Native Plants For National Parks

NPS photo - Capitol Reef NP

NPS photo - Bottlebrush Squirreltail for Zion NP

FY 2010 Plant Materials Project Summary Reports

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

FY 2010

Plant Materials Project Summary Reports

from the

Natural Resources Conservation Service

to the

National Park Service

September 2011

Compiled by

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National Park Service, Denver Service Center, Lakewood, Colorado

INTRODUCTION

This is the 2010 Natural Resources Conservation Service Plant Materials Centers Annual Progress Report on all Interagency Agreements between the National Park Service (NPS) and the Natural Resources Conservation Service (NRCS). These projects relate to development of native plant materials for revegetation of park roads and other restoration projects. The NPS and NRCS have been cooperating in testing and increasing native plants under a Memorandum of Understanding and Interagency Agreements since 1989.

The cooperating NRCS Plant Materials Centers have prepared a Park Summary report for each of their agreements. The Summary Report is a culmination of all of these individual reports into one document. The Summary Report is sent to all parks with current projects, to respective NPS field areas and associated park resource managers and respective NRCS offices and Plant Centers. Additional hard copies or CD form of this report are available on request.

This report can be requested from Pat Davey, NRCS National Technical Advisor, National Park Service, Denver Service Center-Transportation, 12795 West Alameda Parkway, Room 252, Lakewood, CO 80228, Email: Pat_Davey@nps.gov or call 303-969-2349

If you have questions or comments to improve the use and distribution of this report, please contact Pat Davey or Sarah Wynn, NPS National Technical Advisor at 303-969-2292 or email: sarah_wynn@nps.gov

NATIONAL PARK SERVICE
AND
NATURAL RESOURCES CONSERVATION SERVICE

INTERAGENCY PLANT MATERIALS PROGRAM
FY2010 PROGRAM SUMMARY

Technical Assistance

- NRCS NTA (National Technical Advisor) provided assistance to Landscape Architects, Project Specialists, and Project Managers at the NPS Denver Service Center relative to revegetation project needs with eight National Parks in addition to those with Interagency Agreements.
- NRCS NTA provided on site assistance to 15 different National Park staffs.

Development and Administration of Interagency Agreements

- Seven new agreements and eight amendments to agreements were developed this year. A total of 42 active interagency agreements were administered and coordinated.
- There were 46 active projects at 29 National Park units that cooperated with 11 NRCS Plant Materials Centers.

Native Seed and Plant Production

- 29 National Parks
- 6,627 pounds of seed
- 40,600 container plants
- 152 different native species grown

Park Collected Native Seed Processed

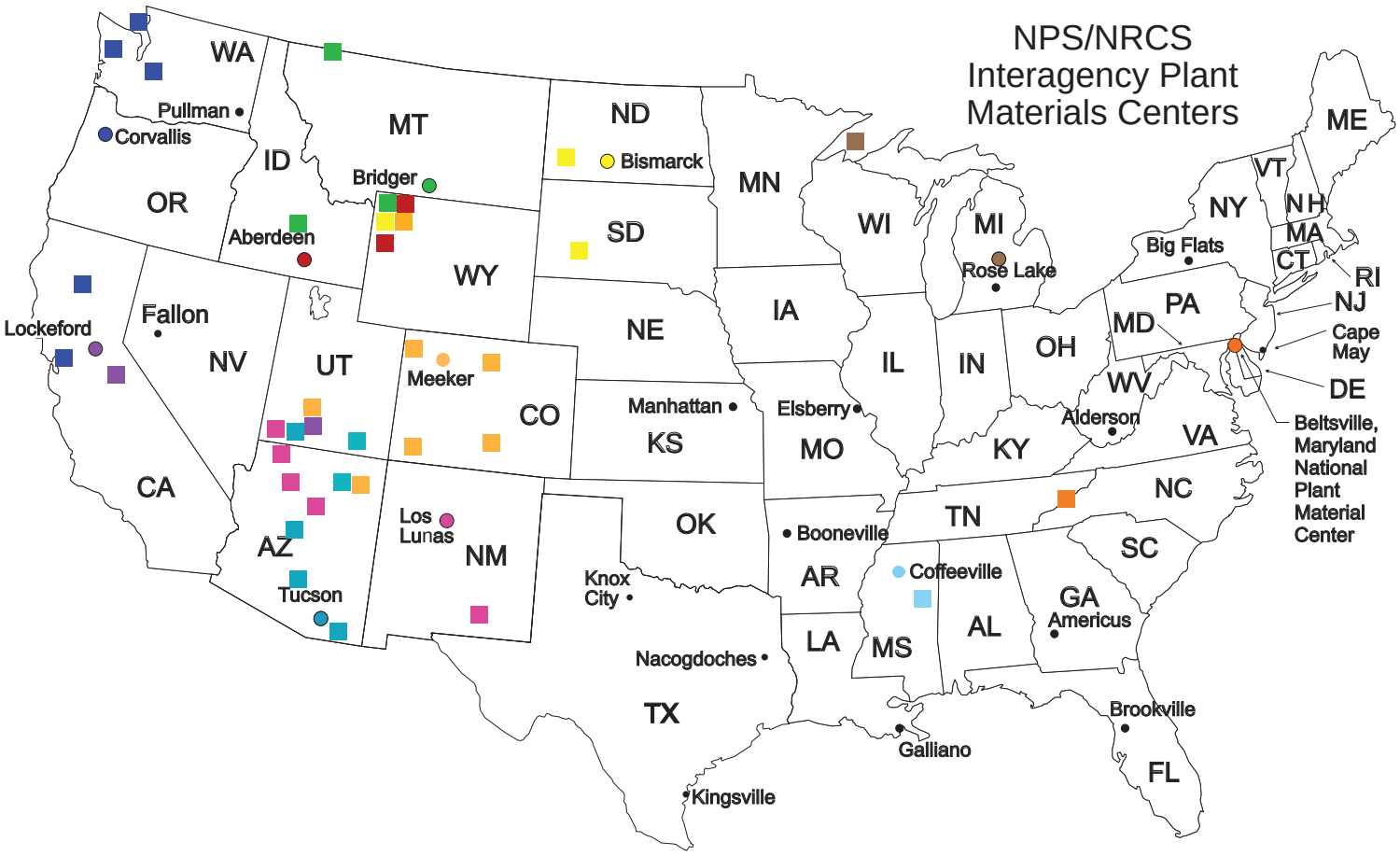
- 3 National Parks
- 703 pounds of seed
- 108 different species

Interagency Agreements Reviewed

- Rocky Mtn., Carlsbad Caverns, Badlands, Craters of the Moon, Mesa Verde, Natchez Trace, Theodore Roosevelt, Yellowstone, Grand Teton, Lassen Volcanic, Canyon de Chelly, Coronado. Capitol Reef, Glacier,
- **Cooperating NRCS Plant Centers:** Aberdeen, ID, Bismarck, ND, Bridger, MT , Beltsville, MD, Coffeeville, MS, Corvallis, OR, East Lasing, MI, Los Lunas, NM, Lockeford, CA, Meeker, CO, Tucson, AZ

Technology Transfer and Research

- Information provided includes basic Federal Lands Highway Program (FLHP) guidelines, examples of revegetation specifications, tools (seed collection techniques, seed storage, plant salvage, propagation, cost estimates, monitoring etc.) Links to the NRCS Plant Materials Program, NRCS Electronic Field Office Technical Guide (EFOTG), Plant Propagation Protocols websites were provide at training sessions and as requested.
- Provide seed collection training workshops to over 35 NPS staff personnel, in five National Parks.
- NRCS NTA and program staff prepared and distributed to cooperating Park/PMCs, key NPS and NRCS personnel 275 copies of the FY2009 Annual Interagency Summary Report



Plant Materials Center		In cooperation with these National Parks
Aberdeen, ID		Grand Teton, Yellowstone
Beltsville, MD		Great Smoky Mountains
Bismark, ND		Badlands, Theodore Roosevelt, Grand Teton
Bridger, MT		Glacier, Yellowstone, Craters of the Moon
Coffeeville, MS		Natchez Trace
Corvallis, OR		Lassen Volcanic, Mount Rainier, Olympic, San Juan Island, Golden Gate
Lockeford, CA		Yosemite, Zion
Los Lunas, NM		Carlsbad Caverns, Grand Canyon, Pipe Spring, Wupatki, Zion
Meeker, CO		Bryce Canyon, Canyon de Chelly, Dinosaur, Great Sand Dunes, Mesa Verde, Rocky Mountain, Yellowstone
Tucson, AZ		Canyon de Chelly, Coronado, Montezuma Castle, Saguaro, Zion
East Lansing, MI		Apostle Island

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Pacific West Region

Southeast Region

BRYCE CANYON NATIONAL PARK

FY2010 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION

Upper Colorado Environmental Plant Center (UCEPC) signed Interagency Agreement 1211-08-010 with Bryce Canyon National Park (BCNP), USDA Natural Resources Conservation Service, Colorado, and NPS Denver Service Center, in July 2008. The agreement called for the establishment of a 0.5 acre field of nodding brome grass *Bromus anomalus* with continued production through September 30 of 2011. The seed source for the project is material previously produced for BCNP by UCEPC.

ACCOMPLISHMENTS

In August of 2008, a 0.5 acre field of *Bromus anomalus* was hand planted. The summer planting allowed for good establishment in the spring of 2009 and the field produced 25 pounds bulk seed. After July's harvest, five rows in the field received a chemical treatment of Metsulfuron (Escort) to help reduce competition from prostrate pigweed. The Escort treatment negatively affected the bromes' vigor/survival, with 60-90% mortality. UCEPC planted six additional rows of nodding brome in June of 2010 to keep the field at 0.5 acre. On August 5, 2010, the field was harvested. Production was very good for the field's second year of growth and considering the loss of production from the five chemically treated rows. The nodding brome field produced 87 pounds of bulk seed. The seed was sent to the Wyoming Seed Laboratory for analysis and those results are listed below. It was noted that the five chemical damaged rows appear to be re-establishing. The field received a fertilizer application of 30-10-5-5, @ 17 gallons per acre. An herbicide treatment of Buctril, 2-4D and methylated seed oil was applied in the spring to help fight annual invasives. The final year of this contract will be 2011.

The table below lists the information for the *Bromus anomalus* 2008 – 2011 contract.

Bryce Canyon National Park Inventory 01/15/2011						
Bromas anomalus						
Species	Lot #	Field size	Bulk lb	PLS %	PLS lb	Test Date
NoBr	2004	NA	**31**	61.00% TZ	**18.61**	9/24/04
NoBr	2009	0.5	**25**	43.21%	**10.80**	2/8/10
NoBr	2010	0.5	**87**	29.57%	**25.73**	2/8/11

TECHNOLOGY DEVELOPMENT

There is the possibility that the application of the herbicide, Metsulfuron (Escort) had some effect on the seed's germination process. The test results from the Colorado Seed Laboratory were comparable to those discovered in the UCEPC greenhouse. Although a different herbicide treatment was applied in the field in 2010, germination percentages remain low. UCEPC will investigate alternative methods for the chemical treatment process. Possible application timing,

application techniques, and experiments with different materials will be necessary for understanding prostrate pigweed control in perennial native grasses. The prostrate pigweed was suppressed in the nodding brome field but with adverse effects.

Fig 1: 2010 Bryce Canyon nodding brome field

Fig 2: July, added 6 new rows of BRCA nodding brome

UCEPC has on inventory the following materials for BCNP:

Bryce Canyon National Park Inventory 01/15/2011						
Elymus trachycaulus / slender wheatgrass						
Species	Lot #	Field size	Bulk lb	PLS %	PLS lb	Test Date
ElTr	2004	2.0	**7.7**	58.00%	**4.47**	9/4/04
ElTr	2005	2.0	**9.0**	61.81%	**5.56**	3/3/06
ElTr	2006	2.0	**267.0**	86.26%	**230.31**	1/23/07
ElTr	2007	2.0	**499.0**	74.16%	**370.06**	2/8/08
ElTr	2008	2.0	**137.5**	61.18%	**84.12**	2/19/09

UCEPC continues to maintain the following BCNP collections:

Bryce Canyon National Park Miscellaneous Materials				
Inventory	16-Feb-11			
Symbol	**Common name**	**year**	**Accession #**	**Amount**
AR PA	Green leaf Manzanita	1990	9024854	291 g
		1992		84 g
		1993		665 g
		1997	9024854	97 g
PU TR	Bitterbrush	1990	9024865	81 g
BR AN	Nodding brome	1989	9024815	15 g
		1989	9024816	21 g
		1990	9024816	275 g
LE SA	Salina wildrye			34 g
EL TR	Slender Wheatgrass	1989	9024815	38 g
BE HA	Red barberry	1989	9024817	88 g
ST CO	Needle & Thread	2005	Park collection	10 g
		2005		238 g
CH NA	Rabbitbrush	2007		12 g
CH VI	Douglas rabbitbrush	2007		13 g
CH spp	Rabbitbrush specie	2008		4 g
AR NO	Black sagebrush	2007		17 g
EL EL	Squirreltail	2008		8 g
OR HY	Indian Ricegrass	2005		54 g
		2005	Park Collection	3 g
		2006	Park Collection	6 g
AR AR	Low sage	1990	9024879	170 g
		1991	9024879	65 g

CANYON de CHELLY NATIONAL MONUMENT

FY2010 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT MATERIALS CENTER
MEEKER, COLORADO

INTRODUCTION

This report is in reference to sub agreement IA No-F739008005/Requisition Reference No. R7390100032. In June of 2008, an interagency agreement was signed between the National Park Service, Canyon de Chelly National Monument (CDCNM) of the U. S. Department of Interior and the Natural Resources Conservation Service (NRCS). The agreement calls for Upper Colorado Environmental Plant Center (UCEPC) to produce seed of two native species; Indian ricegrass *Achnatherum hymenoides* and western wheatgrass *Pascopyrum smithii*, from native seed stock collected at the monument. The agreement stipulates that UCEPC will establish two acres of Indian ricegrass and one acre of western wheatgrass. This agreement will remain in effect until December 31, 2012.

ACCOMPLISHMENTS

At the end of the 2009 growing season 1.27 acres of western wheatgrass had been established through plugs and direct seeding. The Indian ricegrass had 1.73 acres established. The 2010 growing season was the first year of harvest for both materials. The Indian ricegrass cleaned seed weight was 41 pounds. The Indian ricegrass seed test results were 8.43 percent pure live seed (PLS). The western wheatgrass cleaned seed weight was 321 pounds and seed test results came back with a 77.55 percent PLS. Seed lab test results can be provided from UCEPC upon request. Seed inventory for Canyon de Chelly is listed in Table 1 below.

Species Symbol	Harvest Year	Field Size	Amount Cleaned Seed (Bulk)	PLS %	Amount PLS on Hand	Date Tested
AcHy	2010	1.73 acres	41 lbs	8.43	3 lbs	12/9/2010
PaSm	2010	1.27 acres	321 lbs	77.55	249 lbs	1/10/2011

Table 1. Seed available at UCEPC for Canyon de Chelly National Monument.

TECHNOLOGY DEVELOPMENT – Cultural practices, harvest, and cleaning protocols were utilized to handle the western wheatgrass and Indian ricegrass seed.

The western wheatgrass field has done extremely well for its first year of production. The direct seeded portion of the field and the plugged portion of the field have both established well. With seed production being so high in its first year of production, the field should continue to produce well in the future.

The Indian ricegrass field still has not established well. Plants, while they are present, are small in stature and lack an overall healthy vigor. The additional 14 planted rows from 2009 have not established very well. Some small plants have emerged, but the majority of the field is still sparse. The source of Indian ricegrass chosen for increase may be an inferior producer of both seed and plants. Seed from the 2010 growing season may be needed to re-seed the empty spaces in the field to see if production can be increased.

Fig 1. Some of the cleaned Indian ricegrass seed from 2010.

CANYON de CHELLY NATIONAL MONUMENT

FY2010 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION

This report is in reference to sub agreement IA No-1211-08-003 (South Rim). In February of 2008, an interagency agreement was signed between the National Park Service, Canyon de Chelly National Monument (CDCNM) of the U. S. Department of Interior and Upper Colorado Environmental Plant Center (UCEPC). The agreement calls for UCEPC to produce seed of two native species, Indian ricegrass *Achnatherum hymenoides* and western wheatgrass *Pascopyrum smithii*, from seed stock collected at the monument. The agreement stipulates that UCEPC will produce 50 pounds of Pure-Live-Seed (PLS) of Indian ricegrass and 50 PLS pounds of western wheatgrass. This agreement remains in effect through December 31, 2012.

ACCOMPLISHMENTS

At the end of the 2009 growing season, 1.73 acres of Indian ricegrass and 1.27 acres of western wheatgrass had been established in fields. The 2010 growing season was the first year of harvest for both materials. The Indian ricegrass cleaned seed weight was 41 pounds and seed test results came back with an 8.43 percent pure live seed (PLS). The western wheatgrass produced 321 pounds of clean seed and its seed test results came back with 77.55 percent PLS. Seed lab test results can be provided from UCEPC upon request. Seed inventory for Canyon de Chelly is listed in Table 1 below.

Species Symbol	Harvest Year	Field Size	Amount Cleaned Seed (Bulk)	PLS %	Amount PLS on Hand	Date Tested
AcHy	2010	1.73 acres	41 lb	8.43	3 lb	12/9/2010
PaSm	2010	1.27 acres	321 lb	77.55	249 lb	1/10/2011

Table 1. Canyon de Chelly National Monument seed that is available from UCEPC.

TECHNOLOGY DEVELOPMENT

Cultural practices, harvest, and cleaning protocols were utilized to handle the Indian ricegrass and western wheatgrass seed.

The Indian ricegrass field still is not at optimal condition to produce high amounts of seed. Plants, while they are present, are small in stature and lack an overall healthy vigor. The additional planted rows from 2009 have not established very well. Some small plants have emerged, but the majority

of the field is still sparse. The source of Indian ricegrass chosen for increase may be an inferior producer of both seed and plants. Seed from the 2010 growing season may be needed to re-seed the empty spaces in the field to see if production can be increased.

The western wheatgrass field has done extremely well for its first year of seed production. The direct seeded part of the field and the plugged portion of the field have both established well. With seed production being so high in its first year of production, the field should continue to produce well in the future.

Fig1. Canyon de Chelly western wheatgrass field at the beginning of the 2010 growing season.

Fig 2. Canyon de Chelly western wheatgrass seed heads from the 2010 growing season.

CANYON DE CHELLY NATIONAL MONUMENT

FY2010 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
TUCSON, ARIZONA

INTRODUCTION

This project involves the production of 120 PLS lbs of *Sporobolus airoides* and 140 PLS lbs of *Aristida purpurea*. Seed produced will be used for revegetation of disturbed areas in Canyon de Chelly National Park. The original agreement (IA No.: 1211-08-002) was signed the 14th of November, 2007 with the project ending the 30th of September, 2010. In September of 2010, an amendment was signed that extended this agreement until December 31, 2012 to allow for additional seed collection and production time.

ACCOMPLISHMENTS

In June 2008, 0.36 acres were planted to *Sporobolus airoides* using seed collected by park personnel in 2006. Harvest totals for years 2008-2010 are shown in the table below. At the time of this report, seed lab results have not been received for some harvests. As a result, it is not possible to calculate PLS pounds in storage at the center.

***Sporobolus airoides* bulk harvest totals 2008-2010**

	Harvest Year				
	2008	**2009**		**2010**	
Bulk lbs.	15.00	29.30	19.25	10.84	5.96

Seed collections made within the park by a contracted seed collector were received at the center throughout 2009-2010. Species and amounts received include: *Aristida purpurea* = 8.26 lbs, *Bouteloua gracilis* = 6.12 lbs, *Plueraphis jamesii* = 1.18 lbs and *Sporobolus cryptandrus* = 1.5 lbs.

In March of 2010, approximately 3,700 *Aristida purpurea* plants were started from seed received in 2009. In June 2010, these plants were used to establish a 0.54 acre seed production field. In late 2010, 23 bulk pounds of seed were harvested from the field. Seed samples will be sent for germination and purity testing in 2011.

TECHNOLOGY DEVELOPMENT – Seed cleaning techniques for *Aristida purpurea* are under development at the time of this report. Seed cleaning techniques being tested include use of the Westrup Brush Machine, Eclipse Model 324 Seed and Grain Cleaner and/or various hammermills. It is believed that removing the awns from the harvested seed during the cleaning process may reduce seed viability. However, park personnel have requested cleaned seed. Attempts are being made to find a seed cleaning method that removes the long awns of *Aristida purpurea* without significantly reducing seed viability.

Fig 1: PMC personnel planting *Aristida purpurea*, June 2010

Fig 2: Aristida purpurea field, November 2010

CARLSBAD CAVERNS NATIONAL PARK

FY2010 Annual Summary Report
Prepared by

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

INTRODUCTION

On August 23, 2004, an agreement with the LLPMC was made for the collection, propagation, and the increase of native grass species. A new agreement was started in 2010 that provides for the propagation of transplants and seed increase by the LLPMC for CCNP native grass species.

The following table shows a complete list of the accessions involved in the CCNP agreement:

Carlsbad Caverns National Park Accessions

Common Name	Scientific Name	Plant Symbol	Accession Number
Blue grama	*Bouteloua gracilis*	BOGR	9066604
Curlyleaf muhly	*Muhlenbergia setifolia*	MUSE	9066608
Green sprangletop	*Leptochloa dubia*	LEDU	9066658
Plains bristlegrass	*Setaria vulpiseta*	SEVU2	9066606
Purple threeawn	*Aristida purpurea*	ARPU9	9066607
Sideoats grama	*Bouteloua curtipendula*	BOCU	9066605

ACCOMPLISHMENTS

In 2010, the grass species blue grama, green sprangletop, plains bristlegrass, sideoats grama, and threeawn plug transplants were grown from seed harvested from seed production fields at the LLPMC.

The following tables describe the seed production fields established at the LLPMC, the amount of seed delivered to CCNP, the amount of seed production, the amount of CCNP pure live seed on inventory, and the amount of the transplants grown and delivered to CCNP:

2010 Established CCNP Production Fields at the LLPMC

Common Name	Scientific Name	Agreement Acreage	2010 LLPMC Acreage
Blue grama	*Bouteloua gracilis*	0.50 acre	0.50 acre
Green sprangletop	*Leptochloa dubia*	0.50 acre	0.50 acre
Plains bristlegrass	*Setaria vulpiseta*	0.50 acre	0.90 acre
Purple three-awn	*Aristida purpurea*	0.50 acre	0.50 acre
Sideoats grama	*Bouteloua curtipendula*	0.50 acre	0.50 acre

2010 Amount of Seed Delivered to the CCNP

Common name	Scientific name	Pounds delivered
Blue grama	*Bouteloua gracilis*	32.40
Green sprangletop	*Leptochloa dubia*	17.00
Plains bristlegrass	*Setaria vulpiseta*	25.70
Sideoats grama	*Bouteloua curtipendula*	26.00
Threeawn	*Aristida purpurea*	18.30

2010 Amount of CCNP Seed Production

Common Name	Scientific Name	Pounds cleaned
Blue grama	*Bouteloua gracilis*	21.80
Green sprangletop	*Leptochloa dubia*	63.02
Plains bristlegrass	*Setaria vulpiseta*	51.90
Sideoats grama	*Bouteloua curtipendula*	16.82
Threeawn	*Aristida purpurea*	7.52

2010 Amount of CCNP Pure Live Seed on Inventory at the LLPMC

Common Name	Scientific Name	Accession	Pure Live Seed on Inventory (lbs)	Test Date
Blue grama	*Bouteloua gracilis*	9066604	17.40	1/24/07
			8.12	1/09/08
			20.50	6/17/10
			2.59	12/01/09
			16.82	1/19/11
Green sprangletop	*Leptochloa dubia*	9066658	41.44	1/19/07
			82.23	1/03/08
			60.91	7/13/10
			28.09	12/10/09
			29.92	12/01/10
Plains bristlegrass	*Setaria vulpiseta*	9066606	1.56	3/20/07
			17.57	5/15/08
			166.06	7/13/10
			24.06	2/12/10
			14.53	12/08/10
Purple threeawn	*Aristida purpurea*	9066607	2.96	3/21/06
			9.10	3/09/07
			7.90	4/23/08
			15.39	6/11/10
			6.34	1/19/10
			5.11	12/13/10

2010 Amount of CCNP Pure Live Seed on Inventory at the LLPMC

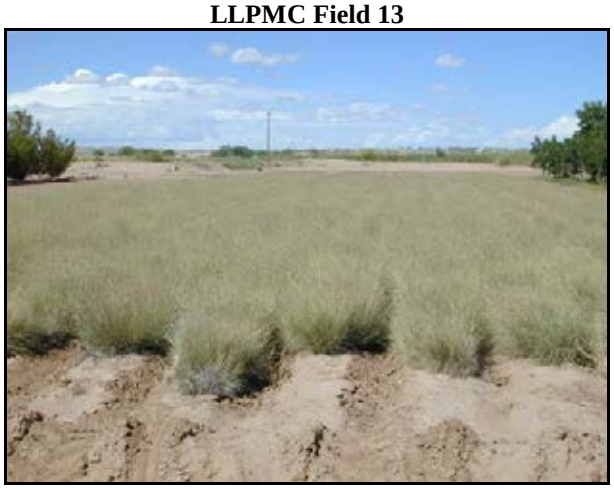
Common Name	Scientific Name	Accession	Pure Live Seed on Inventory (lbs)	Test Date
Sideoats grama	*Bouteloua curtipendula*	9066605	63.84	1/19/06
			36.34	1/23/07
			117.07	3/10/08
			59.07	6/29/10
			13.53	12/23/09
			9.72	12/15/10
			3.00 Bulk	No test*
			1.02 Bulk	No test*

* Seed not sent for testing due to an insufficient amount of seed or seed was from the collections made at the CCNP.

2010 Amount of Transplants Delivered to the CCNP

Common Name	Scientific Name	Transplants Delivered
Blue grama	*Bouteloua gracilis*	1070
Green sprangletop	*Leptochloa dubia*	1070
Plains bristlegrass	*Setaria vulpiseta*	1070
Sideoats grama	*Bouteloua curtipendula*	875
Threeawn	*Aristida purpurea*	1070

LLPMC Field 13



CCNP Blue grama Seed Production Field 2010

CORONADO NATIONAL MEMORIAL

FY2010 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
TUCSON, ARIZONA

INTRODUCTION

This agreement (IA 1211-09-005) was initiated July 17, 2009 and is expected to be completed September 30, 2013. The Tucson Plant Materials Center (TPMC) will propagate a total of 5000 containerized plants of agave (*Agave palmeri*) during the course of the contract. Approximately 1500-2000 plants will be delivered to the Memorial each year in order to meet the amount stipulated in the agreement. The agave plants will be out-planted in an area disturbed during the construction of the border fence along the Arizona - Mexico border. At present, there is limited information available on growth protocols for this species. Therefore, the TPMC has initiated studies to collect data on optimal propagation techniques.

ACCOMPLISHMENTS

Seed collected at the Memorial was cleaned and production of plants was initiated in July 2009. The first batch of seeds was pre-soaked in water for 12 hours, drained and then placed in the greenhouse to germinate. Germination was excellent resulting in about 1600 seedlings which were transplanted to 3 x 5 inch zipset plant band containers (45 cubic inches in volume). The 1600 containerized plants were delivered to the Coronado National Memorial on July 16, 2010 (see photos below). The size of each individual plant rosette averaged about 2-3 inches at the time of delivery. Another 1600-2000 plants are scheduled to be delivered in late summer of 2011.

TECHNOLOGY DEVELOPMENT

Limited information is available in the literature regarding *Agave palmeri* culture under nursery conditions. The TPMC initiated observational trials and a growth rate study to find out more about the cultural requirements for this plant. The following are some of the observations recorded during the first year of the grow-out:

Growing Media: A mixture of peat moss and perlite at a 1:2 ratio provided the best results for drainage and growth. A mixture of 3:1:1 of shredded bark, sand and peat moss did not work as well as the 1:2 ratio of peat moss and perlite. A mixture of medium texture field soil, peat moss and perlite (1:1:1) did not provide adequate drainage.
Irrigation Frequency: Ten minute irrigation frequencies of 3 days, 2 days and 1 day per week were compared to observe differences in growth rates. Additional watering days per week did not improve growth rates but did result in a fungus gnat infestation in the greenhouse. An irrigation frequency of one watering day per week provided sufficient water for the agave plants and control of the fungus gnat infestation.

Fertilization: Plants were fertilized approximately once per month with 200 parts per million of 20-20-20 Peter's Professional soluble fertilizer.
Growth Rate Study: A greenhouse/shade house growth rate study was initiated soon after the agave plants were transplanted into individual containers. Three replications of 16 plants were used for the study. Initially, leaf growth was recorded to measure growth. However, once the plants began forming rosettes, this task became time consuming and rosette diameters were recorded instead. Below is a figure illustrating average rosette diameter growth in centimeters for 16 plants from February through September 2010 (data was not collected for the month of August). Rosette diameter increased significantly during the late summer months.

***Agave palmeri* Average Rosette Diameter**

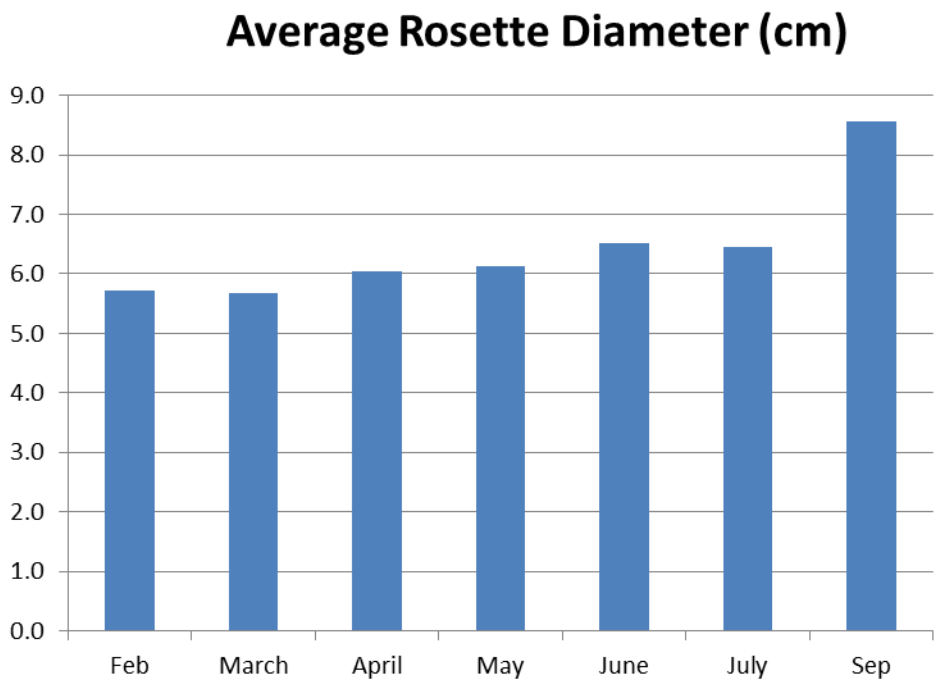


Fig 1: Agave, approximately one year old.

CRATERS OF THE MOON NATIONAL MONUMENT AND PRESERVE
2010 ANNUAL SUMMARY REPORT
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
BRIDGER, MONTANA

INTRODUCTION

The Bridger Plant Materials Center entered into a cooperative agreement with Craters of the Moon National Monument and Preserve in FY 2010. This agreement facilitates the processing, propagation, and establishment of indigenous plant materials and the development of propagation technologies for the restoration of disturbances resulting from road construction and other projects within National Monument (NM) boundaries.

ACCOMPLISHMENTS

In late 2009, the BPMC received and processed 15 wildland collections indigenous to Craters NM (see Table 1). Each lot was processed, accessioned, and inventoried.

Table 1. Craters of the Moon 2009 seed stocks cleaned at the BPMC as of February 2010.

Species	Accession Number	2009 Collection Date	2009 Collection Location	2009 Bulk Clean Seed
				g
Achnatherum hymenoides	9088146	7/10-7/31	Golden Chariot	505
Achnatherum thurberianum	9088147	7/17-7/22	Golden Chariot	138
Artemisia tridentata sub. *vaseyana*	9088148	10/13	Tree Molds Parking	189
Chaenactis douglasii - Lot A	9088149	7/10-8/4	Group Camp	pending
Chaenactis douglasii - Lot B	9088149	7/10-8/4	Group Camp	32
Chamaebatiatia millefolium	9088150	9/10-9/14	across N. Crater Flow	138

Ericameria nauseosa	9088151	9/4-10/15	Tree Molds Road	168
Eriogonum ovalifolium var. *depressum*	9088152	7/14-7/23	Lava Cascades	8
Eriogonum umbellatum	9088153	8/10-8/20	Base of Big Craters	633
Leymus cinereus	9088154	8/19-9/16	North end/ Res. Camp	4,536
Mimulus nanus	9088155	7/20-7/21		161
Penstemon deustus var. *deustus*	9088156	8/5-8/6	Spatter Cones Parking	139
Phacelia hastata	9088157	7/22-8/4	Golden Chariot	243
Pinus flexilis	9088158	8/28-8/31	?	719
Poa secunda	9088159	7/9-7/22	Golden Chariot	560
Purshia tridentata	9088160	7/24-7/30	Vulture Mead.	2,641
				(184-reclean)

After processing, each lot was shipped to the Wyoming Seed Analysis Laboratory for germination testing, and in some cases, purity testing (see Table 2). As a result of very low initial viability of *Purshia tridentata* (9088160), this lot was re-cleaned using a gravity table and multiple cut tests in order to improve the number of pure live seed. As a rule, the viability and purity of the tested lots was relatively high for wildland collections.

Plant propagation began in early 2010 with cold:moist chilling treatments of some species in order to break dormancy. Target production, number of containers sown, and resultant plant production appears in Table 3. The low percentage germination of two species probably reflects low seed vigor and/or viability. Additional sowing of these species is planned for early 2011. All plants were over-wintered in a coldframe and will be transplanted in 2011 to larger pots and held until spring 2012 when they will be delivered to Craters of the Moon National Monument.

Table 2. Seed analysis results, 2009 wildland collections from Craters National Monument.

Species	Accession Number	2009 Bulk Clean Seed	Purity	Viability
		g	%	%
Achnatherum hymenoides	9088146	505	NA	46
Achnatherum thurberianum	9088147	138	NA	96
Artemisia tridentata sub. *vaseyana*	9088148	189	NA	97
Chaenactis douglasii - Lot A	9088149	pending	NA	96
Chaenactis douglasii - Lot B	9088149	32	NA	92
Chamaebatiatia millefolium	9088150	138	NA	92
Ericameria nauseosa	9088151	168	NA	88
Eriogonum ovalifolium var. *depressum*	9088152	8	NA	77
Eriogonum umbellatum	9088153	633	97.54	84
Leymus cinereus	9088154	4,536	94.84	89
Mimulus nanus	9088155	161	NA	84
Penstemon deustus var. *deustus*	9088156	139	NA	87
Phacelia hastata	9088157	243	NA	98
Pinus flexilis	9088158	719	NA	72
Poa secunda	9088159	560	91.02	98
Purshia tridentata	9088160	2,641	98.86	2
		(184-reclean)		

Table 3. Container production in 2010 for Craters of the Moon National Monument.

Species	Accession Number	Target Production	Number Sown	On-Hand	Balance
Artemisia tridentata sub. *vaseyana*	9088148	450	600	496	+46
Ericameria nauseosa	9088151	225	400	355	+130
Pinus flexilis	9088158	275	400	210	-65
Purshia tridentata	9088160	450	800	164	-286

DINOSAUR NATIONAL MONUMENT

FY2010 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION

This report covers the activities conducted by Upper Colorado Environmental Plant Center (UCEPC) for the Dinosaur National Monument (Dinosaur) Plant Materials Agreement in 2009. The agreement involves collecting and increasing grass species native to Dinosaur. These grasses will be used for restoration and to prevent non-indigenous weedy plants from invading. In 2010, all fields produced seed; western wheatgrass, Indian ricegrass, basin wildrye and bluebunch wheatgrass. Additionally, one seed shipment was made of gram quantities of all species except western wheatgrass on October 5, 2010.

ACCOMPLISHMENTS

Seed fields were planted on November 5 and 6, 1997. A field of western wheatgrass (9092278) was planted in 2008. Table 1 lists the seed from Dinosaur stored at UCEPC. The following updates the seed fields through 2010.

1. Indian ricegrass - November 5, 1997 - planted 0.24 acre at rate of about 30 seeds per foot of row - total seed lot (1.42 lb) used. Harvested July 8, 2010, produced 22 pounds of clean seed.

2. Bluebunch wheatgrass - November 5, 1997 – planted 0.24 acre at rate of about 30 seeds per foot of row. Harvested July 12, 2010, produced 6 pounds of bluebunch wheatgrass seed.

3. Western wheatgrass - New field, 0.3 acre, planted September 8, 2008, with a seed source collected from Irish Canyon. Harvested 145 pounds of seed off of 1.3 acre-field shared with BLM Colorado.

4. Basin wildrye - November 6, 1997 - planted at rate of about 30 seeds per foot of row. Harvested July 28, 2010, produced 45.5 pounds of clean seed.

5. Gram quantities of seed of bluebunch, Indian ricegrass, Alkali sacaton, and basin wildrye were supplied to Cindy Heyd of Dinosaur National Monument in October of 2010.

TECHNOLOGY DEVELOPMENT

Seeding rates, irrigation, fertilization, harvest and cleaning records can be provided upon request. Below, Table 1 identifies pure live seed inventory by species and seed lot.

Table 1. A listing of seed from Dinosaur by species and year of harvest stored at UCEPC.

SPECIES	YEAR	BULK	PLS
Basin wildrye	1997 (park collected)	10.69 lb	8.60 lb
	1999 harvest	29.00 lb	25.70 lb
	2000 "	5.50 lb	4.00 lb
	2001 "	10.80 lb	7.40 lb
	2002 "	25.00 lb	17.60 lb
	2003 "	52.00 lb	42.60 lb
	2004 "	43.00 lb	31.10 lb
	2005 "	37.00 lb	24.36 lb
	2006 "	74.00 lb	30.30 lb
	2007 "	83.00 lb	55.00 lb
	2008 "	36.00 lb	no test
	2009 "	54.00 lb	28.62 lb
	2010 "	45.50 lb	20.86 lb
Bluebunch wheatgrass	1997 (park collected)	0.46 lb	no test
	1999 harvest lot 1	10.50 lb	8.40 lb
	lot 2	6.00 lb	3.60 lb
	2000 harvest	1.40 lb	0.80 lb
	2002 (old planting)	300.00 g	215.00 g
	2003 (both plantings)	32.00 lb	25.90 lb
	2004 (both plantings)	25.50 lb	21.62 lb
	2005 (both plantings)	13.00 lb	9.50 1b
	2006 (new planting)	10.80 lb	9.10 lb
	2007 (new planting)	18.00 lb	15.32
	2008 (new planting)	18.50 lb	no test
	2009 harvest	14.00 lb	8.54 lb
	2010 harvest	6.00 lb	2.5 lb
Indian ricegrass	1997 (park collected)	8.00 g	no test
	1999 harvest	1.24 lb	0.80 lb
	2000 "	0.97 lb	0.30 lb
	2001 "	0.97 lb	0.50 lb
	2002 "	3.60 lb	1.15 lb
	2003 "	8.00 lb	3.60 lb
	2004 "	10.00 lb	3.80 lb
	2005 "	12.00 lb	5.23 lb
	2006 "	5.60 lb	3.80 lb
	2007 "	8.00 lb	4.97 lb
	2008 "	6.60 lb	no test
	2009 "	39.00 lb	4.13 lb
	2010 "	22.00 lb	7.40 lb
Western wheatgrass	2008 planted		
	2009 no harvest		
	2010 harvest	33.50 lb	26.40 lb

Fig 1. Bluebunch wheatgrass

GLACIER NATIONAL PARK

FY 2010 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
BRIDGER, MONTANA

INTRODUCTION

The Bridger Plant Materials Center has maintained a cooperative agreement with Glacier National Park since FY 1986. This agreement facilitates the collection, increase, and 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.

ACCOMPLISHMENTS

In 2010, 215 seed lots representing 98 species were delivered to Glacier or used for Bridger Plant Materials Center seed increase. Total weight of seed delivered was 25.7 kilograms (56.7 pounds). Seed distribution included 44 grasses (30 species), 103 forbs (48 species), and 57 woody plants (30 species). A total of 2328 containerized plants were delivered to Glacier Park in 2010. A total of 326 wildland seed collections, including 90 new accessions, were processed at the Bridger Plant Materials Center and are reported in the 2010 Glacier Annual Technical Report.

Active and new seed production fields as of December 2010 appear in Table 1. Field seed increase at the Center is reported in the Glacier Park 2010 Annual Technical Report.

Table 1. Glacier Park seed production fields at the Bridger Plant Materials Center, December 2010.

Genus & Species	Accession Number	Site	Field	Date Field Planted	Field Size (acres)	2010 Harvest (kg)
Elymus glaucus	9087348	SM[1]	15N	4/14/2009	0.75	-
Elymus glaucus	9087348	SM[2]	15N	4/14/2009	0.52	25.4[4]
Eurybia conspicua	9087433	LM	4	6/21/2005	0.05	0.381
Festuca idahoensis	9058298	Camas	15N	4/14/2009	0.63	0
Symphyotrichum laeve	9081447	LM	4	1998	0.04	-
Symphyotrichum laeve	9081447	LM	4	6/3&23/2004	0.09	0.050[3]

1 From 2007 lot.
2 From 2008 lot.
3 Yield is a combination of both acreages in Field 4.
4 Yield is a combination of both acreages in Field 15.

Container plants sown and held in cold storage at the Bridger Plant Materials Center in 2010 for GNP appear in Table 2.

Table 2. Container plants sown and held in cold storage at the Bridger Plant Materials, December 2010.

Species Name	Glacier Lot Number	Accession Number	Collection Location	Date Sown	Number of Units	Size Container *cubic inches*
Alder-leaved buckthorn	03-051	9082175	Goat Haunt	10/29/2010	366	7

Carex microptera	08-028	9087799	Lake McDonald	7/14/2009	600	7
Carex geyeri	08-004	9087925	Lake McDonald	8/10/2009	10	7
Lithosperma ruderale	09-073	9087758	Saint Mary	10/29/2010	198	7
Mahonia repens	07-092	9054489	North Fork	7/23/2008	36	7
Mahonia repens	07-054	9063248	Saint Mary	7/23/2008	274	7
Mahonia repens	08-294	9087360	Goat Haunt	7/23/2008	81	7
Rubus parviflorus	08-144	9078268	Lake McDonald	8/10/2009	104	40
Potentilla fruticosa		9082113	Waterton	10/29/2010	173	7
Symphoricarpos albus	08-293	9087424	Goat Haunt	10/29/2010	200	7
Symphoricarpos albus	07-091	9082150	North Fork	10/29/2010	200	7
Symphoricarpos albus	04-257	9087424	Goat Haunt	10/29/2010	200	7
Symphoricarpos albus	07-189	9082129	Saint Mary	10/29/2010	280	7
Symphoricarpos albus		9087730	Waterton	10/29/2010	200	7
Symphoricarpos albus	07-163	9082128	Lake McDonald	10/29/2010	120	7

Container/potted plants delivered to Glacier National Park in 2010 appear in Table 3.

Table 3. Container/potted plants delivered to Glacier National Park, 2010.

Species Name	Glacier Lot Number	Accession Number	Collection Location	Date Sown	Number of Units	Size Container
Festuca occidentalis	07-015	9087751	Lake McDonald	5/1/2008	1000	7
Mahonia repens	07-054	9063248	Saint Mary	2008	1913	4
Rosa woodsii	Multiple	9063260	Lake McDonald		246	10
Rubus parviflorus	06-038	9078268	Lake McDonald	8/10/2009	169	40

TECHNOLOGY DEVELOPMENT AND ASSISTANCE

A prototype electronic labeling system for wildland seed collection was developed by the Natural Resources Conservation Service State Office staff in cooperation with the Plant Materials Center. Glacier National Park staff were trained in nursery irrigation system design, cutting and container propagation, hardening-off, media preparation and using the new labeling system during the summer visit by BPMC and State Office staff on July 12-16, 2010.

Joe Scianna and Ross Oyler meeting with Reveg staff at Glacier NP

GRAND CANYON NATIONAL PARK

FY2010 Annual Summary Report
Prepared by

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

INTRODUCTION

The US Department of Interior (DOI), the National Park Service (NPS) and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) made agreements with the following national parks and monuments:

GRAND CANYON NATIONAL PARK

In July 1990, an agreement was made with the LLPMC for the collection, propagation, and increase of native grasses, forbs, shrubs, and trees. The agreement states that the LLPMC will produce the plant materials for the purpose of revegetating disturbed areas and native landscaping projects in the GCNP which includes both the north and south rim areas of the park. Amendment No. 1 of 1999 and Amendment No. 2 of 2001 states that the LLPMC will produce seed of two native species (blue grama and muttongrass), and the LLPMC will grow transplants started from native tree and shrub seed collected from the park.

* In 2006 the LLPMC agreed to add bottlebrush squirreltail to the list of grass species to be grown for seed production
* In 2007 the LLPMC agreed to add sideoats grama to the list of grass species to be grown for seed production
* In 2009 the LLPMC agreed to add a new accession of blue grama. In addition, spike muhly was added to the list of grass species to be grown for seed production
* In 2010 an addendum to the GCNP agreement was finalized, and the LLPMC agreed to grow additional transplants of both woody and herbaceous species for GCNP

The following table shows the complete list of the GCNP plant species accessions:

Common Name	Scientific Name	Plant Symbol	Accession Number
Grasses:			
Blue grama	*Bouteloua gracilis*	BOGR	9062875
Blue grama	*Bouteloua gracilis*	BOGR	9066803
Bottlebrush squirreltail	*Elymus elymoides*	ELEL5	9066659
Bottlebrush squirreltail	*Elymus elymoides*	ELEL5	9062858
Indian ricegrass	*Achnatherum hymenoides*	ORHY	9062857
Muttongrass	*Poa fendleriana*	POFE	9062861
Needleandthread	*Hesperostipa comata*	HECO	9062859
Sideoats grama	*Bouteloua curtipendula*	BOCU	9066732
Spike muhly	*Muhlenbergia wrightii*	MUWR	9066802
Western wheatgrass	*Pascopyrum smithii*	PASM	9062860
Trees and Shrubs:			
Apache plume	*Fallugia paradoxa*	FAPA	9062865
Big sagebrush	*Artemisia tridentata*	ARTR	9066056
Century plant	*Agave utahensis*	AGUT	9062874
Cliffrose	*Purshia mexicana*	COME	9062876
Curl-leaf mountain mahogany	*Cercocarpus ledifolius*	CELE	9062867
Currant	*Ribes spp.*	RI SPP.	9066057
Datil yucca	*Yucca baccata*	YUBA	9066058
Desert barberry	*Berberis fremontii*	BEFE	9066059
Elderberry	*Sambucus spp.*	SA SPP.	9066047
Fernbush	*Chamaebatiaria millefollium*	CHMI	9062866
Fourwing saltbush	*Atriplex canescens*	ATCA	9062873
Gambel oak	*Quercus gambelii*	QUGA	9062872
Lupine	*Lupinus spp.*	LU SPP.	9062863
Penstemon (blue)	*Penstemon spp.*	PE SPP.	9062862
Penstemon (red)	*Penstemon spp.*	PE SPP.	9066054
Pinyon (twoneedle) pine	*Pinus edulis*	PIED	9066467
Ponderosa pine	*Pinus ponderosa*	PIPO	9066466
Rabbitbrush	*Chrysothamnus nauseosus*	CHNA	9062877
Utah juniper	*Juniperus osteosperma*	JUOS	9066055
Utah serviceberry	*Amelanchier utahensis*	AMUT	9062869
Wolfberry	*Lycium spp.*	LY SPP.	9062870

2010 ACCOMPLISHMENTS

In 2010, the GCNP sent seed of several woody and grass species to the LLPMC from collections made at the park. The seed received by the LLPMC from the GCNP in 2010 will be stored and used to produce containerized transplants.

In 2010, plug transplants of the GCNP muttongrass and blue grama were grown using seed harvested from the production seed fields at the LLPMC. These plugs were used to establish a 1.00 acre of field of muttongrass and a 0.75 acre field of blue grama at the LLPMC.

The following tables describe the seed production fields established at the LLPMC, the type and amount of seed delivered to GCNP, the amount of seed production, the amount of pure live seed on inventory, and the species of grass and shrub transplants grown at the LLPMC and delivered to GCNP:

2010 Established GCNP Production Fields at the LLPMC

Common Name	Scientific Name	Agreement Acreage	2010 LLPMC Acreage
Blue grama	*Bouteloua gracilis*	2.00	2.59
Bottlebrush squirreltail	*Elymus elymoides*	0.50	0.00*
Muttongrass	*Poa fendleriana*	1.00	1.78
Sideoats grama	*Bouteloua curtipendula*	0.50	0.00*
Spike muhly	*Muhlengbergia wrightii*	0.50	0.70

* The bottlebrush squirreltail and sideoats grama fields were removed prior to 2010 as per agreement with GCNP.

2010 Amount of Seed Delivered to the GCNP

Common Name	Scientific Name	Pounds Delivered
Blue grama	*Bouteloua gracilis*	6.6
Muttongrass	*Poa fendleriana*	17.00

2010 Amount of Seed Production for the GCNP

Common Name	Scientific Name	Pounds Cleaned
Blue grama	*Bouteloua gracilis*	36.84
Muttongrass	*Poa fendleriana*	21.10
Spike Muhly	*Muhlenbergia wrightii*	12.56

2010 Amount of Pure Live Seed on Inventory for the GCNP

Common Name	Scientific Name	Accession	Pure Live Seed On Inventory (lbs)	Test Date
Blue grama	*Bouteloua gracilis*	9062875	2.17 14.96	11/17/09 12/10/10
Blue Grama	*Bouteloua gracilis*	9066803	8.43	1/28/11

2010 Amount of Pure Live Seed on Inventory for the GCNP

Common Name	Scientific Name	Accession	Pure Live Seed On Inventory (lbs)	Test Date
Muttongrass	*Poa fendleriana*	9062861	2.00	9/23/10
Sideoats grama	*Bouteloua curtipendula*	9066732	0.50	12/04/09
Spike muhly	*Muhlenbergia wrightii*	9066802	9.31	N/A*

* Spike muhly seed is still being tested at the New Mexico State Seed Laboratory

2010 Amount of Transplants Delivered to the GCNP

Common Name	Scientific Name	Transplants Delivered
Apache plume	*Fallugia paradoxa*	212
Artemisia tridentate	*Big sagebrush*	680
Blue grama	*Bouteloua gracilis*	329
Fernbush	*Chamaebatiaria millefolium*	178
Fremonts mahonia	*Mahonia fremontii*	365
Mexican cliffrose	*Purshia Mexicana*	150
Pinyon pine	*Pinus edulis*	600
Rubber rabbitbrush	*Ericameria nauseosa*	150

GCNP Blue grama Seed Production Field 2010

GRAND TETON NATIONAL PARK

FY2010 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION

The Aberdeen Plant Materials Center (PMC) entered into an interagency agreement with Grand Teton National Park (GTNP) in 2006 to produce seed of four native grasses for use in revegetation of disturbed areas following road construction. Seed fields of slender wheatgrass (*Elymus trachycaulus*), Sandberg bluegrass (*Poa secunda*), blue wildrye (*Elymus glaucus*) and mountain brome (*Bromus marginatus*) were planted in 2006, and seed was harvested in 2007 and 2008. New fields of Idaho fescue (*Festuca idahonensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) were planted in May, 2008. Seed from these fields were harvested in 2009 and 2010. In 2010, a new field of mountain brome was planted for seed production in 2011 and 2012.

ACCOMPLISHMENTS

Mountain brome (2.5 acres) was planted June 10, 2010 in field P7W, Pearl Farm. Soil at the Pearl Farm is Kimama silt loam with a pH of 7.4 to 9.0. Average annual precipitation is 9.39 inches and seed fields are sprinkler irrigated to supplement natural precipitation to approximate 18 to 20 inches of total annual moisture. Weeds were controlled during the growing season. The following table lists all species grown for GTNP, field acreage, current seed inventory and seed shipped during 2010.

Species	Harvest year	Field size (ac)	Inventory PLS pounds	Lbs. shipped 2010	Seed Test date
Idaho fescue	2010	0.3	82.8		3/21/11
Idaho fescue	2009	0.3	0	8.76	3/20/09
Bluebunch wht.g.	2010	0.17	1.57		3/21/11
Bluebunch wht.g.	2009	0.17	0	0.4	5/27/10
Slender wht.g.	2009	1.0	489.8		5/17/10
Slender wht.g.	2008	1.0	415.2		4/14/09
Slender wht.g.	2007	1.0	567.9	300	3/20/08
Sandberg b.g.	2009	0.25	4.1		6/4/10
Sandberg b.g.	2007	0.25	2.98		3/19/09
Blue wildrye	2008	2.7	389.2		4/22/09
Blue wildrye	2007	2.7	699.3		3/10/08

DIGITAL PHOTOS

Fig 1. Grand Teton National Park bluebunch wheatgrass seed increase field at Aberdeen PMC. June, 2010.

Fig 2. Grand Teton National Park Idaho fescue seed increase field.

Fig 3. Grand Teton National Park mountain brome seed increase field.

GRAND TETON NATIONAL PARK

FY2010 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
BISMARCK, NORTH DAKOTA

INTRODUCTION

The Natural Resources Conservation Service (NRCS), Plant Materials Center (PMC), Bismarck, North Dakota, entered into an interagency agreement on June 1, 2010, with the National Park Service (NPS), Grand Teton National Park (GTNP) to grow and produce seed of bluebunch wheatgrass (*Pseudoroegneria spicata*), slender wheatgrass (*Elymus trachycaulus*) and mountain bromegrass (*Bromus marginatus*) for use in revegetating Kelly Hay Fields. Fields were established at the PMC in 2010 with seed originating from GTNP. Seed will be harvested from these fields in 2011 and 2012 and distributed to GTNP for reclamation activities.

Targeted Species and Goaled Seed Amounts

Species	Common Name	PLS Pounds
Pseudoroegneria spicata	bluebunch wheatgrass	100
Elymus trachycaulus	slender wheatgrass	600
Bromus marginatus	mountain bromegrass	400

ACCOMPLISHMENTS

Seed from GTNP was given to the Bismarck PMC to establish seed production fields at the PMC. The PMC assigned each species an accession number and recorded it in a seed inventory database. The fields were prepared using an S-tine field cultivator and packed with a Brillion packer prior to seeding. Each field was seeded using a modified Truax grass drill. The fields were seeded on 42-inch row spacing. A one-acre field of mountain bromegrass was established at the PMC on May 26, 2010. The field was seeded at a rate of 10 lb pure live seed (PLS)/ac, resulting in 25 PLS per foot of row to be planted. A one-acre field of slender wheatgrass was seeded on May 26, 2010, at a rate of 5.5 lb PLS/ac for 20 PLS seeds per foot of row. A 0.5-acre field of bluebunch wheatgrass was seeded on June 6, 2010, at a rate of 9.5 lb PLS/ac for 30 PLS seeds per foot of row. The fields were irrigated throughout the summer to aid in establishment. Weeds were clipped during the summer. The mountain bromegrass and slender wheatgrass fields established quickly and resulted in excellent stands by the end of the growing season. The bluebunch wheatgrass field was slow to establish. Seedling vigor was noticeably poor for the bluebunch wheatgrass, resulting in a fair stand by the end of the growing season. A fall pre-emergent herbicide was applied to all fields in September.

Accession Number	Species	Seeding Date	Seeding Rate (PLS lb/ac)	Field Size (ac)
9094354	mountain bromegrass	5/26/2010	10.0	1.0
9094353	slender wheatgrass	5/26/2010	5.5	1.0
9094352	bluebunch wheatgrass	6/26/2010	9.5	0.5

TECHNOLOGY DEVELOPMENT

Plans are to harvest all fields in 2011. All harvest dates and combine settings will be recorded at this time. Cleaning protocols will be recorded when each species is cleaned. Seed will be tested for purity and germination.

GREAT SAND DUNES
NATIONAL PARK AND PRESERVE

FY2010 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION

In March of 2009, an interagency agreement was signed between Great Sand Dunes National Park and Preserve (GSD) and Upper Colorado Environmental Plant Center (UCEPC) to produce seed of two species, one half acre of Indian ricegrass *Achnatherum hymenoides* and two-tenths of an acre field of ring muhly *Muhlenbergia torreyi*. This agreement was signed into effect in April of 2009 and will remain in effect until September 30, 2011.

ACCOMPLISHMENTS

Ring muhly and Indian ricegrass fields were harvested during the summer of 2010, seed was cleaned, tested at the seed lab and is being stored at UCEPC. Ring muhly cleaned seed weight was 4.6 pounds. Indian ricegrass clean seed weight was 41 pounds. Indian ricegrass and ring muhly were both sent to the Wyoming seed lab for testing. The Indian ricegrass came back with 34.77 percent pure live seed (PLS). The ring muhly seed was sent in two times to the seed lab. The first seed test came back with discrepancies and was sent in an additional time for re-testing, the PLS came back as 74 percent PLS. Seed lab test results can be provided from UCEPC upon request. Seed inventory for Great Sand Dunes is listed in Table 1 below.

Table 1. Great Sand Dunes National Park and Preserve seed inventory on hand at UCEPC.

Species Symbol	Harvest Year	Field Size	Amount Cleaned Seed (Bulk)	PLS %	Amount PLS on Hand	Date Tested
MuTo	2010	0.2	4.6 lb	74.00	3 lb	12/6/2010
AcHy	2010	0.5	41.0 lb	34.77	14 lb	12/1/2010
MuTo	2009	0.2	3.4 lb	31.35	1 lb	12/22/2009
AcHy	2009	0.5	6.2 lb	20.93	1 lb	1/14/2010

*All park materials from 2008 and prior have been shipped to the park.

TECHNOLOGY DEVELOPMENT

Cultural practices, harvest, and cleaning protocols were utilized to handle the Indian ricegrass and ring muhly.

When comparing seed lab results from the Indian ricegrass field from over the years it's been observed that PLS has remained fairly low and has fluctuated. A lack of PLS consistency from this source has been a concern. Fluctuations in seed production may perhaps be a result of various environmental elements and factors that UCEPC has no control over. However, since the Indian ricegrass field has never had high PLS results, it may be an Indian ricegrass source that is a mediocre seed producer.

The ring muhly field has been in production for four years. Its seed quantities and PLS results have fluctuated drastically over that period of time. Since the ring muhly has only been in production for a short period, at this time it is hard to determine the fluctuating seed test results.

Fig 1. Field of ring muhly summer 2010.

Fig 2. Field of Indian ricegrass summer 2010.

MESA VERDE NATIONAL PARK

FY2010 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION

Upper Colorado Environmental Plant Center (UCEPC) and Mesa Verde National Park (MVNP) signed Interagency Agreement 1211-07-006 in August of 2007. The new agreement was for the propagation of approximately 415 PLS lbs of a native erosion seed mix. See UCEPC's Annual Technical Report, Project Number, COPMC-S-0703-CR, for additional information about this agreement.

Agreement 1211-07-006 was amended in June of 2009. The amendment revised species and PLS seed amounts for three materials. A half-acre field of salina wildrye *Leymus salinus,* UCEPC accession 43501, would be increased to one full acre substituting for the Indian ricegrass and needle and thread.

A second amendment to the agreement was signed July 28, 2010. This amendment provided a one year extension with funding for continued production of the following material: Louisianna sage *Artemsia ludoviciana*, muttongrass *Poa fendleriana*, slender wheatgrass *Elymus trachycaulus* and yarrow *Achillea millefolium*. However, the funding for the one year extension was provided by Federal Lands Highway Program dollars (FLHP) with interaction from Cam Hugie. Mr. Hugie proposed that if UCEPC would continue to produce and store the seed for a road project scheduled to begin in 2014, the FLHP would share the production costs with MVNP. All the extra seed could be used to rehabilitate around the new Curatorum, near the entrance or other small on going disturbance work the park does yearly. MVNP declined to share the cost.

ACCOMPLISHMENTS

Five materials were planted for MVNP in the fall of 2007. The table below lists the materials in the original agreement, amendment No. 1 and No. 2. Yields, test results, and PLS amounts are provided.

The substitution field of UCEPC salina wildrye accession 43501 was planted August 11 of 2009, The field established and was maintained through 2010. No further funding was provided for the salina wildrye field.

The four fields outlined for production in the second amendment were at the peak of their production in 2010. UCEPC provided MVNP an estimate for bulk pounds produced by each species. With the exception of the slender wheatgrass, the remaining three materials exceeded the original estimate. The quantities are listed in the table below. Although no funding was provided

for the western wheatgrass, it could be made available via negotiation.

Inter Agency Agreement # 1211-07-006 Mesa Verde National Park										
2007-2009										
Material	**Acre**	****Seed**	**Production Amounts****			**PLS %**	**PLS lbs**	**Test date**	**Total PLS**	**Trgt PLS**
		2007	2008	2009	2010					
AC MI	0.02	Est.	Rplnt	0.84 g		na	na	na	na	**5**
					6 lbs	39.49	2.37	1/20/2011	2.37	**-2.63**
AR LU	0.02	Est.	Rplnt	5 lb		54.29	2.71	1/28/2010		**5**
					7.5 lbs	69.85	5.23	12/20/2010	7.94	**+ 2.94**
PO FE	0.5	Est.	Na	1.71 lb		na	na	na	na	**5**
					23 lbs	83.75	19.26	3/24/2011	19.3	**+14.3**
EL TR	0.5	Est.	618 g's			na	na	na	na	**100**
				118 lb		63.50	74.92	2/24/2010		
					90 lb	75.93	68.33	12/17/2010	143.25	**+43.25**
PA SM	1	Est.	343 g's			na	na	na	na	**200**
				274 lb		69.43	190	3/9/2010		
					70 lb	75.38	52.77	12/27/2010	242.77	**+42.77**
LE SA	1			Est.						**100**
					na	na	na	na	na	**-100**

On August 16, 2010, UCEPC shipped material to Horizon Environmental services, Inc. for the main road entrance rehabilitation project. Table 1 lists specie, year grown, bulk amount produced, and PLS amount shipped. Table 2 lists PLS amounts on inventory at UCEPC from project 1211-07-006.

Table 1

Specie	Lot #	Bulk	PLS Shpd
PASM	2009	212.00 lb	147.00
ELTR	2009	113.00 lb	72.00
ACMI	2009	263.00 g	NA
ARLU	2009	1.14 lb	0.62
POFE	2009	1.71 lb	NA
	2010	5.00 lb	4.19

Table 2

Specie	Yr Grown	PLS Lb Avail	Yr Grown	PLS Lb Avail
PASM	2009	43.0	2010	52.70
ELTR	2009	3.2	2010	68.30
ACMI	2009	0.0	2010	2.40
ARLU	2009	2.1	2010	5.23
POFE	2009	0.0	2010	19.30

UCEPC continues to store 677 lb of previously produced seed for MVNP. As our need for more storage space continues to increase, we are asking that Mesa Verde accommodate their old material or allow UCEPC to dispose of it. One alternative might be to use some of these materials as mulch along the road project.

DISCUSSION

All actions to fulfill the terms of Interagency Agreement 1211-07-006, amendment No. 1 and amendment No. 2, have been completed. There has been no further discussion to continue with seed production for Mesa Verde National Park. Those fields are scheduled to be removed in 2011.

MONTEZUMA CASTLE NATIONAL MONUMENT

FY2010 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
TUCSON, ARIZONA

INTRODUCTION

This project involves the production of approximately 1600 containerized trees and shrubs and the seeding of six acres of pasture at Montezuma Well National Monument. The ultimate goal of the project (IA No.:1211-09-005) is to restore and re-connect two riparian habitats within the park. The project began May 2009 and was completed in February of 2011.

ACCOMPLISHMENTS –In late July 2010, Tucson Plant Materials Center (TPMC) personnel traveled to Montezuma Well National Monument to seed approximately six acres of native grasses within a mesquite bosque and pasture along Beaver Creek. Park Service staff spot sprayed and mowed the former pasture to treat invasive weeds prior to seeding and provided a mix of seed including: Western Wheatgrass (*Pascopyrum smithii*), Sideoats Grama (*Bouteloua curtipendula*), Green Sprangletop (*Leptochloa dubia*), 'Salado' Alkali Sacaton (*Sporobolus airoides*), Sand Dropseed (*Sporobolus cryptandrus*) and 'Grant' Cane Beardgrass (*Bothriochloa barbinodis*). The seed mix was planted at 16 lbs/acre with a Truax FLXII86 grass drill set for a planting depth of approximately ¼ inch.

In February of 2011, TPMC personnel traveled to Montezuma Well National Monument to deliver a second batch of containerized plants. Table 1 provides the list of species grown for the agreement and the number of plants delivered in both 2010 and 2011. For some of the species, seed provided by the park germinated poorly. In order to meet contract numbers, alternative species were grown and/or numbers of other species were increased.

Table 1. Species Grown and Delivered to Montezuma Well National Monument

Shrub Species	**Planned number**	**Feb 2010 Number Delivered**	**Feb 2011 Number Delivered**
Atriplex canescens	295	304	48
Baccharis pteronioides	95	25	3
Mahonia haematocarpa	106	0	6
Encelia frutescens	84	128	16
Ephedra viridis	84	0	0
Lycium pallidum	167	0	195
Purshia mexicana	128	0	1

Rhus trilobata	128	0	1
Ribes aureum	106	0	227
Yucca elata	84	167	32
Celtis reticulata	16	0	160
Chilopsis linearis	184	195	32
Frangula californica	94	0	1
Fraxinus veluntina	25	0	88
Ziziphus obtusifolia	0	0	12
Platanus wrightii	0	0	80
Total Shrub/Trees	***1596***	***819***	***902***

Fig 1: Montezuma Well National Monument Pasture August 2010

Fig 2: Montezuma Well National Monument Pasture September 2010

PIPE SPRING NATIONAL MONUMENT

FY2010 Annual Summary Report
Prepared by

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

INTRODUCTION

On September 12, 2002, an agreement was made with the LLPMC for propagating and harvesting native seed collected from the PSNM for the purpose of revegetation projects.

The following table shows a complete list of the accessions involved in the PISP agreement:

Pipe Spring National Monument Accessions

Common Name	Scientific Name	Plant Symbol	Accession Number
Blue grama	*Bouteloua gracilis*	BOGR	9066558
Bottlebrush squirreltail	*Elymus elymoides*	ELEL5	9066590
Galleta	*Pleuraphis jamesii*	PLJA	9066559
Indian ricegrass	*Achnatherum hymenoides*	ACHY	9066587

ACCOMPLISHMENTS

The following tables describe the seed production fields established at the LLPMC, the amount of seed production, and the amount of pure live seed on inventory for the PSNM:

2010 Established PISP Production Fields at the LLPMC

Common Name	Scientific Name	Agreement Acreage	2010 LLPMC Acreage
Blue grama[1]	*Bouteloua gracilis*	0.00	0.00
Bottlebrush squirreltail	*Elymus elymoides*	0.00	0.00
Galleta	*Pleuraphis jamesii*	0.00	0.00
Indian ricegrass	*Achnatherum hymenoides*	0.50	0.30*

* Only 0.30 acres of Indian ricegrass was established due to the amount of seed originally received from PSNM.

[1] **Note:** The LLPMC has never received any blue grama seed from the PSNM; therefore no seed production field has been established.

2010 Amount of Seed Production for the PISP

Common Name	Scientific Name	Pounds Cleaned
Indian ricegrass	*Achnatherum hymenoides*	69.00

2010 Amount of Pure Live Seed on Inventory for the PISP

Common Name	Scientific name	Accession	Pure Live Seed on Inventory (lbs)	Test Date
Bottlebrush squirreltail	*Elymus elymoides*	9066590	46.26	11/26/07
Galleta	*Pleuraphis jamesii*	9066559	0.41 4.22 2.70	3/05/07 1/14/08 10/28/09
Indian ricegrass	*Achnatherum hymenoides*	9066587	39.76 57.66 37.70 6.02	4/30/08 8/04/09 3/05/10 11/29/10

PISP Indian ricegrass Seed Production Field 2010

ROCKY MOUNTAIN NATIONAL PARK
BEAR LAKE ROAD

FY2010 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION

Upper Colorado Environmental Plant Center (UCEPC), Rocky Mountain National Park (ROMO), and the USDA Natural Resources Conservation Service (NRCS), signed a cooperative plant materials agreement (IA Project No. 1211-08-001) in May 2008. This agreement involves seed production of five forbs and five grass species for revegetation of the Bear Lake Road Project. The Bear Lake Road Project involves widening Bear Lake Road by two feet for ten miles, adding pullouts and retaining walls, widening switchbacks, and expanding some of the parking lots.

ACCOMPLISHMENTS

This year, eight of the eight established materials were harvested for use in the revegetation of the Bear Lake Road Project. Three forbs, hairy goldenaster, purple locoweed, and fringed sage all produced moderate quantities of seed and accounted for 16 pounds of pure live seed. A fourth forb, rose pussytoes, produced just 74 grams. The four grasses produced 226 pounds of pure live seed. Additionally, blue grama which was not contracted this year, produced five pounds of pure live seed.

Again this year, on July 29, 2010, Pat Davey, Terri Blanke, and Steve Parr provided a seed collection training for approximately 25 park service employees. Also attending the training were representatives from Boulder County.

No seed was shipped to ROMO this year.

TECHNOLOGY DEVELOPMENT

Goldenbanner was identified as the most important forb for Bear Lake Road revegetation, but seed production has not been near anticipated amounts. Bee board placement and the import of 10,000 bees to UCEPC in an effort to improve pollination and subsequent germination did not result in increased seed production of golden banner, but may have benefitted other forbs. Both goldenbanner and blue grama from the east side of Rocky Mountain National Park are not well suited for seed production at UCEPC.

Inventory for RMNP Bear Lake Road Project

SPECIES	2006	2007	2008	2009	2010
	PLS lb	PLS lb	PLS lb	PLS lb	PLS lb
Blue grama	NA	7.90	NA	2.57	4.95
Bottlebrush Squirreltail	NA	NA	NA	NA	208.00
Fringed sage	4.75	1.89	5.70	8.50	4.36
Goldenaster	NA	3.3	4.43	5.10	3.50
Goldenbanner	NA	4.79	1.20*	1.80*	NA
Mountain muhly	5.70	4.10	8.24	9.20	7.95
Needle and thread	NA	1.00	0.65	7.64	1.75
Prairie Junegrass	NA	1.50	2.00	1.83	9.00
Purple locoweed	NA	9.00	3.00*	12.40	8.29
Rose pussytoes	NA	NA	NA	NA	0.16*

* Clean seed quantity

Fig 1. Rose pussytoes

ROCKY MOUNTAIN NATIONAL PARK
COLORADO RIVER POWERLINE PROJECT

FY2010 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION

Upper Colorado Environmental Plant Center (UCEPC), Rocky Mountain National Park (ROMO), and the USDA Natural Resources Conservation Service (NRCS), signed a cooperative plant materials agreement (IA Project No. 1211-07-009) in August 2008. The agreement calls for the production of native plant materials indigenous to the west side of ROMO for a restoration project. The project will remove an overhead power line and install the power transmission lines underground.

ACCOMPLISHMENTS

After receiving the collected seed the fall of 2007, fields were established in 2008 and seed was produced in 2009 and 2010.

UCEPC staff produced plugs of the beauty cinquefoil for field establishment after determining that germination could be challenging in a direct seeding in the field, and we had limited seed to work with. But after several attempts, germination efforts were successful and a 0.17-acre field was established utilizing 1600 greenhouse produced plugs on June 26, 2008. The brome seed was treated with a fungicide, Dividend, as a water bath solution to reduce or prevent the transmission of head smut to the produced seed.

On July 1, 2010, a scoping session was conducted on the Grand Ditch restoration project on the west side of ROMO. Park personnel, along with Pat Davey and Steve Parr hiked upstream from the Timber Creek Campground in the park to just below the breech area for the overflow of the Grand Ditch. The site visit, along with planned activities, were discussed, and potential plant materials for increase were identified. However, no additional discussions have occurred since the scoping session.

The table below identifies the production for the past two years.

Species	Planted Acres	Year	Bulk lb	PLS lb
Blue wildrye	0.26	2009	1.6	NA
		2010	10.0	6.59
Nodding brome	1.50	2009	106.0	60.60
		2010	155.0	21.33
Beauty cinquefoil	0.17	2009	1.7	NA
		2010	8.5	5.78

TECHNOLOGY DEVLOPMENT

The treatment of nodding or wooly brome from ROMO with the fungicide, Dividend, has prevented head smut from being a concern in the production of seed. Additionally, beauty cinquefoil can be successfully propagated through standard greenhouse procedures.

Fig 1. Beauty cinquefoil

ROCKY MOUNTAIN NATIONAL PARK
GENERAL EASTSIDE DISTURBANCE

FY2010 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION

Upper Colorado Environmental Plant Center (UCEPC), Rocky Mountain National Park (ROMO), and the USDA Natural Resources Conservation Service (NRCS), signed a cooperative plant materials agreement (IA Project No. 1211-09-003) in July 2009. This agreement extends through 2013. The agreement calls for the production of three native plant materials indigenous to the eastside of ROMO for general restoration projects. The primary focus of plant material selection for this agreement is based on those species that naturally occur on the eastside of ROMO that have attributes that will enable successful competition with cheatgrass.

ACCOMPLISHMENTS

Each planting was established from seed collected from park personnel in 2008. All fields were directly seeded, and have successfully been established. Two of the three fields produced large pls quantities of seed in 2010, while the scratch grass produced a very limited amount.

For the second year in a row, Pat Davey, Terri Blanke, and Steve Parr provided a seed collection training for approximately 25 park service employees. Also attending the training were representatives from Boulder County. The trainings are beneficial to both entities since the folks being trained are the ones who will collect the seed for the increase fields at UCEPC.

SPECIES	DATE	QTY	PROCESS
Bottlebrush			
Field Establishment	8/6/2009	2.0 acres	Planet Jr.
Harvest	2010	320 clean lb	285 pls lb
Canada wildrye			
Field Establishment	8/5/2009	1.5 acres	Planet Jr.
Harvest	2010	300 clean lb	210 pls lb
Scratch grass			
Field Establishment	8/12/2009	0.5 acre	Planet Jr.
Harvest	2010	28 grams	NA

TECHNOLOGY DEVELOPMENTS

No new technology has been produced with this project

Fig 1. Canada Wildrye

Fig 2. Seed Collection Training 2010

SAGUARO NATIONAL PARK

FY2010 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
TUCSON, ARIZONA

INTRODUCTION

This project involves the production of 690 containerized plants to be used for the revegetation of two disturbed areas of Saguaro National Park: Hope Camp and Scenic Drive. The last signature on the agreement was the 17th of May 2009, with the project extending until the 30th of September, 2011. Plant Materials personnel provided expertise on growing methods for multiple species of plants, as well as the maintenance, inputs and space for the growing plants.

ACCOMPLISHMENTS

Plant materials personnel provided assistance to park personnel in the selection and purchase of growing mediums and containers in early July 2009. Park personnel and volunteers arrived at the Plant Materials Center (PMC) in late July to begin work on the propagation of the forb and grass species listed in table 1. In September, park personnel returned to the PMC to propagate the tree and shrub species listed in table 2. In both instances, seed was placed in trays, allowed to germinate, and transplanted into pots when at the appropriate growth stage. Some of the species propagated by park personnel exhibited very low germination rates. Those species included cane beardgrass, creosote bush, odora, paperflower, and Desert globemallow. To compensate for the lower germination rates, park personnel increased the transplanted numbers of some of the other species. Additionally, in mid-August, park personnel propagated two additional species, *Digitaria californica* and *Dyssodia tenuloba,* to ensure enough plants were available for revegetation.

All of the species listed in table one were outplanted by park personnel in January/February of 2010. Approximately half of the species listed in table two were picked up by park personnel in February of 2011 while the others remain in holding at the PMC.

Table 1. Species started in July 2009

Common name	Scientific name	Number propagated
Purple threeawn	*Aristida purpurea*	30
Cane beardgrass	*Bothriochloa barbinodis*	30
Creosote bush	*Larrea tridentata*	80
Menadora	*Menadora scabra*	80
Odora	*Porophyllum gracile*	80
Paperflower	*Psilostrophe cooperi*	80
Desert senna	*Senna covesii*	30
Desert globemallow	*Sphaeralcea ambigua*	80
Totals		**490**

Table 2. Species started in September 2009

Common name	Scientific name	Number
Whitethorn acacia	*Acacia constricta*	30
Catclaw acacia	*Acacia greggii*	40
Fairy duster	*Calliandra eriophylla*	10
Foothills paloverde	*Cercidium microphyllum*	50
Ocotillo	*Fouquieria splendens*	20
Mesquite	*Prosopis velutina*	50
Totals		**200**

Fig 1: Fouquieria splendens, Cercidium microphyllum and others in early April 2010

WUPATKI NATIONAL MONUMENT

FY2010 Annual Summary Report
Prepared by

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

INTRODUCTIONS

On May 16, 2006, an agreement with the LLPMC was made to produce seed for the WAPA. This agreement was terminated in 2009.

ACCOMPLISHMENTS

The following table describes the seed delivered to the WNM from the LLPMC in 2010.

2010 Seed Delivered to the WNM

Common Name	Scientific Name	Pounds Delivered	Accession
Sideoats grama	*Bouteloua curtipendula*	28.30	9062880
Galleta	*Pleuraphis jamesii*	8.80	9066657
Needleandthread	*Hesperostipa comata*	93.40	9066655
Black grama	*Bouteloua eriopoda*	1.50	9066053
Galleta	*Pleuraphis jamesii*	1.00	9062882
Spike dropseed	*Sporobolus contractus*	61.00	9062881
Alkali sacaton	*Sporobolus airoides*	1.50	9062883

YELLOWSTONE NATIONAL PARK

FY2010 Annual Summary Report - Gibbon Falls
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION

In 2008, the Natural Resources Conservation Service (NRCS), Aberdeen, Idaho Plant Materials Center (PMC) entered into an interagency agreement with the National Park Service (NPS), Yellowstone National Park (YNP) to propagate and deliver approximately 35,000 wetland plants in 10 cubic inch conetainers. Delivery will take place over a three year period (targeting approximately 12,000 plants per year) beginning in the fall of 2009. Species to be grown include *Carex aquatilis*, *C. microptera*, *C. rostrata*, *C. utriculata*, *Juncus ensifolius*, and *Deschampsia caespitosa*. Seed for propagation is provided from YNP collections stored at the Bridger, Montana PMC.

ACCOMPLISHMENTS

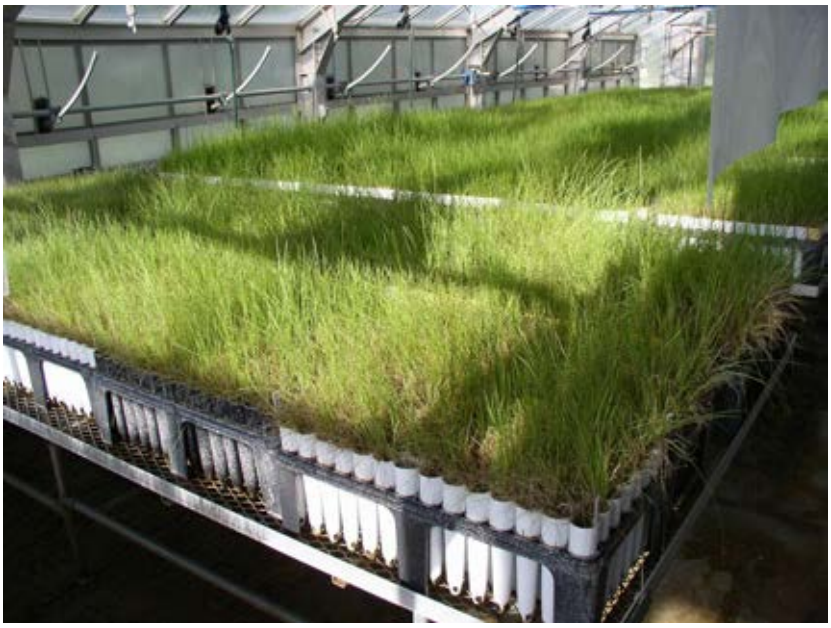
The following table outlines the number of plants requested, greenhouse planting date, survival and number of plants delivered to YNP:

Species	Requested #	# Planted	Planting Date	# Delivered	% Survival
Deschampsia caeaspitosa	3,038	3,430	3/30/10	3,360	98
Calamagrostis canadensis	1,960	2,156	3/30/10	2,054	95
Carex rostrata	2,058	2,744	4/1/10	2,733	99
Carex aquatilis	4,998	5,880	4/14/10	5,880	100
Juncus ensifolious (2009 planting)	2,000	2352	5/26/09	1,274	54
Total	14,054	16,562		15,301	92

TECHNOLOGY DEVELOPMENT

Deschampsia caeaspitosa, Calamgrostis canadensis, and Carex aquatilis were direct seeded into conetainers with no pre-treatment of the seed. The *Juncus* and *Carex rostrata* seed was stratified in a "sphagnum moss tea" at 5º C for 14 days and 40 days respectively prior to planting. All seed was surface planted, and pressed into soil surface to maximize seed-to-soil contact. Irrigation was by overhead spray with water applied 2 minutes every hour from 9 am to 6 pm daily. Supplemental lighting was provided from 8 pm to 8 am each day until May 18. Plants were fertilized with liquid Miracle Grow® once weekly from May 6 – June 24. Greenhouse temperature were kept at 90 -100º F. The plants were delivered to planting site at YNP on July 22. A new planting of *Juncus ensifolious* (3,038 conetainers) was started in greenhouse wetland tanks on August 23 for delivery in 2011.

DIGITAL PHOTOS



Calamgrostis canadensis for Yellowstone National Park.
July 19, 2010

Wetland planting along Gibbon River, Yellowstone National Park
September 15, 2010.

YELLOWSTONE NATIONAL PARK

FY2010 Annual Summary Report - Gardiner Basin Fields
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION

In 2008, the Natural Resources Conservation Service (NRCS), Plant Materials Center (PMC), Aberdeen, Idaho entered into an interagency agreement with the National Park Service (NPS), Yellowstone National Park (YNP) to produce seed of Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and needleandthread (*Hesperostipa comata* ssp. *comata*) for use on restoration sites at YNP. Seed will be harvested from these fields in 2010 and 2011 with possible extension to 2012.

ACCOMPLISHMENTS

The seed fields were planted in spring 2009. Sandberg bluegrass was planted in field 2E at the PMC Home Farm and the bluebunch wheatgrass and needleandthread were planted in field 410E at the University of Idaho Brewington Farm. Each seed increase block is approximately 1 acre. Soils at the PMC Home Farm are Declo silt loam with pH of 7.4 to 8.4. Soils at the Brewington Farm are also classified as Declo loam but these soils have a high percentage of sand. Average annual precipitation is 9.39 inches and seed fields are sprinkler irrigated to supplement natural precipitation to approximate 18 to 20 inches total annual precipitation. Establishment of the seed production fields were rated fair to good.

In early to mid-April, 2010 broadleaf weeds started emerging in the needleandthread and bluebunch wheatgrass fields. These fields were sprayed on April 19 with 2, 4-D at a rate of 32 oz./ac (standard rate used on all fields). The weather cooled to below normal temperatures in the latter half of April so no irrigation water was applied. The weather finally warmed to normal temperatures in early May and irrigation was started on the fields May 13. On May 27 signs of chemical damage were observed in the fields. The University of Idaho Extension Weed Specialist was asked to evaluate the fields and determine cause of the chemical damage. Her conclusions were that there might have been several factors that occurred separately or in combination. 1) We might have used a bad batch of spray tank cleaner the previous fall that did not neutralize the herbicides used the previous fall. 2) The cool, dry weather following herbicide application may have caused the herbicide to sit on the plants without the plants metabolizing the herbicide. When irrigation started and temperatures warmed up, the plants took up the herbicide more rapidly than usual

As a result of the herbicide damage, no seed harvest was made from the bluebunch wheatgrass. A bale of needleandthread hay containing seed and weighing 195 pounds was harvested and delivered to YNP in September, 2010. The Sandberg bluegrass (which was not sprayed in April)

produced 58.76 PLS pounds of seed. The bluebunch wheatgrass and needleandthread fields recovered from the herbicide damage by late summer and should produce seed in 2011.

DIGITAL PHOTOS

Fig 1. Bluebunch wheatgrass recovering from herbicide damage. July 22, 2010.

Fig 2. Needleandthread recovering from herbicide damage. July 22, 2010.

YELLOWSTONE NATIONAL PARK

2010 Annual Report Summary FLHP Projects

Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
BRIDGER, MONTANA

INTRODUCTIOIN

The agreements facilitate the collection, increase, and reestablishment of indigenous plant materials for restoration of disturbances resulting from road construction and other improvement projects within Park boundaries. The Bridger PMC (BPMC) has maintained cooperative agreements with Yellowstone National Park (YNP) since FY 1986.

In 2010, 10 allocations of 94 seed lots were distributed to YNP, YNP-contracted growers, and the BPMC. The BPMC-distribution included seven grass lots (six species) and one tree species for planting seed increase fields and container production.

ACCOMPLISHMENTS

Yellowstone National Park can forecast future road construction projects with enough lead time to allow seed and/or plant collection and production efforts to begin 3 years in advance of each project.

Wildland seed collections are made by YNP and BPMC crews, dried, and either delivered to the BPMC or picked up by BPMC personnel. In 2010, 42 pounds of 32 collections were made from 22 grasses of 13 species totaling 41 pounds and 10 forbs of seven species totaling 1.2 pounds.

YNP records number of person-hours required to collect each seed lot, from which the approximate cost of collecting native seed can be estimated. In 2010, YNP and BPMC personnel spent more than 115 person-hours seed collecting on eight different sites. There were 94 hours (approximately 4.3 hours per collection) dedicated to collecting grass seed on seven sites and 21 hours (approximately 2.1 hours per collection) for forbs on five sites.

There were seven grass increase blocks planted at the PMC on 1.65 acres in 2010. Seed increase blocks of two grasses on 0.65 acre were removed due to natural decline in production. Currently there are 3.47 acres planted with 15 accessions of 10 grass species in seed increase blocks at the BPMC.

During the past growing season, six grass species were harvested on 1.5 acres. The total amount of seed produced was nearly 99 pounds, with the best grass stand yielding 345 lb/acre. Nearly all of the current year's production was processed and distributed to the Park for fall planting.

The wildland collection and seed increase inventory contains seed dated from 2001 to 2010. The 2005 seed lots of slender wheatgrass and the 2003 seed lots of mountain brome were returned to YNP in 2010. Additionally, all seed lots from 2000 were distributed back to the Park. There are approximately 1,500 lodgepole pine seedlings in the vegetative inventory.

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.

YELLOWSTONE NATIONAL PARK

FY2010 ANNUAL SUMMARY REPORT- Gardiner Basin
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
BRIDGER, MONTANA

INTRODUCTION

Effective in fiscal year 2009, a new YNP agreement was developed to address issues associated with enhancing critical wildlife habitat along the northern boundary in the Gardiner Basin. The 3-year project facilitates seed production of two native grasses at the BPMC, along with establishment of restoration test plots on a small portion of the land formerly used for agricultural production and acquired by YNP in the 1930s. The plots will be evaluated on the effectiveness of various weed control methods, seeding techniques, and plant performance.

ACCOMPLISHMENTS

The BPMC assisted YNP with seed collection efforts at the Carbella Site. YNP personnel spent more than 62 hours hand-collecting 10 pounds of seed of four grasses on the site. There are 10 lots of five grasses with more than 41 pounds of wildland seed collections from the Carbella site on inventory at the BPMC.

There are three seed increase blocks of two grass species totaling approximately 1 acre at the BPMC. Seed was harvested from two blocks in 2010, including one field in the first year of establishment. The total amount of seed produced was 11 pounds. Forty-four, small, square bales of needle and thread grass aftermath were delivered to YNP.

Seed increase of YNP bluebunch wheatgrass at the Bridger PMC.

TECHNOLOGY DEVELOPMENT

May 13, the BPMC attended a seminar and on-site review by Dr. Hamilton on the results of soil sampling for microbes in different plant communities in the Park. The BPMC provided Dr. Hamilton with seed of several native species for laboratory testing and examination of plant interactions with soil microbes indigenous to YNP. His field studies will generate data on microbial community dynamics related to exotic and native plants and nitrogen cycling in the soil. The data will be analyzed and used to enhance the success rate of native revegetation efforts in YNP.

The first test plot located near the Park's Northern Boundary continues to be maintained in cereal grains in order to stabilize the site. Park-approved herbicides have been applied to eliminate non-native vegetation. The fenced site will be monitored until the revegetation study plots are established in the fall of 2011.

YELLOWSTONE NATIONAL PARK

FY2010 Annual Summary Report
Prepared by

UPPER COLORADO ENVIRONMENTAL PLANT CENTER
MEEKER, COLORADO

INTRODUCTION

This report is in reference to sub agreement IA No: 1211-10-002/ Requisition No. R1580100283. An interagency agreement was entered into by Yellowstone National Park and the Natural Resources Conservation Service (NRCS). The agreement calls for Upper Colorado Environmental Plant Center (UCEPC) to produce seed for a single grass species, bluebunch wheatgrass. UCEPC is to plant a one acre field and produce approximately 240 pounds pure live seed (PLS) for Yellowstone National Park. This agreement will remain in effect until September 30, 2014.

ACCOMPLISHMENTS

The seed was received from Bridger Plant Materials Center on July 23, 2010. The lot number assigned to the material was SWC-08-YNP-148. It had been previously tested in September of 2008 and had 97% viability, it was noted that the lot contained cheatgrass seed.

August 18, 2010, the acre field of Yellowstone bluebunch wheatgrass was planted in field 3 at UCEPC. Two Planet Juniors were used to plant the field. The field was watered several times to help ensure germination and to get seedling establishment before fall. It was observed that the field established well before cold temperatures occurred in late September.

TECHNOLOGY DEVELOPMENT

Standard planting, cultural practices, harvest, and cleaning protocols will be utilized to handle the bluebunch wheatgrass.

Fig 1. Summer employees and Johnnie Barton using Planet Juniors to plant the bluebunch field.

ZION NATIONAL PARK

FY2010 Annual Summary Report
Prepared by Margaret Smither-Kopperl

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
LOCKEFORD, CALIFORNIA

INTRODUCTION

A trial was conducted to determine the feasibility of growing squirreltail (*Elymus elymoides*) from Zion National Park for seed production at the Lockeford Plant Material Center. There is a consistent need for seed of squirreltail at the Park and although the environment at Lockeford is far different it was considered worthwhile to test the production. The planting was established in October 2009, with seed collected at Zion NP and cleaned at the NMPMC.

ACCOMPLISHMENTS –

On October 30, 2009, an area of 0.1 acre was planted with ELEL seed at a rate of 3.5 lbs PLS/acre. Planting was accomplished with a Truax range drill; seed was mixed with rice hulls for planting (0.45 lb bulk seed/0.71 lb rice hulls). Seedling emergence was monitored with limited plant growth over the winter (Figure 1). Plant growth was good during the spring and early summer (Figures 2 and 3). There were rust symptoms noted on the seed heads prior to harvest in June 2010. Rusts are common on native grasses in California.

Harvest was accomplished using a sickle bar mower, and seed heads were placed in bins. Cleaning was accomplished by hand screening and passing the material through the brush machine. A total of 9 lbs of seed was harvested to be dispatched to Zion. The planting was removed in the autumn of 2010.

Fig 1. Emergence of squirreltail during the winter (Jan 2010).

Fig 2. Squirreltail planting prior to harvest.

Fig 3. Seed heads of squirreltail.

ZION NATIONAL PARK

FY2010 Annual Summary Report
Prepared by

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

On September 12, 2002, an agreement with the Los Lunas Plant Materials Center (LLPMC) was made for the collection of native seed from the ZNP, the propagation of those seeds at the LLPMC, and the increase of native grass species.

The agreement states that ZNP will use the plant materials produced by the LLPMC to revegetate disturbed areas at the park. The seed will be collected by the park staff and sent to the LLPMC for conditioning; it then will be used to establish seed production fields to satisfy the agreement.

The following table shows a complete list of the accessions involved in the ZNP agreement:

Zion National Park Accessions

Common Name	Scientific Name	Plant Symbol	Accession Number
Blue grama	*Bouteloua gracilis*	BOGR	9066530
Bottlebrush squirreltail	*Elymus elymoides*	ELEL5	9066532
Cane bluestem	Bothriochloa barbinodis	BOBA	9066543
Galleta	*Pleuraphis jamesii*	PLJA	9066586
Indian ricegrass	*Achnatherum hymenoides*	ACHY	9066528
Muttongrass	*Poa fendleriana*	POFE	9066531
Sand bluestem	*Andropogon hallii*	ANHA	9066529

2010 ACCOMPLISHMENTS

The LLPMC established a 1.00 acre bottlebrush squirreltail seed production field in 2010. The seed field was established using transplants grown by the LLPMC and planted into Field 19. This new field increases the total bottlebrush squirreltail production acreage to 1.84.

See the following tables for the seed production fields established at the LLPMC, the amount of seed delivered to the ZNP, the amount of seed production, the amount of pure live seed on inventory for the ZNP:

Table 3-2: 2010 Established Production Fields at the LLPMC

Common Name	Scientific Name	Agreement Acreage	2010 LLPMC Acreage
Bottlebrush squirreltail	*Elymus elymoides*	1.50	1.84
Indian ricegrass	*Achnatherum hymenoides*	0.50	0.42*

Table 3-2: 2010 Established Production Fields at the LLPMC

Common Name	Scientific Name	Agreement Acreage	2010 LLPMC Acreage
Sand bluestem	*Andropogon hallii*	0.50	0.00*

* Only 0.42 acres of Indian ricegrass was established due to the amount of seed originally received from ZNP.

* The sand bluestem field was removed prior to 2010 as per agreement with ZNP.

2010 Amount of Seed Delivered to the ZNP

Common Name	Scientific Name	Pounds Delivered
Bottlebrush squirreltail	*Elymus elymoides*	21.80

2010 Amount of Seed Production for the ZNP

Common name	Scientific name	Pounds cleaned
Bottlebrush squirreltail	*Elymus elymoides*	63.42
Indian ricegrass	*Achnatherum hymenoides*	100.68

Amount of Pure Live Seed on Inventory for ZNP

Common Name	Scientific name	Accession	Pure Live Seed on Inventory (lbs)	Test date
Bottlebrush squirreltail	*Elymus elymoides*	9066532	4.32 38.11 0.47 14.35	8/29/09 9/23/10 8/27/07 8/12/05
Cane bluestem	*Bothriochloa barbinodis*	9066543	1.40 Bulk 1.36 2.19 1.58 0.20 Bulk	No test* 1/21/05 1/17/06 3/09/07 No test*
Galleta	*Pleuraphis jamesii*	9066586	1.51 0.58 Bulk 0.46 Bulk	1/08/07 No test* No test*
Indian ricegrass	*Achnatherum hymenoides*	9066528	25.48 44.13 76.59 33.06 22.74	10/16/06 4/28/08 10/31/08 11/11/09 12/14/10
Muttongrass	*Poa fendleriana*	9066531	4.55 0.70 1.84 Bulk	5/30/08 11/20/08 No test*

Amount of Pure Live Seed on Inventory for ZNP

Common Name	Scientific name	Accession	Pure Live Seed on Inventory (lbs)	Test date
Sand bluestem	*Andropogon halii*	9066529	2.73 Bulk	No test*
			2.80	3/20/06
			8.89	3/21/07
			3.26	6/14/10
			9.84	7/07/10
			24.80	4/19/10

* Seed was not sent for testing due to an insufficient amount of seed or seed was from the collections made at the ZNP.

ZNP Bottlebrush squirreltail Seed Production Field

ZNP Indian ricegrass Seed Production Field 2010

ZION NATIONAL PARK

FY2010 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
TUCSON, ARIZONA

INTRODUCTION

This project involves the production of 900 PLS lbs of *Sporobolus cryptandrus* to be used for revegetation of disturbed areas in Zion National Park. The last signature on the agreement was the 8th of January 2007, with the project originally extending until the 30th of September 2009. In August of 2009, a modification was completed which extended the agreement until December 31, 2011. A sub agreement was signed in August 2010 to produce an additional 130 PLS of *Sporobolus cryptandrus*, increasing the total amount of seed to be produced for this project to 1030 PLS lbs. The sub agreement ends December 2011 to coincide with the project extension.

ACCOMPLISHMENTS

In October of 2007, 1.68 acres of land was planted to *Sporobolus cryptandrus* at the center. The acreage was increased to a total of 5.25 in March of 2009. For the increase, approximately 16,000 *Sporobolus cryptandrus* plants were grown in our greenhouse from the seed originally sent to the center in November 2006. Harvest totals for 2008-2010, along with their germination and purity results, are presented in the table below. In August of 2009, 170 pounds of bulk seed (154 PLS pounds) was sent via Fed Ex ground to Great Basin Seed, Ephraim, Utah, as requested by park personnel.

***Sporobolus cryptandrus* harvest totals for years 2008-2010:**

	Harvest Year				
	2008	**2009**		**2010**	
Bulk lbs.	34.69	265.62	208.48	296.36	342.10
Cleaned lbs.	16	154.00	153.78	249.02	257.20
Germination %	94	91	80	66	64
Purity %	99.21	99.77	99.32	99.88	99.96
Test date	5/17/2010	8/14/2009	3/18/2011	3/18/2011	3/18/2011
PLS %	93.26	90.79	79.46	85.9	77.97
PLS lbs.	*14.92	*139.82	122.19	213.91	200.54

* These totals have been shipped to Zion and are no longer maintained at the Tucson Plant Materials Center

TECHNOLOGY DEVELOPMENT – Center personnel continue to use a Massy Ferguson MXP plot combine for harvesting *Sporobolus cryptandrus*. Personnel have experimented with various fan settings on the combine to maximize seed collected and minimize the collection of extraneous materials. Fan settings used during the 2010 harvesting will be verified during 2011 harvests.

Fig 1: Center personnel cleaning out the Massy Ferguson combine after harvest.

Fig 2: A view of the back of combine showing harvested material.

Fig 3: A close up of harvested seed prior to cleaning.

APOSTLE ISLANDS NATIONAL LAKESHORE

FY2010 Annual Summary Report
Prepared by

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

INTRODUCTION - The Apostle Islands National Lakeshore (National Park Service) entered into an interagency agreement with the Natural Resources Conservation Service to propagate plants of beachgrass (*Ammophila breviligulata*), bearberry (*Arctostaphylos uva-ursi*), crinkled hairgrass (*Deschampsia flexuosa),* Canada mayflower (*Maianthemum canadense*), blueberry (*Vaccinium angustifolium* or *myrtilloides*), wild rose (*Rosa blanda*), juniper (J*uniperus communis*), huckleberry (*Gaylussacia baccata*), blue-bead lily (*Clintonia borealis*) and Bunchberry dogwood (*Cornus canadensis*). During the summer and autumn of 2009 Park Service staff collected seeds and/or vegetative materials from each of the species and sent them to the Rose Lake Plant Materials Center. The PMC developed propagation protocols, propagated each species and delivered those plants to the Park Service as agreed upon in the Interagency Agreement.

ACCOMPLISHMENTS -
The following plants were propagated at the Rose Lake PMC and delivered to the Apostle Islands National Lakeshore in 2010:

Species	Number of Plants Delivered
Beachgrass	1230
Bearberry	96
Crinkled Hairgrass	3680
Bunchberry	10
Pennsylvania sedge (*Carex pensylvanica*)*	365

*Pennsylvania sedge was propagated in 2009 but was not large enough to deliver to Apostle Islands in 2009. Those plants were delivered in 2010.

TECHNOLOGY DEVELOPMENT – Several germination protocols were tested on the some of the species propagated for Apostle Islands in 2010. The following table is a summary of those efforts. Species that had no germination observed in any of the treatments tested are not reported.

Evaluation of germination protocol for seed of Apostle Island native plants. 2009-10.

Bearberry (*Arctostaphylos uva-ursi* (L.) Spreng.)	Scarification	Stratification	Seedling Emergence (%)
	H_2SO_4 soak for 3 hr	90 day warm (30°C) followed by 120 day cold (4°C)	results pending completion of study
	H_2SO_4 soak for 3.5 hr	90 day warm (30°C) followed by 120 day cold (4°C)	results pending completion of study
	H_2SO_4 soak for 4 hr	90 day warm (30°C) followed by 120 day cold (4°C)	results pending completion of study
	H_2SO_4 soak for 7 hr	90 day warm (30°C) followed by 120 day cold (4°C)	results pending completion of study

Canada mayflower (*Maianthemum canadense* Desf.)	Scarification	Stratification	Germination (%)	
			Acc'n 9086886	Acc'n 9086895
	None	30 day cold (4°C)	1	0
	None	60 day cold (4°C)	2	54
	None	90 day cold (4°C)	29	0

Juniper (*Juniperus communis* L.)	Scarification	Stratification	Seedling Emergence (%)
	None	60 days warm (30°C) followed by 60 days cold (4°C) followed by 60 days warm (30°C) followed by 60 days cold (4°C)	results pending completion of study
	H_2SO_4 soak for 30 min	60 days warm (30°C) followed by 60 days cold (4°C) followed by 60 days warm (30°C) followed by 60 days cold (4°C)	results pending completion of study
	H_2SO_4 soak for 30 min	60 days cold (4°C) followed by 60 days warm (30°C) followed by 60 days 60 days cold (4°C)	results pending completion of study

Evaluation of germination protocol for seed of Apostle Island native plants. 2009-10. (Continued)

Bunchberry dogwood (*Cornus canadensis* L.)	Scarification	Stratification	Germination (%)
	H_2SO_4 soak for 1 hr	90 days warm (30°C) followed by 90 day cold (4°C)	44
	None	45 days warm (30°C) followed by 140 day cold (4°C)	56
	None	60 days warm (30°C) followed by 150 day cold (4°C)	0

BADLANDS NATIONAL PARK

FY2010 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
BISMARCK, NORTH DAKOTA

INTRODUCTION

The National Park Service (NPS) has a need to preserve the native plant resources and revegetate disturbed park lands. The NPS requires that restoration of native plants will be accomplished using germplasm from populations as closely related genetically and ecologically as possible to the park populations. Quantities of native seed are needed to revegetate areas disturbed by construction activities for the proposed road rehabilitation project. The NPS has requested assistance from the Bismarck Plant Materials Center (PMC). The PMC has agreed to increase seed of five selected grass species collected at Badlands National Park. Technical assistance for planting, growing and cleaning of seed will also be provided to the park. The original interagency agreement was signed in May 2007, and expired in 2010. The agreement has been extended for one additional year (2011).

Targeted Species and Goaled Seed Amounts

Species	Common name	PLS pounds
Nassella viridula	green needlegrass	100
Pascopyrum smithii	western wheatgrass	200
Elymus trachycaulus	slender wheatgrass	100
Bouteloua gracilis	blue grama	10
Sporobolus cryptandrus	sand dropseed	5

ACCOMPLISHMENTS

Five seed production fields were managed and maintained using herbicides and hand roguing for weed control. All fields produced seed and were straight combined. Seed was cleaned at the PMC and tested for purity and germination by the North Dakota State Seed Department. This was the second year of significant seed harvest from these fields. Seed distribution to the Badlands National Park in 2010 was 331.72 PLS pounds.

Seed Production and Distribution

Accession Number	Species	Date Planted	Field Size (ac)	Seed Production (PLS lbs) 2008	2009	2010	2010 Seed Harvest Date	Seed Distribution to Park in 2010 (PLS lbs)	Remaining Inventory as of 1/1/2011 (PLS lbs)
9092167	Green needlegrass	11/30/07	0.41	No harvest	63.2	264.0	07/01/10	22.02	305.21
9092165	Western wheatgrass	05/06/08	1.50	No harvest	307.0	202.7	08/05/10	229.11	280.60
9092166	Slender wheatgrass	05/06/08	0.95	5 lbs uncleaned (mixed and cleaned with 2010 harvest)	362.0	333.1	07/16/10	77.48	617.64
9092168	Blue grama	06/10/08	0.04	No harvest	7.6	1.3	09/22/10	2.73	6.15
9092169	Sand dropseed	05/22/08	0.03	mixed with 2009 harvest	7.8	6.0	07/28/10	0.38	13.39

TECHNOLOGY DEVELOPMENT –Seed was cleaned and tested for purity and germination. All seed cleaning procedures and seed tests have been documented and are available from the Bismarck Plant Materials Center.

Fig 2: Western wheatgrass seed production

THEODORE ROOSEVELT NATIONAL PARK

FY2010 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
BISMARCK, NORTH DAKOTA

INTRODUCTION

The Bismarck Plant Materials Center (PMC) entered into a cooperative agreement in May 2007 to provide seed and technical information for revegetating areas disturbed by construction activities in the North Unit Scenic Route 10 of the Theodore Roosevelt National Park in western North Dakota. The agreement is between the National Park Service, Theodore Roosevelt National Park of the U.S. Department of Interior, and the USDA Natural Resources Conservation Service. The original agreement was in effect from FY 2007 through FY 2010. A new agreement has been signed and is in effect for FY2011 and FY2012. The Bismarck PMC has agreed to produce native grass seed of six species collected in the park by park personnel and PMC staff. The seed produced will be distributed to the Park for their revegetation work.

Targeted Species and Goaled Seed Amounts

Species	Common name	PLS pounds
Nassella viridula	green needlegrass	100
Pascopyrum smithii	western wheatgrass	200
Elymus trachycaulus	slender wheatgrass	100
Bouteloua curtipendula	sideoats grama	100
Bouteloua gracilis	blue grama	10
Koeleria macrantha	prairie junegrass	5

ACCOMPLISHMENTS

Six seed production fields were managed and maintained using herbicides and hand roguing for weed control. All fields produced seed and were harvested by straight combining. This was the second year of significant seed harvest from these fields. Seed was cleaned at the PMC and tested for purity and germination by the North Dakota State Seed Department. Seed distribution to Theodore Roosevelt National Park in 2010 was 95.77 PLS pounds.

Seed Production and Distribution

Accession Number	Species	Date Planted	Field Size (ac)	Seed Production (PLS lbs) 2008	2009	2010	2010 Seed Harvest Date	Seed Distribution to Park in 2010 (PLS lbs)	Remaining Inventory as of 1/1/2011 (PLS lbs)
9092171	Green needlegrass	11/30/07	0.49	No harvest	55.70	200.56	07/01/11	22.25	234.01
9092172	Western wheatgrass	05/01/08	0.57	No harvest	33.80	105.27	08/04/11	28.58	110.49
9092175	Slender wheatgrass	05/01/08	0.50	No harvest	208.30	306.90	07/26/11	22.95	492.25
9092173	Blue grama	06/10/08	0.02	1.5 pounds clean seed was bulked and tested with the 2009 harvest	6.40	1.98	08/24/11	1.20	7.18
9092174	Sideoats grama	06/10/08	0.03	3 pounds clean seed was bulked and tested with the 2009 harvest	23.90	7.20	08/24/11	19.39	11.71
9092176	Prairie junegrass*	05/22/08	0.03	No harvest	2.00	3.36	07/13/11	1.40	3.96

* 700 greenhouse plants planted

TECHNOLOGY DEVELOPMENT

Combine settings, seed cleaning procedures and seed tests have been documented and are available from the Bismarck Plant Materials Center.

Fig 1. Small fields of prairie junegrass, blue grama, and sideoats grama produced a fair seed harvest in 2010

GOLDEN GATE NATIONAL PARK

FY2010 Annual Summary Report
Prepared by Amy Bartow

NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON

Figure 1. California oatgrass (*Danthonia californica*) seed increase field at the Corvallis PMC, June 1, 2010.

INTRODUCTION

In 2009, The Corvallis Plant Materials Center (PMC) entered into a new agreement with Golden Gate National Park to provide native plant materials for ecological restoration following road construction in the Marin Headlands. The PMC has agreed to produce 250 lbs of two grasses, California oatgrass (*Danthonia californica*) and Foothills needlegrass (*Nassella lepida*).

ACCOMPLISHMENTS

Activities in 2010 included containerized production of 30,600 grass plugs, establishment and maintenance of two grass seed increase fields, as well as harvest of one seed increase field. The Foothills needlegrass flowered and set seed during its first growing season. It produced 3.3 lbs of seed in 2010. The oatgrass field is the best looking one of this species the PMC staff have ever seen. It should produce an impressive amount of seed in 2011.

TECHNOLOGY DEVELOPMENT

Foothills needlegrass (*Nassella lepida*) is a new species to the PMC staff. Best harvest methods were unknown and PMC staff didn't decide what method to use until the plants were flowering. The plants in the field flowered and set seed at highly variable times, so it was harvested multiple times. It was harvested by hand in late May, a flail-vac seed stripper in late June, and then with the seed stripper again in late July. The seed stripper worked fairly well. It didn't pull off all the seed that was mature and pulled some of the seed that was still very green. It could be used multiple times, so that made up for the inconsistencies.

Three pounds of needlegrass seed remain in the seed storage facilities.

LASSEN VOLCANIC NATIONAL PARK

FY2010 Annual Summary Report
Prepared by Amy Bartow

NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON

Figure 1**.** One of the PMC's shadehouses full of plants for Lassen National Park, August 20, 2010.

INTRODUCTION

The Corvallis Plant Materials Center (PMC) entered into a new agreement with Lassen Volcanic National Park in 2009 to provide additional native plant materials for planting around the new Visitors' Center and restoring historically disturbed lands in the park. It was agreed that the PMC would produce a minimum of 16,875 container plants including: 1,000 grass plugs, 3,700 sedge and rush plugs, 4,100 trees, and 7,575 shrubs. Three small deliveries of plants will occur in 2009, 2010 and 2011 to spread out the labor of planting nearly 17,000 containers. The optimal transplanting conditions at the Park exist in late September and early October. With this limited time to transplant, staggering the deliveries over three years will make the project more manageable. Activities in 2010 included the collection and vegetative propagation of one shrub species and production (by seed) of two tree, one shrub, one legume, 12 forb, and two sedge species.

ACCOMPLISHMENTS

The PMC has produced and delivered three quarters of the plants required for this three year project. Over 9,000 plants were produced and delivered to the park this year.
On September 20, 2010, PMC staff traveled to the park to deliver the plants. The pines were delivered to the Manzanita Lake area and all the other species were unloaded at the planting site at the Visitors' Center.

Table 1. Plants Delivered to Lassen Volcanic National Park, September 20, 2010, for the Visitors' Center agreement.

Species	# of plants	size
Abies magnifica	347	D40
Arctostaphylos patula	360	D40
Pinus jefferyi	1,480	D40
Aster alpigenus	849	D40
Aster alpigenus	263	cones
Balsamorhiza sagittata	67	cones
Silene sp	84	cones
Carex nigricans	294	cones
Carex straminformus	199	cones
Castilleja sp	7	cones
Anaphalis margaritacea	548	cones
Senecio aronicanoides	532	cones
Lupinus obtusilobus	287	cones
Hieracleam albiflorium	35	cones
Penstemon cinicola	56	cones
Hackelia sp	5	cones
Penstenmon gracilentus	77	cones
Wyethia mollis	3,570	loose tubers
Erigeron sp	93	cones
	9,153	

TECHNOLOGY DEVELOPMENTS

Mule's ears and balsamroot are tap rooted plants that go dormant in the late summer months. From previous work done at the PMC, the staff has seen that these species are usually dormant during the preferred transplanting period for this project. The PMC staff wanted to try growing these species in deep propagation flats during the spring and summer then remove the dormant tubers from the flats before shipping and only send the plants without all the cone-tainers and media (this saves space and shipping costs). Seeds of these species were sown on January 15 into 5" X 14" X 14" propagation flats filled with moistened media (Sunshine #4, a special peat-based soil-less mix amended with a balanced slow-release fertilizer and micronutrients) and covered with a thick layer of vermiculite. The flats were placed in plastic bags and left in a walk-in cooler

for 90 days. After 90 days the seedlings were germinating and the trays were unwrapped and placed in a heated greenhouse. Flats remained in the greenhouse until late June and then were moved to an outdoor shadehouse. The plants grew well in the summer but surprisingly never went dormant. As delivery time neared, the plants were watered less in hopes of forcing them to go dormant. Some plants went dormant, but many still had green leaves when they were dumped out of the flats and packed in moist vermiculite for shipment to the Park. This method of propagation and shipping was very easy for the PMC staff, but it created an urgency to plant them as soon as possible once they were delivered to the park and they required special handling (refrigeration).

Figure 2. Wooly mule's ears (*Wyethia mollis*) growing in deep flats in the PMC shadehouse, August 20, 2010.

MOUNT RAINIER NATIONAL PARK

FY 2010 Annual Summary Report – Stevens Canyon
Prepared by Amy Bartow

NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON

Steven's Canyon Road Revegetation Project

Fig 1. Blue wildrye (*Elymus glaucus*) seed increase field at the Corvallis Plant Materials Center.

INTRODUCTION

The Corvallis Plant Materials Center (PMC) entered into a new agreement with the National Park Service (NPS) in 2007 to provide native plant materials for ecological restoration along Steven's Canyon Road following road construction. It was agreed that the PMC would establish and maintain seed increase fields of three grasses (five accessions). The PMC will deliver 195 lbs pure live seed (PLS) of upper elevation grasses and 135 lbs (PLS) of lower elevation grasses. The road construction project was expected to be complete in 2009, but now has been delayed until 2011. Seed will be held at the PMC until it is requested by the Park. All seed production goals were exceeded for this contract in 2009 except for the high elevation blue wildrye. This field was maintained and harvested again in 2010.

ACCOMPLISHMENTS

All conditions of the contract were exceeded in 2009 except for the high elevation blue wildrye. This field will be continued in 2010 to meet contract goals.

Table1. Seed in storage for Steven's Canyon Road Revegetation Project at Corvallis Plant Materials Center in 2010.

No materials were delivered in 2009. Seed that was produced in 2008, 2009, and 2010 will be kept in the seed storage facilities at the PMC.

Table 5. Seed currently in storage as of December 30, 2010 for the Steven's Canyon Rd revegetation project at the PMC.

Species	Code	Seed lot	Bulk Amount in Storage	PLS Wt	Purity	Germ
Lower Elevation						
Elymus glaucus	ELGL	SG1-08-MR520	30 lbs		98.68	68
	ELGL	SG1-09-MR520	129 lbs		99.02	87
Festuca rubra	FERU	SG1-08-MR521	6 lbs			
	FERU	SG1-09-MR521	186 lbs			
Upper Elevation						
Elymus glaucus	ELGL	SG1-09-MR518	44 lbs		98.92	94
Elymus glaucus	ELGL	SG1-10-MR518	30 lbs		99.55	97
Festuca rubra	FERU	SG1-09-MR519	134 lbs		99.12	90
Bromus carinatus	BRCA5	SG2-09-MR531	142 lbs			

TECHNOLOGY DEVELOPMENTS

The high elevation blue wildrye field is located at another research farm that is about five miles from the PMC's main farm. Moving equipment between the farms can be complicated and time consuming, so this year the blue wildrye was harvested using the "moon rover". It is a self-propelled swather with a conveyor belt to move cut material off the field to be stuffed into large collection bags. It is a small machine that can be loaded onto a trailer and driven over to the other farm. This is much easier than trying to drive a swather and a combine across town. Harvesting with the moon rover means that all the collected material has to be laid on tarps in a shed to dry. Once dry, the material was pitch-forked into a stationary combine.

MOUNT RAINIER NATIONAL PARK

FY 2010 Annual Summary Report – Nisqually Entrance
Prepared by Amy Bartow

NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON

Figure 1. Blue wildrye (*Elymus glaucus*) increase field for the Nisqually Entrance Revegetation Project with Corvallis Plant Materials Center, May 5, 2010.

INTRODUCTION

The Corvallis Plant Materials Center (PMC) entered into a new agreement with Mount Rainier National Park in 2008 to provide native plant materials for the ecological restoration of the Nisqually Entrance Road construction area. It was agreed that the PMC would produce a minimum of 120 lbs pure live seed (PLS) of *Elymus glaucus*, 200 lbs (PLS) of *Bromus carinatus*, and 35 lbs (PLS) of *Festuca rubra*. The project was completed in 2010.

ACCOMPLISHMENTS

Activities in 2010 included maintenance and harvest of three seed increase fields.

All three seed increase fields were very vigorous and flowered profusely. These fields were some of the most productive and weed-free fields on the PMC farm.

Table 1. Seed Harvested for the Nisqually Entrance Revegetation Project at Corvallis Plant Materials Center in 2010.

Species	Accession Number	Field Size (ac)	Harvest date	Method	Yield
Bromus carinatus	9079592	0.5	7/4, 7/13	swath/combine	261 lbs
Blue wildrye	9079593	0.3	7/9,7/15	swath/combine	156 lbs
Festuca rubra	9079594	0.2	7/5	seed strip	61 lbs

TECHNOLOGY DEVELOPMENTS

There were no new technology developments for this project in 2010.

Table 2. Seed in storage in 2010 for the Nisqually Entrance Revegetation Project with Corvallis Plant Materials Center.

Species	Seed lot	Bulk Wt	PLS Wt	Purity	Germination
Bromus carinatus	SG1-09-MR592	13 lbs			
Bromus carinatus	SG2-10-MR592	261 lbs	251 lbs	99.49%	97%
Elymus glaucus	SG1-10-MR593	156 lbs	133 lbs	99.51%	86%
Festuca rubra	SG1-09-MR594	5 lbs			
Festuca rubra	SG1-10-MR594	61 lbs	50 lbs	98.64%	82%

SAN JUAN ISLANDS NATIONAL HERITAGE PARK

FY 2010 Annual Summary Report
Prepared by Amy Bartow

NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON

Figure 1. American Camp Prairie restoration site, San Juan Island National Heritage Park, August 12, 2010.

INTRODUCTION

The Corvallis Plant Materials Center (PMC) entered into a new agreement with San Juan Islands National Historical Park in 2009 to provide native plant materials for the restoration of the American Camp prairie. It was agreed that the PMC would produce a minimum of 900 lbs pure live seed (PLS) of *Elymus glaucus*, 900 lbs (PLS) of *Bromus sitchensis*, and 440 lbs (PLS) of *Festuca roemerii*. The project is expected to be completed in 2013.

ACCOMPLISHMENTS

Activities in 2010 included establishment and maintenance of three seed increase fields as well as additional expansion in the fall of 2010 of the fescue and blue wildrye seed increase fields. PMC staff also visited the park and viewed the restoration sites. The San Juan Island ecotypes seem to be suffering slightly in the wet spring months at the PMC. Plants were reddish and looked sick through most of the spring. It was an unusually wet and cool spring which didn't help these fields. The brome field began to flower in late March and was covered with smut. These plants were not able to make viable seeds due to the wet weather. A later flush of

flowering happened in late May and these flowers did produce some seed. Smut was still a problem but did not destroy the harvest.

Table 1. Seed increase field yields in 2010 for the restoration of American Camp Prairie project with the Corvallis Plant Materials Center.

Species	Accession	Field size(ac)	Date	Method	Yield
Elymus glaucus	9079607	0.25	7/14,7/14,7/26	seed strip swath/combine	53 lbs
Bromus sitchensis	9079606	0.62	6/25,7/2	swath/combine	63 lbs

TECHNOLOGY DEVELOPMENT

The blue wildrye field did not grow much in early spring, but grew fast and flowered moderately as the fields dried out and the temperatures increased. Seeds were highly variable in ripening and shattering upon maturity. A double harvest was attempted by seed stripping the field to remove the seeds that were ripe, then swathing the remaining stems and combining a week later. These methods harvested a large portion of the seed that was produced. Hopefully next year the fields will ripen more evenly.

Table 2. Seed in storage in 2010 for the restoration of American Camp prairie project with the Corvallis Plant Materials Center.

Species	Seed lot	Bulk Wt	PLS Wt	Purity	Germination
Elymus glaucus	SG1-10-SJ607	53 lbs	44 lbs	99.34%	84%
Bromus sitchensis	SG1-10-SJ606	63 lbs	52 lbs	98.99%	84%

OLYMPIC NATIONAL PARK

FY 2010 Annual Summary Report
Prepared by Amy Bartow

NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON

Figure 1.Blue wildrye (*Elymus glaucus)* seed increase field at the Corvallis PMC, June 4, 2010.

INTRODUCTION

The Corvallis Plant Materials Center (PMC) entered into a new agreement with Olympic National Park in 2004 to provide native plant materials for the ecological restoration of Lake Mills and Lake Aldwell following the removal of two high head dams on the Elwha River. Current plans estimate that the dams will be removed in 2012. The PMC has agreed to produce 4355 lbs of four grass species, 450 lbs of two sedge species, and 430 lbs of three forbs.

ACCOMPLISHMENTS

In 2010, PMC staff collected 23 pounds of wild seed from four grass species in the Park. Five seed increase fields were maintained and harvested, yielding 1,044 lbs of seed. In the fall of 2010, another 1.6 acres of seed increase fields were established using the PMC's precision cone seeder. This was a very slow way to plant such large fields, but the planter is extremely accurate

and seed is not wasted. The sedge fields were also expanded using transplants (15,000 sedge plants were grown in the summer of 2010). The total amount of area in production for this project in 2010 is 6.5 acres.

Table 1. Seed increase field yields and acreage for the Elwha River Ecosystem and Fisheries Restoration Cooperative Agreement at the Corvallis PMC, October 2010.

Species	Area	Date(s)	Method	Yield	Total acres
Elymus glaucus	2.1	July12, 20	swath/combine	495 lbs	3.1
Bromus complex	1.6	July 2, 7	swath/combine	502 lbs	2.25
Carex deweyana	0.01	June 24	Hand	2 lbs	0.2
Carex pachystachya	0.22	July 8	moon rover	15 lbs	0.5
Eriophyllum lanatum	0.15	Sept 14,25	swath/combine	30 lbs	0.5

TECHNOLOGY DEVELOPMENTS

The new portion of the *E. lanatum* field was very weedy and the PMC staff decided to use a Hiniker Flail Mower/Shredder to mow down the field instead of attempting to weed or spot spray the field. This piece of equipment cuts and "vacuums" all residue laying on the ground surface. Residue is shot out into a wagon that is pulled behind the mower and can be dumped offsite. This form of "weed control" was chosen because the annual weeds would be killed or reduced to 2" tall, and all of the seeds that were about to be produced by the weeds were removed from the field. The *E. lanatum* plants were mowed also, but were not harmed by the cutting. The field was mowed in early summer and early fall to remove the weeds. The *E. lanatum* plants looked very healthy heading into winter and almost all the weeds had been killed by the mowing. This weed control method was quite effective at removing the large amount of weed seed that would have been germinating in the spring of 2011.

Table 2. Seed in storage at the PMC for the Elwha River Restoration Project, December 30, 2010.

Scientific name	Common name	Amount in storage
Forbs		
Achillea millefolium	yarrow	50 lbs
Artemisia suksdorfii	coastal wormwood	5 lbs
Eriophyllum lanatum	Oregon sunshine	47 lbs
Grasses, sedge, and rushes		
Agrostis exerata	spiked bentgrass	18 lbs
Bromus complex	brome species	768 lbs
Carex deweyana	Dewey's sedge	5.5 lbs
Carex pachystachya	thick-headed sedge	117 lbs
Deschampsia elongata	slender hairgrass	131 lbs
Elymus glaucus	blue wildrye	689 lbs

YOSEMITE NATIONAL PARK

FY2010 Annual Summary Report
Prepared by Margaret Smither-Kopperl

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
LOCKEFORD, CALIFORNIA

INTRODUCTION

In 2006 the Lockeford California Plant Materials Center (PMC) entered into an agreement with Yosemite National Park (YNP) to produce seed of two grasses, Sandberg bluegrass (*Poa secunda*) and California brome (*Bromus carinatus*), and two forb species, Sierra lupine (*Lupinus grayi*) and big deer vetch (*Lotus crassifolius*). The agreement ran through 2009 and accomplishments were noted in the FY 2009 Annual Report. Seed production of the two forb species was low for Sierra lupine and no seed was produced by the big deer vetch so it was determined to retain those plantings for the 2010 season. There was no contract for 2010 but the initial contract specified seed production of 20 lbs lupine and 10 lbs deer vetch.

The National Park Service requires that restoration of native plants be accomplished using germplasm from populations as closely related genetically and ecologically as possible to park populations. The PMC was chosen due to its ability to clean, propagate and produce the desired amounts of high quality seed within the required time frame. The PMC is also able to conduct studies to determine adaptation and cultural requirements for establishment and seed production.

ACCOMPLISHMENTS

Sierra Lupine

In early 2007, the PMC seeded 1200 plugs of Sierra lupine. Hot water scarification was used as a seed pre-treatment and germination was 40%. From this original propagation effort, 478 *L. grayi* plugs were transplanted into weed barrier fabric at the PMC in 2007. In February 2008, the *Lupinus grayi* plot was inter-seeded with seed abraded for 30 seconds in an electric seed scarifier (Seedburo No. 390B); this scarification method appeared to increase germination success over the hot water treatment. In 2008 and 2009, at total of 6.02 lbs of seed were harvested from the surviving lupine plugs and volunteer plants from naturally stratified seed. The plot was retained to obtain a further harvest from the plants during 2010 and the plants appeared to be healthy through the fall of 2009 (Figure 1). During the following year the plants exhibited severe wilt symptoms in the early spring. This disease was of unknown etiology but probably caused by fungal infection, and the majority of plants died prior to seed production (Figure 2). No harvest was possible and the plot was removed during 2010.

Fig. 1. *Lupinus grayi* plot in November 2009.

Fig 2. *Lupinus grayi* plants exhibited syptoms of wilt and many plants died prior to harvest seed production. (5/25/10)

Big Deer Vetch

In January 2009, a plot of *Lotus crassifolius* was established at the PMC. The seed was scarified for 30 seconds using an electric seed scarifier and direct seeded at 18-inch spacing into a plot covered with weed barrier fabric. Establishment was good for areas of the plot which received full sun, but seedling emergence was inconsistent closer to a nearby tree planting. Competition from shade, tree roots or an allelopathic effect may have influenced seedling emergence and

establishment in these areas. The plants died back during the winter, but growth during 2010 was good throughout the plots (Figure 3). The plot did not flower or yield any seed in its first year (2009) or during 2010 possibly due to juvenility issues. The plot will be retained for bloom and possible seed production during 2011.

Fig 3. *Lotus crassifolius* plot at the PMC (8/6/10)

GREAT SMOKY MOUNTAINS NATIONAL PARK

FY2010 Annual Summary Report
Prepared by Shawn Belt

NATURAL RESOURCES CONSERVATION SERVICE
NATIONAL PLANT MATERIALS CENTER
BELTSVILLE, MARYLAND

INTRODUCTION

The Great Smoky Mountains National Park (GRSM) and Foothills Parkway, has a need to preserve the native plant resources and revegetate parklands. The NPS requires that restoration of native plants will be accomplished using germplasm from populations as closely related genetically and ecologically as possible to park populations. GRSM has harvested seed from indigenous populations, but does not have the personnel, expertise, facilities or equipment needed to clean process, test and store the seed. The NRCS, National Plant Materials Center (NPMC) does have the personnel and is equipped to clean, process and store quantities of seed sufficient to meet the NPS needs within the required time frame.

ACCOMPLISHMENTS

The Cades Cove increase fields harvest resulted in over 625 lbs. (bulk) of grass, legume and wildflower seed harvested. Table 1 lists the 10 different lots of seed which were harvested. The seed was cleaned (de-bearded and then run through a clipper) by NPMC staff to yield 120 lbs Pure Live Seed (P.L.S. = bulk x purity x viability). Also included in the table are the species, amounts of seed harvested, and the resulting cleaned seed weights.

Table 1: Seed harvested and cleaned by species, to support GRSM conservation activities.

Common Name	Species Code	Harvest year	Amount Cleaned	P.L.S.	Seed Test Date	Source
Big bluestem	ANGE	2010	139	18.8	9-30-2010	Cades Cove
Swamp sunflower	HEAN2	2010	7.5	1.2		Cades Cove
Roundhead lespedeza	LECA8	2010	13.2	1		Cades Cove
Wild bergamot	MOFI	2010	20.7	1		Cades Cove
Wild quinine	PAIN3	2010	11.1	.3	9-30-2010	Cades Cove
Sugarcane plumegrass	SAGI	2010	15.6	3.4	9-30-2010	Cades Cove
Little bluestem	SCSC	2010	72.4	4.9	9-30-2010	Cades Cove
Indiangrass	SONU2	2010	176	71	9-30-2010	Cades Cove
Purpletop	TRFL2	2010	11.4	7.5	9-30-2010	Cades Cove
N.Y. Ironweed	VENO	2010	.7	.7		Cades Cove
			625	120		

Virginia Wildrye (*Elymus virginicus*) is a native, cool season grass which quickly germinates, making it a very highly used species for maintaining slope stability on the Foot Hills Parkway. Native grass and wildflower seed mixes contain up to 25% Virginia wildrye for these reasons. The seed also maintains high viability while in storage. The current amount of Virginia wildrye seed remaining in storage has dropped to ~50 lbs. In order to provide ample seed for future slope revegetation purposes it was decided that the NPMC would establish an increase field.

11,000 plugs were sown and grown in the winter 2010 in order to establish a ~1/2 acre increase field. The plugs were planted in the Spring of 2010, watered, weeded and harvesting should begin in the autumn of 2011.

TECHNOLOGY DEVELOPMENT

There were a significant amount of improvements to the NPMC's ability to clean GRSM's seed. A new 2 screen Eclipse 324 clipper was purchased. While this new machine has required some trial and error by the staff in order to effectively clean the seed, it has already greatly increased our ability to clean large amounts of seed. Another seed cleaning machine was purchased, the Westrup LA-H brush machine. This new machinery was also complimented by a total redesign of our air filtration system. All new ducts were installed and in most cases the size of the ducts were diminished to increase the air speed and efficiency. This has greatly benefited the air quality and safety for the staff who clean the seed.

NATCHEZ TRACE NATIONAL PARKWAY

FY2010 Annual Summary Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
JAMIE L. WHITTEN PLANT MATERIALS CENTER
COFFEEVILLE, MISSISSIPPI

INTRODUCTION - The NPS is constructing a multi-use trail along a section of the Natchez Trace Parkway. The MSPMC will re-vegetate areas disturbed by construction. Seed stock and plant materials will be collected from the local plant population. The greenhouse facilities at the MSPMC will be used for propagation and increase of plant materials. Plants are to be delivered and installed at the Natchez Trace.

Year initiated: 2008
Anticipated completion date: 2011

Plants delivered to date:

Indian woodoats (*Chasmanthium latifolium* (Michx.) Yates) – seeds. 4" container plants: 150

Longleaf woodoats (*Chasmanthium sessiliflorum* (Poir.) Yates) – seeds. 4" container plants: 0

Switchgrass (*Panicum virgatum* L.) - seeds. 4" container plants: 150, 1-gallon container plants: 25

ACCOMPLISHMENTS

Plants were grown in greenhouse and delivered to the Madison County, MS site in February 2011. We planted approximately 300 switchgrass and river oats. We intend to sow the remainder of seed collection in the spring in order to achieve our goal of 2900 plants to be installed by the fall of 2011.

NATIONAL PARK SERVICE-DSC

FY2011 Annual Report –Wetland Species Pre-germination Study
Prepared by

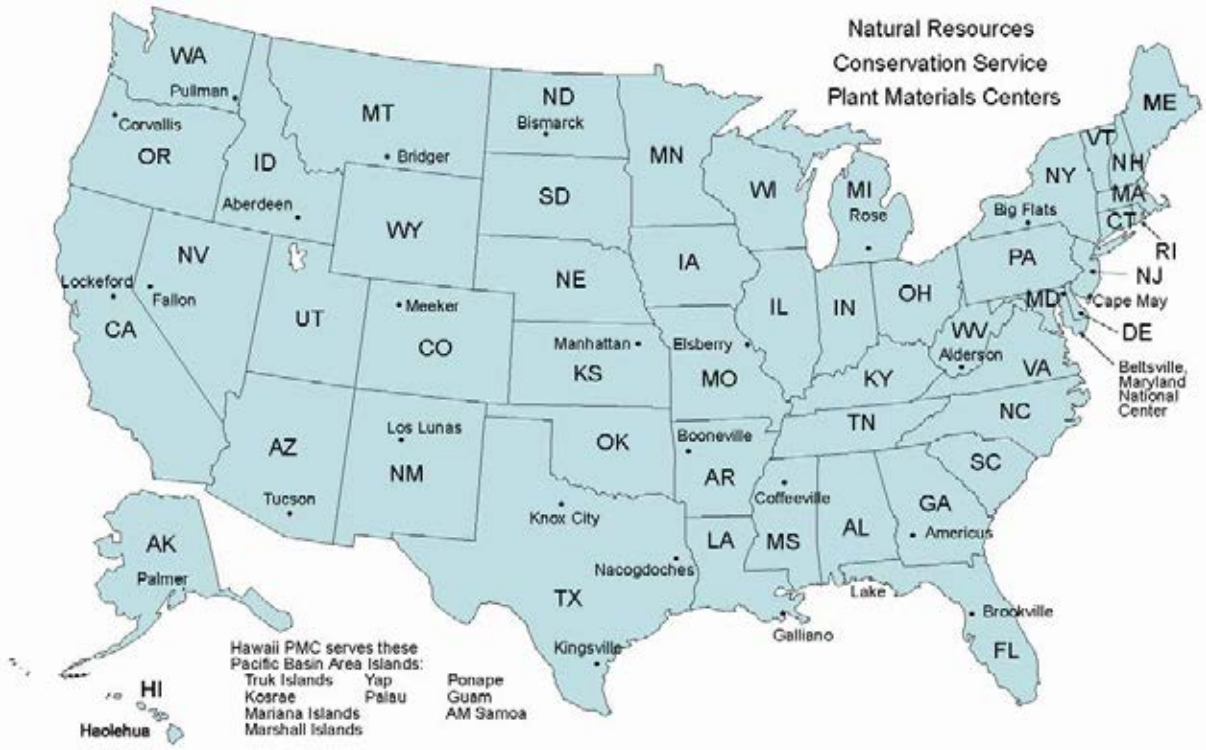
NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION - In 2011 the Aberdeen PMC initiated a study investigating various methods to establish wetland plant species via direct seeding. Prior studies conducted by the PMC indicated that seed of Nebraska sedge (*Carex nebrascensis*) could be pre-germinated in containers of aerated water. The pre-germinated seed could then conceivably be applied to wetland by hydroseeding or other broadcasting methods. This study compared establishment rates of pre-germinated seed versus traditionally stratified seed applied through hydroseeding and dry broadcasting. The study also investigated two bed preparation methods; one a traditional dry bed preparation (similar to land preparation for a seed production field), and the other seeded into a muddy slurry bed.

ACCOMPLISHMENTS – The trial was planted into constructed wetland ponds at the PMC on July 7, 2011 using a randomized complete block, split-plot design. The ponds were then watered and allowed to draw down repeatedly for optimum wetland plant establishment. On August 8, the plots were evaluated for plant density. Plots will be evaluated again in late fall and in spring 2012.

TECHNOLOGY DEVELOPMENT – No significant difference was detected regarding seed pre-treatment (pre-germinated versus stratified); however significant differences were found comparing seed delivery techniques; applying seed via hydroseeding had 2 to 3 times greater establishment than broadcasting the seed. Hydroseeding resulted in essentially 100 percent establishment regardless of seed pre-treatment, while broadcasting seed resulted in 37 to 50% establishment. The two bed preparation treatments could not be analyzed for statistical differences, but establishment means were higher in the wet-prepared (muddy slurry) pond than the traditionally dry-prepared bed. These early results indicated that hydroseeding may be an acceptable alternative to greenhouse grown materials for wetland plant establishment.

DIGITAL PHOTOS-
Top: Hydroseeding into wet muddy slurry and dry, traditionally prepared seed bed.
Bottom-Nebraska sedge seedlings in hydroseeded plot.



Plant Materials Centers (PMC)				
Palmer, AK	Alaska PMC	5310 South Bodenburg Spur Road	Palmer, AK 99645	(907) 745-4469
Tucson, AZ	Tucson PMC	3241 North Romero Road	Tucson, AZ 85705	(520) 292-2999
Booneville, AR	Booneville PMC	6883 S. State Highway 23	Boonville, AR 72927	(479) 675-5182
Lockeford, CA	Lockeford PMC	PO Box 68, 21001 N. Elliott Road	Lockeford, CA 95237	(209) 727-5319
Meeker, CO	Upper CO Environmental Plant Center	5538 RBC #4	Meeker, CO 81641	(970) 878-5003
Brooksville, FL	Brooksville PMC	14119 Broad Street	Brooksville, FL 34601	(352) 796-9600
Americus, GA	Jimmy Carter PMC	295 Morris Drive	Americus, GA 31709	(229) 924-4499
Hoolehua, HI	Hoolehua PMC	P.O. Box 236	Hoolehua, HI 96729	(808) 567-6885
Aberdeen, ID	Aberdeen PMC	PO Box 296, 1691A South 2700 West	Aberdeen, ID 83210	(208) 397-4133
Manhattan, KS	Manhattan PMC	3800 S. 20th Street	Manhattan, KS 66502	(785) 539-8761
Galliano, LA	Golden Meadows PMC	438 Airport Road	Galliano, LA 70354	(985) 475-5280
Beltsville, MD	National PMC	Building 509, BARC-East, E. Beaver Dam Road	Beltsville, MD 20705	(301) 504-8175
East Lansing, MI	Rose Lake PMC	7472 Stoll Road	East Lansing, MI 48823	(517) 641-6300
Coffeeville, MS	Jamie L. Whitten PMC	2533 County Road 65	Coffeeville, MS 38922	(662) 675-2588
Elsberry, MO	Elsberry PMC	2803 N. Highway 79	Elsberry, MO 63343	(573) 898-2012
Bridger, MT	Bridger PMC	98 South River Road	Bridger, MT 59014	(406) 662-3579
Cape May, NJ	Cape May PMC	1536 Route 9 North	Cape May Court House, NJ 08210	(609) 465-5901
Los Lunas, NM	Los Lunas PMC	1036 Miller Street, SW	Los Lunas, NM 87031	(505) 865-4684
Big Flats, NY	Big Flats PMC	3266A State Route 352	Corning, NY 14830	(607) 562-8404
Bismarck, ND	Bismarck PMC	3308 University Drive	Bismarck, ND 58504	(701) 250-4330
Fallon, NV	Great Basin PMC	2055 Schurz Highway	Fallon, NV 89406	(775) 423-7957
Corvallis, OR	Corvallis PMC	3415 NE Granger Avenue	Corvallis, OR 97330	(541) 757-4812
Nocogdoches, TX	East Texas PMC	6598 FM 2782	Nocogdoces, TX 75962	(936) 564-4873
Kingsville, TX	Kika De La Garza PMC	3409 North FM 1355	Kingsville, TX 78363	(361) 595-1313
Knox City, TX	James E. “Bud” Smith PMC	3776 Farm Road 1292	Knox City, TX 79529	(940) 658-3922
Pullman, WA	Pullman PMC	PO Box 646211, WSU	Pullman, WA 99164	(509) 335-6892
Alderson, WV	Alderson PMC	PO Box 390, Old Prison Farm Road	Alderson, WV 24910	(304) 445-3005

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS – 999/101258 (September 2011)

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