

**National Park Service
Plant Materials
Year 2008 Annual Report**

Prepared by

**USDA Natural Resources Conservation Service
Los Lunas Plant Materials Center
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Chapter 1

Grand Canyon National Park

I. Background

In July 1990, an agreement among the US Department of Interior (DOI), the National Park Service (NPS), the Grand Canyon National Park (GCNP), and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) was made for the collection, propagation, an increase of native grasses, forbs, shrubs, and trees.

The agreement states that the LLPMC will produce the plant materials for the GCNP for the purpose of revegetating disturbed areas and native landscaping projects in the park. The agreement 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 will grow transplants started from native tree and shrub seed collected at the park.

In 2006, the LLPMC agreed to add bottlebrush squirreltail to the list of grass species to be grown for seed production, and in 2007 sideoats grama was added.

II. Accessions Involved

Table 1-1 is a complete list of the accessions involved in the GCNP project.

Table 1-1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number	Vegetation Association
Grasses:				
Blue grama	<i>Bouteloua gracilis</i>	BOGR	9062875	122.4149
Bottlebrush squirreltail	<i>Elymus elymoides</i>	ELEL5	9066659	122.3233
Bottlebrush squirreltail	<i>Elymus elymoides</i>	ELEL5	9062858	122.3233
Indian ricegrass	<i>Achnatherum hymenoides</i>	ORHY	9062857	122.3233
Muttongrass	<i>Poa fendleriana</i>	POFE	9062861	122.3233
Needle and thread	<i>Stipa comata</i>	STCO	9062859	122.3233
Sideoats grama	<i>Bouteloua curtipendula</i>	BOCU	9066732	122.3233
Western wheatgrass	<i>Agropyron smithii</i>	AGSM	9062860	122.3233
Trees and Shrubs:				
Apache plume	<i>Fallugia paradoxa</i>	FAPA	9062865	122.3233
Big sagebrush	<i>Artemisia tridentata</i>	ARTR	9066056	122.3233
Century plant	<i>Agave utahensis</i>	AGUT	9062874	122.4149
Cliffrose	<i>Purshia mexicana</i>	COME	9062876	122.4149
Curl-leaf mountain mahogany	<i>Cercocarpus ledifolius</i>	CELE	9062867	122.3233
Currant	<i>Ribes spp.</i>	RI SPP.	9066057	122.3233
Datil yucca	<i>Yucca baccata</i>	YUBA	9066058	122.3233
Desert barberry	<i>Berberis fremontii</i>	BEFE	9066059	122.3233
Elderberry	<i>Sambucus spp.</i>	SA SPP.	9066047	122.3233
Fernbush	<i>Chamaebatiaria millefolium</i>	CHMI	9062866	122.3233
Fourwing saltbush	<i>Atriplex canescens</i>	ATCA	9062873	122.4149
Gambel oak	<i>Quercus gambelii</i>	QUGA	9062872	122.3233

Table 1-1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number	Vegetation Association
Lupine	<i>Lupinus spp.</i>	LU SPP.	9062863	122.3233
Penstemon (blue)	<i>Penstemon spp.</i>	PE SPP.	9062862	122.3233
Penstemon (red)	<i>Penstemon spp.</i>	PE SPP.	9066054	122.3233
Pinyon (twoneedle) pine	<i>Pinus edulis</i>	PIED	9066467	122.3233
Ponderosa pine	<i>Pinus ponderosa</i>	PIPO	9066466	122.3233
Rabbitbrush	<i>Chrysothamnus nauseosus</i>	CHNA	9062877	122.4149
Utah juniper	<i>Juniperus osteosperma</i>	JUOS	9066055	122.3233
Utah serviceberry	<i>Amelanchier utahensis</i>	AMUT	9062869	122.3233
Wolfberry	<i>Lycium spp.</i>	LY SPP.	9062870	122.3233

III. Collection Information

The LLPMC received seed from the GCNP in 2008 as shown in Table 1-2.

Table 1-2: 2008 Seed Received from GCNP

Common Name	Scientific Name	Cleaned Weight (g)
Apache plume	<i>Fallugia paradoxa</i>	2.5
Beardlip penstemon	<i>Penstemon barbatus</i>	2.7
Big sagebrush	<i>Artemisia tridentate</i>	1.0
Bridge penstemon	<i>Penstemon rostriflorus</i>	1.5
Century plant	<i>Agave utahensis</i>	8.6
Cliffrose	<i>Purshia Mexicana</i>	9.5
Curl-leaf mountain mahogany	<i>Cercocarpus ledifolius</i>	3.4
Datil yucca	<i>Yucca baccata</i>	38.0
Desert barberry	<i>Berberis fremontii</i>	25.0
Fernbush	<i>Chamaebataria millefolium</i>	5.0
Fourwing saltbush	<i>Atriplex canescens</i>	126.0
Mormon tea	<i>Ephedra viridis</i>	12.5
Pinyon (twoneedle) pine	<i>Pinus edulis</i>	65.0
Thickleaf beardtongue	<i>Penstemon pachyphyllus</i>	14.0
Torrey's milkvetch	<i>Astragalus calycosus</i>	0.35

IV. Seed Condition Information

The seed received in 2008 will be stored at the LLPMC for use in the production of containerized transplants. See previous GCNP reports for information on seed received by the LLPMC.

V. Seed Production Establishment

In 2008, seed from the muttongrass fields at the LLPMC were used to start transplants in the greenhouse. In October of 2008, these transplants were then used to establish a new 0.28 acre seed field at the LLPMC.

See Table 1-3 for the seed production fields established for the GCNP at the LLPMC.

Table 1-3: 2008 Established GCNP Production Fields at the LLPMC

Common Name	Scientific Name	Agreement Acreage	2008 LLPMC Acreage
Blue Grama	<i>Bouteloua gracilis</i>	0.50	1.00
Muttongrass	<i>Poa fendleriana</i>	1.00	1.78
Bottlebrush squirreltail	<i>Elymus elymoides</i>	0.50	0.60
Sideoats grama	<i>Bouteloua curtipendula</i>	0.50	0.70

VI. Seed Production

A. Field Management

9062875 Blue grama Field 20N – 0.5 Acre 2008 Date

Fertilization		
40lbs. Nitrogen		2/19
40 lbs. Phosphorous		6/23
Irrigation		
3" water application		3/24, 6/11, 6/26, 8/12
Herbicide Application		3/12, 5/27
Pesticide Application		7/21, 8/15, 8/27
Cultural Weed Control		
Hand Hoeing		As needed
Harvest		
Combine		9/12

9062875 Blue grama Field 28S – 0.5 Acre 2008 Date

Fertilization		
80 lbs. Nitrogen		6/23, 7/22
40 lbs Phosphorous		2/19
Irrigation		
3" water application		3/21, 6/11, 6/24, 7/28
Herbicide Application		3/20, 5/27
Pesticide Application		7/21, 8/15, 8/27
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		7/18
Harvest		
Combine		9/12

9062861 Muttongrass Field 20N – 0.5 Acre 2008 Date

Fertilization		
160 lbs. Nitrogen		4/21, 6/19, 7/22, 9/9
40 lbs. Phosphorous		9/12
Irrigation		
3" water application		2/22, 3/20, 4/10, 4/22, 5/5, 6/11, 8/15, 9/22, 11/4

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9062861 Muttongrass	Field 20N – 0.5 Acre	2008 Date
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		4/21, 7/18
Herbicide Application		5/28, 9/5
Pesticide application		4/18, 4/30, 6/13
Harvest		
Combine		5/12

9062861 Muttongrass	Field 21S – 0.28 Acre	2008 Date
Transplant		10/17
Irrigation		
3" water application		10/17, 10/23, 11/4, 12/2
Cultural Weed Control		
Hand Hoeing		As needed

9062861 Muttongrass	Field 28S – 1.0 Acre	2008 Date
Fertilization		
160 lbs. Nitrogen		4/21, 5/13, 7/22, 9/9
40 lbs. Phosphorous		9/12
Irrigation		
3" water application		2/22, 3/20, 4/10, 4/22, 5/5, 6/11, 7/28, 9/12, 11/4
Herbicide Application		9/5
Pesticide Application		4/18, 4/30, 6/13
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical cultivation		4/18, 7/7
Harvest		
Combine		5/12

9066659 Bottlebrush squirreltail	Field 20N, 28S – 0.45 Acre	2008 Date
Fertilization		
40 lbs. Nitrogen		4/21, 5/13
40 lbs. Phosphorous		2/19
Irrigation		
3" water application		2/22, 3/20, 4/10, 4/22, 6/2, 6/26, 8/28, 11/4
Pesticide Application		7/1
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical cultivation		4/21
Harvest		
Flail-Vac		7/25, 8/15, 8/28

9066732 Sideoats grama	Field 25N – 34S – 0.5 Acre	2008 Date
Fertilization		
120 lbs. Nitrogen		2/19, 6/17, 7/22
Irrigation		
3” water application		4/28, 6/5, 6/20, 7/25, 8/25
Herbicide Application		3/10, 5/27
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical cultivation		7/18
Harvest		
Combine		9/17

B. Seed Produced

Table 1-4 describes the seed production for the year 2008.

Table 1-4: 2008 GCNP Seed Production

Common Name	Scientific Name	Pounds Cleaned
Blue grama	<i>Bouteloua gracilis</i>	18.76
Bottlebrush squirreltail	<i>Elymus elymoides</i>	2.42
Muttongrass	<i>Poa fendleriana</i>	47.44
Sideoats grama	<i>Bouteloua curtipendula</i>	44.50

Table 1-5 describes the seed delivered to GCNP by the LLPMC in September of 2008.

Table 1-5: 2008 GCNP Seed Delivery

Common Name	Scientific Name	Pounds Delivered
Blue grama	<i>Bouteloua gracilis</i>	94.32
Bottlebrush squirreltail	<i>Elymus elymoides</i>	7.46
Muttongrass	<i>Poa fendleriana</i>	59.71

C. Climatological Data

See Appendix A for the climatological data for 2008 at the Los Lunas Plant Materials Center.

VII. Transplant Production

Table 1-6 describes the grass, wildflower, and shrub species transplants grown and delivered to GCNP in 2008 by the LLPMC.

Table 1-6: 2008 GCNP Transplant Delivery

Common Name	Scientific Name	Transplants Delivered
Apache plume	<i>Fallugia paradoxa</i>	200
Banana yucca	<i>Yucca baccata</i>	211
Beardlip penstemon	<i>Penstemon barbatus</i>	52
Blue grama	<i>Bouteloua gracilis</i>	5400
Bridge penstemon	<i>Penstemon rostriflorus</i>	137
Curl-leaf mountain mahogany	<i>Cercocarpus ledifolius</i>	50
Fernbush	<i>Chamaebatiaria millefolium</i>	240

Table 1-6: 2008 GCNP Transplant Delivery

Common Name	Scientific Name	Transplants Delivered
Fourwing saltbush	<i>Atriplex canescens</i>	425
Fremont's mahonia	<i>Mahonia fremontii</i>	100
Mexican cliffrose	<i>Purshia mexicana</i>	350
Mormon tea	<i>Ephedra viridis</i>	200
Muttongrass	<i>Poa fendleriana</i>	5110
Palmer's penstemon	<i>Penstemon palmeri</i>	73
Rubber rabbitbrush	<i>Ericameria nauseosa</i>	300
Sideoats grama	<i>Bouteloua curtipendula</i>	1300
Thickleaf beardtongue	<i>Penstemon pachyphyllus</i>	213
Threadleaf snakeweed	<i>Gutierrezia microcephala</i>	278
Utah agave	<i>Agave utahensis</i>	232
Utah serviceberry	<i>Amelanchier utahensis</i>	100

VIII. Specialized Treatments

See previous Grand Canyon National Park reports for information on specialized treatments.

IX. Observations

The production of a good, viable seed crop from the GCNP seed fields continues to be the goal of the LLPMC. The use of various amounts of irrigation applications along with higher varied rates of fertilizer has led to improved amounts of both forage and seed production of the species being grown by the LLPMC. In particular, increasing irrigation applications for the GCNP muttongrass has allowed the plants to produce abundant forage, and it has kept the plants from being damaged during the warmest time of the season.

- Bottlebrush squirreltail – The bottlebrush squirreltail did not produce much seed in 2008. The plants looked healthy and had good vigor in the early part of 2008, but forage and seed production declined as the temperatures rose in late spring and early summer. Seed production was poor in 2008, and some of the plants appeared to have died after they had produced seed. The field will be checked early in 2009 for survival, and it could be possible that the bottlebrush squirreltail may need to be replanted. Bottlebrush squirreltail seed was harvested in 2008.
- Blue grama – The blue grama fields will continue to have insecticide applications to control insects that can lower seed yields. The blue grama in Field 20N produced only a fair amount of forage and seed head production was lower than in previous years. The blue grama in Field 28S had vigorous growth and seed head production was good, but viable seed was less than expected. Blue grama seed was harvested in 2008.
- Muttongrass – The muttongrass in Field 20N had good forage production in 2008, but the amount of seed head production was lower than expected. The muttongrass in Field 28S was healthy and vigorous and seed production was fair. This field of muttongrass is expected to produce a good seed crop in 2009. Muttongrass seed was harvested in 2008.
- Sideoats grama – The sideoats grama in fields 25N and 34S had healthy vigorous growth in 2008. The sideoats grama fields produced a good crop of seed heads and seed was harvested in 2008.



Figure 1-1: Delivering Seed to the GCNP in September 2008



Figure 1-2: Delivering Transplants to the GCNP in September 2008



Figure 1-3: Field 28S – GCNP Muttongrass Seed Production Field



Figure 1-4: Field 28S – GCNP Blue Grama Seed Production Field



Figure 1-5: Field 20N – GCNP Muttongrass Production Field



Figure 1-6: Field 21S – GCNP Muttongrass Production Field

Chapter 2

Pipe Spring National Monument

I. Background

On September 12, 2002, an agreement among the US Department of Interior (DOI), the National Park Service (NPS), the Pipe Spring National Monument (PSNM), and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) was made for propagating and harvesting native seed collected from the PSNM for the purpose of revegetation projects.

II. Accessions Involved

Table 2-1 lists the accessions involved in the PSNM agreement.

Table 2-1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number
Blue Grama	<i>Bouteloua gracilis</i>	BOGR	9066558
Bottlebrush squirreltail	<i>Elymus elymoides</i>	ELEL5	9066587
Galleta	<i>Pleuraphis jamesii</i>	PLJA	9066559
Indian ricegrass	<i>Achnatherum hymenoides</i>	ACHY	9066587

III. Collection Information

See previous PSNM reports for collection information.

IV. Seed Condition Information

See the previous PSNM for seed condition information collected from the PSNM.

V. Seed Production Establishment

Note: No blue grama seed was available in 2008 to establish a seed production field.

See Table 2-2 for the established production fields for the PSNM at the LLPMC.

Table 2-2: 2008 Established Production Fields

Common name	Scientific name	Agreement Acreage	2008 LLPMC Acreage
Bottlebrush squirreltail	<i>Elymus elymoides</i>	0.50	0.00
Galleta	<i>Pleuraphis jamesii</i>	0.50	0.58
Indian ricegrass	<i>Achnatherum hymenoides</i>	0.50	0.30

VI. Seed Production

A. Field Management

9066559 Galleta Field 26S – 0.10 Acre 2008 Date

Fertilization		
40 lbs. Nitrogen		7/22
Irrigation		
3" water application		3/14, 6/12, 8/15, 9/5
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical cultivation		7/21
Herbicide Application		3/11, 9/5
Harvest		
Flail-Vac		7/29, 9/4

9066559 Galleta Field 16 – 0.50 Acre 2008 Date

Fertilization		
40 lbs. Nitrogen		4/21
40 lbs. Phosphorous		2/19
Irrigation		
3" water application		4/1, 5/5, 6/17, 7/25, 9/11
Cultural Weed Control		
Hand Hoeing		As needed
Herbicide Application		3/27, 7/2
Harvest		
Flail-van		7/29, 9/4

9066587 Indian ricegrass Field 8 – 0.30 Acre 2008 Date

Fertilization		
120 lbs. Nitrogen		2/19, 4/21, 5/13
80 lbs. Phosphorous		2/19, 6/23, 9/12
Irrigation		
3" water application		3/18, 4/22, 6/5, 6/26, 8/15, 11/6
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical cultivation		4/21, 6/24, 7/7
Pesticide Application		5/20
Harvest		
Flail-Vac		6/2, 6/10, 6/17

B. Seed Produced

Table 2-3 describes the seed production for the year 2008.

Table 2-3: Seed Production in 2008

Common name	Scientific name	Pounds Cleaned
Galleta	<i>Pleuraphis jamesii</i>	3.12
Indian ricegrass	<i>Achnatherum hymenoides</i>	64.14

C. Climatological Data

See Appendix A for the climatological data for 2008 at the Los Lunas Plant Materials Center.

VII. Transplant Production

Transplant production is not part of this agreement.

VIII. Specialized Treatments

See the previous Pipe Spring National Monument report for information on specialized treatments.

IX. Observations

The LLPMC made the following observations in 2008 for the PSNM agreement:

- Galleta – The PSNM galleta field was harvested in 2008 and the planting appeared healthy and vigorous during the growing season. Seed head production was high and a good seed crop was anticipated. Seed produced from the planting was low again in 2008, and it is unknown if production will increase in 2009. In 2009 the LLPMC will increase both irrigation and fertilization of the galleta planting. The increase in water and nutrients will be an attempt to increase the seed yield of this planting
- Indian ricegrass – Seed from the PSNM Indian ricegrass was harvested in 2008. The ricegrass field was healthy and vigorous and seed head production was abundant.



Figure 2-1: Field 8 – PSNM Indian Ricegrass Production Field



Figure 2-2: Field 16 – PSNM Galleta Production Field

Chapter 3 Zion National Park

I. Background

On September 12, 2002, an agreement among the US Department of Interior (DOI), the National Park Service (NPS), Zion National Park (ZNP), and the USDA-NRCS 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. The seed then will be used to establish production fields to satisfy the agreement.

II. Accessions Involved

Table 3-1 lists the accessions involved in the ZNP project.

Table 3-1: Accessions Involved

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

III. Collection Information

See previous ZNP reports for collection information prior to 2008.

IV. Seed Condition Information

See previous ZNP reports for the seed condition information prior to 2008.

V. Seed Production Establishment

The LLPMC established a bottlebrush squirreltail seed production field on October 3, 2008. The 0.20 acre seed field was established using transplants produced in the greenhouse and planted in Field 19 at the LLPMC.

See Table 3-2 for the seed production fields established for ZNP at the LLPMC in 2008.

Table 3-2: 2008 Established Production Fields

Common name	Scientific name	Agreement Acreage	2008 LLPMC Acreage
Bottlebrush squirreltail	<i>Elymus elymoides</i>	0.50	0.50
Cane bluestem	<i>Bothriochloa barbinodis</i>	1.00	0.00
Galleta	<i>Pleuraphis jamesii</i>	0.33	0.55
Indian ricegrass	<i>Achnatherum hymenoides</i>	0.50	0.42
Muttongrass	<i>Poa fendleriana</i>	0.50	0.50
Sand bluestem	<i>Andropogon hallii</i>	0.50	0.50

VI. Seed Production

A. Field Management

9066532 Bottlebrush squirreltail Field 19 – 0.20 Acre 2008 Date

Transplant	10/3
Irrigation	
3" water application	10/3, 10/10, 10/23, 11/6, 12/2
Cultural Weed Control	
Hand Hoeing	As needed

9066529 Sand bluestem Field 25S, 27N – 0.50 Acre 2008 Date

Fertilization	
40 lbs. Nitrogen	6/17
40 lbs. Phosphorus	2/19
Irrigation	
3" water application	3/12, 6/5, 6/19, 7/25
Cultural Weed Control	
Hand Hoeing	As needed
Herbicide Application	3/11, 5/27
Harvest	
Combine	10/8

9066528 Galleta Field 35N – 0.10 Acre 2008 Date

Fertilization	
40 lbs. Nitrogen	6/19
Irrigation	
3" water application	3/18, 6/11, 6/20, 8/15, 9/5
Herbicide Application	3/12
Cultural Weed Control	
Hand Hoeing	As needed
Harvest	
Flail-Vac Harvester	7/25, 8/8

9066586 Galleta Field 24S – 0.50 Acre 2008 Date

Fertilization	
80 lbs Nitrogen	6/19, 7/22
40 lbs. Phosphorous	2/19
Irrigation	
3" water application	3/18, 6/5, 6/24, 7/25
Herbicide Application	3/11, 5/27, 7/21
Cultural Weed Control	
Hand Hoeing	As needed
Mechanical Cultivation	7/18
Harvest	None

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9066531 Muttongrass	Field 35S – 0.50 Acre	2008 Date
Fertilization		
160 lbs Nitrogen		4/21, 5/13, 7/22, 9/9
40 lbs. Phosphorous		9/12
Irrigation		
3” water application		2/26, 3/18, 4/10, 4/22, 5/5, 6/9, 6/20, 7/25, 8/15, 9/12, 10/28
Herbicide Application		9/5
Pesticide Application		4/18, 4/30
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		4/21, 7/18
Harvest		
Forage Harvester		5/19

9066528 Indian ricegrass	Field 35N – 0.42 Acre	2008 Date
Fertilization		
160 lbs. Nitrogen		4/21, 5/13, 7/22, 9/9
80 lbs. Phosphorus		2/19, 9/12
Irrigation		
3” water application		2/29, 3/6, 4/22, 6/5, 9/18, 10/3
Herbicide Application		9/5
Pesticide Application		4/30, 5/8/20
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		4/21, 6/24, 7/18
Harvest		
Flail-Vac Harvester		5/27, 6/2, 6/10

9066532 Bottlebrush squirreltail	Field 26N – 0.30 Acre	2008 Date
Fertilization		
160 lbs. Nitrogen		2/19, 5/13, 7/22, 9/9
40 lbs. Phosphorous		9/12
Irrigation		
3” water application		2/26, 3/17, 4/10, 4/29, 5/9, 6/2, 7/25, 9/12, 10/28, 12/2
Herbicide Application		3/10, 9/5
Pesticide Application		5/20, 6/13
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		3/7, 4/21, 7/7
Harvest		
Flail-Vac Harvester		6/13

B. Seed Produced

Table 3-3 describes the seed production for the year 2008.

Table 3-3: 2008 Seed Production

Common name	Scientific name	Pounds bulk
Bottlebrush squirreltail	<i>Elymus elymoides</i>	7.22
Galleta	<i>Pleuraphis jamesii</i>	0.46
Indian ricegrass	<i>Achnatherum hymenoides</i>	79.04
Muttongrass	<i>Poa fendleriana</i>	0.86
Sand bluestem	<i>Andropogon hallii</i>	16.48

C. Climatological Data

See Appendix A for the climatological data for 2008 at the Los Lunas Plant Materials Center.

VII. Transplant Production

Transplants are not part of this agreement.

VIII. Specialized Treatments

See previous ZNP reports for information on specialized treatments.

IX. Observations

During the 2008 season, the following observations were made for the ZNP agreement:

- Blue grama – No ZNP blue grama production blocks were established for ZNP at the LLPMC in 2008.
- Bottlebrush squirreltail – Transplants were grown by the LLPMC, and these transplants were used to establish a 0.20 acre production field in Field 19. Seed was harvested in 2008 from an already existing planting located in Field 26N.
- Galleta –Galleta seed was harvested from the galleta planting in Field 35N at the LLPMC in 2008. The galleta planting in Field 24S did not produce much forage or seed heads this year, and no seed was harvested. The fields will receive increased amounts of fertilizer and water in 2009 to see if this results in better seed production.
- Indian ricegrass –Indian ricegrass seed was harvested from the production field at the LLPMC in 2008.
- Muttongrass – In 2008 seed was harvested from the LLPMC production field. The amount of seed heads was numerous, but seed fill was low. The planting vigor diminished in 2008 and a new production field of the muttongrass should be established in 2009 to meet the contract requirements for this species.
- Sand bluestem – In 2008 seed was harvested from the LLPMC production field. The sand bluestem fields were healthy and had good forage vigor in 2008. Seed head production was abundant this year, but unfortunately just prior to seed harvest, the LLPMC experienced a major storm event. The storm's high winds and hail resulted in a majority of the ripe seed to be stripped from the sand bluestem plants.



Figure 3-1: Field 26N – ZNP 2008 Bottlebrush Squirreltail Production Field



Figure 3-2: Field 19 – ZNP October 2008 Bottlebrush Squirreltail Planting



Figure 3-3: Field 35N – ZNP Indian Ricegrass Production Field



Figure 3-4: Field 35S – ZNP Muttongrass Production Field

Chapter 4 Capulin Volcano National Monument

I. Background

On August 30, 2004 an agreement among the US Department of Interior (DOI), the National Park Service (NPS), the Capulin Volcano National Monument (CVNM), and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) was made to propagate and increase native grass species found on CVNM. CVNM will be responsible for the collection of native seed. The LLPMC will propagate the seed for the purpose of establishing seed production fields.

II. Accessions Involved

Table 4-1 lists the accessions involved in the CVNM project.

Table 4-1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number
Blue grama	<i>Bouteloua gracilis</i>	BOGR	9066609
Little bluestem	<i>Schizachyrium scoparium</i>	SCSC	9066612
Mountain muhly	<i>Muhlenbergia montana</i>	MUMO	9066611
Western wheatgrass	<i>Pascopyrum smithii</i>	PASM	9066610

III. Collection Information

No seed was received from CVNM in 2008.

IV. Seed Condition Information

See previous CVNM reports for seed condition information.

V. Seed Production Establishment

Table 4-2: 2008 Established Production Fields

Common Name	Agreement Acreage	2008 LLPMC Acreage	Accession Number
Blue grama	0.50	0.50	9066609
Little bluestem	0.50	0.50	9066612
Mountain muhly	0.50	0.50	9066611

VI. Seed Production

A. Field Management

9066609 Blue grama	Field 23S – 0.50 acre	2008 Date
Fertilization		
80 lbs. Nitrogen		6/19, 7/22
40 lbs. Phosphorous		2/19
Irrigation		
3” Water Application		3/19, 6/6, 6/24, 7/25
Herbicide Application		3/11, 5/27
Pesticide Application		7/21

9066609 Blue grama	Field 23S – 0.50 acre	2008 Date
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		7/18, 9/9
Harvest		
Combine		9/18

9066612 Little bluestem	Field 23S – 0.50 acre	2008 Date
Fertilization		
80 lbs. Nitrogen		6/19, 7/22
40 lbs. Phosphorous		2/19
Irrigation		
3” Water Application		3/19, 6/6, 6/24, 7/25
Herbicide Application		3/11, 5/27
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		7/18
Harvest		
Flail-Vac		9/08

9066611 Mountain Muhly	Field 27N – 0.50 acre	2008 Date
Fertilization		
80 lbs. Nitrogen		6/17, 7/22
40 lbs. Phosphorous		2/19
Irrigation		
3” Water Application		3/12, 6/5, 6/19, 7/25
Herbicide Application		3/11, 5/27
Pesticide Application		8/27
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		7/7

B. Seed Produced

Table 4-3 describes the seed production for the year 2008.

Table 4-3: 2008 Seed Production

Common name	Scientific name	Pounds Cleaned
Blue grama	<i>Bouteloua gracilis</i>	7.40
Little bluestem	<i>Schizachyrium scoparium</i>	0.10
Mountain muhly	<i>Muhlenbergia montana</i>	No harvest

C. Climatological Data

See Appendix A for the climatological data for 2008 at the Los Lunas Plant Materials Center.

VII. Transplant Production

Transplant production is not part of this agreement.

VIII. Specialized Treatments

No specialized treatments were done in 2008.

IX. Observations

The following observations were made in 2008 for the CVNM agreement:

- Blue grama – The blue grama field produced seed in 2008.
- Little bluestem – The little bluestem field produced seed in 2008.
- Mountain muhly – The mountain muhly seed field did not produce any seed in 2008. The mountain muhly had a foliar application of iron applied in June of 2008. The iron application was done to evaluate its affect on stimulation of forage and seed production. An application of insecticide was applied in August of 2008 to prevent insect damage during seed development. No seed was found in the mountain muhly florets even after these treatments. Seed production for this species continues to be a problem at the LLPMC, and different types of treatments will be evaluated.



Figure 4-1: Field 23S – CVNM Little Bluestem Production Field as of September 2007.

Chapter 5

Carlsbad Caverns National Park

I. Background

On August 23, 2004, an agreement among the US Department of Interior (DOI), the National Park Service (NPS), Carlsbad Caverns National Park (CCNP), and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) was made for the collection, propagation, and increase of native grass species.

II. Accessions Involved

Table 5-1 lists the accessions involved in the CCNP project.

Table 5-1: Accessions Involved

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

III. Collection Information

See previous CCNP reports for seed collection information.

IV. Seed Condition Information

See previous CCNP reports for seed condition information.

V. Seed Production Establishment

Table 5-2 describes the 2008 seed production fields established at the LLPMC.

Table 5-2: 2008 CCNP Established Production Fields

Common name	Scientific name	Agreement Acreage	2008 LLPMC Acreage
Blue grama	<i>Bouteloua gracilis</i>	0.50 acre	0.50 acre
Green sprangletop	<i>Leptochloa dubia</i>	0.50 acre	0.50 acre
Plains bristlegrass	<i>Setaria vulpiseta</i>	0.50 acre	0.90 acre
Purple three-awn	<i>Aristida purpurea</i>	0.50 acre	0.50 acre
Sideoats grama	<i>Bouteloua curtipendula</i>	0.50 acre	0.50 acre

VI. Seed Production

A. Field Management

9066604 Blue grama	Field 13 – 0.50 acre	2008 Date
Fertilization		
120 lbs. Nitrogen		2/19, 6/23, 7/22
80 lbs. Phosphorous		2/19, 6/23
Irrigation		
3” Water Application		3/21, 6/5, 6/24, 7/28, 8/28
Herbicide Application		3/20
Cultural Weed Control		4/21, 7/11, 9/9
Hand Hoeing		As needed
Harvest		
Combine		10/29

9066605 Sideoats grama	Field 23N – 0.50 acre	2008 Date
Fertilization		
80 lbs. Nitrogen		6/19, 7/22
40 lbs. Phosphorous		2/19
Irrigation		
3” Water Application		3/20, 6/9, 6/24, 7/28, 8/12
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		7/21, 8/27
Herbicide Application		3/11, 5/27
Harvest		
Combine		9/16

9066606 Plains bristlegrass	Field 20S, 28S – 0.90 acre	2008 Date
Fertilization		
80 lbs. Nitrogen		6/23, 9/9
40 lbs. Phosphorous		2/19
Irrigation		
3” Water Application		3/24, 6/12, 6/23, 8/13
Herbicide Application		3/12, 5/27
Pesticide Application		7/1
Cultural Weed Control		
Hand Hoeing		As needed
Harvest		
Combine		7/31, 8/14

9066658 Green Sprangletop	Field 24N – 0.50 acre	2008 Date
Fertilization		
80 lbs. Nitrogen		6/19, 7/22
40 lbs. Phosphorous		2/19
Irrigation		
3” Water Application		3/18, 6/5, 6/23, 7/18, 8/8, 8/28, 9/18

9066658 Green Sprangletop	Field 24N – 0.50 acre	2008 Date
Herbicide Application		3/11, 5/27
Cultural Weed Control		
Hand Hoeing		As needed
Combine		9/23

9066607 Threawn	Field 24S – 0.50 acre	2008 Date
Fertilization		
40 lbs. Nitrogen		6/19
40 lbs. Phosphorous		2/19
Irrigation		
3" Water Application		3/14, 6/5, 6/23, 7/28
Herbicide Application		3/11, 5/27
Pesticide Application		7/21
Cultural Weed Control		
Hand Hoeing		As needed
Harvest		
Flail-Vac harvester		7/28, 8/14, 8/25

B. Seed Produced

Table 5-3 describes the seed production for the year 2008.

Table 5-3: 2008 CCNP Seed Production

Common name	Scientific name	Pounds cleaned
Blue grama	<i>Bouteloua gracilis</i>	29.46
Green sprangletop	<i>Leptochloa dubia</i>	65.84
Plains bristlegrass	<i>Setaria vulpiseta</i>	224.50
Sideoats grama	<i>Bouteloua curtipendula</i>	81.18
Threawn	<i>Aristida purpurea</i>	16.50

C. Climatological Data

See Appendix A for the climatological data for 2008 at the Los Lunas Plant Materials Center.

VII. Transplant Production

In 2008 the LLPMC produced transplants for five CCNP grass species for plantings at the Park. The CCNP picked up the transplants from the LLPMC in September of 2008.

Table 5-4 lists transplants produced for CCNP in 2008.

Table 5-4: 2008 CCNP Seed Production

Common name	Scientific name	Number of Transplants*
Blue grama	<i>Bouteloua gracilis</i>	331
Green sprangletop	<i>Leptochloa dubia</i>	334
Plains bristlegrass	<i>Setaria vulpiseta</i>	293
Sideoats grama	<i>Bouteloua curtipendula</i>	339
Threawn	<i>Aristida purpurea</i>	303

* Transplants grown in 10-cubic-inch Super Cell containers

VIII. Specialized Treatments

No specialized treatments were done in 2008.

IX. Observations

The following observations were made in 2008 for the CCNP agreement:

- Blue grama – Seed was harvested from the CCNP blue grama field in 2008.
- Green sprangletop – Although green sprangletop was not specified in the original agreement, it was added by CCNP in 2006. The green sprangletop produced seed in 2008.
- Plains bristlegrass – Seed was harvested from the plains bristlegrass in 2008. In September of 2008, the LLPMC provided 29 forage bales to CCNP from the bristlegrass seed production field. The bales were to be used by CCNP for mulching areas being seeded at the Park.
- Sideoats grama – Seed was harvested from the CCNP sideoats grama in 2008.
- Three-awn – Seed was harvested from the CCNP three-awn in 2008.



Figure 5-1: Field 20S – CCNP Plains Bristlegrass Production Field



Figure 5-2: Field 24S – CCNP Three-awn Production Field

Chapter 6 Wupatki National Monument

I. Background

On May 16, 2006, an agreement was made between the Wupatki National Monument (WNM) of the U. S. Department of Interior (USDI) and the Natural Resources Conservation Service (NRCS) of New Mexico. This agreement declares that the Los Lunas Plant Materials Center (LLPMC) of the NRCS will produce seed for the WNM.

II. Accessions Involved

Table 6-1 lists the accessions involved in the WNM project.

Table 6-1: Accessions Involved

Common Name	Scientific Name	Plant Symbol	Accession Number
Bottlebrush squirreltail	<i>Elymus elymoides</i>	ELEL5	9066656
Galleta	<i>Pleuraphis jamesii</i>	PLJA	9066657
Needle and thread	<i>Hesperostipa comata</i>	HECO	9066655

III. Collection Information

No seed was received from WNM in 2008. See previous WNM reports for seed collection information.

IV. Seed Condition Information

See previous WNM reports for seed condition information.

V. Seed Production Establishment

See Table 6-2 for the seed production fields established at LLPMC.

Table 6-2: 2008 WNM Established Production Fields

Common name	Scientific name	Agreement Acreage	2008 LLPMC Acreage
Bottlebrush squirreltail	<i>Elymus elymoides</i>	1.00	0.00
Galleta	<i>Pleuraphis jamesii</i>	2.00	2.00
Needle and thread	<i>Hesperostipa comata</i>	1.00	0.24

VI. Seed Production

A. Field Management

9066655 Needle and thread

Field 34S – 0.24 acre

2008 Date

Fertilization		
200 lbs. Nitrogen		2/19, 4/21, 5/13, 7/22, 9/9
80 lbs. Phosphorous		2/19, 9/12
Irrigation		
3" Water Application		2/26, 3/18, 4/10, 4/22, 5/13, 6/12, 7/28, 8/25, 9/12, 10/28
Herbicide Application		9/4
Pesticide Application		5/20

Cultural Weed Control		
Hand Hoeing		As needed
Mechanical cultivation		4/21, 6/24
Harvest		
Forage harvester		6/2,3

9066657 Galleta	Field 20S – 1.0 acre	2008 Date
Transplanted		5/15
Fertilization		
80 lbs. Nitrogen		6/23, 7/22
40 lbs. Phosphorous		2/19
Irrigation		
3” Water Application		3/21, 6/12, 8/4, 8/13
Herbicide Application		3/12, 5/28
Cultural Weed Control		
Hand Hoeing		As needed
Harvest		
Flail-Vac Harvester		7/17, 7/22, 7/25, 7/29

9066657 Galleta	Field 14 – 1.0 acre	2008 Date
Fertilization		
80 lbs. Nitrogen		10/18, 12/5
Irrigation		
3” Water Application		3/31, 4/24, 6/9, 6/24, 9/3
Pesticide Application		7/2, 7/28, 8/15, 9/12
Cultural Weed Control		
Hand Hoeing		As needed
Mechanical Cultivation		6/5, 7/3
Harvest		
Flail-Vac Harvester		7/25, 7/17, 7/22, 7/29

B. Seed Produced

Table 6-3 describes the seed production for the year 2008.

Table 6-3: 2008 Seed Production

Common name	Scientific name	Pounds Clean Seed
Galleta	<i>Pleuraphis jamesii</i>	6.12
Needle and thread	<i>Hesperostipa comata</i>	In cleaning process

C. Climatological Data

See Appendix A for the climatological data for 2008 at the Los Lunas Plant Materials Center.

VII. Transplant Production

Transplant production is not part of this agreement.

VIII. Specialized Treatments

No specialized treatments were done in 2008.

IX. Observations

The following observations were made in 2008 for the WNM agreement:

- Bottlebrush squirreltail – The LLPMC did not receive any bottlebrush squirreltail seed from WNM in 2008. A production field has not been established at the LLPMC.
- Galleta – Seed was harvested from the WNM galleta production field in 2008.
- Needle and thread – The WNM needle and thread field is established and seed was harvested in 2008.



Figure 6-1: Field 14 – WNM Galleta Production Field



Figure 6-2: Field 34S – WNM Needle and Thread Production Field

Appendix A Climatological Data

2008 Climatological Data – Los Lunas Plant Materials Center, Los Lunas, New Mexico

Average Temperatures Fahrenheit				
Month	High	Low	Monthly Average	Monthly Precipitation/Inches
January	49.9	13.3	31.6	0.31
February	58.6	19.8	39.2	0.24
March	69.2	23.8	46.5	0.01
April	75.2	31.0	53.1	0.00
May	81.4	44.4	62.9	1.05
June	96.2	54.2	75.2	0.63
July	92.9	62.2	77.6	1.65
August	93.9	58.1	76.0	1.60
September	87.2	48.8	68.0	0.17
October	76.1	36.9	56.5	1.22
November	64.7	23.6	44.2	0.14
December	54.7	21.2	38.0	0.15
	Avg. High 75.0	Avg. Low 36.4	Mean Temp. 55.7	Yearly Total 7.17