

**Coffee Point Off-Center Evaluation (2006 planting)  
2008 Progress Report  
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## **INTRODUCTION**

In the fall of 2006, the Aberdeen Plant Materials Center (PMC) installed a multi-species off-center planting at the Coffee Point test site 25 miles northwest of Aberdeen, Idaho. Seed collections were assembled with the assistance of ARS Logan, UT; Bridger, MT PMC; Benson Seed Farm; University Nevada, Reno; Department of Defense; Geertson Seed Farm and Los Lunas, NM PMC. The trial contains 58 accessions of 23 species of native and introduced grasses, forbs and shrubs (table 1). Figure 1 shows a plot map of the planting. The goal of this trial is to evaluate the adaptability of new conservation releases in a low precipitation environment and compare their establishment, production and longevity against older traditionally used released plant materials.

The Coffee Point test site is located in Major Land Resource Area (MLRA) 11B, Snake River Plains of the Northwestern Wheat and Range region of the Intermountain West in what historically supported a Wyoming big sagebrush/bluebunch wheatgrass plant community. Climatic conditions are very dry with mean annual precipitation ranging from 8 to 12 inches, average air temperature is 43° F, and the frost free period is approximately 90 days. Soils at the site are the Splittop-Atomic complex with 2 to 8% slopes and effective rooting depth of 20 to 40 inches. The pH of the soil complex is 7.4 to 8.4. The elevation is 4,850 ft.

## **MATERIALS AND METHODS**

Prior to site preparation we determined the pre-existing cover frequencies by running four 30 meter transects across randomly chosen portions of the test site on April 15, 2006. Intercept determinations were made at each meter. Pre-existing cover consisted of 38.3% litter; 28.3% bare ground; 15.8% P-27 Siberian wheatgrass; 14.2% Hycrest crested wheatgrass and 3.3% Immigrant forage kochia.

The seed bed was prepared with chemical treatments of 16 oz 2,4-D and 64 oz Roundup per acre applied on May 2, 2005, August 1, 2005 and May 17, 2006. The site was disked on August 3, 2006. The trial was planted on November 20, 2006 with a modified Tye Drill with a width of 80 inches (8 spouts at 10" spacing). Experimental design was a randomized complete block with 4 replications. Each plot was one drill width wide (80 in) and 20 ft long. Species were arranged into blocks with the exception of introduced grasses, forbs and shrubs making up one block each. Seeding depths were dependent on species and were planted according to Ogle et al (2006). Species were seeded at a target rate of 20 to 30 pure live seeds (PLS) per ft<sup>2</sup> for large seeded species (<500,000 seeds per pound) and 40 to 50 PLS/ft<sup>2</sup> for smaller seeded species (>500,000 seeds/lb). PLS was determined by seed lab results or, when lab results were not available, PLS was estimated visually or the PLS from other accessions were averaged. All seed was mixed with rice hulls as an inert carrier for improved seed flow according to St. John et al (2005) with the exception of fourwing and Gardener's saltbush. A cover crop of 50% Anatone bluebunch

wheatgrass, 20% Bannock thickspike wheatgrass, 20% Magnar basin wildrye and 10% Snake River Plains fourwing saltbush was planted in the prepared areas surrounding the trial.

Establishment year evaluations were conducted on April 30 and May 1, 2007 and again on September 7, 2007 using a frequency grid based on that described by Vogel and Masters (2001). The grid measured approximately 40X41 inches, having four ten inch columns (to incorporate 1 drill row per column) and five rows, totaling 20 cells. The first grid was laid on the rows approximately 1 ft into the plot. Counts were made of the cells that contained at least one plant. Grids were subsequently advanced one grid length in the plot and evaluated four more times giving a total of 100 evaluated cells. Density evaluations for 2008 took place on April 28 in the same manner as 2007. In August 2008 forage samples were taken from those species blocks judged to have enough production to warrant evaluation: thickspike wheatgrass, slender wheatgrass, and the introduced grass species. A 2' x 6' metal frame was placed in the center of each plot, and all above ground biomass was hand clipped and placed in paper grocery sacks. Forage samples were air dried for two weeks and weighed. Data were then converted to lbs/acre. All tables have been arranged with accessions ranked from highest plant density to the lowest at the time of the first evaluation. Data were analyzed using the Statistix 8 Analytical software and subjected to an analysis of variance with a significance level of  $p < 0.05$ . If significance was detected, means were separated using a Tukey HSD all pairwise comparison.

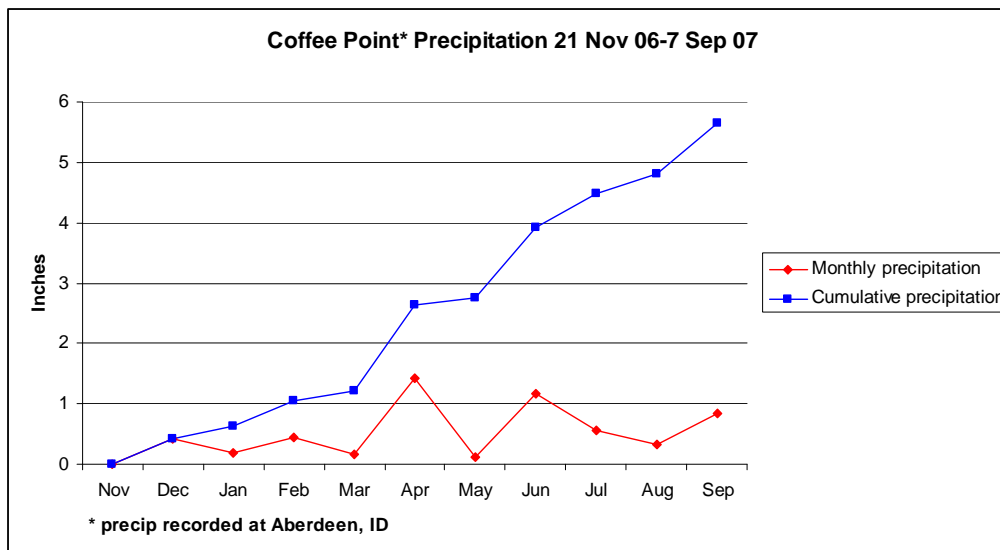
## **ZEBA**

Also included in the planting are single observational plots of Appar blue flax, Goldar bluebunch wheatgrass, Magnar basin wildrye and Nezpar Indian ricegrass treated with ZEBA coating. ZEBA is a super-absorbent cornstarch based polymer. When saturated, the ZEBA molecules form a hydrogel that is able to absorb up to 400 times its original weight and holds and releases water for use by plants as needed. The reported result is faster germination, quicker emergence, consistent growth and higher, better-quality yields using less water. ZEBA plots will not be included in any statistical analysis and are only for observational purposes.

## **RESULTS**

At the time of the first evaluation in the spring of 2007, there was major crusting of the soil surface to about 0.5 in depth. Soil moisture conditions below the soil crust were good and most species had managed to break through the crust or had germinated inside the cracks in the soil. Most species had reached 1 to 4 true leaves by the first evaluation. Weed control from the chemical and mechanical treatments was excellent. Young plants of prickly lettuce (*Lactuca serriola*), white-stem blazing star (*Mentzelia albicaulus*), flixweed (*Descurainia sophia*), lupine (*Lupinus* sp.), tumble mustard (*Sisymbrium altissimum*) and Russian thistle (*Salsola kali*) were common throughout the test site, but were not in such numbers as would present a problem with competition.

Rainfall during the establishment year was lower than normal. In the 2007 water year, less than 6 inches of precipitation accumulated at Aberdeen. Spring rains in April helped establishment, but sparse summer rains caused many germinants to die by September. Water year 2008 was also lower than normal in precipitation. From October 1, 2007 through September 30, 2008, Aberdeen only received 4.45 inches of rain.



### SPECIES DISCUSSION

In the spring 2007 evaluation, basin wildrye densities ranged from 0.06 plants/ft<sup>2</sup> (Topinish and Jim Creek) to 0.24 plants/ft<sup>2</sup> (Trailhead). Densities dropped to 0.00 to 0.06 plants/ft<sup>2</sup> at the time of the fall evaluation. Plant densities remained low from the 2008 evaluation.

#### Basin wildrye

Accession	% PLS	Density (plants/ft <sup>2</sup> )		
		5/07	9/07	4/08
Trailhead	86.6	0.24 <sup>a</sup>	0.06 <sup>a</sup>	0.04 <sup>a</sup>
L-46	74.4	0.22	0.03	0.06
L-45	81.7	0.21	0.01	0.08
Magnar	89.6	0.15	0.01	0.03
Washoe	83.9	0.08	0.02	0.01
Gund	89.9	0.08	0.01	0.04
Jim Creek	83.6	0.06	0.01	0.01
Topinish	85.8	0.06	0.00	0.01

<sup>a</sup>Not significant at p<0.05

Although no significant differences were detected between the Sandberg bluegrass accessions, at the spring 2007 evaluation, 9081633, an accession being investigated by the Bridger, MT PMC had better overall establishment than all other accessions. 9081633 continued to have the highest density in the fall evaluation, 0.06 plants/ft<sup>2</sup>, which was significantly higher than all other accessions. In 2008 there was again no significant difference between means. High Plains Sandberg bluegrass increased from 0.00 plants/ft<sup>2</sup> to 0.06 plants/ft<sup>2</sup>, equaling accession 9081633 for the top performer.

Sandberg bluegrass

Accession	% PLS	Density (plants/ft <sup>2</sup> )		
		5/07	9/07	4/08
9081633	86.0	0.13 <sup>a</sup>	0.06 a	0.06 <sup>a</sup>
High Plains	95.0	0.07	0.00 b	0.06
Wallowa	83.2	0.02	0.05 b	0.02
Duffy	79.0	0.05	0.00 b	0.01
Mtn. Home	85.0	0.05	0.00 b	0.00
Critical value (0.05)		0.05		

<sup>a</sup>Not significant at p<0.05

In the bluebunch wheatgrass trial no significance was detected between density means for the spring or fall evaluation during 2007. Plant densities in the spring ranged from 0.01 plant/ ft<sup>2</sup> to 0.37 plants/ft<sup>2</sup>. The top performer was P-19, a test accession from the ARS (0.37 plants/ft<sup>2</sup>). Plant densities generally stayed the same between the spring and fall evaluations indicating good adaptability of the species to the site conditions. The 2008 evaluation yielded significant differences in plant densities. P-19 had the highest density with 0.26 plants/ft<sup>2</sup>, significantly greater than P-27 with 0.06 plants/ft<sup>2</sup>.

Bluebunch wheatgrass

Accession	% PLS	Density (plants/ft <sup>2</sup> )		
		5/07	9/07	4/08
P-19	92.9	0.37 <sup>a</sup>	0.37 <sup>a</sup>	0.26 a
Anatone	88.1	0.33	0.29	0.22 ab
P-24	91.2	0.28	0.28	0.22 ab
9081636	92.0	0.27	0.17	0.12 ab
P-22	85.3	0.24	0.28	0.20 ab
Wahluke	87.3	0.24	0.25	0.18 ab
Goldar	90.6	0.13	0.13	0.10 ab
P-27	87.4	0.11	0.09	0.06 b
P-7	89.4	0.11	0.12	0.11 ab
P-32	86.5	0.01	0.12	0.10 ab

<sup>a</sup>Not significant at p<0.05

0.17

Snake River wheatgrass densities were generally higher than those of bluebunch wheatgrass indicating, at least in this trial, greater adaptation to low precipitation conditions. The highest establishment density was 0.50 plants/ft<sup>2</sup> achieved by SERDP, and the lowest was 0.32 from E-46 during 2007. Densities decreased between the spring and fall evaluations. SERDP continued to have the highest density (0.35 plants/ft<sup>2</sup>). In 2008 SERDP had increased slightly to 0.38 plants/ft<sup>2</sup>, but there were still no detectable significant differences between means.

Snake River wheatgrass

Accession	% PLS	Density (plants/ft <sup>2</sup> )		
		5/07	9/07	4/08
SERDP	90.0	0.50 <sup>a</sup>	0.35 <sup>a</sup>	0.38 <sup>a</sup>
E-51	91.1	0.39	0.29	0.30
E-45	94.5	0.33	0.18	0.18
E-46	96.3	0.32	0.27	0.26

<sup>a</sup>Not significant at p<0.05

Thickspike and streambank wheatgrass exhibited good drought tolerance and seedling vigor with spring plant densities between 0.84 and 0.98 plants/ft<sup>2</sup> during 2007. No significant differences were detected between means. Densities remained high through the fall evaluation, with all accessions having densities between 0.66 and 0.78 plants/ft<sup>2</sup>. Plant densities of thickspike and streambank wheatgrass remained high in 2008. Sodar streambank wheatgrass had the best plant density with 0.83 plants/ft<sup>2</sup>, though that did not differ significantly from the other accessions. In 2008 forage yields were measured in the thickspike and streambank wheatgrass plots. The highest yielding accession was Bannock thickspike wheatgrass with 151 lb/ac. No significant differences were detected between forage yield means.

Thickspike and streambank wheatgrass

Accession	% PLS	Density (plants/ft <sup>2</sup> )			Forage (lb/ac) 8/08
		5/07	9/07	4/08	
Sodar	96.5	0.98 <sup>a</sup>	0.78 <sup>a</sup>	0.83 <sup>a</sup>	137 <sup>a</sup>
Critana	90.0	0.86	0.67	0.74	133
Bannock	94.3	0.84	0.66	0.73	151

<sup>a</sup>Not significant at p<0.05

Western wheatgrass is typically recommended for use in sites receiving 12 inches or more annual precipitation and is not well adapted to the conditions faced at Coffee Point. Although some plants did germinate from each of the accessions tested. Densities were very low in 2007, 0.03 to 0.05 plants/m<sup>2</sup> in the spring and slightly lower in the fall. In 2008 western wheatgrass densities remained very low with Rosana having the highest density of 0.07 plants/ft<sup>2</sup>.

Western wheatgrass

Accession	% PLS	Density (plants/ft <sup>2</sup> )		
		5/07	9/07	4/08
Rosana	90.0	0.05 <sup>a</sup>	0.02 <sup>a</sup>	0.07 <sup>a</sup>
9076517	90.0	0.03	0.03	0.03
9081630	85.0	0.03	0.03	0.01

<sup>a</sup>Not significant at p<0.05

Among the slender wheatgrass accessions, First Strike slender wheatgrass from the Department of Defense and ARS had significantly greater plant densities than Copperhead from the MT PMC during 2007. First Strike was developed for superior traits in germination and establishment for use on military training grounds. The other tested accession, Pryor did not differ significantly in establishment from of the other accessions. At the fall evaluation, the ranking remained constant, although densities decreased for all accessions. In 2008 slender wheatgrass densities of accession First Strike and Pryor increased slightly to 0.45 and 0.34 0.07 plants/ft<sup>2</sup> respectively, both significantly greater than Copperhead (0.08 plants/ft<sup>2</sup>). In 2008 accession First Strike yielded 143 lb/ac of forage, and Pryor had an average forage yield of 75 lb/ac.

Slender wheatgrass					
Accession	% PLS	Density (plants/ft <sup>2</sup> )			Forage (lb/ac)
		5/07	9/07	4/08	8/08
First Strike	90.0	0.53 a	0.37 a	0.45 a	143 a
Pryor	95.9	0.46 ab	0.30 ab	0.34 a	75 ab
Copperhead	85.0	0.23 b	0.08 b	0.08 b	0 b
Critical value (0.05)		0.28	0.28	0.18	86

In the bottlebrush squirreltail trial, accession 9019219, test material from the MT PMC had an establishment density of 0.65 plants/ft<sup>2</sup> during 2007 and was significantly greater than the plant density of Toe Jam Creek (0.20 plants/ft<sup>2</sup>). Fall densities remained essentially the same as spring. Accession 9019219 is likely the subspecies *elymoides* and is currently being tested by Bridger PMC in Montana, while Toe Jam Creek is subspecies *californicus* and was collected in a higher precipitation area near Elko, Nevada. In 2008 squirreltail density means were not separable statistically. Accession 9019219 had 0.58 plants/ft<sup>2</sup> and Toe Jam Creek had a density of 0.20 plants/ft<sup>2</sup>.

Bottlebrush squirreltail				
Accession	% PLS	Density (plants/ft <sup>2</sup> )		
		5/07	9/07	4/08
9019219	85.0	0.65 a	0.57 a	0.58 <sup>a</sup>
Toe Jam Creek	92.2	0.20 b	0.15 b	0.20
Critical value (0.05)		0.32	0.37	

<sup>a</sup>Not significant at p<0.05

Shrub densities were low and were not separable statistically in the spring 2007 evaluation. Most accessions had meager amounts of germinants; however Snake River Plains fourwing saltbush and the accession of Gardner's saltbush from the MT PMC both had fair establishment with 0.17 and 0.15 plants/ft<sup>2</sup> respectively. In the fall evaluation the saltbush accessions continued to have relatively good densities (0.19 for Gardner's and 0.13 for Snake River Plains). Other accessions had negligible establishment. In 2008 Snake River Plains fourwing saltbush and Gardner's saltbush both had densities of 0.19 plants/ft<sup>2</sup>. Open Range winterfat and Wyoming big sagebrush both had minimal establishment with densities of 0.06 and 0.01 plants/ft<sup>2</sup> respectively.

Shrubs				
Accession	% PLS	Density (plants/ft <sup>2</sup> )		
		5/07	9/07	4/08
Snake River Plains fourwing saltbush	44.5	0.17 <sup>a</sup>	0.13 ab	0.19 a
Gardener's saltbush, 9016134	30.0	0.15	0.19 a	0.19 a
Open Range winterfat	80.8	0.02	0.04 bc	0.06 ab
Wytana fourwing saltbush	45.0	0.01	0.00 c	0.00 b
Northern Cold Desert winterfat	85.2	0.00	0.00 c	0.00 b
Wyoming big sagebrush	21.3	0.00	0.01 bc	0.01 b
Critical value (0.05)			0.13	0.15

<sup>a</sup>Not significant at p<0.05

In the forb trial, only Maple Grove Lewis flax and the test accession of Phacelia, 9081632, from the MT PMC had fair establishment. Maple Grove had a plant density of 0.45 plants/ft<sup>2</sup> and was significantly greater than all other accessions with the exception of Phacelia which had a density of 0.28 plants/m<sup>2</sup> during 2007. All other accessions had essentially zero plants emerge. In the fall, Maple Grove continued to have the best density (0.20 plants/ft<sup>2</sup>). Most of the Phacelia plants had died by the fall evaluation, and Cedar Palmer penstemon had an increase in density, from 0.00 to 0.06 plants/ft<sup>2</sup>. In 2008 the only forbs with surviving plants in the plots were Maple Grove Lewis flax and Great Northern western yarrow. Maple Grove had significantly better plant density than all other accessions with 0.36 plants/ft<sup>2</sup>.

Forbs				
Accession	% PLS	Density (plants/ft <sup>2</sup> )		
		5/07	9/07	4/08
Maple Grove Lewis flax	93.0	0.45 a	0.20 a	0.36 a
Phacelia	81.8	0.28 ab	0.00 b	0.00 b
Great Northern w. yarrow	90.0	0.01 b	0.00 b	0.01 b
Cedar Palmer penstemon	95.0	0.00 b	0.06 ab	0.00 b
Eagle w. yarrow	90.0	0.00 b	0.01 b	0.00 b
Richfield firecracker penstemon	92.2	0.00 b	0.00 b	0.00 b
Antelope prairie clover	98.0	0.00 b	0.00 b	0.00 b
Old Works penstemon	95.0	0.00 b	0.00 b	0.00 b
Stillwater prairie coneflower	94.5	0.00 b	0.00 b	0.00 b
Critical value (0.05)		0.34	0.18	0.17

As a group, the introduced grasses outperformed all others with regard to establishment densities. All performed well with the lowest density coming from Bozoisky II Russian wildrye with a density of 0.54 plants/ft<sup>2</sup> during 2007. The best density was achieved by Vavilov II, a new release in 2008 of Siberian wheatgrass from the ARS, DOD and NRCS which had 1.48 plants/ft<sup>2</sup>. Fall densities were generally slightly lower than in the spring, but all accessions maintained good plant densities. Vavilov II again had a significantly higher density than all other accessions (1.46 plants/ft<sup>2</sup>). In 2008 Vavilov II densities remained significantly greater than all other accessions

with 1.53 plants/ft<sup>2</sup>. Forage yields of Vavilov II were also significantly greater than the other tested accessions. Vavilov II yielded 1176 lb/ac of forage, while the next closest yield came from Vavilov with 528 lb/ac.

#### Introduced grasses

Accession	% PLS	Density (plants/ft <sup>2</sup> )			Forage (lb/ac)
		5/07	9/07	4/08	
Vavilov II Siberian wheatgrass	90.0	1.48 a	1.46 a	1.53 a	1176 a
Vavilov Siberian wheatgrass	90.0	0.74 b	0.68 b	0.75 b	528 b
Mustang Altai wildrye	90.0	0.75 b	0.58 b	0.70 b	56 b
Bozoisky Select Russian wildrye	90.7	0.70 b	0.65 b	0.65 b	189 b
Bozoisky II Russian wildrye	90.0	0.54 b	0.59 b	0.63 b	168 b
Critical value (0.05)		3.70	0.42	0.39	527

#### Zeba Initial Evaluation

We also included one plot each of Magnar basin wildrye, Goldar bluebunch wheatgrass, Appar blue flax and Nezpar Indian ricegrass which were treated with Zeba® moisture retention seed coating. Because there was only one plot of each accession, these plots could not be analyzed statistically and only general observations can be made. The treated Magnar seed had a mean density of 0.71 plants/ft<sup>2</sup> as compared with 0.15 plants/ft<sup>2</sup> achieved in the untreated plots during 2007. Likewise, the treated Goldar plot had an average plant density of 0.43 plants/ft<sup>2</sup> while the untreated plots averaged only 0.13 plants/ft<sup>2</sup>. Appar and Nezpar were not included in the main trial, so a comparison cannot be made, however, the results achieved with Magnar and Goldar are favorable. In the fall evaluation, all densities had decreased with the exception of Nezpar which increased from 0.09 to 0.15 plants/ft<sup>2</sup>. From 2007 to 2008 there were increases in plant densities for all accessions except Nezpar. The top plant density was recorded by Appar blue flax with 0.43 plants/ft<sup>2</sup>.

#### Zeba®

Accession	% PLS	Density (plants/ft <sup>2</sup> )		
		5/07	9/07	5/08
Magnar	87.3	0.71 <sup>a</sup>	0.24 <sup>a</sup>	0.30 <sup>a</sup>
Goldar	92.0	0.43	0.32	0.35
Appar	91.3	0.33	0.26	0.43
Nezpar	79.3	0.09	0.15	0.04

<sup>a</sup> Means not separated



## SUMMARY

Meager precipitation in the first two seasons provided good conditions to test the assembled accessions under extreme drought conditions. Several species and accessions proved unable to establish and survive at the Coffee Point test site. All three species of introduced grasses had good establishment and survival into the 2008 season. Native species that contained good performing accessions included thickspike and streambank wheatgrass, slender wheatgrass, Snake River wheatgrass and bottlebrush squirreltail. Of the forbs, only Maple Grove Lewis flax had a fair stand in 2008. In the shrub evaluation, Snake River Plains and Gardener's saltbush both had nice looking stands.

The plots will be evaluated again in 2009 for density and forage production. Subsequent evaluations will take place in 2011 (five year) and 2016 (ten year) to measure long-term persistence and forage yield.

## REFERENCES

Ogle, D., St. John, L., Stannard, M. and L. Holzworth. 2006. Technical Note 24: Grass, grass-like, forb, legume and woody species for the Intermountain West. USDA-NRCS, Boise, ID; Bozeman, MT and Spokane, WA. ID-TN 24. 41p.

St. John, L., Ogle, D., Tilley, D., Majerus, M. and L. Holzworth. 2005. Technical Note 7: Mixing seed with rice hulls. USDA-NRCS, Boise, ID. ID-TN 7. 14p.

Vogel, K.P. and R.A. Masters. 2001. Frequency grid-a simple tool for measuring grassland establishment. *Journal of Range Management* 54(6): 653-655.

**Table 1. List of species and accessions**

<b>Species</b>	<b>Accession</b>	<b>Seed source</b>
<b>Basin wildrye</b>	Trailhead	MTPMC
	Washoe	MTPMC
	Topinish	Benson Seed Farm
	Jim Creek	Benson Seed Farm
	Gund	UNR
	Magnar	IDPMC
	L-45	ARS
	L-46	ARS
<b>Sandberg bluegrass</b>	High Plains	MTPMC
	Mountain Home	FS
	Duffy Creek	Benson Seed Farm
	Wallowa	Benson Seed Farm
	9081633	MTPMC
<b>Bluebunch wheatgrass</b>	P-7	ARS
	P-32	ARS
	Wahluke	Benson Seed Farm
	9081636	MTPMC
	Anatone	IDPMC
	Goldar	IDPMC

	P-19	ARS
	P-24	ARS
	P-22	ARS
	P-27	ARS
<b>Snake River wheatgrass</b>	SERDP	ARS
	E-45	ARS
	E-46	ARS
	E-51	ARS
<b>Thickspike wheatgrass</b>	Critana	MTPMC
	Bannock	IDPMC
	Sodar	IDPMC
<b>Western wheatgrass</b>	Rosana	MTPMC
	9081630	MTPMC
	9076517	DOD/ARS
<b>Slender wheatgrass</b>	Pryor	MTPMC
	First Strike	DOD/ARS
	Copperhead	MTPMC
<b>Bottlebrush squirreltail</b>	9019219	MTPMC
	Toe Jam Creek	ARS
<b>Shrubs</b>	Wytana fourwing saltbush	MTPMC
	SRP fourwing saltbush	IDPMC
	9016134 Gardner saltbush	MTPMC
	N. Cold Desert winterfat	IDPMC
	Open Range winterfat	MTPMC
	Wyoming big sagebrush	BLM
<b>Forbs</b>	Great Northern w. yarrow	MTPMC
	Eagle w. yarrow	FS and Geertson
	Antelope P. clover	MTPMC
	Stillwater coneflower	MTPMC
	9081632 Phacelia	MTPMC
	Old works penstemon	MTPMC
	Cedar Palmer penstemon	NMPMC
	Maple Grove Lewis flax	IDPMC
	Richfield penstemon	IDPMC
<b>Intro. Grasses</b>	Bozoisky Russian wildrye	ARS
	Bozoisky II R. wildrye	ARS
	Vavilov Siberian wheatgrass	ARS
	Vavilov II S. wheatgrass	IDPMC
	Mustang Altai wildrye	ARS
<b>ZEBA</b>	Nezpar Indian ricegrass	IDPMC
	Magnar basin wildrye	IDPMC
	Goldar b. wheatgrass	IDPMC
	Appar blue flax	IDPMC

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### Figure 1. Plot map; Coffee Point, 2006

34'	20'												
1.	Trailhead	Washoe	Jim erk	Magnar	1.	Rosanna	9076517	9081630	Rosanna	1.	Rosanna	9081630	1.
2.	Washoe	Jim erk	Topimish	L-45	2.	9081630	Rosanna	Rosanna	9076517	2.	9076517	Rosanna	2.
3.	Topimish	Gund	Trailhead	Washoe	3.	9076517	9081630	9081630	9076517	3.	9081630	9081630	3.
4.	Jim erk	L-45	Magnar	L-46	4.	Pryor	Pryor	Pryor	First Strike	4.	Copper	Copper	4.
5.	Gund	Magnar	Washoe	L-46	5.	First Strike	Copper	Copper	Pryor	5.	Pryor	Pryor	5.
6.	Magnar	Trailhead	Gund	Jim erk	6.	Copper	First Strike	First Strike	Pryor	6.	First Strike	First Strike	6.
7.	L-45	L-46	L-45	Gund	7.	9019219	Toe jam	9019219	Toe jam	7.	Toe jam	Toe jam	7.
8.	L-46	Topimish	Magnar	Trailhead	8.	Toe jam	9019219	9019219	Toe jam	8.	9019219	9019219	8.
9.	High plains	Mt home	Wallowa	Duffy	9.	Wytana	SRP	SRP	Gardner's	9.	Open range	Open range	9.
10.	Mt home	Wallowa	Duffy	High plains	10.	SRP	Gardner's	Gardner's	WY sage	10.	NCD	NCD	10.
11.	Duffy	9081633	High plains	9081633	11.	Gardner's	Open range	Open range	NCD	11.	WY sage	WY sage	11.
12.	Wallowa	Duffy	9081633	Mt home	12.	NCD	Wytana	Open range	Open range	12.	Gardner's	Gardner's	12.
13.	9081633	High plains	Mt home	Wallowa	13.	Open range	WY sage	SRP	Wytana	13.	Wytana	Wytana	13.
14.	p-7	p-32	Goldar	Anatone	14.	WY sage	NCD	NCD	Wytana	14.	SRP	SRP	14.
15.	p-32	9081636	p-27	Goldar	15.	Great northern	Eagle	Eagle	Old works	15.	Stillwater	Stillwater	15.
16.	Wahluke	p-7	9081636	p-32	16.	Eagle	Phacelia	Phacelia	m. grove	16.	Old works	Old works	16.
17.	9081636	p-27	p-19	p-22	17.	Antelope	Great northern	Richfield	Richfield	17.	Antelope	Antelope	17.
18.	Anatone	p-24	p-32	p-19	18.	Stillwater	Cedar	Phacelia	Great northern	18.	Great northern	Great northern	18.
19.	Goldar	p-22	p-24	Wahluke	19.	Phacelia	M. grove	Stillwater	Stillwater	19.	M. grove	M. grove	19.
20.	p-19	Goldar	Anatone	p-7	20.	Old works	Stillwater	Antelope	Antelope	20.	Richfield	Richfield	20.
21.	p-24	Wahluke	p-22	p-27	21.	Cedar	Antelope	Antelope	Great northern	21.	Cedar	Cedar	21.
22.	p-22	p-19	p-7	p-24	22.	Maple grove	Richfield	Richfield	Cedar	22.	Eagle	Eagle	22.
23.	p-27	Anatone	Wahluke	9081636	23.	Richfield	Old works	Old works	Eagle	23.	Phacelia	Phacelia	23.
24.	SERDP	e-45	e-51	e-46	24.	Bozoisky	Vav II	Vav II	Mustang	24.	Vavilov	Vavilov	24.
25.	E-45	e-46	Serdp	e-51	25.	Boz II	Bozoisky	Bozoisky	Vavilov	25.	Mustang	Mustang	25.
26.	E-46	Serdp	e-45	e-45	26.	Vavilov	Mustang	Mustang	Vav II	26.	Bozoisky	Bozoisky	26.
27.	E-51	e-51	e-46	SERDP	27.	Vav II	Vavilov	Vavilov	Boz II	27.	Vav II	Vav II	27.
28.	Critana	Bannock	Bannock	Sodar	28.	Mustang	Boz II	Bozoisky	Bozoisky	28.	Boz II	Boz II	28.
29.	Bannock	Critana	Sodar	Critana	29.	ZEBa Nezmar	ZEBa Magmar	ZEBa Goldar	ZEBa Annar	29.	ZEBa Annar	ZEBa Annar	29.
30.	Sodar	sodar	critana	bannock	30.	blank	blank	blank	blank	30.	blank	blank	30.
34'	20'									14'			34'

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