. 1520-2-9001) cooperative plant materials agreement was signed September 9, 1999 by Rocky Mountain National Park, the USDA Natural Resources Conservation Service (USDA-NRCS), and the UCEPC. This agreement involves the collection and seed production of three grass species native to the East side of Rocky Mountain National Park. Targeted species are: mountain muhly (*Muhlenbergia montana* - 9070957), Junegrass (*Koeleria cristata* - 9070962), and sleepy grass (*Stipa robusta* - 9070958)

ACCOMPLISHMENTS:

The field (0.8 acre) of mountain muhly (*Muhlenbergia montana*) that was planted for the new East side seed mix in 1999 was interseeded in 2000. The small experimental plot (10' by 20') of mountain muhly established in 1997 produced 427 grams cleaned seed this year, in addition to 1.0 lb the prior year. We have had park approval to continue production of the previously identified collection of green needlegrass (*Stipa viridula*) that has been identified as predominantly sleepy grass (*Stipa robusta*). This field produced 47 lb of cleaned seed in 2000. On July 26th, two seasonal park employees visited the center and picked up 532 wild strawberry plants for the Hidden Valley Revegetation Project. The following table include collection amounts from RMNP for the proposed Junegrass field, and harvested amounts from established plots.

EAST SIDE SPECIES

Scientific name	Common name	Seed on hand	2000 Harvest
		Cleaned seed	
Grasses:			
<i>Muhlenbergia montana</i>	mountain muhly	2.9 lb	0.94 lb
<i>Koeleria cristata</i>	Junegrass	78.0 g (SC)	22.00 g (SC)
<i>Stipa robusta</i>	sleepy grass	47.5.0 lb	47.00 lb

(SC) Seed Collected from RMNP

TECHNOLOGY DEVELOPMENTS: Specific information on procedures and methods on seed cleaning or seeding rates can be requested for each species

YELLOWSTONE NATIONAL PARK
2000 Summary Report
prepared by
Natural Resources Conservation Service
Bridger Montana Plant Materials Center

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 projects within Park boundaries.

In 2000, 132 lots of seed were delivered to YNP or the PMC totaling 174.16 pounds (79 kg). This included 68 grass lots (25 species), 55 forb lots (28 species), and 9 shrub lots (7 species). Distribution to the PMC for planting seed increase included 11 grass lots (6 species) and 2 forb lots (2 species), and 1 shrub lot.

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.

Collections are made by Yellowstone National Park crews, dried, and either delivered to the Bridger PMC, or picked up by PMC personnel. In 2000, 155 collections were made: 77 grasses (22 species) at 77.765 pounds (35.274 kg); 75 forbs (32 species) at 16.46 pounds (7.466 kg); and 3 shrubs species at 2.282 pounds (1.035 kg) resulting in a total of 96.506 pounds (43.775 kg) of clean seed.

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 2000, more than 407 hours were spent by YNP personnel in the activity of seed collection. There were approximately 191 hours (average 2.48 hours per recorded collection) dedicated to collecting grass seed, 172 hours (average 2.29 hours per recorded collection) for forbs, and 44.5 hours (40 hours for one of the three recorded collections) for woody species.

There were eight additional grass increase blocks established for road projects. Currently there are 17 accessions of 11 grass species (3.54 acres/1.43 hectares) planted in seed increase blocks at the Bridger PMC.

During the past growing season, 14 different accessions (11 species) were harvested, producing 398.91 pounds (180.944 kilograms) of clean seed. Seed production averaged 147.74 pounds-per-acre (165.62 kg-per-hectare).

Seed germination tests are being conducted on PMC seed increase production for 12 grass accessions. Percentage germination is expected within normal range for the 8 grass species. Final results will be in the 2000 Annual Technical Report.

The wildland collection and seed increase inventory contains 535 accessions (137 species) totaling 1,443.17 pounds (654.62 kg). This is comprised of 267 grass accessions (36 species) at 1,378.41 pounds (625.25 kg), 253 forb accessions (88 species) at 61.77 pounds (28.02 kg), and 15 shrub accessions (13 species) weighing 2.99 pounds (1.35 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. A growth chamber is now in operation allowing seed germination testing of all PMC-produced material.

**ZION NATIONAL PARK
2000 ANNUAL REPORT
prepared by
UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO**

INTRODUCTION

During January, 2000, discussions between Zion National Park and Upper Colorado Environmental Plant Center (UCEPC) focused on the need for all Zion seed materials to be sent to Zion National Park in February for revegetation work. Seed had been in storage at UCEPC from collections made in 1997 and 1998. Additional work for 2000 included cleaning and returning seed collected by Zion National Park during 1999 for additional revegetation purposes.

ACCOMPLISHMENTS

Two seed shipments to Zion National Park were made in February which included 74 separate materials. One shipment, dated February 18, 2000, consisted of three species. The second shipment went out on February 24 and made up the remainder of the materials (see enclosed Distribution and Delivery Records). During previous years, UCEPC had provided Zion seed, which was stored by UCEPC, and consultation to various growers selected by Zion for propagation. Additional seed from 11 species collected by Zion National Park during 1999 was sent to UCEPC for cleaning. Clean seed of 10 species was sent back to Zion on July 26, 2000 (Distribution and Delivery Record included). One material, *Yucca baccata*, was molded to the point that the seed was not viable.

TECHNOLOGY DEVELOPMENTS

Specific information about seed cleaning methods, equipment and various processes used for the above materials is available upon request.

MIDWEST REGION

**APOSTLE ISLANDS NATIONAL LAKESHORE
IA-6140-A-0007 (Raspberry Island)
FY2000 Annual Report**

Prepared by
**USDA- NATURAL RESOURCES CONSERVATION SERVICE
ROSE LAKE PLANT MATERIALS CENTER
East Lansing, MI**

Introduction: This project was initiated in 2000 to produce native plant stock for stabilizing slopes, preventing erosion, preserving native plant resources and revegetating park lands. Species to be propagated for this Agreement will be selected from an amendable list. A minimum of 2 grass, 2 forb and 4 shrub species from this list will be supplied by the Center based on the material's availability, viability and site adaptability for the intended use. The Agreement further specifies deliverables as 30 pounds of Canada wildrye seed, 500 forb/grass plugs and 500 shrub transplants. All materials are to be shipped or delivered to Apostle Islands in spring 2002.

Accomplishments: The species listed below were collected from the park and delivered to the Center in late 2000. Species collected as vegetative material have been planted and are under observation in the greenhouse.

<u>Scientific Name</u>	<u>Common Name</u>	<u>Type of Material</u>
<i>Alnus rugosa</i>	Speckled alder	seed/vegetative
<i>Amelanchier sp.</i>	Juneberry sp.	seed
<i>Ammophila breviligulata</i>	Beachgrass	seed/vegetative
<i>Anaphalis margaritacea</i>	Pearly everlasting	seed
<i>Archillea millefolium</i>	Yarrow	seed
<i>Calamagrostis canadensis</i>	Canada bluejoint	seed
<i>Cornus stolonifera</i>	Red-osier dogwood	vegetative
<i>Danthonia spicata</i>	Poverty oats	seed/vegetative
<i>Deschampsia or Aira sp.</i>	Hairgrass sp.	seed/vegetative
<i>Elymus canadensis</i>	Canada wildrye	seed
<i>Epilobium angustifolium</i>	Fireweed	seed
<i>Equisetum arvense</i>	Horsetail	vegetative
<i>Geum aleppicum</i>	Yellow avens	seed
<i>Heracleum maximum</i>	Cow-parsnip	seed
<i>Lathyrus japonicus</i>	Beach pea	seed
<i>Oenothera sp.</i>	Evening primrose	seed
<i>Prunus pumila</i>	Sand cherry	seed/vegetative
<i>Rhus typhina</i>	Staghorn sumac	seed/vegetative
<i>Rosa sp.</i>	Wild rose	seed
<i>Salix sp.</i>	Willow sp.	vegetative
<i>Sambucus pubens</i>	Red elderberry	seed/vegetative
<i>Solidago canadensis</i>	Canada goldenrod	seed

Technology Development and Observations: No technological developments or significant observations have been completed.

**APOSTLE ISLANDS NATIONAL LAKESHORE
IA-6140-A-0004 (Oak Island)
FY2000 Annual Report**

Prepared by
**USDA- NATURAL RESOURCES CONSERVATION SERVICE
ROSE LAKE PLANT MATERIALS CENTER
East Lansing, MI**

Introduction: This project was initiated in 2000 to assist with the restoration of the Oak Island sandscape in the Apostle Islands National Lakeshore. Efforts by the Plant Materials Program staff will include (1) evaluating the extent of invasive non-native species, (2) assisting with the determination and collection of species for use in restoration, (3) determine collection methods for selected species, (4) determining the best propagation methods for selected species (5) developing plot designs for establishing collected species on the sandscape, (6) planting plots and determining the information to be collected, and (7) preparing a restoration plan. Under the Memorandum of Agreement this project is scheduled for completion in September 2002.

Accomplishments: The species listed below were collected from the park and delivered to the Center in late 2000. Species collected as vegetative material have been planted and are under observation in the greenhouse.

Scientific Name	Common Name	Type of Material Collected
<i>Ammophila breviligulata</i>	Beachgrass	vegetative
<i>Anaphalis margaritacea</i>	Pearly everlasting	seed
<i>Archillea millefolium</i>	Yarrow	seed
<i>Artemisia campestre</i> (?)	Wild wormwood	seed
<i>Danthonia spicata</i>	Poverty oats	seed
<i>Elymus canadensis</i>	Canada wildrye	seed
<i>Equisetum arvense</i>	Horsetail	vegetative
<i>Fragaria virginiana</i> (?)	Wild strawberry	vegetative
<i>Juniperis</i> sp.	Juniper sp.	vegetative
<i>Panicum</i> sp.	Panic grass	seed
<i>Rosa</i> sp.	Wild rose	vegetative
<i>Vaccinium angustifolium</i>	Low-sweet blueberry	vegetative
<i>Vaccinium</i> sp.	Blueberry	vegetative

Technology Development and Observations: No technological developments or significant observations have been completed.

SLEEPING BEAR DUNES NATIONAL LAKESHORE
IA-6620-98-003
FY2000 Annual Report

Prepared by
USDA- NATURAL RESOURCES CONSERVATION SERVICE
ROSE LAKE PLANT MATERIALS CENTER
East Lansing, MI

Introduction: This project was initiated in 1998 to produce native plant stock for restoration of various disturbed sites within Sleeping Bear Dunes National Lakeshore (SBD). Under the Agreement an unspecified number of plants will be grown and returned to the park from a collection of species sent to the Center. Termination of the project was scheduled for September 2000, however additional plants and cleaned seed will be returned to the park in 2001.

Accomplishments: A total of 10 species were grown for the park. Over 3300 plants were returned to SBD for transplanting in 2000. Hemlock, and additional ironwood, little bluestem and prairie sandreed plants will be delivered in spring 2001. Approximately ½ pound of cleaned grass seed was sent back to the park in January 2001 for use in a school educational program. Remaining seed will be kept at the center for any future restoration work at the park. A summary of returned and remaining materials is listed in Attachment 1.

Technology Development and Observations: A discussion on collection methods for species that could be included in the project was sent to SBD prior to the assembly of material in 1998. A report on production status and treatments was completed in 1999. Seed treatment processes and observations for each species are listed below.

<i>Scientific Name</i>	Common Name	Seed treatment	Observation
<i>Calamovilfa longifolia</i>	Prairie sandreed	none	good germination and survival
<i>Fagus grandifolia</i>	American beech	3 mo. cold, moist stratification	good germination, vigor questionable
<i>Ostrya virginiana</i>	Ironwood	3 mo. warm, moist followed by 3 mo. cold, moist stratification	slow and unpredictable germination, 50% survival on germinated material
<i>Pinus banksiana</i>	Jack pine	none	good germination, poor vigor
<i>Pinus strobus</i>	White pine	(cuttings) dipped in Hormex #3 rooting powder	no survival
<i>Prunus virginiana</i>	Chokecherry	3 mo. warm, moist followed by 4 mo. cold, moist stratification	good germination and survival
<i>Quercus alba</i>	White oak	none	good germination and survival
<i>Quercus rubra</i>	Red oak	3 mo. cold, moist stratification	good germination and survival
<i>Schizachyrium scoparium</i>	Little bluestem	none	good germination and survival
<i>Solidago altissima</i>	Tall goldenrod	1 week cold, moist stratification	non-stratified seed germinated better, seed insect infestation, good vigor
<i>Tsuga canadensis</i>	Eastern hemlock	2 1/2 mo. cold, moist stratification	poor germination and vigor

Sleeping Bear Dunes NL Species List

Scientific Name	Common Name	Acc'n No.	Source	Plant Type	Returned to SBD		Remaining at Rose Lake		
					Plants (ea)	Seed (gm)	Plants (ea)	Cleaned Seed (gm)	Uncleaned Seed (gm)
<i>Solidago altissima</i>	Tall goldenrod	9084150	NMI	f	203				
<i>Solidago altissima</i>	Tall goldenrod	9084432 ?	?	f					851
forb subtotal					203				851
<i>Calamovilfa longifolia</i>	Prairie sandreed	9084154	NMI	g	167	143.3			
<i>Calamovilfa longifolia</i>	Prairie sandreed	9084155	GH	g	140			108.5	
<i>Calamovilfa longifolia</i>	Prairie sandreed	9084430	?	g					89
<i>Schizachyrium scoparium</i>	Little bluestem	9084153	NMI	g	165			63.8	
<i>Schizachyrium scoparium</i>	Little bluestem	9084161	NMI	g	183	81.4			
<i>Schizachyrium scoparium</i>	Little bluestem	9084162	NMI	g	171	16.2			
<i>Schizachyrium scoparium</i>	Little bluestem	9084431	?	g					134
<i>Schizachyrium scoparium</i>	Little bluestem	9094156	GH	g	136			14.3	
grass subtotal					962	240.9		186.6	223
<i>Fagus grandifolia</i>	American beech	9084149	NMI	w	450				
<i>Ostrya virginiana</i>	Ironwood	9084151	NMI	w	182		30 *		534
<i>Pinus banksiana</i>	Jack pine	9084159	GH	w	463			8.8	3.6 **
<i>Pinus strobus</i>	White pine	9084201	GH	w	0				
<i>Prunus virginiana</i>	Chokecherry	9084146	NMI	w	176				
<i>Prunus virginiana</i>	Chokecherry	9084160	GH	w	87				
<i>Prunus virginiana</i>	Chokecherry	9085152	NMI	w	180				
<i>Quercus alba</i>	White oak	9084157	GH	w	91				
<i>Quercus rubra</i>	Red oak	9084147	NMI	w	42				
<i>Quercus rubra</i>	Red oak	9084158	GH	w	482				
<i>Tsuga canadensis</i>	Eastern hemlock	9084148	NMI	w			65	12.3	42.5 **
woody subtotal					2153		95	21.1	580.1
Total					3318	240.9	95	207.7	1654.1

Key

GH Good Harbor
NMI North

g grass
f forb
w woody

* in cold storage
** seeds in additional

NATIONAL CAPITAL REGION

GEORGE WASHINGTON MEMORIAL PARKWAY
2000 Annual Report
summary sheet prepared by
USDA-Natural Resources Conservation Service
National Plant Materials Center
Beltsville, MD

Introduction: This project was initiated in 1994 to produce plants for revegetation of construction sites along the George Washington Memorial Parkway. Approximately 2750 wildflower plugs, 575 vines, 484 shrubs seedlings, and 2,800 tree seedlings will be produced and delivered to the park for this agreement. This will include a minimum of four forb, one vine, six shrub, and five tree species. For the initial memorandum of agreement, delivery of plants began in 1997 and is scheduled to continue through 2000. An amendment to the agreement was drafted in 1999 to extend project completion date through Spring 2002. This amendment was drafted to allow for plants to be maintained at the NPMC while highway construction along the Parkway is completed. Another small agreement was initiated in 2000 for the NPMC to provide an additional 1,200 tree and shrub container seedlings.

Accomplishments: A total of 15 species are currently being grown for the park. A total of 970 trees and shrubs and 1,435 wildflowers and grasses were delivered to the park for planting in spring 2000. Bareroot oaks and redbuds were containerized in 2000. The NPMC currently has 500 tree and shrub transplants ready for spring delivery to the park, and has started additional seed in outdoor beds for future delivery. Seed of the following species were collected at the park in fall 2000:

<u>Species</u>	<u>Common Name</u>
<i>Carpinus caroliniana</i>	ironwood
<i>Carya tomentosa</i>	mockernut hickory
<i>Juglans cinerea</i>	butternut
<i>Juglans nigra</i>	black walnut
<i>Lindera benzoin</i>	spicebush
<i>Liriodendron tulipifera</i>	tulip poplar
<i>Quercus albus</i>	white oak
<i>Quercus prinus</i>	chestnut oak

Technology Developments and Observations: The NPMC generally uses endomycorrhizal fungi to enhance woody plant growth in container planting mixes and at park transplant sites. Recently an ectomycorrhizal fungi product has become commercially available and the NPMC has started using it specifically for birch, oak, and walnut seedlings grown for George Washington Parkway. The NPMC continues to use endomycorrhizal fungi for maples and other woody species.

**NATIONAL CAPITOL PARKS-EAST
OXON RUN PARKWAY
2000 Annual Report
summary sheet prepared by
USDA-Natural Resources Conservation Service
National Plant Materials Center
Beltsville, MD**

Introduction: This project was initiated in 1997 to produce plants for revegetation of the Oxon Run Parkway site in southeastern Washington, D.C. Approximately 400 tree seedlings, 200 shrub seedlings, and 200 ferns were produced and delivered to the Park Service through the year 2000. This included 6 tree, 5 shrub, and 4 fern species. Delivery of plants began in 1999 and ended in 2000. The project was completed in November 2000.

Accomplishments: A total of 834 tree and shrub containers were delivered to the park in spring 2000 for planting by NRCS and NPS staff with Americorps team members. Most of the plant materials were used to fill in an access road through a wetland previously used by Washington, D.C. Metro (transit authority) and the Army Corps of Engineers. It was not possible to access to the planting site with vehicles, so plants were hauled in by hand and wheelbarrow down slopes, across a stream, and through springtime mud. The majority of the planting was completed in one day.

Work was completed in 2000 for the smaller agreement signed in 1999 with the Army Corps of Engineers to produce native grass plugs to cover a lead-contaminated site at Oxon Run. Approximately 1,600 broomsedge (*Andropogon virginicus*) and deertongue (*Dichanthelium sp.*) plugs were planted at the site, along with over 50 poison sumac (*Toxicodendron vernix*) and sweetbay magnolia (*Magnolia virginiana*) plants.

A final delivery of 164 trees, shrubs, and ferns was made to the park in November 2000 to finish the cooperative agreement between the NPMC and NCP-E.

Technology Developments and Observations: The NPMC generally uses endomycorrhizal fungi to enhance woody plant growth at park transplant sites. Recently an ectomycorrhizal fungi product became commercially available and the NPMC began using it during spring planting in 2000. At Oxon Run, ectomycorrhizae were used for river birch transplants.

By late summer into early fall of this final year of the Oxon Run project, the access road was less visible, and the cool- and warm-season grasses planted on the lead contaminated site were flowering and producing seed.

An article about the cooperative work between NPS, NRCS, and the Army Corps was written by Susan Rudy, Environmental Specialist with NCP-E, and appeared in the NPS publication Park Science (Vol. 20, No. 1: 5-6).

NORTHEAST REGION

**ACADIA NATIONAL PARK
2000 ANNUAL REPORT
Prepared by
USDA, Natural Resources Conservation Service
Big Flats Plant Materials Center**

INTRODUCTION:

The USDA, Natural Resources Conservation Service, Big Flats Plant Materials Center, entered into three interagency agreements with the USDI, National Park Service, Acadia National Park, including: IA Project No. 2041-6-0017 (1996), IA Project No. 2071-7-0002 (1997), and IA Project NO.4500-00-002 1 (1999). The Natural Resources Conservation Service agreed to:

- (A) Collect seed and plant materials of selected species within Acadia National Park boundaries.
- (B) Use these seeds to establish isolated seed increase fields of grasses and forbs, to produce plugs and transplants of grasses, forbs, trees and shrubs. A minimum of (3) grasses, (4) forbs, (4) shrubs and (3) tree species will be applied.
- (C) Make available seed, plugs and transplants to Acadia National Park for re-vegetation of the Federal Lands Highways Administration road project and utility/reconstruction projects from 1996 to 2001.

The park will use the plant materials for roadside re-vegetation after resurfacing the park loop road and upgrading the Carriage Paths, and seeding area disturbed during utility and reconstruction projects 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, establishing seed increase fields, propagating materials vegetatively and delivering the plant material back to the Park.

ACCOMPLISHMENTS:

Three grasses, six forbs, 12 shrubs and 6 trees, are involved in this project. During 2000, seed was collected in late September (red oak, arrowwood viburnum, white birch, hawthorn, white spruce, red spruce, mountain holly, wild raisin, hobblebush, bayberry, mapleleaf viburnum, white flat top Aster, large leaf Aster, and downy goldenrod) and late October (winterberry, red spruce, arrowwood viburnum, bayberry, few maple leaf viburnum, Canada goldenrod, rough-stemmed goldenrod, downy goldenrod, New York Aster, large leaf Aster, and white flat topped Aster). Vegetative cutting material was collected in mid-May and late October. The cutting material was placed in the greenhouse mist system. Species of meadowsweet, arrowwood viburnum and arborvitae have rooted well. Species of sheep laurel, rhodora, wild raisin, blueberry and bayberry have not been successful in rooting. For many of the shrub and tree species, propagation by seed is a more successful method than by softwood/hardwood cuttings. A total of 75 lbs. of seed, 3,060 plugs and 982 plants were delivered for re-vegetation seedings and plantings in the year 2000.

A seed increase field of red fescue (10 rows, 600 feet long on 42" centers) was established on September 14th, to replace a prior production field that was removed this year. For our forb

production, we are establishing stands in long single rows, and finding it easier for mechanical cultivation and harvesting. Additional rows of aster and goldenrods were established by transplants this summer. Harvesting of the forbs has worked best, using our Massey 8XP plot combine, with all the air shut off. With such small, light seed, it is a challenge to harvest. After testing other harvesting techniques, we found the combine to be best.

Seeds of trees and shrubs were placed in flats in the PMC cold frames in January, allowing for natural stratification to occur. This included winterberry (this takes 2 years to germinate), arrowwood viburnum, white birch, mountain holly, wild raisin, bayberry, Canada mayflower, white spruce, shadbush and maple leaf viburnum. Seedlings from prior year seeding were potted up during the course of the year. Some seedlings of red spruce and balsam firs and root cuttings of bunchberry were collected and potted and placed in the lathe house. Red maple seedlings collected last year along the edge of a dirt road in the park, continue to grow and will be potted up next spring. The weather was cold and wet this summer.

At Acadia, plant materials were utilized to re-vegetate disturbed areas from utility construction, road shoulders from park road re-surfacing work and site of project disturbances. The sites planted in 1999, at Jordon Pond and Otter Cliff, were doing well. The re-vegetation signs posted at these sites definitely helped keep visitors out of the plantings, which increased their survival and growth.

TECHNOLOGY DEVELOPMENT/TRANSFER

A meeting on the re-vegetation projects was held at the park in May, with everyone able to review the plantings, discuss the projects and assess future needs. Two articles (Vegetated Erosion Control Mats for Site Stabilization, by van der Grinten and Gregory; and Harvesting Native Seeds with a Gas Hedge Trimmer, by van der Grinten and Ayers) were published in the fall issue of Native Plants Journal, as a result of the work in Acadia. The abstracts of the poster sessions presented at the Second Eastern Native Grass Conference (Nov., 1999, Baltimore, MD, 300 participants) on our work at Acadia, was published in the proceedings this past May. Plant propagation protocols have been developed for inclusion in the native plant propagation manual. Forb seed production fields utilizing long, single rows versus a block planting works well. Harvesting and seed cleaning techniques continue to be refined each year. Utilizing cold frames to germinate shrub and tree species continues to work very well, but they should be seeded in January to obtain natural stratification. The storing of potted plants at the Acadia lathe house has been successful and it allows the park re-vegetating crew to select optimum planting dates and best suited plant materials. The posting of re-vegetation signs has decreased the trampling of new plantings, plus they have educated the public on how the park service is utilizing native plants.

GATEWAY NATIONAL RECREATION AREA
Sandy Hook Unit
2000 Annual Summary Report
Prepared by

Natural Resources Conservation Service
Cape May, New Jersey Plant Materials Center

INTRODUCTION: The NRCS Cape May New Jersey Plant Materials Center entered into an agreement with the Sandy Hook Unit of the NPS Gateway National Recreation Area in 2000. The purpose of the agreement is to produce indigenous native seed and plants for revegetation of areas disturbed by construction associated with the elevation of portions Hartshorne Drive and associated bike/pedestrian pathway. Recent coastal storm events have caused flooding, erosion to the road and limited public access to the park. Approximately 120 PLS pounds of seed and 1,600 transplants will be produced and delivered to the park. Species to be propagated will include seed of four grass and transplants of seven forb, shrub and tree species selected from an amendable list. FHwy contractor will plant the seed and the transplants will be installed by the PMC.

Targeted Species will be:

Grasses

Schizachyrium scoparium ssp. littoralis
Festuca longifolia
Panicum virgatum
Panicum amarum

Forbs and Legumes

Cassia chamaecrista Strophostyles helvola
Oenothera biennis Lathyrus japonicus
Solidago semervirens

Shrubs and Trees

Myrica pennsylvanica
Prunus maritima
Rhus copallina
Rosa virginiana
Nyssa sylvatica
Celtis occidentalis

ACCOMPLISHMENTS: Since this contract did not get finalized until late summer of 2000, collections could not be made of many of the species. Fortunately, the Cape May PMC germplasm repository maintained past seed lots from previous contracts with the Sandy Hook unit of Gateway NRA.

Seed of many of these species underwent winter stratification and will be transplanted into appropriate sized containers in early spring 2001. All materials have been forced early in the greenhouse in order to receive extra growing time before installation in the fall of 2001.

TECHNOLOGY DEVELOPMENTS: No new technological developments or significant observations have been noted or completed. Specific information on procedures and methods can be requested for each species.

PACIFIC WEST REGION

CRATER LAKE NATIONAL PARK
Mazama Dorm Project
2000 Annual Report Summary
Prepared by
NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER

INTRODUCTION- The Corvallis Plant Materials Center (PMC) entered into an amended agreement with Crater Lake National Park in 2000 to evaluate and increase grasses and sedges for revegetation purposes (Mazama Dorm Project). It was agreed to maintain and harvest two grass and two sedge fields and clean/process and provide the resulting seed to Crater Lake National Park in September 2000.

ACCOMPLISHMENTS- Activities in 2000 included maintenance and seed harvest of field increase plantings, maintenance of excess containerized stock, establishment of seed increase fields, and delivery of plant materials. A total of 10.9 kg clean seed was harvested from two grass and two sedge plots. Although *Carex spectabilis* flowered in 2000, no seed set occurred. All seed harvested in 2000 was provided to Crater Lake National Park personnel on September 26, 2000. Excess containerized stock involved five species and 140 containers. Two seed increase fields were established in fall 2000 in anticipation of seed needs for future restoration projects at Crater Lake National Park.

TECHNOLOGY DEVELOPMENTS- Two new seed increase fields (*Elymus glaucus*, 0.41 A; *Bromus carinatus*, 0.16 A) were established via carbon banding on September 14, 2000. Prior to drilling, the *Bromus carinatus* seed was treated with a systemic fungicide to control smut and other seed borne fungal diseases. Diuron was applied immediately after drilling to prevent weed seed emergence between rows. Both species established well, and diuron provided excellent weed control.

MOUNT RAINIER NATIONAL PARK
Mather Memorial Parkway
2000 Annual report Summary
Prepared by
NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER

INTRODUCTION- The Corvallis Plant Materials Center (PMC) entered into a two-year cooperative agreement with Mount Rainier National Park in 2000 to produce seed and plants for revegetation purposes on Mather Memorial Parkway (high elevation zone of Highway 410). Four grass, three sedge, two forb and one woody species shall be increased. One thousand 5X5X5.5 containerized stock of select herbaceous species shall be produced for delivery in fall 2001. The seed increase blocks, trial plots, and woody cutting block (previously established) shall continue to be maintained, seed harvested, and cutting/whips/poles prepared and delivered when requested. Seed from this agreement and in storage from previous agreements shall be shipped to Mount Rainier National Park at the conclusion of this agreement. Lastly, seed of select species shall be collected within Park boundaries in September 2001 by PMC staff and volunteers to increase the diversity of seed mixtures for this project.

ACCOMPLISHMENTS- Activities in 2000 included maintenance and harvest of seed increase blocks and trial plots, maintenance of a willow cutting block, establishment of five additional seed increase trial plots, and containerized stock production and maintenance. Seed yield from PMC increase blocks and trial plots in 2000 totaled 1.4 kg, from two grass, two sedge, and one forb species. Delivery of willow whips or cuttings was not requested. Five seed increase trial plots were established [three sedge (each 4'X10') and two grass (each 4'X25')] from transplants. Surviving containers of greenleaf fescue (*Festuca viridula*), Sitka valerian (*Valeriana sitchensis*), thick-headed sedge (*Carex pachystachya*), Merten's sedge (*Carex mertensii*), and showy sedge (*Carex spectabilis*) were transplanted into 5X5X5.5 containers; final count included 297 greenleaf fescue, 40 Sitka valerian, 122 thick-headed sedge, 129 Merten's sedge, and 139 showy sedge, for a total of 727 containers. Also, 103 tree pots (4X4X14) of Sitka valerian were produced. Finally, an additional 980 containers of greenleaf fescue and 196 containers of Sitka valerian were produced via cold-moist stratified seed to meet next year's delivery goals and compensate for any losses that might occur.

TECHNOLOGY DEVELOPMENTS- Trial plots of good to excellent stand density and vigor for thick-headed sedge, Merten's sedge, showy sedge, blue wildrye (*Elymus glaucus*), and Columbia brome (*Bromus vulgaris*) were established via transplants (containers) at the PMC. Trial plots of greenleaf fescue established via broadcast seeding and transplants in 1999 did not overwinter. Sitka valerian transplants rooted throughout the deep (tree) pots in a matter of weeks, but these plants exhibited sensitivity to nitrogen fertilization levels above 200 ppm and several periods of dieback and subsequent regrowth. Seedlings of Sitka valerian that had received a chilling period of eight weeks prior to transplanting exhibited faster regrowth, greater vigor, less sensitivity to nitrogen fertilization, and flowered. Only 40% of greenleaf fescue containers produced in 1999 overwintered, and the remaining transplants exhibited crown rot, leaf spot, and/or rust signs and symptoms throughout the growing season of 2000. However, with careful overhead and drip irrigation, treatment with contact and systemic fungicides, and lower nitrogen fertilization rates (150 ppm N on a monthly basis), the frequency and severity of disease outbreaks were reduced, and plant vigor improved. All sedge species in containers exhibited tremendous shoot and root growth under drip irrigation and fertilization with a balanced fertilizer every 3-4 weeks. These may need to be repotted or divided in spring 2001.

SEQUOIA AND KINGS CANYON NATIONAL PARKS
2000 Annual Report
prepared by
UPPER COLORADO ENVIRONMENTAL PLANT CENTER, MEEKER, COLORADO

INTRODUCTION: The Upper Colorado Environmental Plant Center (UCEPC) entered into an agreement with Sequoia and Kings Canyon National Parks on June 20, 1994. The agreement was amended in 1995 and 1997. The goal of the project is to develop propagation, cultivation, and cleaning technology for and deliver a total of 800 PLS lb of seed for Wuksachi Village and 440 PLS lb of seed for Giant Forest. The species list was expanded with the 1995 Amendment. The agreement was put on hold in April of 1997 and no new work was initiated for live plant production. A conference call in April 1998 helped establish what work should be done on specific plant materials in 1998. A meeting was held at the plant center in March 1999, to determine the work to be done for the cooperative agreement in 1999. A new Cooperative Interagency Agreement was signed in 2000, for work to be done in 2000, 2001, and 2002.

ACCOMPLISHMENTS: Two seed shipment were received from the park in 2000. One shipment was cleaned and returned to the park without listing on inventory. Seed was harvested from one seed field for the park in 2000. Plants were grown in the greenhouse in 2000 for delivery to the park. One shipment of plant materials was sent to the park in 2000, which involved seed and plants.

Species (Location) (Wuksachi or Giant)	Harvest Seed	Provided To Park		
		Live Plants	Clean Seed	PLS
Blue wildrye (G)	(No harvest in 2000)			0.87 lb
California needlegrass (G)			135.0 g	1.50 lb
Orcutt's brome (G)				2.26 lb
Bearded melicgrass (G)				0.84 lb
Sticky cinquefoil (W)	4.4 lb			
“ “ (G)				0.16 lb
Draperia (G)			548.0 g	
Naked buckwheat (G)		1598		
Changeable phacelia			308.0 g	
Carex		2100		
Mustang clover			849.0 g	

TECHNOLOGY DEVELOPMENTS: Seed cleaning technology was developed for each species cleaned. Specific information can be provided on request. Seed treatment methods were developed to enhance the germination of Draperia.

YOSEMITE NATIONAL PARK
2000 Annual Report
prepared by
UPPER COLORADO ENVIRONMENTAL PLANT CENTER,
MEEKER, COLORADO

INTRODUCTION: Yosemite National Park and the Upper Colorado Environmental Plant Center entered into an agreement which was formally approved in September of 1997. This agreement entails field establishment and seed increase of five grasses and one legume which are native to Yosemite National Park. The targeted species include the following: Blue wildrye (*Elymus glaucus*), mountain brome (*Bromus carinatus*), deergrass (*Muhlenbergia rigens*), pullup muhly (*Muhlenbergia filiformis*), melicgrass (*Melica californica*) and lupine (*Lupinus species*). However, only two of the targeted materials were successfully collected during the summer/fall of 1997 for use as starter materials for seed increase work in 1998. One material, mountain brome, or California brome as it is sometimes referred, was added for seed increase in September of 1998. Harvests of blue wildrye and what was thought to be the perennial California brome netted almost 1800 clean pounds of seed in 1999. However, preliminary test results from the Colorado Seed Laboratory indicated the brome to be a weedy annual, *Bromus commutatus*, hairy chess. The field also behaved like an annual and died after harvest. As a result and at the recommendation of Yosemite National Park Personnel, the seed was destroyed. Additional testing was conducted by a seed company in California, and seed was sent to the Agricultural Research Service for genetic identity and species determination. At present, only blue wildrye will be used in revegetation efforts to restore flood damaged areas within the park.

ACCOMPLISHMENTS:

Harvest

The blue wildrye produced 140 cleaned pounds of seed. Seed test results are not available at this time.

Seed Shipment

472 pounds of 1999 grown blue wildrye were shipped to Yosemite National Park in September of 2000 for revegetation work

Contract Extension/Ammendment

Field maintenance and seed production of blue wildrye during fiscal year 2001 and the possibilities of future material production for Yosemite have been discussed.

TECHNOLOGY DEVELOPMENTS: Specific information about harvest methods or soil preparation, seeding methods, seeding rates or seedling establishment techniques are available upon request.

SOUTHEAST REGION

Cumberland Gap National Historical Park
2000 Annual Report
summary sheet prepared by
USDA-Natural Resources Conservation Service
National Plant Materials Center, Beltsville, MD

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 third cooperative agreement with the Park covers the realignment of Rte. 58 in Virginia and the replanting of the Gap. This agreement was initiated in 1997 and goes through 2001, with final plant deliveries scheduled for the spring of 2002. A new agreement will need to be developed in 2001 to provide plant materials for the final stages of gap restoration, which is expected to be completed by 2004.

Accomplishments: NPMC staff coordinated planting at the Park once again. Thirteen students from Cumberland Mountain Research Center, Lincoln Memorial University in Harrogate, TN were hired to help plant over 2079 bare-root woody plants, over 700 container-grown woody plants, about 160 vines, and about 1500 container-grown junipers. An estimated total of 8 acres was planted. There were 29 species of native trees and shrubs delivered in 2000. There was no grass seed delivered in 2000 because the park had not needed any.

Junipers, vines and small shrubs were planted on the element walls leading to the KY tunnel portal. A system of anchors, ropes, harnesses, and ascenders was designed and implemented to ensure the safety of the students planting the wall. It was decided by the park to use non-native junipers on the walls because native vegetation was not adequately covering the concrete. Three juniper cultivars purchased for the wall planting were carefully selected to eliminate the possibility of them becoming invasive and propagating themselves off the wall. The cultivars were also selected for their adaptation to the harsh conditions of the site, as well as disease resistance, form, color, and spread.

In the vernal pool area, three test plantings of sphagnum moss were planted by NPMC staff. This planting should help determine the best methods for creating the microclimate sphagnum moss requires for establishment and long term survival in this artificially created environment.

Woody-species seed was collected by contract with the Cumberland Mountain Research Center, Lincoln Memorial University in Harrogate, TN. Over 170,000 seeds from 16 species of woody plants were collected and conditioned, and many were planted at the NPMC in the fall.

Approximately 5260 bare-root trees and shrubs were harvested in November and December 2000. The majority of these will be delivered to the Park in March 2001 for planting. About 965 container-grown plants were finished off in late 2000 to be delivered in 2002 for Gap parking lots. An anticipated 50 to 60 pounds of grass and wildflower seed was produced in 2000 and is currently being cleaned and tested for germination.

Technology Developments and Observations: In the spring 2000 planting we used new pre-cut weed barrier (Arbortec Brush Blankets, Reforestation Technologies International, CA) which was the best, and least expensive, biodegradable alternative to cutting our own weed barrier. We also started using ecto-mycorrhizal fungi (Reforestation Technologies International, CA) for the planting of pines, junipers. Weed barrier and Endo-mycorrhizal fungi has been used in our plantings for the past few years, and having the pre-cut weed barrier and ecto-mycorrhizal fungi available allows us to refine our techniques that improve the vigor and survivability of our plantings.

GREAT SMOKY MOUNTAINS NATIONAL PARK

2000 Annual Report

summary sheet prepared by

USDA-Natural Resources Conservation Service

National Plant Materials Center, Beltsville, MD

Introduction: A new cooperative agreement between the Great Smoky Mountains National Park and the National Plant Materials Center (NPMC) was signed in October, 1999 for FY 2001 – 2005. The NPMC will continue to provide plants, seed and assistance to the Park for the ongoing restoration of Cades Cove and for revegetating an estimated 2 acres per year on the Foothills Parkway in Tennessee. Approximately 300 lbs. of grass/forb seed, 30,000 grass/forb plugs, and 5,000 bareroot and containerized trees and shrubs will be supplied to the Park during the course of the agreement. The Park will continue to collect and ship seed to the NPMC for processing and production. NPMC will continue seed production for difficult-to-grow species and will assist the Park in establishing seed production and demonstration fields in Cades Cove.

Accomplishments: Over 950 bare-root and container-grown woody species, encompassing a total of 5 species of trees and shrubs, were delivered to the Park in March, 2000, for planting along the Foothills Parkway and in other areas. Approximately 400 bare-root trees and shrubs were harvested from the NPMC woody production beds in Dec., 2000 and will be delivered to the Park in March, 2001 along with 156 containerized trees held over from previous years.

In May 2000, the NPMC delivered over 15,000 plugs of native grasses and wildflowers for Cades Cove restoration and Foothills Parkway revegetation. Approximately 10,700 plugs of the following native grasses were planted in the Cades seed increase fields, which the Park started with NPMC assistance in 1999: big bluestem (2,300), little bluestem (2,500), Indian grass (3,500) and purpletop (1,800). A total of 3,250 plugs of new grass and wildflower species, grown from seed that was collected by the Park in 1999, were planted in a native species demonstration area: aster sp. (400), beardgrass (600), eupatorium (600), mountain mint (500), ironweed (550) and solidago sp. (600). NPMC staff brought equipment and assisted Park staff with the outplanting in Cades Cove. Another 1,200 plugs (nine grass and forb species) were delivered to the Park for outplanting in the Foothills Parkway.

We anticipate around 200 pounds of NPMC-produced seed, which is now in the process of being cleaned and tested. Species being produced at the NPMC include 2 grasses, 1 grass-like, 2 legumes, and 5 forbs. An additional 75 pounds of seed or 5 species of warm-season grasses, collected by the Park from Cades Cove Old Field and new increase fields in fall, 2000, is also being processed.

Technology Development: The NPMC provided technical advice to Park staff on equipping their new greenhouse and with outplanting methods. Modifications made to the NPMC debarker have facilitated the mechanical cleaning of small seed lots and removal of the pappus from fluffy seeds. New weed control methods in the woody beds have significantly reduced the amount of seasonal labor required for maintenance and new protocols in the greenhouse have reduced the time and increased the uniformity of emergence of warm season grass seedlings and forbs.

