

1995 Plant Materials Project Summary Reports
from the
Natural Resource Conservation Service
to the
National Park Service

February 1996

National Park Service, Denver Service Center, Lakewood Colorado

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INTRODUCTION

This is the 1995 Plant Materials Centers annual progress report on cooperative project agreements between the National Park Service (NPS) and the Natural Resources Conservation Service (NRCS), formally 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 plant over the passed seven years.

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 projects and to respective NPS field areas and associated park resource managers. This report is also sent to respective NRCS offices. Additional copies of the "one page summary report" are available on request. This report can be requested from Wendell Hassell, National Park Service, DSC-RP, P.O. Box 25287, Lakewood CO. 80225, CC Mail or (303) 969-2172.

The comprehensive 1995 Annual Technical reports are also available from Wendell Hassell at the above address or from respective plant material centers.

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INTERMOUNTAIN FIELD AREAS

BANDELIER NATIONAL MONUMENT
1995 Annual Report
Prepared by
Natural Resources Conservation Service
Los Lunas New Mexico Plant Materials Center

I. Introduction

An Agreement was made with Bandelier National Monument, New Mexico, and the Natural Resources Conservation Service in 1990 to collect and increase seed of selected native species on the Monument. This seed would be used by the Monument to revegetate disturbed sites and also to help stabilize erosive sites and rehabilitate native stands.

II. Accomplishments

Seed Production Field Establishment 1995

In 1995, transplant plugs of the Mountain muhly accession were grown in the greenhouse for replacement of dead plants in the field. These plugs were transplanted to the field in September. The fields of Little bluestem and Blue grama were interseeded to reseed bare spots from the initial seeding. The Blue grama planting failed to produce plants and will be repeated in 1996 with seed, or possibly transplant plugs.

Seed Production 1995

Common Name	AC	Cleaned (lbs)	Purity %	Germ. %	PLS (lbs)
**Sand dropseed	0.25	46.22			
**Little bluestem	0.61	53.50			
Blue grama	0.86	9.02	85.46	84.00	6.48
Sideoats grama	0.59	140.32	77.74	83.00	90.53
**Mountain muhly	0.64	1.70			

**Seed production test information is still being gathered by the LLPMC for some species harvested in 1995.

III. Technology Developments

The Mountain muhly planting had a smut problem in 1995. Seed was harvested very late and it is not clear if there will be any viable seed. The Sand dropseed planting had a severe infestation of thrips and required an insecticide treatment. Seed production of the dropseed may be lower as a result of the thrip damage.

BIB BEND NATIONAL PARK
1995 Annual Report
prepared by
NATURAL RESOURCES CONSERVATION SERVICE
TUCSON PLANT MATERIAL CENTER

INTRODUCTION- Project No. 04S9303B. One hundred Chino grama (*Bouteloua breviseta*) plants were started in 1 gallon containers 1-15-93. Thirty False grama (*Cathastecum erectum*) were started in 1 gallon containers 1-22-93. Objective of project was to evaluate seed production of these two grass species at Tucson Arizona.

ACCOMPLISHMENTS- Notes: 2/13/93 - 53 Chino Gramas are actively growing, two developed seedheads. No green-up of false grama. 6/24/93- Planted 60 chino grama to field 2 border 1, 2 rows of 30 plants each. False grama never showed any life, plants were discarded.

3/1/94- Surviving plants 43 (chino grama). Seedheads appear to be to be retained well on plant. Also appears to be good percentage of filled seed. Harvested eight spikes. Percent plant survival-71.6 (43/60). Percent flowered-.09 (4/43). Hand rubbed harvested florets, found eight good seeds.

5/3/94- Fenced, fertilized and irrigated plot. Very heavy rabbit damage. 6/15/94- Ordered more chino grama plants from Ft. Knox PMC. 6/28/94- Received 84 salvageable plants (85 sent). Clipped to 4 inch height, put in greenhouse, set temperature at 85 degrees. 7/20/94- Planted 39 surviving false grama in field 2, border 1. Planted in 10'x10' crossing block.

7/20/94- Conditioned chino grama seed harvested on 7/18/94. Used hand rubbing block and air aspirator, 1 viable produced. 9/23/94- Harvested seed from false grama. Most of the floret are not filled. Plants have done very well in the fenced crossing block, plants are reproducing very well by stolons.

12/2/94- false grama is dormant, chino grama still green, not dormant. 3/1/95- False grama is greening up. Fence has been stolen. 12/ 27/95- No seed on chino grama, no sign of live false grama.

TECHNOLOGY DEVELOPMENTS - CHINO GRAMA: Will grow well from transplants and under irrigation. Viable seed is not produced at temperatures above 100 degrees. Annual forage production under irrigation is about 5000 lbs/ac.

FALSE GRAMA: Plants recover well from shipping in the green house. Plants are fairly drought tolerant. Plants do not tolerate consecutive close clipping. Healthy plants do propagate themselves readily from stolons if protected from grazing and receive adequate irrigation. Seed production is minimal and of low viability. Plants start green-up about the March 1st. Plants go dormant about November 1st or when night temperatures drop to about 34 degrees.

Big Bend National Park
 1995 Annual Report
 prepared by
 Natural Resources Conservation Service
 James E. 'Bud' Smith Plant Materials Center

Introduction

The original agreement with Big Bend National Park and the James E. 'Bud' Smith Plant Materials Center was developed and signed in 1989. The first project was started in 1989 and was completed in 1993. The second agreement was started in 1992 and is scheduled for completion in 1997. Both projects involve seed and/or plant collection and seed increase of certain grass and forb species. Seeds produced are to be used for roadside revegetation.

Currently, road renovation efforts are underway in the park along 22 miles of the Ross Maxwell Scenic Drive which runs north to south along the western part of the park.

Accomplishments:

Since 1989 the James E. 'Bud' Smith PMC has made 6 collection trips to the park collecting seed and some plants of requested species. As of 1994, eight different species are being produced for the park and three other species are being studied looking at production and propagation techniques.

At the end of 1994, the park had received a total of five shipments, totaling 942 bulk pounds of seed. In FY 95 plans are being developed for road cut slope revegetation projects.

Seed Production at James E. 'Bud' Smith PMC 1993-1995

Common Name	Area(ac)	1993 Prod./Lbs	1994 Prod./lbs	1995 Prod./lbs
Sideoats grama	.85	368.0	138.5	125.0
Alkali sacaton	1.30	25.0	222.5	84.0
Green sprangletop	1.00	—	—	—
Cane bluestem	.30	77.0	56.0	60.0
Showy menodora	.50	19.5	95.0	69.0
Chisos bluebonnet	.10	1.0	—	3.0
Chino grama	.20	0.3	1.0	2.0
Limoncillo	.10	65.0*	47.0*	—
Fluffgrass	Greenhouse observation			
Tobosa	Greenhouse observation			
False grama	Greenhouse observation			
* bulk material wt				

BRYCE CANYON NATIONAL PARK
1995 Annual Report
NATURAL RESOURCES CONSERVATION SERVICE AND THE
UPPER COLORADO ENVIRONMENTAL PLANT CENTER, MEEKER, COLORADO

INTRODUCTION: Upper Colorado Environmental Plant Center (UCEPC) Project No. 08S212 (Pkg. No. BRCA-162, PT 06P) was initiated on June 15, 1990, by Bryce Canyon National Park, the USDA Natural Resource Conservation Service (USDA-NRCS), and the UCEPC. The project is to provide 1919 PLS pounds of seed, 6260 transplants, and 3000 tubelings for revegetation of the FHWA road projects within Bryce Canyon National Park. Targeted species and estimated PLS pounds desired are: 9024815 *Elymus trachycaulus* ssp. *trachycaulus* (slender wheatgrass) 790 lbs. and 1000 tubelings, 9024906 *Leymus salinus* (Salina windrye) 205 lbs. and 500 tubelings, 9024816 *Bromus anomalus* (nodding brome) 822 lbs. and 1000 tubelings, 9024853 *Oryzopsis hymenoides* (Indian ricegrass) 102 lbs. and 500 tubelings, 9024854 *Arcostaphylos patula* (greenleaf manzanita) 2000 transplants, 9024879 *Artemisia arbuscula* (low sage) 200 transplants, 9024865 *Purshia tridentata* (antelope bitterbrush) 1000 transplants, 9024855 *Symphoricarpos oreophilus* (mountain snowberry) 3000 transplants, and 9024877 *Chrysothamnus nauseosus* (rubber rabbitbrush) 60 transplants by the end of 1996 (ie., 4 grasses, 5 shrubs).

ACCOMPLISHMENTS: The number of PLS pounds or transplants that have been produced by the UCEPC as well as the PLS pounds or plants that have been shipped to Bryce Canyon National Park are:

grasses:

1.)	9024815 <i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i>	1007.57 lb produced (364.05 lb. remain)
	- slender wheatgrass	643.52 lb total shipped (0.00 in '95)
		1173 tubelings shipped (all in '95)
2.)	9024816 <i>Bromus anomalus</i> - nodding brome	662.84 lb prod. (0.00 + field remain)
		662.84 lb total shipped (228.66 in '95)
		1200 tubelings shipped (all in '95)
3.)	9024906 <i>Leymus salinus</i> - Salina wildrye	29.26 lb prod. (0.00 + field remain)
		29.26 lb total shipped (24.26 in '95)
		656 tubelings shipped (all in '95)
4.)	9024853 <i>Oryzopsis hymenoides</i>	36.83 lb. prod. (0.00 + field remain)
	- Indian ricegrass	36.83 lb total shipped (33.92 in '95)
		630 tubelings shipped (all in '95)
5.)	'Arriba' <i>Pascopyron smithii</i> - W. wheatgrass	428.98 lb total shipped (NPS request)

shrubs:

1.)	9024854 <i>Arcostaphylos patula</i>	520 produced (0 in production)
	-greenleaf manzanita	519 total shipped (81 in '95)
2.)	9024879 <i>Artemisia arbuscula</i> - low sage	216 produced (0 remain in production)
		216 shipped (8 in '95)
3.)	9024865 <i>Purshia tridentata</i>	1401 produced (0 remain in production)
	- antelope bitterbrush	1401 shipped (1401 in '95)
4.)	9024855 <i>Symphoricarpos oreophilus</i>	1446 produced (0 remain in production)
	- mountain snowberry	1446 shipped (256 in '95)
5.)	9024877 <i>Chrysothamnus nauseosus</i>	60 produced (0 remain)
	- rubber rabbitbrush	60 shipped (0 in '95)
6.)	Bryce <i>Mahonia</i> sp. - desert holly	3 shipped (0 remain)
7.)	Bryce <i>Sambucus</i> sp. - elderberry	2 shipped (0 remain)

TECHNOLOGY DEVELOPMENTS: Production, cultivation, and cleaning technology for each accession has been developed by the UCEPC. Mechanical scarification with a scarifier or a hammermill) has been utilized in combination with a screen-cleaner for seed types. Greenhouse, field, and bare-root production has been developed for plant types.

CANYONLANDS NATIONAL PARK
1995 Annual Report
Prepared by
Natural Resources Conservation Service
Los Lunas New Mexico Plant Materials Center

I. Introduction

An Agreement was made in August 1990 between Canyonlands National Park, Utah, and the Natural Resources Conservation Service (NRCS), Albuquerque, to propagate 3,600 transplants and to produce 50 lbs of Galleta grass seed. The transplants included 13 species grown in three different container sizes. A container technique from Joshua Tree Nursery in California is to be evaluated to determine practicality for producing transplants. Plants and seed are to be used to revegetate road construction areas and for landscaping a new residence area.

II. Accomplishments

Seed Production 1995

Common Name	AC	Cleaned (lbs)	Purity %	Germination %	PLS (lbs)
**Galleta	0.50	0.96			

**Seed production test information is still being gathered by the LLPMC on some species harvested in 1995.

III Technology Developments

The following one-gallon potted transplants were delivered in 1995; 115 Fourwing saltbush, 8 Shadscale, and 104 Big sagebrush. Seed was collected of four species by Park personnel in 1995 and shipped to the PMC. The PMC has also started 500 transplants for delivery to the Park in 1996 and 1997.

Chickasaw National Recreation Area
 1995 Annual Report
 prepared by
 Natural Resources Conservation Service
 James E. 'Bud' Smith Plant Materials Center

Introduction

The agreement with Chickasaw National Recreation Area and the James E. 'Bud' Smith Plant Materials Center was developed and signed in 1990. The First Phase of the project will be completed in 1995. The project involves seed collection, plant and seed increase of certain grass and woody species. Seeds and plants produced are to provide locally adapted species for roadside revegetation.

The materials produced will be used for revegetation following road construction and realignment in Phase 1 at Buckhorn.

Accomplishments:

Since 1990 the James E. 'Bud' Smith PMC has made 5 collection trips to the park. As of 1995, five different grass species are being produced and six woody species were produced.

In 1993 Chickasaw NRA took delivery of the first plants returning to the park. Smooth sumac (574 plants) and Southern red oak (75 plants) were delivered. In 1994 additional collections of blackjack oaks, red oaks hybrid, post oaks, Chinkapin oaks, smooth sumac, and redbud were made. In FY 95 the park received its first seed shipment totaling 111 bulk pounds. In 1995 woody plants of Southern red oak (100 plants) and post oak (120 plants) were delivered to CNRA.

Seed Production at James E. 'Bud' Smith PMC 1993-1995:

Common Name	Area(ac)	1993 Prod.	1994 Prod.	1995 Prod.
Sideoats grama	.55	105.0	160.0	100.0
Hairy Grama	.15	0.3	0.5	0.7
Big Bluestem	.50	9.5	9.0	10.0
Little bluestem	.20	63.0	59.0	61.0
Indiangrass	.60	88.0	215.0	133.0
Blackjack oak	ea	-	-	100.0
Post oak	ea	-	-	50.0
Chickasaw plum	ea	-	1000	-
Smooth sumac	ea	-	-	-
Eastern redbud	ea	400	-	-
Southern red oak	ea	-	-	150.0

**FORT BOWIE NATIONAL HISTORIC SITE
CHIRICAHUA NATIONAL MONUMENT**

**1995 Annual Report
prepared by**

**NATURAL RESOURCES CONSERVATION SERVICE
TUCSON ARIZONA PLANT MATERIALS CENTER**

INTRODUCTION - Seed increase of four grass species, collected at Fort Bowie National Historic Site. Project was initiated in August 1993. The objective is to produce 50 bulk pounds of seed for Fort Bowie revegetation work. Seed is being produced at PMC on 1/8 acre per specie production plots. Seed was hand collected with initial collections conducted 9/93 and followup collections conducted 11/94 and 10/95. Original completion date was 1995. However, due to potential contamination of one specie the project has been extended through 1996.

ACCOMPLISHMENTS - Seed increase fields are in their second production year. To date we have a total of 26 pounds of seed. By species: sideoats grama = 11 lbs. 14 oz., green sprangletop = 11 lbs. 4 oz., plains lovegrass = 2 lbs., and sandropseed = 1 pound. As expected, seed production in the first year was minimal with the second year showing significant increases. In April 1996 we will replant plains bristlegrass (previously contaminated). Project should be completed by December 1996.

TECHNOLOGY DEVELOPMENTS - At the beginning of this project we felt that 1/8 acre production plots would be sufficient for these native species. However, based on our actual seed yields 1/4 to 1/2 acre increase fields would be more appropriate and probably would have delivered our estimated yields. Also, larger fields would have lessened the herbivory impact from our local rabbit population. The flail-vac mechanical harvester is very efficient in harvesting sideoats grama, green sprangletop, and plains bristlegrass. Seed production for plains bristlegrass appears to be inherently low. Flowering is indeterminate with filled florets being produced in the lower 2/3 area of the inflorescence. Seed shatters easily so timing your harvest is critical. We generally conduct our harvest when the inflorescence is still green.

GLACIER NATIONAL PARK
1995 Annual Report
prepared by
NATURAL RESOURCES CONSERVATION SERVICE
BRIDGER MONTANA PLANT MATERIALS CENTER

INTRODUCTION: The Bridger PMC has maintained a cooperative agreement with Glacier Park since FY 1986. This agreement facilitates the collection, increase and reestablishment of indigenous plant material for revegetation of disturbances resulting from road construction projects within Park boundaries. It has been mutually agreed upon that Plant Materials and PMC personnel will spend two weeks each year in Glacier Park observing restoration efforts and consulting with the Park plant science staff.

In 1995, 71 lots of seed were delivered to GNP (including 14 lots sent to Bitterroot Native Growers for commercial container production) totaling 11.62 kg (25.6 pounds). Five lots of seed (1.338 kg/2.9 lbs.) were used at the Bridger PMC to establish new seed increase blocks. The 1995 seed distribution included 43 grass lots (18 species), 44 forb (29 species) and 3 shrub lots (3 species).

ACCOMPLISHMENTS: It is anticipated that this cooperative agreement will be long term. GNP has identified their seed and plant needs for each project allowing 2 - 3 years of lead time in most cases. Seed collections are made by GNP employees, dried and mailed to the Bridger PMC where they are cleaned, weighed, accessioned, inventoried and stored until requested. In 1995, 69 collections were made: 12 grasses, sedges or rushes (species), 45 forbs (37 species) and 12 shrubs (9 species) resulting in a total of 8.11 kg (17.9 lbs.) of clean seed.

In the spring of 1995 (May 4, 1995), five new seed increase blocks were seeded totaling 1.43 ha (0.58 A). Eight declining increase blocks (East Side/St. Mary) were removed (2.15 ha/0.87 A). There are currently 15 accessions of 8 species of grass (5.21 ha/2.11 A) and 3 accessions of 3 species of forbs (0.59 ha/0.24 A) in seed increase blocks at the Bridger PMC. Additional seed increase blocks will be established in spring 1996 for the Avalanche project. During the 1995 growing season, 19 different accessions were harvested producing 102.906 kg (226.9 lbs.) of clean seed.

Bareroot field stock held over for 1995 includes 3,300 *Rosa woodsii* (2 accessions) and 4,400 *Amelanchier alnifolia* (4 accessions). In the fall of 1995, four additional woody collections were seeded including *Rubus idaeus* (19.3 g), *Symphoricarpos albus* (39.0 g), *Mahonia repens* (50.0 g) and *Rubus parviflorus* (19.0 g). In addition, spring sowing is anticipated for several other accessions. All woody material is seeded and grown inside an electric fence to prevent deer and rabbit predation.

TECHNOLOGY DEVELOPMENT: The climate in the Bridger area is less than ideal for the production of seed of alpine plants. Temperatures usually warm up too early in the spring and winters remain relatively open, exposing plants to extreme fluctuations in environmental conditions. In an attempt to produce seed of *Phleum alpinum*, *Poa alpina*, *Deschampsia atropurpurea*, *Poa gracillima* and *Sibbaldia procumbens*, snow fence was placed at 40 foot intervals across the production field in order to trap leaves and snow. Plants were also produced in 10 in³ conetainers in the greenhouse and coldframe. There are approximately 600 *Deschampsia atropurpurea* (1 accession), 784 *Trisetum spicatum* (1 accession) and 784 *Elymus/Agropyron* mix being held in cold storage.

An environmental growth chamber is now in operation at the PMC allowing for germination testing of seed. There are currently five species in testing as part of a propagation study that includes *Juncus mertensiana*, *Xerophyllum tenax*, *Trisetum spicatum*, *Deschampsia atropurpurea* and an *Elymus/Agropyron* mix.

Two groups of cuttings of *Abies lasiocarpa* were taken in 1995 as part of asexual propagation trials for this species. The first group consisted of 3 different hormone treatments of 147 stem cuttings (49/treatment). The second group consisted of 2 different hormone treatments of two different ages of wood (7 cuttings/treatment) for a total of 49 cuttings.

GLEN CANYON NATIONAL RECREATION AREA
1994 ANNUAL REPORT
PROPOSED BY
NATIONAL RESOURCES CONSERVATION SERVICE
LOS LUNAS NEW MEXICO PLANT MATERIALS CENTER

Introduction An Agreement covering 1995-97 was signed January 1995 between the Glen Canyon National Recreation Area (GLCA) and the Natural Resource Conservation Service (NRCS) to propagate approximately 1,000 transplants for revegetation work at Bull Frog Basin GLCA.

Accomplishments The seed received from Glen Canyon has been cleaned and yielded the following seed weights:

1.	<i>Atriplex canescens</i> -	
	Fourwing saltbush (Collected 1/23/93 - Cleaned 1/30/95)	65.5 g
2.	<i>Yucca angustissima</i> (Cleaned 1/30/95)	89.6 g
3.	<i>Artemisia filifolia</i> - Sand sagebrush (Cleaned 5/4/95)	
	1/21/93 Collection	2.43 g
	12/10/94 Collection	11.61 g
4.	<i>Coleogyne ramosissima</i> - Blackbrush (Cleaned 8/28/95)	28.5 g
5.	<i>Ephedra viridia</i> - Green ephedra (Cleaned 8/28/95)	68.7 g
6.	<i>Psoralea fremontii</i> - Indigo bush (Fremont dalea) (Cleaned	
	8/25/95) 1995 Collection	184.2 g
	1994 Collection (Cleaned 1/30/95)	2.3 g
	1993 Collection (Cleaned 1/30/95)	41.4 g
7.	<i>Penstemon ambiguus</i> - Sand penstemon (Collected 2/23/93)	
	(Cleaned 1/30/95)	1.68 g

The current inventory of Glen Canyon plants is as follows:

Deep Pots (4" dia. x 30" deep)		
<i>Artemisia filifolia</i>	50	
<i>Psoralea fremontii</i>	6	(Another 22 dormant or dead)
	56	
Tree Pots (4" x 4" x 14" deep)		
<i>Artemisia filifolia</i>	145	
<i>Atriplex canescens</i>	26	
<i>Penstemon ambiguus</i>	72	
<i>Yucca angustissima</i>	111	
	354	
Tree Bands (3" x 3" x 9" deep)		
<i>Artemisia filifolia</i>	25	
<i>Yucca angustissima</i>	35	
<i>Psoralea fremontii</i>	15	(All dormant or dead)
	75	
Super Cells (1.5" dia. x 8" deep)		
<i>Artemisia filifolia</i>	85	
<i>Ephedra viridis</i>	600	
<i>Coleogyne ramosissima</i>	300	
<i>Psoralea fremontii</i>	30	
<i>Yucca angustissima</i>	180	
	1195	

Presently there are extra seedlings of *Ephedra viridia*, *Coleogyne ramosissima*, and *Yucca angustissima*. Some deep pots and tree pots being produced for 1997 delivery may be ready by fall 1996; the faster growing species include *Artemisia filifolia*, *Ephedra viridis*, and *Coleogyne ramosissima*.

GRAND CANYON NATIONAL PARK
1994 Annual Report
Prepared by
Natural Resources Conservation Service
Los Lunas New Mexico 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. The Park will use this plant material for over 24 acres of revegetation work on roadsides, cut slopes, and new construction areas.

II. Accomplishments

Seed Production 1995

Common Name	AC	Cleaned (lbs)	Purity %	Germ. %	PLS (lbs)
**Blue grama	0.67	0.64			
Bottlebrush	1.00	43.73	97.28	86.00	35.74
squirreltail					
**Western wheatgrass	1.30	351.22			
**Blue penstemon	0.39	15.88			
**Muttongrass		3.22			

**Seed production test information is still being gathered by the LLPMC on some species harvested in 1995.

III. Technology Development

The Red penstemon field was disked in late winter due to the almost complete death of all existing plants. This penstemon was not able to tolerate the soil fungus located in the field. The LLPMC has learned more about how to successfully grow penstemon and it is likely another planting of this species could be done for seed production.

GRAND TETON NATIONAL PARK
1995 Annual Report
NATURAL RESOURCES CONSERVATION SERVICE AND THE
UPPER COLORADO ENVIRONMENTAL PLANT CENTER, MEEKER, COLORADO

INTRODUCTION: Upper Colorado Environmental Plant Center (UCEPC) Project No. 08S212 (IA No. 1460-1-0005) was initiated on September 13, 1991 by Grand Teton National Park, the USDA Natural Resource Conservation Service (USDA-NRCS), and the UCEPC. The original project was to provide 460 PLS pounds of seed and 1200 transplants for revegetation of the FHWA road projects within Grand Teton National Park, however there have been numerous amendments. As of fall 1995, the targeted species and estimated PLS pounds and/or number of plants desired are: 9024705 *Elymus trachycaulus* ssp. *trachycaulus* (slender wheatgrass) 280 lbs. PLS, 9024810 *Psuedoroegneria spicata* ssp. *spicata* (bluebunch wheatgrass) 240 lbs. PLS, 9024706 *Bromus carinatus* (mountain brome) 370 lbs. PLS, 9024809 *Stipa nelsonii* ssp. *dorei* (Columbia needlegrass) 90 lbs. PLS, 9024712 *Artemisia tridentata* the total number of transplants that are available by the fall of 1996 (ie., 4 grasses, 1 shrub).

ACCOMPLISHMENTS: The number of PLS pounds or transplants that have been produced by the UCEPC as well as the PLS pounds or plants that have been shipped to Grand Teton National Park are:

grasses:

1.)	9024705 <i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i>	715.77 lb produced (407.59 lb. remain)
	- slender wheatgrass	308.18 lb total shipped (0.00 in 1995)
2.)	9024706 <i>Bromus carinatus</i> - mountain brome	715.21 lb produced (39.47 lb. remain)
		675.74 lb total shipped (0.00 in 1995)
3.)	9024810 <i>Psuedoroegneria spicata</i> ssp. <i>spicata</i>	301.76 lb produced (181.76 lb. remain)
	- bluebunch wheatgrass	120.00 lb total shipped (0.00 in 1995)
4.)	9024809 <i>Stipa nelsonii</i> ssp. <i>dorei</i>	36.84 lb. prod. (36.1 + field remain)
	- Columbia needlegrass	0.84 lb total shipped (0.00 in 1995)

shrubs:

1.)	9024712 <i>Artemisia tridentata</i> - big sage	90 produced (all remain)
		0 total shipped

TECHNOLOGY DEVELOPMENTS: Production, cultivation, and cleaning technology for each accession has been developed by the UCEPC. Mechanical scarification (either with a scarifier or a hammermill) has been utilized in combination with a desk-top or intermediate screen-cleaner for seed types. Specific screen sizes will be presented upon request. Greenhouse, field, and bare-root production has been developed for plant types.

Lake Meredith National Recreation Area
 1995 Annual Report
 prepared by
 Natural Resources Conservation Service
 James E. 'Bud' Smith Plant Materials Center

Introduction

Two agreements with Lake Meredith National Recreation Area and the James E 'Bud' Smith PMC were developed and signed in 1991 and 1992. The first project was to be completed in 1994, and the second project which ran through 1995, was amended to extent through 1996. The project involve seed and plant collection and plant increase of certain woody species. Plants produced are to provide locally adapted species for roadside and campground revegetation.

Originally, the materials produced was to be used for revegetation following road construction and renovation in the Plum Creek area. In 1994 the focus was changed to areas of higher priority on the south- side mainly Fritch Fortress and the stilling basin (Spring Canyon) below the dam.

Accomplishments:

Since 1991 the James E. 'Bud' Smith PMC has made 5 collection trips to the park collecting seed of requested species. In 1995, seven different woody species were being produced.

In 1994 LMRA and the PMC met and dicsussed plans for use of plant materials already produced. At that time the agreement was amended to: 1) reduce original production numbers on certain species and 2) include additional species that would better fit the focus of the project. Targeted planting dates were also moved to the spring of 1996 taking into consideration construction activities and the need to collect additional species.

Plant Production at James E. 'Bud' Smith PMC 1993-1995

Common Name	1993 Prod./Plts	1994 Prod./Plts	1995 Prod./Plts
Fourwing saltbush	200	-	1400
Skunkbush sumac	-	collected	-
Hackberry	306	-	-
Honeylocust	65	-	-
Western soapberry	222	-	-
Plains cottonwood	600	-	-
Black locust	-	collected	-
Winterfat	-	collected	100
Hopseed tree	-	collected	600

MESA VERDE NATIONAL PARK
1995 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 now involves a total of 19 species, with 1342 lbs. 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* ssp. *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* (blue leafedaster) 3 PLS, 9024873 *Chrysopsis villosa* (hairy goldenaster) 38 PLS, 9024886 *Artemisia ludoviciana* (Louisiana sage) 65 PLS, 9070862 *Penstemon* sp. (low penstemon) 500 (T), *Lupinus laxiflorus* (spur lupine) 500 (T), *Oenothera* spp. (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).

ACCOMPLISHMENTS: The following species had seed (S) collected from the park, cuttings (C) collected from the park, seed harvested (H) at the UCEPC, or were delivered to the park as live (L) plants or seed (S). In 1995, the yarrow field was expanded, while the blueleaf aster field was destroyed.

<u>COLLECTION OR HARVEST</u>			<u>DELIVERY TO PARK</u>		
SEED	Clean seed		LIVE PLANTS	NO.	
				April	Oct.
Antelope bitterbrush	21.0 lbs.(S)		Antelope bitterbrush	52 (L)	7 (L)
Mtn. mahogany	1.41 lbs.(S)		Mtn. mahogany	46 (L)	135 (L)
Muttongrass	19.5 lbs.(H)		Utah juniper	2 (L)	
Slender wheatgrass	NC* lbs.(H)		Snowberry	94 (L)	
Yarrow	24.5 lbs.(H)		Pinyon pine	197 (L)	
Louisiana sage	25.0 lbs.(H)		Gambel oak	195 (L)	
Hairy goldenaster	NC* lbs.(H)		Utah serviceberry	6 (L)	
Snowberry	300 (C)		Datil yucca	17 (L)	
Salina wildrye	2.16 lbs.(H)		Rubber rabbitbrush	88 (L)	
Western wheatgrass	94.2 lbs.(H)		Fourwing saltbush		60 (L)
Low Penstemon	79 gms.(S)		Low penstemon		1 (L)
Spur Lupine	90 gms.(S)		Slender wheatgrass		10.00 (S)
Evening Primrose	22 gms.(S)		Western wheatgrass		20.20 (S)
			Salina wildrye		2.52 (S)
			Mutton grass		2.00 (S)

*NC = Not Cleaned

TECHNOLOGY DEVELOPMENTS: Five 10 ft. rows of Utah serviceberry were planted as a test in 1994 and were evaluated in 1995. Hulled seed collected in 1994 and planted in groups of 16 and kept moist in May were best. In 1995, a review of literature was done on the propagation and establishment of Gambel oak, Utah juniper and Utah serviceberry.

Rocky Mountain National Park
1995 Annual Report
Natural Resources Conservation Service and the
Upper Colorado Environmental Plant Center

INTRODUCTION - Upper Colorado Environmental Plant Center (UCEPC) Project No. 08S211 (IA No. 1520-2-9030) was initiated September 23, 1991 by Rocky Mountain National Park, the USDA National Resources Conservation Service (USDA-NRCS), and the UCEPC. The original project was to provide 350 PLS pounds of seed and 2,000 live plants to revegetate 23 acres associated with housing and other projects. The original contract was extended until 1999. The following figures reflect these recent amendments and the contract extension. Targeted species and PLS or live plants desired are: 9024919 *Elymus trachycalus* ssp. *trachycalus* (slender wheatgrass) 340 PLS, 9024911 *Stipa* sp. (needlegrass) 20 PLS, 9024912 *Deschampsia cespitosa* (tufted hairgrass) 45 PLS, 9024992 *Danthonia intermedia* (oatgrass) 9024910 *Artemesia tridentata* (big sage) 618 bare root plants, 9024922 *Potentilla fruticosa* (shrubby cinquefoil) 520 bare root plants, 9024920 *Shepherdia canadensis* (russet buffaloberry) 601 bare root plants, 9024921 *Eriogonum umbellatum* (sulfur buckwheat) 5 PLS, 9024917 Lupine 10 PLS, 9024993 *Penstemon* sp. 5 PLS, 9024914 *Carex microptera* (sedge) desired amt. satisfied, 9024917 *Carex utriculata* (sedge) desired amt. satisfied, 9024915 *Carex* sp. (sedge) desired amt. satisfied, 9024994 *Populus tremuloides* (quaking aspen) 550 potted plants.

ACCOMPLISHMENTS: - No seed was delivered in 1995. Stored amounts are available on request. Potted plant materials were provided to RMNP, plus field increases and establishment of four species. The total amounts of PLS pounds, do not yet including 1995 cleaned and uncleaned harvest amounts.

<u>grasslike:</u>	<u>Cleaned Seed</u>	<u>On hand PLS</u>
1.) <i>Carex microptera</i> (sedge)	Available	33 g.
2.) <i>Carex utriculata</i> (sedge)	on	0.7 lbs.
3.) <i>Carex</i> other (sedge)	Request	1.6 lbs.
<u>grasses:</u>		
1.) <i>Elymus trachycaulus</i> ssp. <i>trachycalus</i> - (slender wheatgrass)	not cleaned	260 lbs.
2.) <i>Danthonia intermedia</i> (oatgrass) - plot increased	0.00	.65 lbs.
3.) <i>Deschampsia cespitosa</i> (tufted hairgrass)	2.46 lbs.	10 lbs.
4.) <i>Stipa</i> sp. (needlegrass)	3.00 lbs.	10 lbs.
	(190 g. from RMNP)	
<u>forbs:</u>		
1.) <i>Lupinus argenteus</i> (lupine)	1.40 lbs.	.50 lbs.
2.) <i>Eriogonum umbellatum</i> (sulfur buchwheat)	11 g. from RMNP	.10 lbs.
3.) <i>Penstemon</i> sp. - field increase of 1000 transplants	7 g. from RMNP	100 g. UCEPC
<u>shrubs:</u>		
1.) <i>Artemesia tridentata</i> (mtn big sage)	177 plants provided	
2.) <i>Potentilla fruticosa</i> (shrubby cinquefoil)	84 plants provided	
3.) <i>Shepherdia canadensis</i> (russet buffaloberry)	4 plants provided	
	(1 g. of seed from RMNP)	
<u>tree:</u>		
1.) <i>Populus tremuloides</i> (aspen)	250 trees	

TECHNOLOGY DEVELOPMENTS: Production, cultivation, and cleaning technology for each accession has been developed by the UCEPC. Mechanical scarification with a scarifier or a hammermill has been utilized in combination with a screen-cleaner for seed types. Greenhouse, field, and bare-root production has been developed for plant types.

YELLOWSTONE NATIONAL PARK
1995 Annual 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 revegetation of disturbances resulting from road construction projects within Park boundaries. Research within the Park involves the comparison of seeded vs unseeded, mulched vs unmulched, fertilized vs unfertilized and combinations of these treatments on two roadside sites (north- and south-facing). Plots have also been installed to compare establishment and persistence of 12 direct seeded forbs. All plots are evaluated annually for plant cover or density and species composition.

In 1995, 127 lots of seed were delivered to YNP totaling 190.06 pounds (86.213 kg). This included 58 grass lots (13 species) and 60 forb lots (17 species). Also, 294 rooted cuttings of two species of woody plants were delivered.

ACCOMPLISHMENTS: This cooperative agreement is anticipated to be quite long term. 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 mailed to the Bridger PMC or picked up by PMC personnel. In 1995, 169 collections were made: 70 grasses (15 species) and 99 forbs (28 species) resulting in a total of 76.5 pounds (34.701 kg) of clean seed. Records are maintained by the PMC of person-hours to collect each seed lot indicating the approximate cost of collecting native seed.

In the spring of 1995 (May 11, 22), 18 new seed increase blocks were planted totaling 5.98 ha (2.42 A). One old increase block (0.77 ha/ 0.31 A) was removed in the fall of 1995 with additional removals anticipated for spring of 1996. Currently, there are 53 accessions of 11 species of grasses (11.95 ha/4.84 A) and 17 accessions of 8 species of forbs (2.32 ha/0.94 A) planted in seed increase blocks at the Bridger PMC.

During the 1995 growing season, 26 different accessions were harvested producing 131.380 kg (289.64 lbs.) of clean seed.

TECHNOLOGY DEVELOPMENT: All plant material collections are assigned accession numbers and inventoried in a data base. Efforts have begun to develop a lot identification system allowing sorting by individual construction project. A growth chamber is now in operation allowing seed germination testing as needed. Testing of 1995 seed lots will begin in early 1996.

The forb trial at Little Thumb Creek has been evaluated for 6 years. Some species have established well and have actually produced and shattered seed producing a secondary plant population. The best species have been: yarrow (123 plants/m²), eriogonum (115 plants/m²), silverleaf phacelia (73 plants/m²), thickstem aster (69 plants/m²), goldenrod (46 plants/m²), pearlyeverlasting (44 plants/m²), penstemon (41 plants/m²), and lupine (19 plants/m²). Those that have performed poorly or deteriorated with time include dusty maiden (7 plants/m²), pussytoes (8 plants/m²), and hairy goldenaster (4 plants/m²).

The plots at Kepler Cascades and Scaup Lake have developed significantly better plant cover with seeding than non-seeding (natural succession). Mulching helps protect the site during initial emergence and establishment but does not appear to provide any advantage over non-mulched plots after 3 years. Species composition is quite different between the south-facing slope (Kepler Cascade) and the north-facing slope (Scaup Lake). On the drier, exposed south-facing slope the vegetation was dominated by rough bentgrass and slender wheatgrass with virtually no forb establishment and minimal tree establishment. In contrast, the species composition of the north-facing slope consisted of a fairly uniform distribution of six grasses, several forbs and a good lodgepole pine population.

NATIONAL CAPITAL FIELD AREA

GEORGE WASHINGTON MEMORIAL PARKWAY

1995 Annual Report

summary sheet prepared by

USDA-Natural Resources Conservation Service

National Plant Materials Center

Beltsville, MD

Introduction: The National Plant Materials Center (NPMC) began working with the George Washington Memorial Parkway in 1994 on an agreement to provide native plants for revegetation along reconstructed sections of the Parkway. Temporary funding was provided to the NPMC in 1995 and the agreement should be finalized in 1996. Delivery of plants is scheduled to begin in 1997. Details on quantities and sizes of plants are still being finalized.

Accomplishments: The following species have been collecting. Several of the woody species were germinated in 1995.

<u>Species</u>	<u>Common Name</u>	<u>Species</u>	<u>Common Name</u>
Asimina triloba	paw paw	Aster divaricatus	white wood aster
Carpinus caroliniana	Eastern hornbeam	Aster sp.	aster
Cercis canadensis	redbud	Eupatorium fistulosum	Joe Pye weed
Clematis virginiana	virgin's bower	Eupatorium perfoliatum	boneset
Hamamelis virginiana	witch hazel	Helianthus decapetalis	thin-leaved sunflower
Hydrangea arborescens	hills-of-snow	Phlox paniculata	garden phlox
Juglans nigra	black walnut	Sida hermaphrodita	Virginia mallow
Kalmia latifolia	mountain-laurel	Solidago canadensis	Canada goldenrod
Lindera benzoin	spicebush	Solidago flexicaulis	broad-lvd. goldenrod
Liriodendron tulipifera	tulip poplar	Solidago gigantea	late goldenrod
Nyssa sylvatica	black gum		
Rhus copallina	winged sumac		
Rhus glabra	smooth sumac		
Staphylea trifolia	bladdernut		
Viburnum acerifolium	maple-leaf viburnum		
Viburnum dentatum	arrowwood		

Technology Developments and Observations: One interesting observation which was made this past year was on the germination of paw paw (*Asimina triloba*) seed in the spring of 1995. *Asimina* seed was sown on 11/18/94. By mid-May, none of the seed had apparently germinated, even though most of the other species in the area had germinated. As we started to pull weeds out of the bed the paw paw seed was in we noticed that those seed which were shaded by weeds were just starting to emerge at the soil surface. Excavation of areas not shaded by weeds revealed seeds which had not germinated or had just started to germinate. We hypothesized that shade (i.e. cooler soil) enhanced or was necessary for germination. We set up shade over the bed, and within one week nearly all the seeds had germinated. Based on these observations, our recommendation is to always provide shade over seed beds of *Asimina triloba* during germination and early growth.

NORTHEAST FIELD AREA

ACADIA NATIONAL PARK
1995 ANNUAL REPORT
prepared by
NATURAL RESOURCES CONSERVATION SERVICE
BIG FLATS PLANT MATERIALS CENTER

I. INTRODUCTION

The USDA, Natural Resources Conservation Service, Big Flats Plant Materials Center entered into an interagency agreement with the USDA, National Park Service, Acadia National Park on September 21, 1992. The Natural Resources Conservation Service agreed to:

- A. Collect seed of selected species within Acadia National Park boundaries.
- B. Use these seeds to produce isolated increase fields of grasses and forbs and transplants of shrubs and trees. A minimum of (3) grasses, (3) forbs, (6) shrubs and (2) tree species will be applied.
- C. Make available seed and transplants to Acadia National Park for revegetation of the Federal Lands Highways Program road projects in the park from 1994 through 1996.

The park will use the plant materials for roadside revegetation after resurfacing the park loop road and up-grading the Carriage Paths in the park. Since this agreement was approved in September 1992, PMC activities have focused on seed collection in the Acadia National Park, seed processing and conditioning, seed/plant propagation at the Plant Materials Center, establishing seed increase fields on the PMC and propagating plant materials vegetatively.

Six grasses, nine forbs, nine shrubs and six tree species are involved in this project. During 1995, seed increase blocks were established of forbs and grasses utilizing transplants initially seeded in the greenhouse. Direct seeding of a grass seed increase plot was done in late summer to expand present production blocks. Red fescue was harvested off 2 year old stands in August with significant increase in yields. Vegetative cutting material was collected on Oct. 26-27 and placed in the greenhouse mist system. Seedlings from the fall '94 and spring '95 woody beds were dug up in the fall, potted and placed in the greenhouse.

II. ACCOMPLISHMENTS

Additional seed increase fields of grasses (red fescue, poverty oatgrass, hairgrass) and forbs (large leaf aster, NY aster, flat-top aster, Downy goldenrod, Canada goldenrod and rough-stemmed goldenrod) were established this summer using transplants started in the greenhouse.

The second harvest off seed increase fields established in 1993 was done late summer and fall with the following yields:

Red fescue	(1.2 acre - est. 1993)	145.00 lbs.
Red fescue	(1.5 acre - est. 1994)	130.00 lbs.
flat-top aster	300' row	.20 lbs.
New York aster	1200' row	.35 lbs.
large leaf aster	600' row	2.20 lbs.
Downy goldenrod	400' row	.50 lbs.
Canada goldenrod	600' row	1.00 lbs.

The second year harvest of red fescue had a significant increase over last years (7.85 lbs to 145 lbs). The poverty oatgrass stand established in 1994 was removed, due to a poor stand. Another stand with transplants was established in 1995.

Seedlings out of the woody beds were dug up in the fall, potted and placed in the greenhouse (bayberry, white pine, red maple, white birch). Overall success was low, so will utilize cold frame technique.

Vegetative material was collected in October, and the cuttings placed in the greenhouse mist system. Seed was collected of the forbs (asters and goldenrods) and shrubs (sheep laural, rhodora, waterberry).

III. TECHNOLOGY TRANSFER

The establishment of seed increase fields using greenhouse transplants worked well. For red fescue, direct seeding can successfully establish a seed increase field. In May, 2.7 miles of park loop road was seeded using grass and forb seed from the PMC. The Park utilized the PMCs brillion seeder to obtain proper placement of seed, which worked well. In June, we assisted park personnel on re-vegetating disturbed areas, utilizing plants from PMC and the Park, with excellent survival. Plantings using grass plugs were tested in various locations (drainage ditches, along footpaths, steep banks) with good success and survival. For high use areas, controlling "people traffic" in re-vegetated areas is critical for survival and establishment success.

ASSATEAGUE ISLAND NATIONAL SEASHORE
1995 Annual Report
prepared by
USDA-NATURAL RESOURCES CONSERVATION SERVICE
CAPE MAY PLANT MATERIALS CENTER

In May of 1991, the National Park Service entered into a five year contract with the Natural Resources Conservation Service's Cape May Plant Material Center for propagating and increasing native plants of Assateague Island, Maryland. The specified indigenous species were produced for revegetating various disturbed sites associated with recent construction activities. The collection of plants and seed began in the months that followed, and continued until 1993.

Plant increase for this agreement was successfully initiated in 1992, with only thoroughwort (*Eupatorium* sp.), beach heather (*Hudsonia tomentosa*) and highbush blueberry (*Vaccinium corymbosum*) offering any resistance to cultivation. The beach heather seed finally yielded to techniques utilized for woody bare root production: fall seeding on raised beds. Little or no success was attained in the attempt to grow thoroughwort or blueberry.

To adequately increase seaside goldenrod to meet the needs of Assateague NS, it was found that each mature plant (2-3 yrs. old) will yield from 10-20 viable root divisions. These root divisions produce vigorous plantable units within eight weeks when containerized under greenhouse conditions.

The delivery of plants and seed for this agreement began in 1993, with 100,000 culms of American beachgrass (*Ammophila breviligulata*), and the final installment for this project was delivered during the spring of 1995. In 1995 Assateague Island NS was provided 8,800 containerized forb seedlings and 3,050 bare-root tree and shrub seedlings. The native species provided to this national seashore in '95 included:

FORBS		
<u>Hudsonia tomentosa</u>	beach heather	200
<u>Solidago sempervirens</u>	seaside goldenrod	8,600
SHRUBS		
<u>Myrica pensylvanica</u>	bayberry	650
<u>Myrica cerifera</u>	beach plum	920
<u>Rhus copallinum</u>	dwarf sumac	
80		
<u>Rubus flagellaris</u>	northern dewberry	200
TREES		
<u>Acer rubrum</u>	red maple	150
<u>Juniperus virginiana</u>	eastern red cedar	150
<u>Pinus taeda</u>	loblolly pine	900

In evaluating the revegetation efforts at Assateague Island NS, it has been continually noted that the plant material provided successfully establishes on these harsh sites. It is unfortunate that most or all of the vegetation has been completely browsed/grazed by resident pony and deer herds.

CAPE COD NATIONAL SEASHORE
1995 Annual Report
prepared by
USDA-NATURAL RESOURCES CONSERVATION SERVICE
CAPE MAY PLANT MATERIALS CENTER

In striving to preserve the native plant resources at Race Point Road, of the Cape Cod National Seashore in Massachusetts, the National Park Service has contracted with the Natural Resources Conservation Service's Cape May Plant Material Center to propagate the needed vegetation. This agreement was finalized in August, 1994. The existing road is under reconstruction to improve access to its natural resources. The collection of plants and seed along Race Point Road began in the months that followed and will continue until 1996. It was agreed that three species of grass, two species of forbs, and three species of shrubs will be propagated, then delivered to Cape Cod NS in the form of seed and plants, starting in 1996.

Seed and some vegetative material was gathered for the propagation of five species in 1995 from along Race Point Road. Vegetative material was collected for a species of upland sedge (Carex sp.) and saltmeadow cordgrass (Spartina patens). More than one-half pound of cleaned bayberry (Myrica pensylvanica), beach plum (Prunus maritima), and horse briar (Smilax rotundifolia) seed was collected from indigenous stands near Provincetown, MA.

Even-though plants nor seed were delivered to Cape Cod NS in 1995, initial increase of trees, shrubs, and grasses began. The first collections of tree and shrub seeds were fall sown in 1994. Successful emergence and development of bayberry, beach plum, and horse briar was observed in 1995 on raised beds, reassuring that adequate numbers of seedlings will be provide as planned. Field provisions were made to increase American beachgrass (Ammophila breviligulata) to supply 10,000 vegetative culms in the spring or fall of '96. Greenhouse increase of sedge and saltmeadow cordgrass culms continued throughout 1995, to establish an adequate seed producing population at the Cape May PMC in '96. The remaining grass and forb seed requested in this contract will be supplied from existing regional seed production blocks maintained at the PMC.

Of the ten species to be supplied for this agreement, three had not been previously propagated at the Cape May PMC. These species were the sedge, black huckleberry, and green briar. The huckleberry and briar seed cleaned quite easily when centrifugally macerated, remaining pulp floated off, sun dried, and then screen cleaned. The emergence from pure cleaned seed of horse briar was excellent with good rapid growth, when compared to the performance of uncleared fruit. The huckleberry has been difficult to initiate consistent emergence. The sedge culms were easily divided and transplanted in the greenhouse, but multiplication has been slow (10-15 culms annually).

GATEWAY NATIONAL RECREATION AREA, SANDY HOOK UNIT
1995 Annual Report
prepared by
USDA-NATURAL RESOURCES CONSERVATION SERVICE
CAPE MAY PLANT MATERIALS CENTER

To preserve and restore the native plant resources on the Gateway National Recreation Area's Sandy Hook Unit in New Jersey, the National Park Service has contracted the Natural Resources Conservation Service's Cape May Plant Material Center to propagate the needed vegetation. This agreement was finalized in March, 1993. The collection of plants and seed began in the months that followed, and will continue until 1995. Plant and seed increase for this agreement was initiated in 1994 with good success.

This location has a unique land use history; it was once the US Army's primary ordinance testing and proving grounds. Such past use or abuse of this peninsula has had great impact on plant succession and cover development in various areas, as is the case throughout this NRA. Due to this unit's close proximity to the other units of the Gateway National Recreation Area, the existing seed increase blocks where permitted to be utilized for Sandy Hook.

This year's installment of plants and seed was delivered in the spring. It included 68,000 American beachgrass bare-root culms, 3,100 bare-root tree and shrub seedlings, 104 lbs. of warm season grass seed and 3,400 containerized forbs. The species and the amounts provided to the Sandy Hook Unit in 1995 are:

GRASSES		
<u>Ammophila breviligulata</u>	American beachgrass	68,000
<u>Panicum amarum</u>	coastal panicgrass	52 PLS lbs
<u>Panicum virgatum</u>	switchgrass	52 PLS lbs
FORBS		
<u>Oenothera biennis</u>	evening primrose	1,700
<u>Solidago sempervirens</u>	seaside goldenrod	1,700
SHRUBS		
<u>Myrica pensylvanica</u>	bayberry	1,500
<u>Prunus maritima</u>	beach plum	1,100
<u>Rhus copallinum</u>	dwarf sumac	50
TREES		
<u>Acer rubrum</u>	red maple	350
<u>Betula populifolia</u>	gray birch	100

Traditional propagation techniques for tree and shrub production have been utilized, with good results for all species listed above. Pitch pine seed was collected and sown in 1995; this tree species will be available as early as the fall of '96. Due to the lack of herbivory at Sandy Hook, plant establishment should be highly successful.

GATEWAY NATIONAL RECREATION AREA
1995 Annual Report
prepared by
USDA-NATURAL RESOURCES CONSERVATION SERVICE
CAPE MAY PLANT MATERIALS CENTER

In an attempt to restore the native plant resources of the Gateway National Recreation Area's Jamaica Bay, Breezy Point, and Floyd Bennet Field Units in New York, the National Park Service has contracted with the Natural Resources Conservation Service's Cape May Plant Material Center to propagate and increase the needed vegetation. Most of the plants and seed supplied will be utilized to revegetate recent construction disturbances. This agreement was finalized in June, 1991. The collection of plants and seed began in the months that followed, and continued until 1993.

Seed increase blocks for wild indigo, partridge pea, evening primrose, switchgrass, little bluestem and seaside goldenrod were established at the PMC in 1992. Seed from all species was possible in the fall of 1993. All six species can be mechanically harvested, and clean easily with conventional methods. The switchgrass collected from Floyd Bennet Field has excellent biomass and seed production capability (+180 stems/sq.ft. and +250 PLS lbs./acre). Controlled burning was successfully utilized on the warm season grasses to stimulate seed production.

The following species listed with their corresponding amounts were provided to Gateway NRA in the spring of 1995:

GRASSES			
<u>Panicum amarum</u>	coastal panicgrass	70 lbs.	
<u>Panicum virgatum</u>	switchgrass	75 lbs.	
<u>Schizachyrium scoparium</u>	little bluestem	2.5 lbs.	
FORBS			
<u>Baptisia tinctoria</u>	wild indigo	1.5 lbs.	
<u>Chamaecrista nictitans</u>	partridge pea	1.5 lbs.	
<u>Oenothera biennis</u>	evening primrose	6.5 lbs.	
<u>Solidago sempervirens</u>	seaside goldenrod	1.5 lbs.	
SHRUBS			
<u>Myrica pensylvanica</u>	bayberry	300	
<u>Prunus maritima</u>	beach plum	300	
TREES			
<u>Betula populifolia</u>	gray birch	100	
<u>Juniperus virginiana</u>	eastern red cedar	100	
<u>Liriodendron tulipifera</u>	tulip poplar	35	
<u>Nyssa sylvatica</u>	black gum	2,200	

Although the original agreement expired at the end of 1995, the success and convenience of the program has initiated negotiations for an extension.

SHENANDOAH NATIONAL PARK
1995 Annual Report
summary prepared by
USDA-Natural Resources Conservation Service
National Plant Materials Center
Beltsville, Maryland

Introduction: This project was initiated in September 1992 to produce seed and plants to be used for the revegetation of roadside construction sites in the Shenandoah National Park along Skyline Drive. Approximately 2400 lbs. of grass and forb seed and 9000 tree and shrub seedlings will be produced and delivered to the park through 1997. This includes a minimum of two grass, three forb, five shrub, and three tree species. To date, 3,124 trees, shrubs, and woody vines, 102 plugs of grasses and wildflowers, and 13 lbs. of herbaceous and woody seed have been delivered to the park.

Accomplishments: Since the project began approximately 50 woody and herbaceous species have been collected from Shenandoah National Park and eight seed increase fields have been established. Production of the major native species that the Park requires has been expanded and production fields for other species are being established. The NPMC is on schedule for plant production with about 2400-2900 potted and bare-root woody species and 112 potted wildflowers ready for delivery in 1996. Three seed production fields were increased in size in 1995 with plans to expand three or four more in 1996. The following is a list of the main species harvested in 1995.

Botanical Name	Common Name	Harvest Date	Production
Aquilegia canadensis	columbine	7/3/95	190.0 grams clean
Aster undulatus	waxy-leaf aster	11/17/95	1,243 grams bulk
Coreopsis verticillata	whorled tickseed	10/2/95	51 grams bulk
Heuchera americana	rock geranium	7/7/95	99.37 grams clean
Hystrix patula	bottlebrush grass	7/21/95	36 lbs. bulk
Monarda fistulosa	bergamont mint	8/17/95	N/A
Schizachyrium scoparium	little bluestem	10/27/95	10 lbs. bulk
Tridens flavus	purpletop	9/19 & 9/21/95	21.25 lbs. bulk

(N/A = Information not available at this time.)

Technology Developments: The NPMC has recently acquired two new pieces of equipment that will greatly improve the efficiency of seed harvesting and cleaning operations. The Massey Ferguson 8-XP plot combine reduces the time and personnel requirements of seed harvesting. In addition, it produces a much cleaner seed lot than previous methods, minimizing seed loss and additional seed cleaning requirements. Seed conditioning has also been improved through the addition of a Crippen debearder to our post harvest seed handling equipment. A number of the grass and wildflower species grown at the NPMC produce fluffy, bearded seed that is extremely difficult to clean. The debearder separates the fluff from the seed; both improving the efficiency of cleaning operations and ensuring greater purity of the harvested seed stock.

In the fall of 1994 a new technique in the production of woody seedlings was utilized. Sixteen species were soaked for 24 hours in a fungicide solution and were direct seeded in the field. The results were excellent. Most species germinated well and growth was exceptional, many seedlings grew 12 to 24 inches over the summer. Due to its success the procedure was repeated this fall.

SHENANDOAH NATIONAL PARK
1995 Annual Report
summary prepared by
USDA-Natural Resources Conservation Services
National Plant Materials Center
Beltsville, Maryland

Introduction: This project was initiated in June 1995 to produce seed and plants for the revegetation of facilities construction sites in Shenandoah National Park. In total 570, lbs. of grass seed, 50 lbs. of forb seed, 1525 shrub seedlings and 390 tree seedlings will be produced. This will include a minimum of three grass, four forb, five shrub, and three tree species. Plants will be delivered to the park beginning in 1998.

Accomplishments: The early stages of planning and preparation for the requirements of the agreement are well underway. Six woody species have been collected from Shenandoah National Park and additional collections are planned for 1996. Due to the prior cooperative agreement many of the seed production fields have already been established. These fields were expanded in 1995 to allow for the increased quantities of seed required. New production fields and continued expansion of existing fields are planned for 1996. Woody plant seed was field planted this fall to begin production for the agreement. In addition, several woody species that were grown in 1995 will be potted, grown to larger sizes and held for delivery. The following is a list of species collected in 1995.

Botanical Name	Common Name	Clean Weight (g)	Estimated Number of Seeds
Acer rubrum	red maple	288.6	4,826
Cercis canadensis	eastern redbud	95.26	3,802
Lindera benzoin	spicebush	905.32	6,629
Ostrya virginiana	hop hornbeam	14.05	931
Quercus rubra	red oak	5580	1,097
Viburnum acerifolium	maple leaf viburnum	18.25	287

Technology Developments: The NPMC has recently acquired two new pieces of equipment that will greatly improve the efficiency of seed harvesting and cleaning operations. The Massey Ferguson 8-XP plot combine reduces the time and personnel requirements of seed harvesting. In addition, it produces a much cleaner seed lot than previous methods, minimizing seed loss and additional seed cleaning requirements. Seed conditioning has also been improved through the addition of a Crippen debarker to our post harvest seed handling equipment. A number of the grass and wildflower species grown at the NPMC produce fluffy, bearded seed that is extremely difficult to clean. The debarker separates the fluff from the seed; both improving the efficiency of cleaning operations and ensuring greater purity of the harvested seed stock.

In the fall of 1994 a new technique in the production of woody seedlings was utilized. Sixteen species were soaked for 24 hours in a fungicide solution and were direct seeded in the field. The results were excellent. Most species germinated well and growth was exceptional, many seedlings grew 12 to 24 inches over the summer. Due to its success the procedure was repeated this fall.

PACIFIC WEST FIELD AREA

CRATER LAKE NATIONAL PARK
Mazama Dorm and Munson Valley Road Projects
1995 Annual Report Summary
Prepared By
NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER

INTRODUCTION - The Corvallis Plant Materials Center (PMC) entered into two separate agreements with Crater Lake National Park in 1995 to collect, plant, evaluate, and increase grasses, sedges, forbs, and shrubs for revegetation purposes. The Mazama Dorm project involves increasing a minimum of two grasses, one sedge, five forbs, and twelve woody species. Approximately 83 pounds (PLS) seed, 200 "jelly roll plugs" or tubelings, 4000 tubelings, and 200 one-gallon containers are scheduled for delivery to the park in late summer of 1998. In addition, propagation requirements of three woody species shall be evaluated, and jelly roll techniques using select species shall be investigated.

The Munson Valley road project involves increasing a minimum of three grasses, one sedge, and seven forbs. Approximately 100 pounds (PLS) seed and 6000 tubelings or jelly roll plugs are scheduled for delivery to the park in late summer 1998. In addition, production studies involving one grass and four forbs shall be implemented, and jelly roll techniques using select species shall also be investigated.

ACCOMPLISHMENTS - Three people from the revegetation crew at Crater Lake received a day-long training session from the staff at the PMC in June 1995 on collecting seeds and cuttings of most species involved in these agreements. This was followed up with a site visit by PMC staff early in the collection season in August at the park, working for 1/2 day with the revegetation crew and several assistants from other park crew members. Seeds and cuttings for all species for the Mazama Dorm project, and all but two species for the Munson Valley Road project were collected by the park crews in late summer - fall 1995 and were shipped to the PMC for processing. All material arrived in excellent condition. Berries were processed to retrieve seeds soon after arrival at the PMC. Some fresh seeds and the cuttings were stored in a walk-in cooler, and the remaining seeds are being held in dry storage for final cleaning and processing in February 1996.

TECHNOLOGY DEVELOPMENTS - Experimental outlines for the "jelly-roll" production testing and needlegrass seed production will be developed in spring 1996 for implementation in 1996 and 1997.

CRATER LAKE NATIONAL PARK
Rim Village Restoration Project
1995 Annual Report Summary
prepared by
NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER

INTRODUCTION - The Corvallis Plant Materials Center (PMC) entered into a 5-year agreement with Crater Lake National Park in 1991 to collect, plant, and evaluate seeds and cuttings in the park for revegetation purposes. The agreement was modified in 1993 to reflect changes in construction schedules, plant materials, and provide more details on revegetation test plots. A minimum of six grasses or sedges, four forbs, and nine woody species were to be increased, and 80 pounds of seed, 14,000 plugs, and 2000 transplants were to be delivered to Crater Lake between spring 1994 and fall 1995. A minimum of five species were to be evaluated in propagation studies, and three species were to be evaluated for seed increase potential. This agreement concluded September 30, 1995.

ACCOMPLISHMENTS - 13,337 container-grown plants were delivered to the park in August, 1995. Of these, 6,902 were needlegrass and squirreltail plants, grown in lieu of seed production which was less than projected for seed increase. Overall, the total amount of seeds and plants delivered to the park is as follows:

Woody plant spp	12 species	2,309 containers	
Sedges	3 species	8,681 containers	
Grasses	4 species	6,902 containers	20.2 lbs seed
Forbs	8 species	4,516 containers	133 g seed

Meanwhile, plant and seedling establishment from the 1994 delivery was good to excellent for most species. Plants delivered this year were more than adequate to fill in the plantings. PMC staff visited the park in August, and found the plantings in excellent shape overall. Since seedling establishment was successful with the seeds delivered last year, no additional seed was required this year. A small amount of blue wild rye, thick-headed sedge, pearly everlasting and lupine seed produced at the PMC this year remains in storage at the PMC.

TECHNOLOGY DEVELOPMENTS - During the course of the agreement, seed and / or cutting propagation trials were conducted on a total of a total of 14 species, resulting in successful plant production for 13 of these. Preliminary germination trials were conducted on four additional forb species before they were dropped from the agreement. Results of seed germination trials for Pinemat Manzanita were presented to the International Plant Propagators' Society Western Region Meeting in September. Title:

Trindle, Joan D.C. **Evaluating Acid Scarification Effects on Dormant *Arctostaphylos nevadensis* Seeds**, Comb. Proc. International Plant Propagators' Society, Vol 45, 1995.

CRATERS OF THE MOON NATIONAL MONUMENT
1995 Annual Report
prepared by
NATURAL RESOURCES CONSERVATION SERVICE
ABERDEEN IDAHO PLANT MATERIALS CENTER

INTRODUCTION

The Aberdeen Plant Materials Center (PMC) entered into an agreement with Craters of the Moon National Monument in 1993 to produce seed and plants of native plant species for revegetation purposes and to develop propagation methods. This agreement is in effect through 1996.

ACCOMPLISHMENTS

Due to delays in beginning road construction in 1995, plant propagation was curtailed in mid-March. In early February, propagation of rubber rabbitbrush *Chrysothamnus nauseosus* accession no. 9067522 and antelope bitterbrush *Purshia tridentata* accession no. 9067521 began in the greenhouse. The plants were maintained in the greenhouse until mid-September when they were moved outside to a temporary lathhouse to overwinter. 1956 Rubber Rabbitbrush and 340 Bitterbrush plants are being stored in the lathhouse.

Needleandthread *Stipa comata* accession no. 9067516 seed was harvested from Field 3 in July and personnel from Craters NM also collected additional seed to augment seed produced at the PMC. 0.5 pounds (clean weight) were produced. Craters personnel also collected 5 pounds (uncleaned weight) of rubber rabbitbrush to augment previous collections in case of loss of seed viability from earlier collections.

TECHNOLOGY DEVELOPMENTS

Work continues in preparation of a manuscript "Phenology Tracking Leading to Seed Development of *Mimulus nanus*, *Eriogonum ovalifolium*, and *Phacelia hastata*" which are important plants found at the Monument. This study will provide guidance for future seed collection of these species.

LAVA BEDS NATIONAL MONUMENT
1995 Annual Report
prepared by
NATURAL RESOURCES CONSERVATION SERVICE
ABERDEEN IDAHO PLANT MATERIALS CENTER

INTRODUCTION

The Aberdeen Plant Materials Center (PMC) entered into an agreement with Lava Beds National Monument in 1992 to produce seed and plants of native plant species for revegetation purposes and to develop propagation methods. This agreement is in effect through 1996. However, due to delays in road construction, a significant portion of the tasks outlined in the original agreement are on hold indefinitely.

ACCOMPLISHMENTS

Seed production of sulphurflower buckwheat *Erigeron umbellatus* accession no. 9067430 was 3.7 pounds cleaned. Because of the extremely wet spring, the plants did not perform as well as expected.

TECHNOLOGY DEVELOPMENTS

This seed production field was the first field to have small plants transplanted after weed barrier installation. The PMC will continue to monitor the interaction between the weed barrier and plant performance.

MOUNT RAINIER NATIONAL PARK
Highway 123 and 410 Revegetation Projects
1995 Annual Report Summary
Prepared By
NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER

INTRODUCTION - The Corvallis Plant Materials Center (PMC) entered into agreements with Mount Rainier National Park in 1990 and 1991 to provide native seed and plants for revegetation on Highway 123 and highway 410, respectively, following road construction. For Highway 123, seeds of seven herbaceous plant species and plants of two woody species were scheduled for delivery to Mount Rainier between spring 1993 and fall 1995. An additional five herbaceous species were to be evaluated in terms of seed germination requirements and increase potential. The Highway 410 agreement called for seed production and propagation information on seven herbaceous species. Seed delivery was planned for spring 1993 through fall 1995. Test plots were installed at three locations near the areas to be reseeded, to test seedbed preparation and plant establishment from these native seeds. The terms of both agreements were met September 30, 1995.

ACCOMPLISHMENTS - Container-grown plants for Highway 123 were delivered to Mount Rainier in April 1995. Seeds for both highways were delivered in October 1995, premixed at the PMC at the request of the landscape architect. Shipments included:

Live plants:

Vine Maple - 3 accessions	385 1-gallon containers
Douglas Mountain Maple	23 1-gallon containers
Bunchberry Dogwood	396 1-gallon or 10" cones

Seeds:

Low elev., Highway 123	23.4 kg	6 species
Low elev., Highway 410	30.9 kg	5 species
High elev., Highway 123 + 410	13.4 kg	12 species

The majority of seed provided was blue wild rye and Columbia brome from PMC increase fields. Several other grasses, sedges and forbs were provided from a combination of field increase seeds and native collected seeds. Several large seed lots remain in storage at the PMC from this agreement. These include 3 accessions of blue wild rye totalling 321 kg, and 9.1 kg of high elevation Columbia brome.

TECHNOLOGY DEVELOPMENTS - Reports from the OSU seed lab during testing indicated that the *Agrostis* from highway 123, low elevation in our seed increase block may have hybridized with domestic species. Because of their reports, it was decided not to use this seed in park revegetation efforts.

A slide presentation titled "Revegetation Plot Study at Mount Rainier National Park" was presented to the Western Forest and Range Seed Council Meeting in Boise, Idaho in June 1995.

**MOUNT RAINIER NATIONAL PARK
Mather Memorial Parkway Project
1995 Annual Report Summary
Prepared By
NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER**

INTRODUCTION - The Corvallis Plant Materials Center (PMC) entered into a "revised agreement" with Mount Rainier National Park in 1995 to produce seed and plants for revegetation purposes on Mather Memorial Parkway (high elevation zone of Highway 410). A minimum of three grasses, one sedge, five forbs and three woody species shall be increased. Approximately 420 pounds (PLS) seed, 20,000 transplants, 480 one-gallon containers, and 2000 woody cuttings are scheduled for delivery to the park in spring of 1999. In addition, propagation trials and jelly-roll techniques using select herbaceous species will be implemented and evaluated.

ACCOMPLISHMENTS - Seed collections of 16 new accessions (4 grasses, 6 forbs, 4 sedges, and 2 shrubs) were taken in August and September to provide seed for container and field seed increases. Three species, *Luetkea pectinata*, *Valeriana sitchensis* and *Potentilla flabellifolia* have not been grown at the PMC before. Only a trace of seed was found for *L. pectinata*, but seed was plentiful for the other two species, for which stratification treatments have begun. Both *L. pectinata* and the *Salix* sp. are slated for vegetative propagation from divisions or cuttings, respectively. These were not collected this year because the PMC was not given the necessary permissions to collect live plant material from the park. The PMC will request these materials from the park Botanist in 1996.

TECHNOLOGY DEVELOPMENTS - Literature searches for the propagation potential from seed for the two new species are underway. Successful propagation from root divisions for *Valeriana sitchensis* is documented; however, specific information on seed propagation for this and *Potentilla flabellifolia* is scarce. Results of seed pretreatments will be documented for the 1996 Annual Report. Preliminary trials with "dryland jellyrolling" is planned for 1996 and 1997.

SEQUOIA AND KINGS CANYON NATIONAL PARKS
1995 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. The goal of the project is to develop propagation, cultivation, and cleaning technology for and deliver a total of 420 lbs. of grass seed and 20 lbs. of forb seed representing the following accessions: Blue wildrye (*Elymus glaucus*), Orcutt's brome (*Bromus orcuttianus*), California needlegrass (*Stipa californica*), Bearded melicgrass (*Melica aristata*), Sticky cinquefoil (*Potentilla glandulosa*), and Naked buckwheat (*Eriogonum nudum*). The species list was expanded with the 1995 Amendment.

ACCOMPLISHMENTS: Six seed fields were planted in 1995. Seeds were planted at a rate of about 30 seeds per foot of row and rows were spaced 3 feet apart. No seed was harvested from seed fields in 1995. Plants were grown for sticky cinquefoil for planting next spring.

Seed was also received from the park in 1995. Seed fields and seed received are listed below.

Seed Fields	Seed Received	
	(grams)	(Cleaned)
<u>Grasses</u>	<u>Wuksachi</u>	<u>Giant</u>
1. Blue wildrye - 0.62 acre	_____	226
2. Orcutt's brome - 0.64 acre	_____	399
3. California needlegrass - 0.12 acre	90	63
4. Bearded melicgrass - 0.20 acre	406	45
<u>Forbs</u>		
5. Sticky cinquefoil - 0.34 acre	344	
6. Naked buckwheat - 0.25 acre	_____	
7. Pink Stickseed - _____	_____	192

TECHNOLOGY DEVELOPMENTS: Seed cleaning technology was developed for each species cleaned. Specific information can be provided on request.

SOUTHEAST FIELD AREA

Cumberland Gap National Historical Park
1995 Annual Report
summary sheet prepared by
USDA-Natural Resources Conservation Service
National Plant Materials Center
Beltsville, MD

Introduction: There are two cooperative agreements between the Park and the NPMC. The first began in 1990 and ended in 1995. The second began in 1991 and ends in 1997. Construction of a tunnel through Cumberland Mountain to replace US 25E, the highway that runs over Cumberland Gap, will ultimately lead to the disturbance of over 120 acres. Restoration of the Gap and areas which support the tunnel roads will utilize 3,075 lbs. of grass and wildflower seed and 31,000 trees, shrubs, and vines.

Accomplishments: Our tree and shrub planting from the past few years have really started to put on growth. Some of the black locust trees planted in 1993 are 15' tall and already producing new seed crops. The summer of 1995 was extremely hot and dry at Cumberland Gap, which took its toll on some of the species planted in the spring of 1995.

The plugs and seed planted over the past two years are beginning to make their mark. There were splashes of yellow Coreopsis lanceolata blooms which were highly visible and made quite a show in the Park.

Seed and plant deliveries to the Park in 1995 included:

Grass and Wildflower Seed	75 lbs.
Plugs of Wildflowers	2,800
Trees and Shrubs	5,600

Seed and plant deliveries to the Park to date include:

Grass and Wildflower Seed	373 lbs.
Plugs of Wildflowers	47,570
Trees and Shrubs	12,161

Plugs were substituted for some of the grass and wildflower seed at a rate of 100 plugs = 1 lb. of seed. Plugs have been especially useful for planting natives in areas where non-native grasses have already been planted but have not established well.

We will soon be harvesting over 8,000 trees and shrubs for delivery and installation at the Park this March 1996. Some of these plants will be used in the few areas which have failed in the past. We will be using special slow-release fertilizers, packets of mycorrhizal inoculum to enhance root growth, and weed control rings around the young trees with the hopes of stimulating rapid root growth and reducing weed competition around the plants.

Seed production this past year was a little lower than expected due to the drought we had at Beltsville and an outstanding weed crop. We are still in the process of cleaning seed, and anticipate that there will be no problem meeting the 1996 needs of the park for seed.

Technology Developments and Observations: Last year we reported on the harvest of Pityopsis graminifolia seed with a Trac-Vac vacuum. This season, we modified the unit with a new vacuum head mounted off to the side of the unit. The tractor rolled down between the rows of Pityopsis while the vacuum head skimmed over the tops of the Pityopsis plants and vacuumed off the mature seed. In this way, we were able to harvest the seed with one tractor operator in a fraction of the time it took us to manually harvest the seed last year. In addition, we were able to purchase a seed debearder this past year. The debearder will greatly improve our ability to clean the fluffy seed.

GREAT SMOKY MOUNTAINS NATIONAL PARK

1995 Annual Report

summary sheet prepared by

USDA-Natural Resources Conservation Service

National Plant Materials Center, Beltsville, MD

and

Quicksand Plant Materials Center, Quicksand, KY

Introduction: The agreement with the Quicksand Plant Materials Center which ended in 1995 was extended in 1995. This amendment bridges the expired agreement and the new agreement which will be initiated with the National Plant Materials Center (NPMC) in 1996. The Quicksand PMC has delivered 21,648 trees and shrubs and 1480 lbs. of grass and wildflower seed for the completed agreement. An additional 4000 "leftover" trees and shrubs will be shipped in spring, 1996. There is still additional seed in storage at Beltsville and Quicksand as the Park needs it.

The new agreement will provide plants for the uncompleted section of the Foothills Parkway known as the "missing link". Park staff has been collecting seed for the new agreement. The NPMC is the coordinating PMC for the project. All woody plants and many of the grass and wildflower species will be grown in Beltsville. Several of the grass species are being grown in Quicksand to take advantage of established fields and higher seed yields with the Quicksand PMC fields.

Accomplishments: In March 1995, the NPMC coordinated the planting of over 8,800 trees, shrubs, and vines produced by the Quicksand PMC. The NPMC contracted with the Lincoln Memorial University in Harrogate, TN to hire ten student to assist with the planting. We did not find many of the plants during initial evaluation of the plantings in the fall of 1995. This was probably due to weeds hiding the plants and perhaps a lower-than-expected survival due to the hot weather and the long drought at the Smokies this past summer.

Park staff made seed collections during the fall of 1994 and throughout 1995. About 20 species of woody plants and eight species of grasses and wildflowers were collected in 1994 and 1995. The park has nearly completed all the necessary collections. Seed delivered to the NPMC has been cleaned and some of the seed has been planted. In 1996 we will begin to evaluate some of the wildflowers for plug production in anticipation of 60,000 plugs which will be produced and delivered 1997-1999.

Production fields of Andropogon virginicus, Danthonia compressa, Pityopsis graminifolia, and Sorghastrum nutans were started or expanded in the spring of 1995. The Danthonia failed due to the hot, dry weather. We had good first-year harvest from the Andropogon and good harvests from the Sorghastrum and the Pityopsis. Several of the fields will be expanded or replanted in 1996.

Technology Developments: Last year we reported on the harvest of Pityopsis graminifolia seed with a Trac-Vac vacuum. This season, we modified the unit with a new vacuum head mounted off to the side of the unit. The tractor rolled down between the rows of Pityopsis while the vacuum head skimmed over the tops of the Pityopsis plants and vacuumed off the mature seed. In this way, we were able to harvest the seed with one tractor operator in a fraction of the time it took us to manually harvest the seed last year. In addition, we were able to purchase a seed debearder this past year. The debearder will greatly improve our ability to clean the fluffy seed.

**NATCHEZ TRACE PARKWAY
1995 Annual Report
prepared by
NATURAL RESOURCES CONSERVATION SERVICE
JAMIE L. WHITTEN PLANT MATERIALS CENTER**

INTRODUCTION - An Interagency Agreement between the Natural Resources Conservation Service (NCRS) in Mississippi and the National Park Service became effective August 10, 1990. This agreement provides for the NCRS, Plant Materials Center in Mississippi to collect and propagate agreed-upon plant materials and to produce propagules for establishment along Section 3X of the Natchez Trace Parkway. Species to be produced include three grasses, seven forbs, and five shrubs.

ACCOMPLISHMENTS - A total of 2150 container grown and 250 bare root shrubs, ready for use in the spring of 1995, were maintained until the fall of 1995.

**NATCHEZ TRACE PARKWAY
1995 Annual Report
prepared by
NATURAL RESOURCES CONSERVATION SERVICE
JAMIE L. WHITTEN PLANT MATERIALS CENTER**

INTRODUCTION - An Interagency Agreement between the Natural Resources Conservation Service (NRCS) in Mississippi and the National Park Service became effective July 20, 1992. This agreement provides for the NRCS, Plant Materials Center in Mississippi to collect and propagate agreed-upon plant materials and to produce propagules for establishment along Section 3P of the Natchez Trace Parkway. Species to be produced include a minimum of three grasses, four forbs, and three shrubs. Delays in construction along Section 3P of the Natchez Trace Parkway have caused delays in the production and delivery of some plant materials.

ACCOMPLISHMENTS - Seed were harvested from three species of grasses (yield 15 PLS) and four species of forbs (yield 487.7 PLS). Three hundred cuttings of *Vaccinium elliottii* were potted and are to be grown through the 1996 growing season. Seeds of *Viburnum rufidulum* were fall planted, and are to be used for future production (germination is delayed until the second year after planting).

TECHNOLOGY DEVELOPMENTS - Seed of *Vaccinium elliottii* from fruit collected in June 1995 were put into warm stratification shortly after removal from the fruit. In October 1995 some of these seed were germinating and were seeded onto a flat in the greenhouse. Seed continue to germinate -- overall percentage germination is good. In past plantings, seed of this species stored dry/cold over the summer, cold stratified in the fall, and seeded the following spring yielded 0 percent germination.

NATCHEZ TRACE PARKWAY
1995 Annual Report
prepared by
NATURAL RESOURCES CONSERVATION SERVICE
JAMIE L. WHITTEN PLANT MATERIALS CENTER

INTRODUCTION - An Interagency Agreement between the Natural Resources Conservation Service and the National Park Service, dated July 20, 1992, provides for the Plant Materials Center in Mississippi to conduct evaluations on establishment methods for twelve (12) species of native grasses and forbs which were collected along sections of the Natchez Trace Parkway. All testing was duplicated with one test site having full exposure to sunlight, and another being in partial shade along a forest edge. Test variables included mulch treatments (three different), planting dates (four different), and seeding a mixture of seed including the 12 native species and cover crops onto a freshly tilled site versus overseeding the 12 natives into previously established cover crops.

ACCOMPLISHMENTS - Evaluations comparing the establishment methods for these twelve species were completed in 1995.

TECHNOLOGY DEVELOPMENTS - Some summarized final results of this test are listed, with the twelve species being considered as a group - (1) performance was better in full sun than in partial shade; (2) wheat straw mulch initially suppressed germination and growth, but final results indicate little difference due to mulch treatments; (3) best planting date was species dependent, but generally ranked best to least desirable were August, June, April and October; (4) seeding native species together with cover crops onto clean tilled sites was superior to overseeding into established cover.

The annual legume, *Chamaecrista fasciculata*, was the most prevalent and noticeable native species. Other natives which produced a good visual impact included *Rudbeckia hirta*, *Coreopsis lanceolata*, *Coreopsis tinctoria*, *Dracopis amplexicaulis*, and *Elymus virginicus*. *Tridens flavus* and *Schizachyrium scoparium* took longer than most other species to become really noticeable.

The final report on this project was submitted in December 1995.

