

Badlands National Park

2008 Annual Technical 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 interagency agreement was signed in May 2007, and runs through FY 2010.

Targeted Species and Amounts

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

Accomplishments

Seed was collected throughout the summer and fall of 2007 by park staff. On July 24, 2007, Badlands National Park staff along with staff from the Natural Resources Conservation Service spent a day collecting seed at the park. All seed was inventoried at the Bismarck PMC and was cleaned, tested and used in the planting of seed increase fields at the PMC. Each species of seed was assigned an accession number (identification number). Seed germination and purity was tested by the North Dakota State Seed Department. The green needlegrass was dormant planted on November 30, 2007. All of the other species except sand dropseed were seeded in the spring of 2008. Seed from the sand dropseed was planted in the PMC greenhouse in February 2008. Approximately 700 sand dropseed plants were propagated for establishing the seed production field. Following are details related to seed increase activities for each grass species. See Table 1 for cumulative information on target species collected at Badlands National Park. See Figure 1 and 2 for field location maps.

Green needlegrass: accession 9092167

Seed cleaning: Debearder and a two-screen office fanning mill. The debearder speed was 160 rpm for 15 minutes. The office mill screen sizes were #9 round on top and a 1/22 bottom screen, with air 1/2 open.

Seeding date: November 30, 2007. Due to high seed dormancy, seed was planted in late fall.

Site preparation: The field was cultivated and packed. No preplant herbicides were used. Field conditions were good with a firm seedbed. Soil moisture was dry at the surface and frozen below the 3-inch depth. Air temperatures were in the teens at the time of seeding.

Seeding: The field was dormant seeded on November 30, 2007. The seeding rate was approximately 50 seeds (bulk)/linear foot. Twelve rows, approximately 424 feet long, were planted using a modified Truax grass drill with 42-inch row spacing (0.41 acre). The seed was planted at a depth of 1/2 inch. The field received approximately 2 to 3 inches of snow cover the day after planting. The planting is located in panel G-4 on the southwest side.

Maintenance:

2008: On May 27, 2008, the field was sprayed for weeds using Buctril™ herbicide at a rate of 1.5 pints per acre. On June 27, and July 11, 2008, Sterling™ herbicide at the rate of 1 pint per acre was applied to the field. The field was hand rogued to remove weeds throughout the summer. Irrigation water was applied during the growing season. The field was fertilized on September 22, using 46-0-0 urea at a rate of 90 pounds of actual N per acre. A fall pre-emergent application of Trust™ herbicide was applied on October 9, at a rate of 1.5 pints per acre. The field was then lightly tilled the same day using a 2-row tiller to incorporate the Trust™ herbicide.

Plant performance:

2008: Seedlings were slow to emerge. A fair stand was present by mid-summer. Weeds presented a problem during the summer and herbicide applications were necessary to reduce the weed pressure. Seed continued to germinate and the stand improved by late summer.

Harvest: No harvest was done in 2008.

Western wheatgrass: accession 9092165

Seed cleaning: Hammermill and a two-screen office fanning mill. The material was first run through a hammermill to break the seed from the stem. The material was hammered milled twice. The first run was with a 1/4-inch screen size. The second run was through a 3/16-inch screen. The office mill screen sizes were 1/12 x 1/2 on top and a blank screen on the bottom for the first run. The second run used a 1/14 x 1/4 screen on top and a blank on the bottom. The side plate setting was 1/4 open on both runs.

Seeding date: May 6, 2008

Site preparation: The seedbed was prepared by working twice with a 6-foot S-tine cultivator and packing twice with a Brillion packer.

Seeding: A seeding rate of 35 PLS per linear foot was used for planting the field. Fourteen rows, approximately 1,290 feet long, were planted using a modified Truax grass drill with 42-inch row spacing (1.5 acres). The seed was planted at a depth of 1/2 inch. The field is located in panel G-2 of the PMC.

Maintenance:

2008: On May 27, and again on June 19, 2008, the field was sprayed for weeds using Buctril™ herbicide at a rate of 1.5 pints per acre. On June 27, and again on July 11, Sterling™ herbicide at the rate of 1 pint per acre was applied to the field. The field was hand rogued to remove weeds throughout the summer. Irrigation water was applied during the growing season. On September 3, the field was sprayed with 2 pints per acre of 2,4-D herbicide for fall emerging weeds. The field was fertilized on September 22, using 46-0-0 urea at a rate of 90 pounds of actual N per acre. A fall pre-emergent application of Trust™ herbicide was applied on October 9, at a rate of 1.5 pints per acre. The field was lightly tilled the same day using a 2-row tiller to incorporate the Trust™ herbicide.

Plant performance: The seedlings emerged very well and a good stand was established by mid summer.

Harvest: No harvest was done in 2008.

Slender wheatgrass: accession 9092166

Seed cleaning:

2007: Hammermill and two-screen office fanning mill. The seed was initially run through a hammermill to separate seed from the stems. A ¼-inch screen size was used on the hammermill and a slow speed was used. The material was fed at full rate. The material was hammermilled twice. The seed was then run through an office mill twice. The first run used a number 12 screen size for the top screen and a blank screen was used on the bottom. A number 10 screen size was used as the top screen with a blank screen being used on the bottom for the second run. The side plate setting on the office mill was ¼ open for both runs.

2008: Twenty-eight pounds of dirty seed was harvested from the field. The seed was cleaned using a 3-screen fanning mill. The seed was run through the fanning mill twice using the same settings. The number 1 screen was a 1/14 x ½ inch slotted hole screen. The number 2 screen was a ¼ inch x 1/16 inch slotted hole screen. The number three screen was a 9 tri with a 1 inch opening. Air speed was set at 248 rpm with the side plate setting open. The seed was finished using a cylinder indent cleaner with a 3-0 screen size and a cylinder speed of 50 rpm. The feeder speed was set at a slow setting (6) and the feeder capacity set at 1/1/2 inch open. Five pounds of clean seed resulted. This seed will be bulked with the 2009 harvest and tested for a purity and germination.

Seeding date: May 6, 2008

Site preparation: The seedbed was worked twice with a 6-foot S-tine cultivator and packing twice with a Brillion packer.

Seeding: A seeding rate of 25 PLS per linear foot was used for planting the field. Six rows, approximately 1,039 feet long, were planted using a modified Truax grass drill with 42-inch row spacing (0.95 acre). The seed was planted at a depth of 1/2 inch. The field is located in panel G-2 of the PMC.

Maintenance:

2008: On May 27, and again on June 19, 2008, the field was sprayed for weeds using Buctril™ herbicide at a rate of 1.5 pints per acre. On June 27, and again on July 11, Sterling™ herbicide at the rate of 1 pint per acre was applied to the field. The field was

hand rogued to remove weeds throughout the summer. Irrigation water was applied during the growing season. The field was fertilized on September 22, using 46-0-0 urea at a rate of 90 pounds of actual N per acre. A fall pre-emergent application of Trust™ herbicide was applied on October 9, at a rate of 1.5 pints per acre. The field was then lightly tilled the same day using a 2-row tiller to incorporate the Trust™ herbicide.

Plant performance: A stand was well established by the end of the growing season. A fair amount of the plants matured and produced seed.

Harvest: Twenty-eight pounds of dirty seed was harvested on September 15, 2008. A Wintersteiger plot combine was used for the harvest. The combine settings were as follows: cylinder speed was 850 rpm, cylinder clearance was 1 inch for the front and rear. Fan speed was set at 670 rpm. A large hole chaffer sieve was used and the finishing sieve was set at the sixth hole from the rear of the combine.

Blue grama: accession 9092168

Seed cleaning: Debearder and two-screen office fanning mill. The seed was processed through a debearder for 10 minutes before being run through a small office mill. The screens used were a number 10 screen for the top screen and a blank screen on the bottom. The seed was then hand screened to remove the larger sticks. A sample was sent to the seed testing lab and is awaiting germination and purity results.

Seeding date: June 10, 2008

Site preparation: The seedbed was prepared by working twice with a 6-foot S-tine cultivator and packing twice with a Brillion packer.

Seeding: A seeding rate of 70 PLS seeds per linear foot was used for planting the field. Due to the limited amount of seed a plot drill was used to plant a 6 foot x 270 foot bed (0.04 acres). The seed was planted at a depth of 1/2 inch. The bed is located in panel G-2 of the PMC.

Maintenance:

2008: On June 19, 2008, the field was sprayed for weeds using Buctril™ herbicide at a rate of 1.5 pints per acre. On June 27, and again on July 11, Sterling™ herbicide at the rate of 1 pint per acre was applied to the field. The field was hand rogued to remove weeds throughout the summer. Irrigation water was applied during the growing season. No fertilizer was applied to the field in 2008.

Plant Performance: Seedling emergence was slow and a fair stand was evident at the end of the growing season.

Harvest: A limited amount of ripe seed was hand stripped from the plants resulting in 2 pounds of dirty seed. The seed has been cleaned and 206 grams of clean seed were obtained. Due to the limited amount of seed, a 2008 seed test will not be done. The 206 grams will be bulked together with the 2009 harvest and tested at that time.

Sand dropseed: accession 9092169

Seed Cleaning:

2007: The park seed was separated from the stems by hand stripping. The seed was then hand screened using a pan screen to separate sticks and chaff out.

2008: The 5 pounds of 2008 harvested seed was cleaned using a hammermill to breakup stems and remove seed from the seed heads. The hammermill was run at a slow speed with a full rate of feed. The screen size was a 1/8 inch hole. The seed was then run across an office mill twice using the same settings, a 1/12 inch screen size for the first screen and a blank for the number 2 screen. The air speed was slow, side plate setting was closed. The seed was finished using an indent cleaner with a 2.75 inch screen.

Seed Quality: No seed was sent in for testing.

Seeding date: Approximately 700 greenhouse grown plants were transplanted to the field on May 22, 2008.

Site Preparation: The bed was prepared by working twice with a 6-foot S-tine cultivator and packing twice with a Brillion packer. A specialized tool bar with two chisel shovels spaced 42 inches apart was used to make 2 rows for transplanting.

Seeding: Due to the limited amount of seed available, plants were grown in the greenhouse and then planted into the field. Seed was planted in flats in the greenhouse on February 14. Plantlets were transplanted from the flats into conetainers when they were approximately 1/2 inch tall. The plants were allowed to grow in the greenhouse until May 12, when they were moved to the lathhouse to harden off for transplanting into the field. Approximately 700 plants were transplanted into two 283 foot long rows in panel G-2 of the PMC.

Maintenance:

2008: The plants were irrigated on May 23, the day after planting, to optimize transplant survival. On May 27, and again on June 19, the field was sprayed for weeds using Buctril™ herbicide at a rate of 1.5 pints per acre. On June 27, and again on July 11, Sterling™ herbicide at the rate of 1 pint per acre was applied to the field. The field was hand rogued to remove weeds throughout the summer. Irrigation water was applied during the growing season. No fertilizer was applied to the field in 2008.

Plant Performance: Survival was excellent and most of the plants produced viable seed the first year.

Harvest: A small harvest of 5 pounds dirty seed was taken using a Wintersteiger plot combine. The combine was set with a cylinder speed of 700 rpm, cylinder clearance of 1 inch in front and 1 inch in the rear. The fan speed was set at 600 rpm with the fan air closed. The large hole chaffer sieve was used and the finishing sieve was 1/2 inch open. Three pounds of clean seed resulted.

Table 1.

Accession number	Species	Targeted bulk seed collection weights (lbs)	Dirty seed collected weight (lbs)	Clean seed weight (lbs)	Purity (%)	Germination (%)			Pure live seed weight available for seeding (lbs)	Targeted field size (ac)	Actual planted field size (ac)	Targeted seed amt (lbs)	Cumulative bulk clean seed amount produced to date (lbs)
						Germination (%)	Dormant (%)	Total (%)					
9092167	green needle-grass	5.40	2.08	1.75	99.91	4.00	92.00	96.00	1.68	0.50	0.41	100	NA
9092165	western wheat-grass	22.00	20.86	8.25	85.40	83.00	2.00	85.00	5.99	1.50	1.50	200	NA
9092166	slender wheat-grass	4.00	4.41	2.00	77.92	78.00	6.00	84.00	1.32	0.50	0.95	100	5.00
9092168	blue grama	1.80	0.99	0.30	80.28	85.00	0.00	85.00	0.21	0.50	0.04	10	0.45
9092169	sand dropseed	0.20	0.22	NA-	No test	No test	No test	No test	700 plants	0.25	700 plants	5	3.00

Figure 1

Panel G-2



Figure 2

Panel G-4

