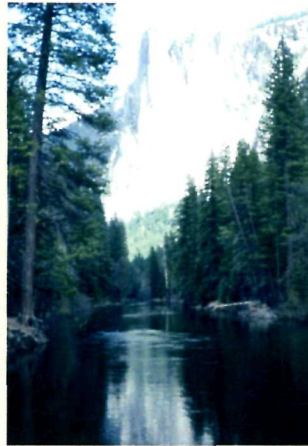


Native Plants for Parks



FY 2001

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 2001
Plant Materials Project Summary Reports
from the
Natural Resources Conservation Service
to the
National Park Service

February 2002

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INTRODUCTION

This is the 2001 NRCS Plant Materials Centers annual progress report on cooperative project agreements between the National Park Service (NPS) and the Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service. These projects relate to development of native plant materials for park roads and restoration projects. The NPS and NRCS have been cooperating in testing and increasing of native plants under a Memorandum of Understanding and Interagency Agreement since 1989.

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

The "One Page Summary Report" is sent to parks with current projects, to respective NPS field areas and associated park resource managers and respective NRCS offices. Additional copies of the "one page summary report" are available on request. This report can be requested from Russ Haas, NRCS National Technical Advisor, National Park Service, Denver Service Center, Planning and Design Services, P.O. Box 25287, Lakewood CO. 80225. E- Mail russ_haas@nps.gov or Phone 303- 969-2172.

The comprehensive 2001 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 2001. 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 2001 ACTIVITIES

Development and Administration of Interagency Agreements. Twelve new agreements and 5 agreement extensions were developed this fiscal year. At this time there are 45 active projects at 25 National Parks in cooperation with 9 NRCS Plant Materials Centers.

Plant and Seed Production. The PMCs produced approximately 1800 PLS pounds of seed and 77,500 transplants of 175 indigenous native grass, forb, shrub and tree species. (62 grass, 39 forb, 56 shrub, and 22 tree species) in 2001.

Technical Assistance. Technical assistance was provided by the NRCS Technical Advisor to NPS Denver Service Center Landscape Architects and Project Managers relative to construction project revegetation needs at 22 National Parks.

On site technical assistance was provided by the NRCS Technical Advisor at seven National Parks and by Plant Materials Center staff and/or Specialists at nine National Parks.

Assistance provided by the Technical Advisor consisted of : development of interagency agreements, modifications to agreements, cost estimation, native plant/seed sources, preparation and review of seed/plant installation specifications, preparation and review of FLHP project revegetation plans.

Technical assistance provided by Plant Materials personnel consisted of: seeding and plant installation, seed collection/harvesting methodology; seed processing; bioengineering techniques; species identification and recommendations; plant/seed establishment techniques; weed control, and design and implementation of revegetation studies.

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://nativeplantnetwork.org>) 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.

Nearly 900 protocols have been entered. Of these approximately 500 are from three NPS nurseries and 200 are from fifteen NRCS Plant Materials Centers. State, federal and private nurseries contributed the remainder.

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INTERMOUNTAIN REGION

**BIG BEND NATIONAL PARK
2001 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 through 2001, 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 within the park. Plant materials (seeds) are drilled and/or broadcast along road shoulders following construction. In late 2001 a new agreement was prepared between the Park and PMC addressing the need to revegetate areas after removal of invasive plants

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 2001, the park had received a total of 2179 bulk pounds of seed totaling 882 PLS lbs.

Seed Production and Available Inventory - 2001

Common Name	Area(ac)	2001 Prod./Lbs	PLS Inventory On Hand
Alkali sacaton	1.0	-	373.9
Sideoats grama	-	-	209.3
Green sprangletop	-	-	435.7
Cane bluestem	-	-	70.1
Showy menodora	.50	15.75	225.9
Chisos bluebonnet	-	-	-
Chino grama	.75	7.75	65.4
Tobosa	.10	increase	-
Limoncillo	-	-	30.0*

* bulk material wt

Conclusion: At the end of FY 2001 seed production fields includes alkali sacaton, showy menodora, Chino grama, and a new increase of tobosagrass are being maintain and harvested. The center will continue to increase the tobosagrass in the anticipation of future needs at Big Bend NP. The new agreement signed in 2001 addressing post weed control revegetation will continue through the year 2004.

BRYCE CANYON NATIONAL PARK

2001 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 - Although no data is yet available on PLS quantities of harvested seed, between 200-250 pounds of slender wheatgrass seed were produced in 2001. The production portion of the field, 0.5 acre, was established August 12, 1998. An additional 0.8 acre was planted September 5, 2000. A one acre field of nodding brome, established July 20, 1998, was removed due to poor vigor. In its place, a one half acre nodding brome field was planted August 12, 2001. Current inventory of Bryce Canyon seed is estimated at 650 pounds.

TECHNOLOGY DEVELOPMENTS - Specific information about germination trials, soil preparation, seeding rates, equipment, or other seeding establishment methods are available upon request.

**CHICKASAW NATIONAL RECREATION AREA
2001 Annual Report**

prepared by
**Natural Resources Conservation Service
James E. 'Bud' Smith Plant Materials Center
Knox City, Texas**

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 six of the project will occur between 2001-2003. 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 six will include only 11 different woody transplant production. Phase three for Veterans Lake Area will also include seed production of several forbs and a legume.

Accomplishments:

From 1993 to 2001 the Park had received a total of 1,076.88 bulk pounds of grass seed totaling 690 PLS lbs, and 3,729 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, persimmon, mexican plum and skunkbush sumac. See following table for current inventory

Chickasaw NRA- Seed and Plant Production Inventory Dec. 2001

Common Names	Units	2001 Prod. or lbs.	PLS or # of Plants On Hand
sideoats grama	.33 ac.	40*	93.5 PLS
hairy grama	.25 ac.	2.75*	2.32 PLS
big bluestem	.25 ac.	3.25*	5.48 PLS
little bluestem	.15 ac.	30*	17.88 PLS
Indiangrass	.75 ac.	37.5*	220.01 PLS
purpletop	.23 ac.	14.3*	11.3 PLS
wildrye sp.	.09 ac.	10*	7.92 PLS
buffalograss	200 sq. ft.	1*	.79 PLS
blackjack oak	Ea.	95	200
buttonbush	Ea.	17	300
carolina buckthorn	Ea.	400	400
eastern redbud	Ea.	200	450
red oak	Ea.	41	125
black willow	Ea.	150	150
cottonwood	Ea.	100	100
sycamore	Ea.	0	500
skunkbush	Ea.	0	300
smooth sumac	Ea.	0	25
persimmon	Ea.	0	300
purple coneflower	.03 ac.	.65*	.51 PLS
purple prairie clover	.03 ac.	2.1*	1.66 PLS
black-eyed susan	.03 ac.	2.5*	1.98 PLS
gayfeather	.03 ac	10*	7.92 PLS
American elm	Ea.	400	400
ash sp.	Ea.	200	200
chinkapin oak	Ea.	11	11
post x white swamp oak	Ea.	92	92
chinkapin x bur oak	Ea.	31	31
coralberry	Ea.	28	28
white honeysuckle	Ea.	2	2
virginia creeper	Ea.	1	1
roughleaf dogwood	Ea.	105	105
winged elm	Ea.	400	400
rusty blackhaw	Ea.	27	27
post oak	Ea.	32	32
hackberry	Ea.	100	100
winged sumac	Ea.	11	11

Bulk lbs.*

DINOSAUR NATIONAL MONUMENT

2001 Annual Report
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 four 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. An additional planting of bluebunch wheatgrass was planted in 2001, since no seed was produced on the original planting in 2001. Dinosaur personnel made one trip to the plant center in 2001. During this trip, seed of alkali sacaton and bluebunch wheatgrass collected in the monument and cleaned at the plant center was returned to the monument. Seed of bluebunch wheatgrass was later returned to the plant center for planting an increase to the seed field in 2001.

ACCOMPLISHMENTS - Seed was harvested from three of the seed fields in 2001, and one field (alkali sacaton) was harvested twice (July 18 and September 14).

<u>Seed Harvested</u>		<u>Seed Fields</u>	
Name	Amount	Name	Size
Indian ricegrass	0.69 lb	Basin wildrye	0.24 acre
Basin wildrye	10.80 lb	Bluebunch wheatgrass	0.24 acre
Bluebunch wheatgrass	no harvest	Bluebunch wheatgrass	0.18 acre (2001)
Alkali sacaton	13.00 lb	Indian ricegrass *	0.24 acre
		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
2001 ANNUAL REPORT**

prepared by
**Natural Resources Conservation Service
Bridger Plant Materials Center, Bridger, MT**

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 2001, 90 lots of seed representing 61 individual species were delivered to GNP or used for BPMC production totaling 26.93 pounds (12.215 kg). The 2001 distribution included 26 grass lots (13 species), 48 forb lots (39 species), and 16 shrub lots (9 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 2001, 87 total collections were sent to the BPMC and cleaned: 19 collections of grasses, sedges, and rushes (15 species); 53 forb collections (28 species); and 15 shrub collections (9 species). A total of 3.68 lb (1.669 kg) of clean seed were processed; 2.18 lb (0.987 kg) of grass and grass-like, 0.96 lb (0.436 kg) of forbs, and 0.54 lb (0.246 kg) of trees and shrubs. A total of 47 new species:collection sites were identified and accessioned representing 8 grasses (7 species), 32 forbs (17 species), and 7 woodies (6 species).

In Spring 2001, 4 new grass seed production fields of *Phleum alpinum* (Logan Pass) were planted at the BPMC. All four fields failed to establish and were removed in the fall, probably the result of low initial seed viability. Also removed in 2001 were fields of *Pseudoroegneria spicata* (Many Glacier), *Stipa nelsonii* (Rising Sun Prairie), *Phleum alpinum* (Sperry Chalet and Logan Pass) and *Poa alpina* (Logan Pass). A total of 8 grass or grass-like (5 species) and one forb (1 species) seed production fields remained active in late 2001. The grass and grass-like production fields produced 68.36 lbs. (31.01 kg) of clean seed. One forb (*Aster laevis*) field produced 0.34 lbs. (0.156 kg) of clean seed. *Poa alpina* and *Phleum alpinum* fields were heavily infested with Timothy billbug, although production did not appear impacted. *Aster laevis* seed production, however, was significantly reduced by an unidentified insect.

Seed germination tests are currently being conducted on 11 accessions (9 species) grown in 2001 including *Carex athrostachya* (two collections; Avalanche and Camas Road), *C. deweyana* (Avalanche), *C. pachystachya* (two Avalanche collections), *Elymus glaucus* (2 collections; Bowman Lake and McGinnis Creek), *Phleum alpinum* (Logan Pass), *Poa alpina* (two Logan Pass collections), *Aster laevis* (Avalanche), *Pseudoroegneria spicata* (Many Glacier) and *Stipa nelsonii* (Rising Sun Prairie). Results are unavailable at this time.

No bareroot or containerized material was delivered to GNP in 2001. Woody seed stratifications established in late 2000 of *Rosa woodsii* (Quarter Circle Bridge), *Rubus parviflorus* (North Fork), and *Symphoricarpos albus* (Avalanche) were moved to the greenhouse in late 2001. Combinations of acid scarification and warm, moist stratification are being compared for the *Rosa woodsii* and *Symphoricarpos albus* lots. Approximately 200 *Rubus parviflorus* will be available in 2002 for delivery.

TECHNOLOGY DEVELOPMENT: A cost estimating Technical Note was completed in 2001 based on a matrix system developed cooperatively by the PMC and GNP. The Technical Note was made available to all PMC's with cooperative NPS projects. The PMC worked cooperatively with GNP on a presentation at the Native Plants: Propagation and Restoration Symposium in December 2001, at Eugene, Oregon. Germination and establishment studies of *Xerophyllum tenax* were initiated in 2001.

**GRAND CANYON NATIONAL PARK
2001 Annual Report**

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

Introduction: In July of 1990, an agreement to produce seed and propagate plants was made between the Grand Canyon National Park of the U.S. Department of Interior and the Natural Resources Conservation Service Plant Materials Center (PMC) in Los Lunas, New Mexico. Amendment No. 1 of 1999 and Amendment No.2 of 2001 provide for the production of two species of native grasses for seed production, and for ten species of native trees or shrubs transplants. From Amendments 1 and 2, 900 transplants of the ten species will be delivered to the Grand Canyon National Park at an agreed upon future date. All species will be grown using seed collected from indigenous ecotypes on the park.

Accomplishments:

Seed Production 2001:

The Blue Grama and Muttongrass fields were planted at the PMC in the year 2000. Seed production fields usually take two years to mature. The seed will be harvested from the Blue Grama and Muttongrass in the year 2002.

Transplant Production 2001:

Common Name	Number of Transplants Delivered in 2001
Mexican Cliffrose	126
Fernbush	348
Apache Plume	211
Big Sagebrush	48
Pinon Pine	674
Ponderosa Pine	50
Currant	53
Desert Barberry	51
Curl-leaf Mountain Mahogany	20
Morman Tea	89
Mountain Snowberry	214
Utah Serviceberry	119
NM Locust	64
Gambel Oak	20
Datil Yucca	261
Century Plant	198
Fourwing Saltbush	91
Elderberry	15
Black sage	299
Utah Juniper	19
Total	2970

Technology Development: The Blue Grama and Muttongrass fields did well this year. The production of a good, viable seed crop from this collection continues to be our goal. The PMC continues to explore production methodologies that will produce a greater amount of seed. The two fields received the following treatments in 2001: In March 2001 we applied pepper wax to the Muttongrass to help reduce rabbit damage. To control seed damaging insects, we applied one application of Orthene and two applications of Lannate insecticides. During the growing season, we applied 100 pounds of nitrogen and phosphorus fertilizer to both fields.

GRAND TETON NATIONAL PARK

**2001 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 September of 2001. This new agreement will extend through fiscal year 2005, and calls for the production of five grass species. One species, basin wildrye, had been established for production in an earlier agreement. Two other species, bluebunch wheatgrass and slender wheatgrass, had been produced in an earlier agreement as well, and was hoped that seed from these previously produced materials could be used to establish new seed fields. The other two species, blue wildrye and prairie Junegrass, would have to be collected from the park in order to establish production fields.

ACCOMPLISHMENTS - Seed test results indicated a low germination for bluebunch wheatgrass which had been produced in 1992 and 1993, but was felt that there was enough germination and seed quantity to establish a one acre field. The slender wheatgrass produced in 1992, however, was completely dead. This made it necessary for park personnel to collect slender wheatgrass in addition to the two other materials called for in the agreement. Total clean pounds of park collections are provided below.

Blue wildrye	14.0 lb	Carex (non-contract)	5.93 lb
Prairie Junegrass	41.0 g	Utah sweetvetch (non-contract)	0.82 lb
Slender wheatgrass	12.5 lb		

The three collected contract materials will be planted the spring of 2002. A one acre field of bluebunch was planted on August 29, 2001. One material, basin wildrye, was produced in 2001. An extremely disappointing 13 pounds were harvested July 30, 2001, for its first year of seed production.

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

2001 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 2000 and now involves the live plant production of six species; 9024895 Gambels oak (*Quercus gambelii*), 9024869 Utah serviceberry (*Amelanchier utahensis*), 9024874 Mountain mahogany (*Cercocarpus montanus*), 9024898 Mountain snowberry (*Symphoricarpus oreophilus*), 9024870 Blueleaf aster (*Aster glaucodes*) and 9024878 Fourwing saltbush (*Atriplex canescens*). In addition, the plant center will provide stored seed as requested. No seed was harvested by the plant center in 2001 for Mesa Verde. All seed production fields have been removed. Two shipments of plant materials were made in 2001, one involved live plants and the other was seed. Two seed shipments of Utah serviceberry were received in 2001 from the park and amounted to approximately 190 grams. All seed lots of Mesa Verde materials were updated for germination in 1999.

ACCOMPLISHMENTS - Below is a listing of plant materials provided to the park in 2001. Seed was provided to the contractor, while the live plants were delivered to the park.

<u>Live Plants</u>		<u>Seed Provided</u>	
Species	Number	Species	Seed PLS
Gambels oak	709	Slender wheatgrass	24.8 lb
Utah serviceberry	91	Mutton grass	14.8 lb
Mountain mahogany	475	Western wheatgrass	11.9 lb
Blueleaf aster	141	Salina wildrye	(approximately) 4.0 lb
Mountain snowberry	686	Louisiana sage	7.4 lb
Fourwing saltbush	275	Yarrow	4.8 lb
		Hairy golden aster	(bulk) 6.5 lb

TECHNOLOGY DEVELOPMENTS - Native Plant Mats grown in the plant centers greenhouse were placed on soil in 2000. These mats are still growing at the plant center; however, no notes were taken on them in 2001.

PETRIFIED FOREST NATIONAL PARK

2001 Annual Report

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

Introduction: On November 14, 2000, an agreement to propagate plants was made between the National Park Service, Petrified Forest National Park of the U.S. Department of Interior, and the Natural Resources Conservation Service Plant Materials Center (PMC) in Los Lunas, New Mexico. 500 plants of three shrub species and two forb species will be delivered to the Petrified Forest National Park by the PMC in the fall of 2002. Park personnel collected the seed used for these plants from indigenous ecotypes from the park. The plants will be grown in deep, 14-inch, one-gallon tree-pots. The long root systems developed in these pots will enhance field establishment.

Accomplishments: Seed of the five different species was cleaned at the PMC. The PMC was successful in starting about 800 plants (see the following tables). The 24 sand sage and 75 jimmy weed will be transplanted to one-gallon containers in the spring of 2002, and they should be ready for field planting in the fall of 2002.

Shrubs:

Species	Common Name	Container	Total
<i>Artemesia filifolia</i>	Sand sage	Tree-pot	144
<i>Artemesia filifolia</i>	Sand sage	Cone-tainer	24
<i>Atriplex canescens</i>	Fourwing saltbush	Tree-pot	144
<i>Parryella filifolia</i>	Dune broom		0
		Total	312

Forbs:

Species	Common Name	Container	Total
<i>Aplopappus heterophylus</i>	Jimmy weed	Tree-pot	108
<i>Aplopappus heterophylus</i>	Jimmy weed	Cone-tainer	300
<i>Sphaeralcea ambigua</i>	Desert globe mallow	Tree-pot	84
		Total	492
		Grand Total	804

Technology Development : No new technology was developed during this time.

ROCKY MOUNTAIN NATIONAL PARK

2001 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 - One seed shipment was sent to the park in 2001. The experimental plot 25' x 35' of mountain muhly, established in 1997, produced seed again this year. The field (0.8 acre) of mountain muhly that was planted for the new East side seed mix in 1999 produced only a small amount of seed. With park approval UCEPC has continued production of sleepy grass, with excellent seed yield this year. The following table includes the total collection amount from the park for the proposed Junegrass field, and harvested amounts from established plots.

EAST SIDE SPECIES

Scientific name	Common name	Seed on hand	2001 Harvest Cleaned seed
Grasses:			
<i>Muhlenbergia montana</i>	Mountain muhly	1.6 lb	Light Production (to be cleaned)
<i>Stipa robusta</i>	Sleepy grass	102 lb	64 lb
<i>Koeleria cristata</i>	Junegrass	171 g (SC)*	80 g (SC)*

*(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. Work was done on a propagation protocol for *Fragaria vesca* live plant production.

**YELLOWSTONE NATIONAL PARK
2001 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 2001, 154 lots of seed from 41 species were delivered to YNP or the PMC totaling 391.23 pounds (177.46 kg). This included 59 grass lots (15 species), 39 forb lots (24 species), and 3 tree lots (2 species). Distribution to the PMC for planting seed increase included 14 grass lots (8 species) and 3 forb lots (2 species).

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 2001, 140 collections from 56 species were made: 49 grasses (15 species) at 48.50 pounds (21.998 kg); 83 forbs (34 species) at 15.29 pounds (6.936 kg); and 8 shrubs/tree (7 species) at 27.47 pounds (12.461 kg). The wildland seed collections totaled 91.26 pounds (41.395 kg).

Records are maintained by the PMC of person-hours to collect each seed lot, from which the approximate cost of collecting native seed can be estimated. In 2001, YNP personnel spent more than 276 hours in the activity of seed collection. There were approximately 109 hours (average 2.22 hours per recorded collection) dedicated to collecting grass seed, 156 hours (average 1.88 hours per recorded collection) for forbs, and 11 hours (1.57 hours per recorded collections) for woody species.

There were 14 grass and 2 forb increase blocks planted in 2001 for road projects; 5 blocks were subsequently removed due to poor or no establishment as a result of the extreme drought conditions. Older increase blocks of seven grasses were also removed due to natural decline in production. Currently there are 22 accessions of 8 grass species (4.62 acres/1.87 hectares) and two accessions of one forb species (.05 acres/.02 hectares) planted in seed increase blocks at the Bridger PMC.

During the past growing season, 14 different accessions (8 species) were harvested, producing 467.35 pounds (211.99 kilograms) of clean seed. Seed production averaged 101.16 pounds-per-acre (113.36 kilograms-per-hectare).

Seed germination tests were conducted on PMC seed increase production for 12 grass accessions. Percentage germination for the 7 grass species ranged from 48 to 100 and averaged 87.5.

The wildland collection and seed increase inventory contains 554 accessions (121 species) totaling 1,603.0 pounds (727.11 kg). This is comprised of 248 grass accessions (37 species) at 1,503.44 pounds (681.95 kg), 284 forb accessions (67 species) at 69.10 pounds (31.34 kg), and 22 shrub accessions (17 species) weighing 30.46 pounds (13.82 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. Propagation protocols were developed on species that have been cultivated in the field for seed production. The 25 protocols (18 grasses and 7 forbs) were posted on the Internet website <http://nativeplantnetwork.org>.

MIDWEST REGION

**APOSTLE ISLANDS NATIONAL LAKESHORE
(Rasp. and Outer Islands)
2001 Annual Report**

Prepared by
**USDA- NATURAL RESOURCES CONSERVATION SERVICE
ROSE LAKE PLANT MATERIALS CENTER
AND
PLANT MATERIALS SPECIALIST
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. Under a Memorandum of Agreement species to be propagated 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. Deliverables are scheduled for 2002 and 2003.

Accomplishments: Twenty-five species have been collected for increase and return to Raspberry and Outer Islands. Propagation of all the woody species from seed has been initiated. All seed from the forb and grass species (except Canada wildrye, *Elymus canadensis*), as well as the reserve seed for most woody species, has been placed in cold storage. Vegetatively collected plants either remain in the greenhouse or have been placed in cold storage. A total of 1021 plants have been propagated at the Center for this project. Collected Canada wildrye seed was cleaned, debarbed and sown into a production field mid-September.

Technology Development and Observations: The site is a west facing steep slope on Lake Superior which is experiencing erosion from wave action, slope sloughing, overland flow and surface movement. Several native and non-native species were noted on the slope. An engineering design to address the wave action erosion is being prepared. The upper slope stabilization design includes the use of soil bioengineering techniques. Brush layers, live stakes and fascines will be used along with a coconut erosion blanket. The plants being grown at the PMC will be planted through the blanket in the spring of 2003. The soil bioengineering techniques and the toe protection will be installed in the fall of 2002. Local native plant materials will be used for the brush layers, live stakes and fascines. The wildrye will be seeded during the time of the coconut blanket installation and the soil bioengineering techniques.

**APOSTLE ISLANDS NATIONAL LAKESHORE
(Oak Island)
2001 Annual Report**

Prepared by
**USDA- NATURAL RESOURCES CONSERVATION SERVICE
ROSE LAKE PLANT MATERIALS CENTER
AND
PLANT MATERIALS SPECIALIST
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: Fifteen species have been collected for increase and return to the Oak Island sandscape. During a survey of the sandscape in July 2' x 2' test plots were established for nine of these species to determine ease of restoration. Survival, colonization and vigor data was collected on each of the plots during the summer and early fall. Propagation efforts for the species continue at the PMC greenhouse.

Technology Development and Observations: A non-native, orange hawkweed (*Heiracium aurantiacum*), does appear to be a problem on the sandscape, as indicated from previous transects, although the extent was difficult to determine as the species was dormant due to the dry conditions. Most other species identified were native to the area. As expected plot evaluations indicate ease of restoration is likely linked to several factors including species, weather, shade conditions and animal disturbance. Species placed in shaded conditions had better overall survival than those in sunny or partially shaded conditions. Some species had 100% survival while others under the same light regime had no survival. Some species were visually affected by droughty conditions, or destroyed or browsed by animals.

Not enough information has been gathered to draw many conclusions concerning the propagation of these species. Some species such as wild strawberry (*Fragaria virginiana*) and beachgrass (*Ammophila breviligulata*) lend themselves quite easily to vegetative propagation, other species such as pearly everlasting (*Anaphalis margaritacea*) and Canada wildrye (*Elymus canadensis*) are more easily propagated by seed.

**ISLE ROYALE NATIONAL PARK
2001 Annual Report**

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

Introduction: While most of the land base of Isle Royale National Park is designated Wilderness and under a continuous vegetative cover, there are areas of significant human development of park operations and visitor use. These developments are focused in specific areas and have an assortment of disturbance ranging from new to several years old. As such these areas are prime locations for non-native plant infestation, unsightly and subject to continued or potential erosion. At present the park does not have the capability or program to restore these area. Though a Memorandum of Agreement with Isle Royale National Park the USDA Natural Resource Conservation Service, Rose lake Plant Materials Center has agreed to 1) increase native material collected from the park and return 1800 plants for restoration purposes, 2) develop and monitor propagation technology for use in shallow soil areas of the park that specifically promotes lateral root growth, and 3) prepare a restoration guide for park staff that will include collection, establishment and management techniques on various park plant species. The MOA extends through September 2005.

Accomplishments: A site visit was made to the three areas of concern on Isle Royale; Mott Island, Rock Harbor and Windigo, for assessment and collection purposes. A trip report including assessments and recommendations was prepared by David Burgdorf, NRCS Plant Materials Specialist, and sent to the Isle Royale management staff. In addition, thirty-two species have been collected for research, increase and return to the Isle Royale. All vegetative material and some seed collected from the park is currently growing and under observation in the Center's greenhouse. A sample plant fact sheet for use in the restoration guide was developed and sent to Jack Oelfke, Isle Royale's Resource Manager.

Technology Development and Observations: Construction/development and foot traffic in the three areas of concern have contributed to erosion problems, the displacement of native vegetation and the spread of non-native vegetation. There were several disturbed sites in these areas including septic fields, dock zones, facility grounds, maintenance yards and a fuel spill site. Non-native vegetation has become well established at some sites. Of particular note and concern is Bachelor's Buttons (*Centaurea* sp.) that has spread near the dock area at Windigo. Testing specific restoration technologies has been scheduled for 2002.

NATIONAL CAPITAL REGION

GEORGE WASHINGTON MEMORIAL PARKWAY
2001 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 2,750 wildflower plugs, 575 vines, 484 shrubs seedlings, and 2,800 tree seedlings were to be produced and delivered to the park for this agreement, including a minimum of 4 forb, 1 vine, 6 shrub, and 5 tree species. For the initial memorandum of agreement, delivery of plants began in 1997 and was scheduled to continue through 2000. An amendment to the agreement was drafted in 1999 to extend project completion date through 2001 to allow for completion of construction along the Parkway. Another small agreement was initiated in 2000 for the NPMC to provide an additional 1,200 tree and shrub container seedlings from spring 2002 through 2004.

Accomplishments: The 1999 amendment (and therefore, the original agreement) was closed out in 2001 with the spring delivery and planting of 468 trees and shrubs at 4 sites along the Parkway. A total of 4,085 wildflower and grass plugs, 238 vines, 807 shrubs seedlings, and 2,596 tree seedlings (including 8 forb, 4 grass, 1 vine, 10 shrub, and 13 tree species) were produced and delivered to the park over a 5-year period. Actual delivery numbers differ slightly from the original agreement numbers because of changes in the project, e.g. a site planting cancelled because of construction design changes, substitution of less competitive grasses and wildflowers for woody plants at a site containing a state-rare species (*Sida hermaphrodita*). An additional 657 container plants (350 remaining from the original project) and 735 bareroot plants of 18 woody species are currently being grown for the new agreement. Seeds of the following species were collected at the park in fall 2001:

<u>Species</u>	<u>Common Name</u>
<i>Asimina triloba</i>	paw paw
<i>Carpinus caroliniana</i>	ironwood
<i>Carya cordiformis</i>	bitternut hickory
<i>Carya tomentosa</i>	mockernut hickory
<i>Cornus florida</i>	flowering dogwood
<i>Nyssa sylvatica</i>	black tupelo
<i>Platanus occidentalis</i>	sycamore

Technology Developments and Observations: In 2001, the NPMC gathered information for almost every woody and herbaceous species grown for George Washington Memorial Parkway, and compiled standardized propagation protocols. These protocols were placed on the Native Plants Network web site (<http://www.nativeplantnetwork.org>) for access by anyone wanting details on propagation and culture of these species.

NORTHEAST REGION

**ACADIA NATIONAL PARK
2001 ANNUAL REPORT**

Prepared by
**USDA, Natural Resources Conservation Service
Big Flats Plant Materials Center, Big Flats, NY**

INTRODUCTION: The USDA, Natural Resources Conservation Service, Big Flats Plant Materials Center, entered into two interagency agreements with the USDI, National Park Service, Acadia National Park: IA Project No. 2041-6-0017 (1996), 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, transit system infrastructure, 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 2001, seed was collected in mid-August (shadbush, blue-eyed grass and hairgrass), and late October (winterberry, pasture rose, glycera, white birch and white flattop aster). Vegetative cutting material was collected in mid-June (meadowsweet), mid-August (meadowsweet) and late October (meadowsweet, quacking aspen, arborvitae, arrowwood viburnum, sheep laurel, rhodora and blueberry). Vegetated material was collected in mid-June (bunchberry, arborvitae, red spruce and white pine), mid-August (bunchberry) and late October (arborvitae, balsam fir, red spruce).

Three deliveries of plant material was made in 2001, totaling 60 pounds of seed, 4,875 plugs and 1,694 plants, for re-vegetation projects in the park. Two FedEx shipments of red fescue seed were made in May and June.

A seed increase field of red fescue, established on September 14th, 2000, came on slow this year due to summer drought conditions. Next year we should be able to get the first harvest. For our forb production, we had been establishing stands in long single rows, allowing for easier mechanical cultivation and harvesting. In 2001, we established new forb seed production blocks using weed barrier fabric. Plugs of goldenrod and aster were started in the greenhouse and then transplanted into six feet wide weed barrier fabric on an approximate spacing of 1 foot by 1 foot. The plantings were irrigated and they established well. The hope is the fabric will keep out weeds over a number of years and allow us to harvest the seed with a combine, by straddling the beds. Seed was harvested in 2001 of red fescue, goldenrods and asters, and processed. The small, light seed is still a challenge to harvest and clean. All seed is tested at the New York State Agricultural Experiment Station's Seed Lab, in Geneva, NY.

Seed of trees and shrubs that were growing in flats in the PMC cold frames, were potted up and placed in the lathe house. This included white birch, white spruce, winterberry and wild raisin. Seedlings from prior year seeding (white spruce, white birch, bayberry) were re-potted into large 1 gallon containers. Red maple seedlings, collected along the edge of a dirt road in the park, were potted up this fall. Cuttings of meadowsweet and arborvitae rooted well in the greenhouse mist system and were potted up during the summer and placed in the lathe house. The dry summer and fall weather required the lathe house to be watered continuously through November.

At Acadia, plant materials were utilized to re-vegetate disturbed areas from utility work, construction projects including the new visitor center and sites of soil disturbance. Stringing out the areas and posting re-vegetation signs has definitely helped keep visitors out of the plantings, giving the plants a chance to get established and grow.

TECHNOLOGY DEVELOPMENT/TRANSFER: A meeting on the re-vegetation projects was held at the park in June, to discuss the future work at Blackwoods and Seawall Campgrounds. The soil condition and possible soil compaction in the campsites should be studied prior to planting vegetation. A graduate student may assist with this study. The control of cars and visitor trampling need to be addressed in the planning for successful establishment of vegetation around the campsites. Forb seed production fields were successfully established by planting into six feet wide weed barrier fabric, with the hope of having weed control for a number of years. Harvesting and seed cleaning techniques continue to be refined each year. Many of the plantings in the park are growing well. The posting of re-vegetation signs has helped to minimize the trampling of plants by visitors and has educated the public on how the park service is utilizing native plants.

**GATEWAY NATIONAL PARK
2001 Annual Report**

Prepared by
**USDA- Natural Resources Conservation Service
Cape May Plant Materials Center, Cape May, NJ**

Introduction: In 2000 the Sandy Hook Unit of Gateway National Park entered into an agreement with the USDA- NRCS Cape May Plant Materials Center to provide a variety of plant materials for mitigating impacts associated with a roadway elevation project. Because the road is the single road allowing access to the park by the public and being flooded out due to rising sea levels, it was necessary to elevate the base of the road.

The species selected for this contract were:

<u>Grasses:</u>	Lbs. of	Number of	<u>Plants</u>
		Seed	
Schizachyrium scoparium ssp. littoralis	40		
Festuca longifolia	60		
Panicum virgatum	6		
Panicum amarum	9		

Forbs/Legumes

Cassia chamaecrista			
Oenothera biennis			
Solidago sempervirens			
Strophostyles helvola			1,100

Shrubs and Trees

Myrica pensylvanica			
Prunus maritima			
Rhus copallina			500

Accomplishments: The Cape May PMC delivered the seed of the grasses during the winter in order to facilitate the contractors installation while on the job site. PMC personnel planted the vegetative materials in May 2001 and September 2001. Park Service personnel commented that the material delivered for this contract was of exceptional quality and vigor in comparison to previous years.

Technology Development: This was the first time in the ten-year history of NPS and NRCS contracts that the Cape May PMC was able to deliver living *Oenothera biennis* plants. In fact, the quality was so exceptional that the plants reached chest height by the end of summer.

Historically propagation under previous management was limited to 2&12" by 2&1/2" 32 insert cell flats. After examining the root physiology of the evening primrose a significant taproot was noticed on healthy plants in the wild. We then transplanted the plants into 4' x 4" x 14" tree pots, resulting in developed roots all the way to the bottom of the tree pot. Once the root system was dense within the container the plant started developing vertical top growth which resulted in the best stand establishment yet. No data was collected.

PACIFIC WEST REGION

CRATER LAKE NATIONAL PARK

Mazama Dorm Project

2001 Annual Report

Prepared by

Natural Resources Conservation Service

Corvallis Plant Materials Center

Corvallis, Oregon

Introduction: The 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 and 2001.

Accomplishments: This agreement was concluded in 2001 with the requirements satisfied. Activities in 2001 included maintenance, harvest, and cleaning of seed from field increase plantings (4), maintenance of excess containerized stock (2 shrubs), and delivery of seed and excess stock. A total of 223 bulk lbs (101.3 kg) of seed of California brome (*Bromus carinatus*), 40 lbs of blue wildrye (*Elymus glaucus*), and 4.7 lbs (2.14 kg) of thick-headed sedge (*Carex pachystachya*) was harvested and cleaned. Although showy sedge (*Carex spectabilis*) flowered in 2001, little if any seed was produced. Except for 166.5 pounds of California brome, the seed harvested and cleaned in 2001 was provided to Crater Lake National Park personnel in September, 2001. The remaining brome will be delivered in 2002. Seed tests showed satisfactory viability and purity for all lots delivered. Excess stock of Mountain maple (*Acer glabrum*), 13 one gallon pots, and Mountain ash (*Sorbus scopulina*), 2 five inch pots, were maintained and delivered. Finally, the backlog of all older seed lots produced, stored, and saved for this project since 1991 were bulked by species/accession and delivered in September 2001. The amount totaled 32.4 bulk lbs (14.7 kg) of seed representing 7 grasses, 16 forbs, and 3 sedges.

Technology Developments: The three fields of blue wildrye, California brome (old and new sections), and thick-headed sedge were hand harvested, cleaned, tested and delivered. Disease management consisted of rust control with applications of the fungicides Bravo plus Tilt. Excellent control of annual weedy grasses was achieved with fall application of Surflan between rows in all three fields with a backpack sprayer. Broadleaf weeds were controlled with phenoxy herbicides. Glyphosate was used for miscellaneous weed control. Excellent purity was obtained for all seed lots, including 99.96% purity for the blue wildrye, with a viability of 95% from TZ test. The newer field of California brome produced substantially higher seed viability compared to the older field (86% vs. 47%), suggesting that seed quality may be influenced by the age and vigor of the plants themselves.

**CRATER LAKE NATIONAL PARK
Vidae Falls Project
2001 Annual Report**

Prepared by
**Natural Resources Conservation Service
Corvallis Plant Materials Center
Corvallis, Oregon**

Introduction: Plant Materials Center (PMC) entered into a one year agreement with Crater Lake National Park in 2001 to evaluate and produce a minimum of 600 and a maximum of 1700 containerized plants of three grasses, one sedge, and three forbs for ecological restoration of the Vidae Falls picnic area. All container stock would be delivered to the Park in the fall of 2001.

Accomplishments: This agreement was concluded in 2001 with the requirements satisfied. Activities in 2001 included production, maintenance, monitoring, and delivery of 1571 cone-tainers of eight different species. Production totaled 194 blue wildrye (*Elymus glaucus*), 194 Mountain brome (*Bromus carinatus*), 279 bottlebrush squirreltail (*Elymus elymoides*), 500 lupines (*Lupinus* spp.), 123 sedges (*Carex* spp.), 34 senecio (*Senecio* spp.), 172 asters (*Aster modesutus*), and 75 Cascade asters (*Aster ledophyllus*). All stock was delivered in August 2001 to Park employees.

Technology Development: Good to excellent quality stock was achieved for all eight species produced. Satisfactory elimination of hard seed coat dormancy and good germination of both lupine species were obtained with vigorous, coarse sandpaper scarification. The lupine seed did not appear to have physiological dormancy. Stock was healthy and grew vigorously. Stock of all eight species were fertilized every 1-2 weeks with 20-20-20 liquid fertilizer at 200 ppm. Safer insecticidal soap was used to control aphids and various other pests affecting the lupines only.

LASSEN VOLCANIC NATIONAL PARK

**2001 Annual Report
Prepared by**

**UPPER COLORADO ENVIRONMENTAL PLANT CENTER
Meeker, Colorado**

INTRODUCTION - An agreement was made between Lassen Volcanic National Park and Upper Colorado Environmental Plant Center June, 2001. The agreement, as signed, calls for the production of one material, blue wildrye. An amendment to the agreement, signed in September 2001, added production of California brome to the list of contracted species.

ACCOMPLISHMENTS - Blue wildrye seed collected in Lassen Volcanic National Park during the 2000 season was shipped to UCEPC for use in field establishment. When the seed was received by UCEPC, a sample was sent to the Colorado Seed Laboratory for analysis. It was discovered during the first planting attempt that further seed cleaning was necessary before seed could easily flow through the sowing equipment, a hand pushed Planet Junior. On the second attempt, September 4, 2001, a one acre field of blue wildrye was planted.

Seed of California brome was collected in Lassen National Park in 2000 and 2001, and samples of three lots were sent to Colorado Seed Laboratory for analysis prior to being planted at UCEPC. Seed test results of the three lots indicated low germination for the 2001 collected materials and high germination for the 2000 collected material. The 2000 collected material, identified from seed analysis as LAV01, was the only lot planted. A few grams of LAV03 seed was planted in the last 65 feet of one row. In addition to the low germination, the real concern for UCEPC was the evidence of a considerable amount of head smut in lots LAV02 and LAV03. As a result, less than 0.2 acre was planted on November 16, 2001.

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

**MOUNT RAINIER NATIONAL PARK
Mather Memorial Parkway
2001 Annual Report**

Prepared by
**Natural Resources Conservation Service
Corvallis Plant Materials Center
Corvallis, Oregon**

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 were increased. A minimum of 1000 5"X5"X5.5" containerized stock of select herbaceous species were to be produced for delivery in fall 2001. The seed increase blocks, trial plots, and woody cutting block (previously established) were to be maintained, seed harvested and cleaned, and cutting/whips/poles prepared and delivered when requested. Seed from this agreement and in storage from previous agreements were to be shipped to Mount Rainier National Park at the conclusion of this agreement. Lastly, seed of select species were to be collected within Park boundaries (Tipso Lake area) in September 2001 by PMC staff and volunteers to increase the diversity of seed mixtures for this project.

Accomplishments: This agreement was concluded in 2001 with the requirements satisfied. Activities in 2001 included maintenance and harvest of seed increase blocks and trial plots, seed cleaning, testing, and delivery, maintenance of a willow cutting block, maintenance and harvest of five additional seed increase trial plots, and containerized stock production, maintenance, and delivery. Seed yield from PMC increase blocks (2) and trial plots (5) in 2001 totaled 4.9 bulk pounds (2.24 kg), from two grass and three sedge species. Delivery of willow whips or cuttings was not requested. The container production and final delivery of 2000 and 2001 stock in September 2001 totaled: 823 greenleaf fescue (*Festuca viridula*) 5" pots, 229 Sitka valerian (*Valeriana sitchensis*) tree, 5" and conetainer pots, 69 thick-headed sedge (*Carex pachystachya*) 5" pots, 84 Merten's sedge (*Carex mertensii*) 5" pots, 165 showy sedge (*Carex spectabilis*) 5" pots, and 5 Potentilla (*Potentilla flabellifolia*) 1 gallon pots. In addition, the backlog of all seed saved and stored since 1991 for Highway 410 (high elevation only) was delivered. This totaled 73.5 bulk pounds (33.4 kg) of 9 forbs, 2 shrubs, 4 grasses, and 7 sedges. Only the largest lots of blue wildrye (*Elymus glaucus*) and Columbia brome (*Bromus vulgaris*) were tested. Finally, the special seed collection at Tipso Lake was completed in September 2001. A total of 2.91 bulk lbs (1.59 kg) of seed representing 15 herbaceous species was cleaned. Delivery is scheduled for fall 2002. Seed produced for Highway 410 (low elevation) remains in storage.

Technology Developments: Trial plots of good to excellent stand density and vigor for thick-headed sedge, Merten's sedge, showy sedge, blue wildrye, and Columbia brome produced good seed yields at the PMC. Sitka valerian plants in the deep (tree) pots and greenleaf fescue were subjected to a chilling period of 16 weeks (January-May). These plants exhibited faster regrowth, greater vigor, less sensitivity to nitrogen fertilization, and flowered after the chilling period. These plants also exhibited less crown rot, leaf spot, and/or rust signs and symptoms in the 2001 growing season than in 2000. Pots of greenleaf fescue were spaced at least a foot apart to allow for air movement. This also helped control crown rot. Overwintered sedges became extremely root bound. Roots were trimmed off all sedges and re-potted. Sedges were fertilized with a balanced fertilizer every 2-3 weeks.

SEQUOIA AND KINGS CANYON NATIONAL PARKS

2001 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 preserve and maintain genetic resources within the park by developing propagation, cultivation, and cleaning technology in order to provide the desired amounts of seed and live plant materials. A new Cooperative Interagency Agreement was signed in 2000, for work to be done in 2000, 2001, and 2002.

ACCOMPLISHMENTS - One seed shipment from the park in 2001 was received, cleaned, stored and will be available upon request. Some seed was harvested from the *Phacelia mutabilis* plots in headquarters (HQ) and from plants in the greenhouse (GH). In May 2001 a trial plot 12' x 12' of *Lianthus montanus* was planted. *Carex* plugs that over wintered in the greenhouse, were transplanted into a plot approximately 20' x 40'. Another plot 15' x 20' of *Lianthus* was planted November 2001, plus an addition of two rows to the 2000 *Phacelia* plot. The following table includes the collection amount from the park in 2001 and uncleaned seed weights from UCEPC plots.

Scientific Name	Common Name	Bulk Seed	Clean Seed
Seed collected from the Park:			
<i>Eriogonum nudum</i>	Naked buckwheat	34.4 g	12 g
<i>Lianthus montanus</i>	Mustang clover	708.0 g	421 g
<i>Phacelia mutabilis</i>	Changeable phacelia	1998.2 g	666 g
Seed collected from the Plant Center:			
<i>Lianthus montanus</i>	Mustang clover	2 g	
<i>Phacelia mutabilis</i>	Changeable phacelia	213 g (HQ) 120 g (GH)	To be cleaned

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 systyla*. Observations are being made on the phenology and survival on new species. Work was done on two propagation protocols.

YOSEMITE NATIONAL PARK

2001 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 2001. This agreement adds to an agreement which was initiated in 1997, and entails field establishment and seed increase of one grass, blue wildrye, *Elymus glaucus*, for use in park revegetation efforts through 2004. The seed used for establishing the new field was from seed grown in 1999 by UCEPC. The first seed harvest is anticipated the summer of 2003.

ACCOMPLISHMENTS - The blue wildrye field planted in 1997 was managed for seed production in 2001. However, by mid-summer, it was noted that a large amount of non-native Kentucky bluegrass was present in the field. The presence of a non-indigenous park material presented obvious concerns about potential seed contamination. Harvest was attempted through roguing and spot harvest of several row portions within the field. Analysis determined that production potential was between 75 and 100 pounds of seed, but chances for contamination with Kentucky bluegrass was almost certain. As a result, harvest activities stopped, the field was removed, and a new 2.5 acre field was planted on November 20, 2001, with a Tye drill. Harvested seed will continue to be shipped to Yosemite as requested.

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 HISTORIC PARK
2001 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 has been 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. Twelve students from Cumberland Mountain Research Center, Lincoln Memorial University in Harrogate, TN were hired to help plant 5379 bare-root woody plants, 188 container-grown woody plants, and 865 vines. An estimated total of 22 acres was planted. There were 20 species of native trees, shrubs and vines delivered in 2001. The vines were planted on the element walls leading to the KY tunnel portal to supplement previous plantings. The safety system designed and used in 2000 was utilized again to ensure the safety of the students planting the wall.

A total of 252 pounds PLS of native grass seed was delivered to plant 28 of the estimated 42 acres disturbed by the Gap restoration. An additional 14 acres is expected to be delivered in 2002. Twelve species of native grasses and wildflowers, grown from seed collected in the park, were used in the seed mixes.

Woody-species seed was collected by contract with the Cumberland Mountain Research Center, Lincoln Memorial University in Harrogate, TN. Over 277,000 seeds from 18 species of woody plants were collected and conditioned, and many were planted at the NPMC in the fall.

Approximately 22,000 bare-root trees and shrubs were harvested in November and December 2001 and January 2002. The majority of these will be delivered to the Park in March 2002 for planting the 42 acres of the Gap restoration. About 250 container-grown plants were finished off in late 2001 to be delivered in 2002 for Gap parking lots. Approximately 190 pounds of grass and wildflower seed was produced in 2001 and is currently being cleaned and tested for germination.

Technology Developments and Observations: In the vernal pool area, the test plantings of sphagnum moss were found to be thriving. To establish a much larger area of sphagnum moss, a large area, between the berm and an island of one vernal pool, was confined by two sloping log walls, lined with burlap and filled with peat moss and rotted logs in fall, 2001. A volume of approximately 100 cubic feet of peat moss and rotted logs with very high water holding capacity was created. This will provide the sphagnum moss with a source of water through long periods of drought that would otherwise kill the moss in this man-made vernal pool. This area will provide for approximately 40 square feet of sphagnum moss. The area was allowed to hydrate through the fall and winter, and will be planted with sphagnum moss in spring 2002. Successful establishment of the sphagnum moss will provide critical nesting habitat for the rare four-toed salamander.

GREAT SMOKY MOUNTAINS NATIONAL PARK

2001 Annual Report

summary sheet prepared by

USDA-Natural Resources Conservation Service

National Plant Materials Center, Beltsville, MD

Introduction: The current cooperative agreement between the Great Smoky Mountains National Park and the National Plant Materials Center (NPMC) was signed in October, 1999 for Fiscal Years 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/year on the Foothills Parkway in Tennessee. Approximately 300 lbs. of grass/forb seed, 30,000 grass/forb plugs, 4,200 bareroot and 800 containerized trees and shrub will be supplied for revegetation within the Park during the course of the agreement. The Park collects and ships seed to the NPMC for processing and production. The 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 900 bare-root and container-grown woody species of trees and shrubs, were delivered to the Park in March, 2001, for planting along the Foothills Parkway and in other areas. Approximately 1,900 bare-root trees and shrubs were harvested from the NPMC woody production beds in Dec., 2001 and Jan. 2002. Of these, 1,600 will be delivered as bareroot stock to the Park in March, 2002, and 300 will be potted into containers and held at the NPMC for future delivery. About 100 containerized shrubs being held over from previous years will also be ready for outplanting in the Park in March, 2002.

In May 2001, the NPMC delivered over 12,200 plugs of native grasses and wildflowers for Cades Cove restoration and Foothills Parkway revegetation. Approximately 6,200 plugs of the following native grass and forb species were planted in the Cades restoration area: big bluestem (1,200), little bluestem (1,100), indiagrass (800), purpletop (1,000), aster (360), mistflower (300), mountain mint (350), goldenrod (750) and New York ironweed (400). NPMC staff brought equipment and assisted Park staff with the outplanting in Cades Cove. Another 5,000 plugs were delivered to the Park for outplanting in the Foothills Parkway. These included: broomsedge (900), little bluestem (850), beaked panicum (750), indiagrass (750), aster (420), grass-leaved golden aster(670), goldenrod (570), partridge pea (900), and lespedeza (150).

In May, 2001, a 4.5 lbs. PLS mix of 9 native forb and grass species was sent for planting along a completed section of the Foothills Parkway. In October, 2001, 312 pounds PLS of Virginia wildrye was delivered to the park for the Foothills Parkway revegetation project.

Approximately 100 pounds seed from 10 native species was harvested from NPMC fields in 2001 for GRSM, and is now being cleaned and tested. NPMC staff is also cleaning and testing approximately 90 pounds of seed for 7 species of warm-season grasses that was hand collected or harvested in fall, 2001 from Cades Cove by Park staff.

Technology Development: In fall 2001, the NPMC purchased a MAT-OSU debearder which was customized to enhance processing small lots of native seed that have historically presented challenges in cleaning. The debearder is expected to decrease the time required to process these species as well as increase the purity of the seed lots.

NEW RIVER GORGE NATIONAL RIVER
2001 Annual Report
summary sheet prepared by
USDA-Natural Resources Conservation Service
National Plant Materials Center
Beltsville, MD

Introduction: This one-year project was initiated in late 2000 and arose from an NPS need for technical recommendations concerning site preparation (including invasives control), appropriate native plant species and establishment protocols, and long-term maintenance procedures at a highly visible visitor / orientation center in Sandstone, West Virginia. Assistance was required for 4 proposed planting zones: (1) successional grasslands, (2) stormwater retention areas/drainage swales, (3) a graywater constructed wetland, and (4) front entrance planting area. The NPMC was asked to prepare a technical report, work with project consultants to meet NPS needs for native species plantings, and provide onsite expertise.

Accomplishments: In October 2000, NPMC staff met with NPS personnel and the project landscape architect (LA) at the planned visitor center site to hear a project presentation, investigate site conditions, and determine existing native plant species. After this meeting, the NPMC developed an initial plant list for each of the 4 proposed planting areas.

In January 2001, the NPMC met with project LAs to make seeding recommendations for grassland and swale areas and discuss species lists for tree and shrub entrance plantings. All recommendations were compiled by the NPMC into a planting recommendations report, which was presented to the NPS in February (to coincide with the due date of the LAs 90% Design Development package). The report was broken into sections that addressed each of the 4 planting zones plus a fifth section covering all mow strips/grassed edges. Each section contained general comments, species recommendations, establishment methods, and maintenance methods. An appendix to the report covered details on specialized equipment such as seed drills, broadcast seeders, and flail mowers, as well as techniques for crownvetch control (a particular problem on the site).

NPMC staff traveled to Sandstone in March 2001 to participate in a site review meeting, discuss container plant and wildflower plug production, and work on a planting schedule with NPS and the LA. For the remainder of the agreement year, the NPMC answered plant production and site preparation queries from NPS and reviewed appropriate sections of the LA's construction specifications.

Technology Developments and Observations: The NPMC staff was able to draw on experience from other NPS projects to make recommendations for the New River Gorge project; for example, we have found that fine fescue grass mixes are relatively non-competitive with native plants but provide good cover, and we were able to recommend such a mix for under tree and shrub installations. Based on growth observations of various native trees and shrubs produced at the NPMC, we were also able to recommend that certain species not be used around parking lots, buildings, or walkways because of characteristics like weak wood or aggressive spread.

