



United States Department of Agriculture

# Aberdeen Plant Materials Center

Natural Resources  
Conservation Service

Aberdeen, Idaho

March 2014

## 2013 Annual Technical Report



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### Plant Materials Publications

The following documents were developed and reported in FY 2013. In order to condense the Annual Technical Report, these documents are not included but are available online:

Technical Notes [http://www.id.nrcs.usda.gov/programs/tech\\_ref.html#TechNotes](http://www.id.nrcs.usda.gov/programs/tech_ref.html#TechNotes)

Plant Guides [http://www.id.nrcs.usda.gov/programs/tech\\_ref.html#PlantGuides](http://www.id.nrcs.usda.gov/programs/tech_ref.html#PlantGuides)

Release Brochures [http://www.id.nrcs.usda.gov/programs/tech\\_ref.html#Brochures](http://www.id.nrcs.usda.gov/programs/tech_ref.html#Brochures)

Other documents <http://plant-materials.nrcs.usda.gov/idpmc/publications.html>

Year 2012 Aberdeen Plant Materials Center Progress Report of Activities

Intermountain Plant Notes newsletter (2013)

Technical Note 2C: Plant Materials for Pollinators and other Beneficial Insects in Eastern Utah and Western Colorado

Technical Note 4A: Filling out ID-CPA-025 Seeding/Planting Plan and UT Planting Specification Sheets

Technical Note 7: Mixing Seed with Rice Hulls

Technical Note 43: Tree and Shrub Planting, Care and Management

Technical Note 51: Threatened, Endangered and Candidate Plant Species of Idaho

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Technical Note 57: Effects of Long-term Refrigerated Storage on Hardwood Willow Cuttings

Technical Note 59: Ecology and Management of Canadian Horseweed (*Conyza canadensis*)

Plant Guides – Nebraska sedge, common reed, Columbia needlegrass, big flower agoseris, Canadian horseweed, Frisco buckwheat, Frisco clover, Las Vegas buckwheat, mountain goldnebanner, one flower sunflower, Ostler's pepperweed, western aster, showy goldeneye, meadow brome, limestone hawkbeard, slickspot peppergrass, Siberian wheatgrass, small burnet, orchardgrass, Russian wildrye, basin wildrye, common spikerush, winterfat, fourwing saltbush, Indian ricegrass, thickspike, streambank and Great Lakes wheatgrass

Fact Sheets – fourwing saltbush, bluebunch wheatgrass, common spikerush, Nebraska sedge, Snake River wheatgrass

Release Brochures – Aberdeen Selection Laurel willow, Anatone bluebunch wheatgrass, ‘Appar’ blue flax, ‘Bannock’ thickspike wheatgrass, Clearwater Venus penstemon, ‘Delar’ small burnet, ‘Ephraim’ crested wheatgrass, ‘Goldar’ bluebunch wheatgrass, ‘Magnar’ basin wildrye, Maple Grove Lewis flax, ‘Nezpar’ Indian ricegrass, ‘Paiute’ orchardgrass, ‘Recovery’ western wheatgrass, ‘Regar’ meadowbrome, Richfield firecracker penstemon,, ‘Sodar’ streambank wheatgrass, ‘Tegmar’ dwarf intermediate wheatgrass, ‘Vavilov II’ Siberian wheatgass

#### Other Documents

Conservation Grasses for Idaho and Utah brochure

Propagation Protocol for Douglas’ dustymaiden

Idaho Practice Standard 422 Hedgerow Planting

Hydroseeding improves field establishment of Nebraska sedge regardless of seed treatment. Native Plants Journal 14(2):89-94

Soaking Nebraska sedge in warm aerated water improves germination. Native Plants Journal 14(1):55-58

## **INTRODUCTION**

The Plant Materials Center at Aberdeen is part of a national plant materials program operated by the United States Department of Agriculture, Natural Resources Conservation Service. The purpose of the Plant Materials Center is to develop and communicate new technology for the use and management of plants to solve natural resource concerns. We also assemble, evaluate and release plant materials for conservation use and develop new techniques for establishment of conservation plants. The Aberdeen Plant Materials Center was established in 1939 and currently maintains 14 cultivars and 4 pre-variety (Selected Class) releases. The Aberdeen Plant Materials Center serves portions of Nevada, Utah, Oregon, Wyoming and Idaho. This document is a compilation of progress reports for activities by the Aberdeen Plant Materials Center during FY 2013.

The following presentations were developed during FY 2013 and may be obtained by contacting the Aberdeen Plant Materials Center:

**Title:** Pollinator Planting Demonstration

**Presenter:** L. St. John

**Location:** Boise, Idaho

**Description:** Overview of Pollinator Planting Demonstration seeding to Native Plant Summit.

**Date presented:** 3/27/2013

**Title:** Direct seeding of wetlands

**Presenter:** D. Tilley

**Location:** Boise, Idaho

**Description:** Presented data on wetland seeding trials for Intermountain Native Plant Summit.

**Date presented:** 3/27/2013

**Title:** Idaho/Utah Plant Materials Committee Meeting

**Presenter:** St. John

**Location:** Aberdeen Plant Materials Center

**Description:** Conducted joint plant materials committee meeting.

**Date presented:** 6/11/2013

**Title:** PMC activity overview, ID/UT committee meeting

**Presenter:** D. Tilley

**Location:** Aberdeen, Idaho

**Description:** Current activities and tour of PMC.

**Date presented:** 6/12/2013

**Title:** Utah plant materials webinar

**Presenter:** D. Tilley

**Location:** online

**Description:** overview of PM program and field planting program.

**Date presented:** 6/18/2013

**Title:** PM orientation

**Presenter:** Derek Tilley

**Location:** Aberdeen, Idaho

**Description:** overview of PM program and PMC activities.

**Date presented:** 6/19/2013

**Title:** Orientation - Plant Materials Technical Assistance and PMC tour

**Presenter:** St. John, Simonson, Bair

**Description:** Technical assistance available to field offices and tour of PMC as part of orientation.  
**Date presented:** 6/19/2013

**Title:** University of Idaho Aberdeen R&E Center Twilight Tour

**Presenter:** L. St. John

**Location:** Aberdeen, Idaho

**Description:** Staffed "Conserving Ecosystems of the West" poster, provided PMC brochures and answered questions.

**Date presented:** 7/24/2013

Copies of this document may be reproduced as needed. Please credit the Aberdeen Plant Materials Center when running a reprint. Some of the data is preliminary, and has not been confirmed through additional research. Therefore, if publishing data from this report, please contact the Team Leader at the Plant Materials Center.

*Note: Trade names are used solely to provide specific information and should not be considered a recommendation or endorsement by the Natural Resources Conservation Service.*

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FOUNDATION SEED PRODUCTION AT ABERDEEN PLANT MATERIALS CENTER

A major responsibility of the Aberdeen Plant Materials Center is the production of Foundation quality seed of the plant releases from the Center. Foundation seed is made available to the University of Idaho Agricultural Experiment Station, Idaho Crop Improvement Association, Utah Crop Improvement Association, other plant materials centers and cooperating agencies. Seed is distributed as provided for by allocation and exchange or other written agreements. Foundation seed of recent releases may also be provided to soil conservation districts for registered or certified seed production under the District Seed Increase (DSI) program.

The following table illustrates seed shipments from the Aberdeen Plant Materials Center for Fiscal year 2005 through 2013:

Cultivar	2005	2006	2007	2008	2009	2010	2011	2012	2013	TOTAL POUNDS
	POUNDS PLS									
Anatone bluebunch wheatgrass	250	350	400	775	450	155	125	80	640	3225
Appar blue flax	848	955	150	150	200	120	175	150	200	2948
Bannock thickspike wheatgrass	1110	900	240	150	0	0	100	850	1369	4719
Delar small burnet	945	490	100	1225	0	0	300	0	1200	4260
Ephraim crested wheatgrass	0	1300	300	500	605	0	0	300	350	3355
Goldar bluebunch wheatgrass	200	170	250	450	300	250	100	400	200	2320
Magnar basin wildrye	0	0	490	50	0	50	0	150	225	965
Maple Grove lewis flax	280	70	-	-	-	0	0	65	15	430
Nezpar Indian ricegrass	300	500	700	150	100	0	0	200	200	2150
P-27 Siberian wheatgrass <sup>1/</sup>	0	0	200	200	0	-	-	-	-	400
Clearwater selection penstemon	8	0	0	0	1	4	20	0	25	58
Richfield selection penstemon	11	25	6	4	11	9	5	10	5	86
Paiute orchardgrass	0	75	200	50	300	0	0	0	0	625
Recovery western wheatgrass	-	-	-	-	400	0	450	425	950	2225
Regar meadow brome	0	650	50	400	0	50	100	100	100	1450
Rush intermediate wheatgrass	800	300	500	0	0	0	0	50	725	2375
S.R.P. fourwing saltbush <sup>2/</sup>	16	0	0	0	0	0	0	0	-	16
Sodar streambank wheatgrass	625	775	250	400	50	0	0	300	800	3200
Tegmar dwarf intermediate wheatgrass	0	0	0	0	250	250	150	0	500	1150
Northern Cold Desert winterfat <sup>2/</sup>	20	5	4	0	0	2	0	0	-	31
VavilovII Siberian wheatgrass	-	-	-	600	300	635	320	230	366	2451
<b>TOTAL POUNDS</b>	<b>5,413</b>	<b>6,565</b>	<b>3,840</b>	<b>5,104</b>	<b>2,967</b>	<b>1,525</b>	<b>1,845</b>	<b>3,310</b>	<b>7870</b>	<b>38,439</b>

<sup>1/</sup> Release discontinued in 2009.

<sup>2/</sup> Release discontinued in 2012.

**March 22, 2013**

**Aberdeen Plant Materials Center**

**2013 FIELD ANNUAL PLAN OF OPERATION**  
**HOME FARM**

<u>Field</u>	<u>Acres</u>	<u>Crop</u>	<u>Operation</u>
1	1.7	Display Nursery (2007)	Manage for display.
2E	1.3	Sandberg Bluegrass (2009) (Yellowstone NP)	Manage for seed production.
2W	0.5	Tansyaster (2010-11)	Manage for Certified seed production and release.
	0.5	Tansyaster (2012)	Manage for Certified seed production and release.
3	1.8	Potatoes	U of I will plant potatoes.
4	1.4	Constructed Wetland Ponds	Control weeds.
5	2.4	Anatone (2012)	Manage for Certified seed production.
6	2.4	Regar (2012)	Manage for Foundation seed production.
7	3.2	Anatone (2009)	Manage for Certified seed production.
8	3.2	Appar (2012)	Manage for Foundation seed production.
9	3.2	Vavilov II	Plant spring cover crop and kill. Plant Vavilov II in late summer.
10	3.2	Anatone	Plant spring cover crop and kill. Plant Anatone in late summer.
11 11S	1.4	Fallow Tansyaster (2012)	Fallow as needed for weed control. Manage for Certified seed production and release.
12		Buckwheat (3)  Searls' clover (2) 2009 IDARNG globemallow 2011 Dusty Maiden (2) 2012 Forb IEP (2012)	Establish 3 rows of buckwheat. Manage for Certified seed production/ evaluation. Remove and plant wheat cover crop. Harvest seed/ weed control. Manage for Ceritifed seed prod./release. Manage/evaluate according to study plan.
13N	0.6	Sandberg trial	Establish Sandberg bluegrass trial.
13M	0.2	Penstemon (2003)	Maintain for pollinator habitat.
13S	0.6	Anatone G0	Establish Anatone G0 block.
13S	0.2	Juniper windbreak (2011)	Maintain windbreak.

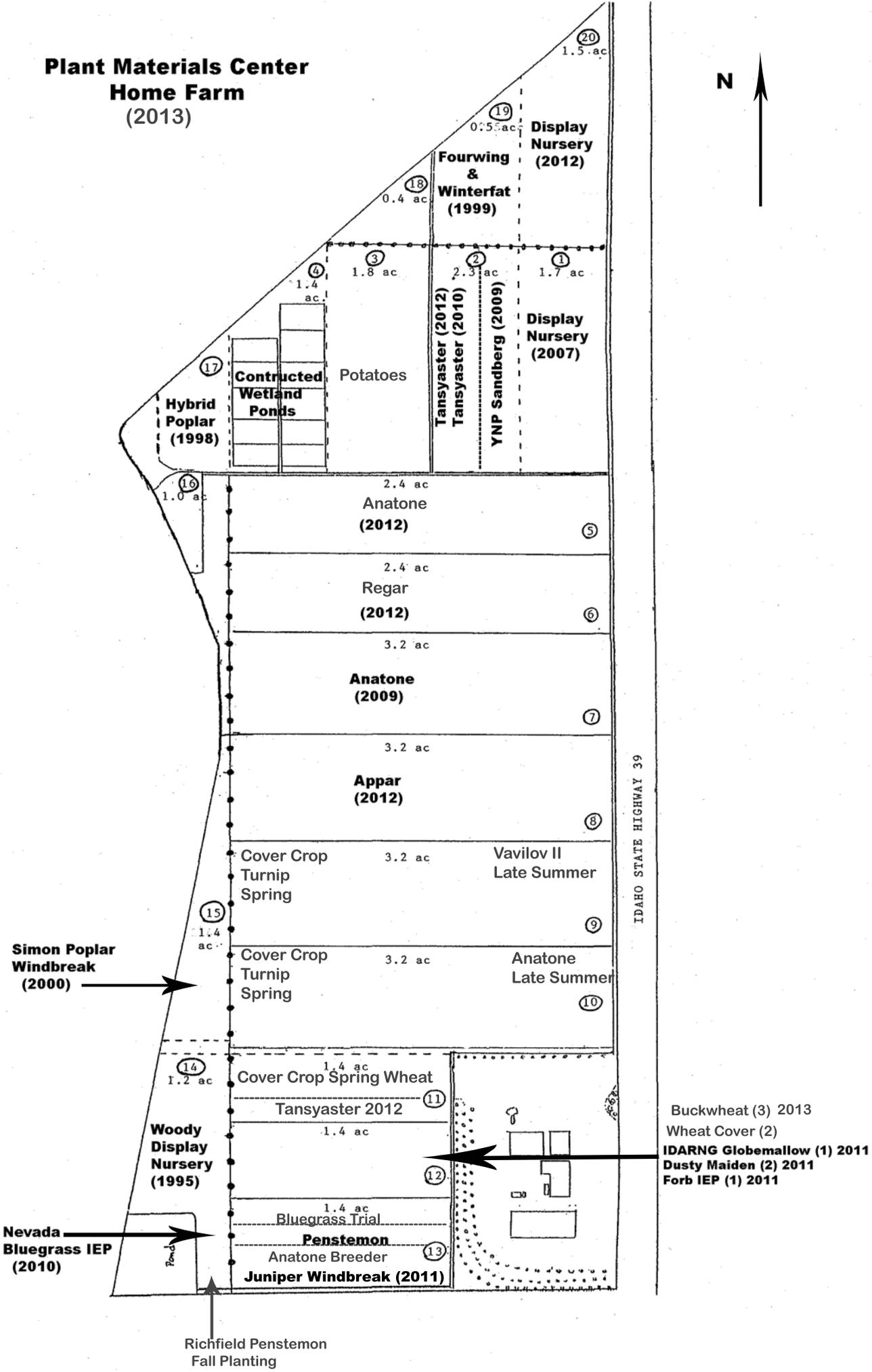
**Aberdeen Plant Materials Center**

**2013 FIELD ANNUAL PLAN OF OPERATION**

**HOME FARM (Continued)**

14	1.2	Woody Display Nursery (1995)	Maintain display of woody conservation plants. Manage Durar/Covar cover crop.
14S	0.3	Richfield Penstemon	Establish new seed production fall, 2013.
<u>Field</u>	<u>Acres</u>	<u>Crop</u>	<u>Operation</u>
15	1.4	Field windbreak (2000)	Maintain Simon poplar field windbreak.
16	1.0	Fallow	Fallow for weed control.
17	0.5	Hybrid Poplars (1998)	Manage for long term survival evaluation.
18-19	0.9	Fourwing and winterfat (1999)	Maintain cover.
20	1.5	Display Nursery (2012)	Manage for display.

**Plant Materials Center  
Home Farm  
(2013)**



**Aberdeen Plant Materials Center**

**2013 FIELD ANNUAL PLAN OF OPERATION**

**FISH AND GAME FARM**

<u>Field</u>	<u>Acres</u>	<u>Crop</u>	<u>Operation</u>
21W	0.7	Forage kochia trial (2012)	Manage according to study plan.
21W	0.3	Idaho Fescue (Grand Teton NP – 2008)	Manage for seed production.
21M	1.3	Maple Grove (2010)	Manage for Certified seed production.
21E	1.4	Pipe yard (2004)	Maintain permanent yard for pipe storage.
21N	1.3	Bozoisky Cover crop (1985)	Maintain as needed for permanent cover.
22W	4.1	Alfalfa (2008)	Manage for hay production and wildlife benefits.
22E	1.3	Willow IEP (1984)	Maintain for wildlife cover.
23W	2.4	Bozoisky Cover crop (2007)	Maintain as needed for permanent cover.
23M	--	Windbreak	Maintain and irrigate as needed.
23E	2.2	Goldar (2011)	Manage for Foundation seed production.
24W	1.1	Windbreaks	Maintain and irrigate as needed.
24 M	2.2	Wildlife Food Plot	Establish and maintain millet for wildlife use.
24E	1.5	Wildlife Food Plot	Establish and maintain millet for wildlife use.
25W	1.5	Wildlife Food Plot	Establish and maintain millet for wildlife use.
25E	3.5	Goldar (2009)	Manage for Foundation seed production.
26W	1.0	Bozoisky Cover crop (2005)	Maintain as needed for permanent cover.
26E	2.7	Willow Cutting Nursery (1994)	Maintain as needed.
27W	2.2	Bozoisky Cover crop (2005)	Maintain as needed for permanent cover.
27M	1.2	Bozoisky Cover crop (2007)	Maintain as needed for permanent cover.
27E	1.0	Wildlife Food Plot	Establish and maintain wheat for wildlife use.
28W	0.2	Wildlife Food Plot	Establish and maintain wheat for wildlife use. Establish pollinator seed mix studies.
28E	5.0	Pollinator Plot	Maintain and evaluate pollinator display planting.
29W	1.3	Willows (1994)	Manage for cuttings.

**Aberdeen Plant Materials Center**

**2013 FIELD ANNUAL PLAN OF OPERATION**  
**FISH AND GAME FARM** (continued)

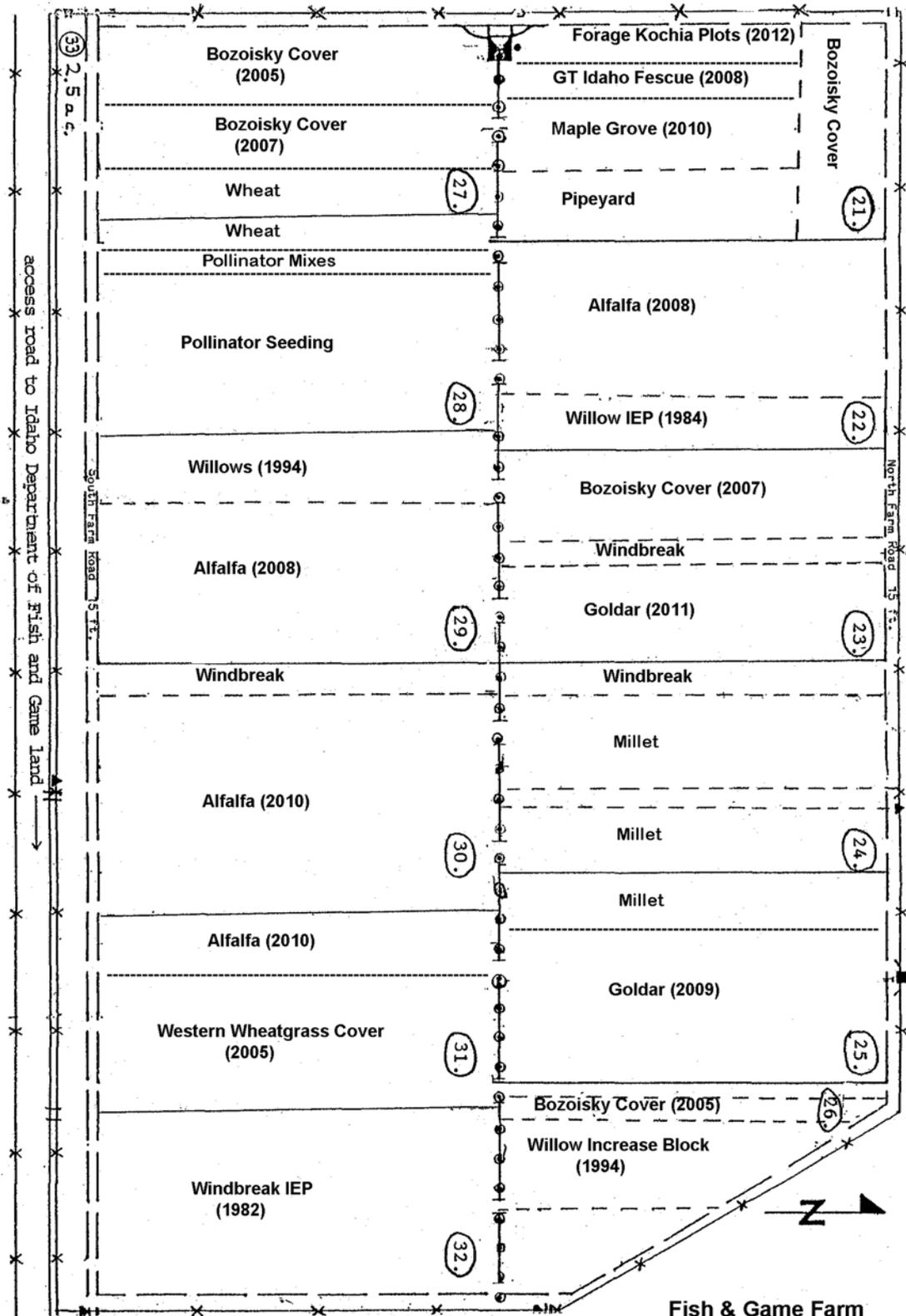
<u>Field</u>	<u>Acres</u>	<u>Crop</u>	<u>Operation</u>
29E	3.7	Alfalfa (2008)	Manage for hay production and wildlife benefits.
30W	0.7	Windbreak	Maintain and irrigate as needed.
30E	4.8	Alfalfa (2010)	Establish and manage for hay and wildlife benefits.
31W	1.5	Alfalfa (2010)	Establish and manage for hay and wildlife benefits.
31E	3.75	Western w.g. (2005)	maintain as needed.
32	6.2	Windbreak IEP (1982)	Maintain as needed.

Any hay grown will not be cut prior to June 15 and not after September 1. Hay will be irrigated after last cut to first fall frost to achieve regrowth prior to winter dormancy.

Irrigated, permanent grass cover seedings will not be mowed prior to July 1 and not after August 1 and will be irrigated a minimum of 3 times. Non-irrigated grass cover seedings will not be mowed. Early mowing or mowing of non-irrigated grass cover requires notification to and inspection by Fish and Game.

**BREWINGTON FARM (U of I)**

<u>Field</u>	<u>Acres</u>	<u>Crop</u>	<u>Operation</u>
410M	1.0	Bluebunch Wheatgrass (2009) (Yellowstone NP)	Manage for seed production.



**Fish & Game Farm**  
(2013)

**Aberdeen Plant Materials Center**

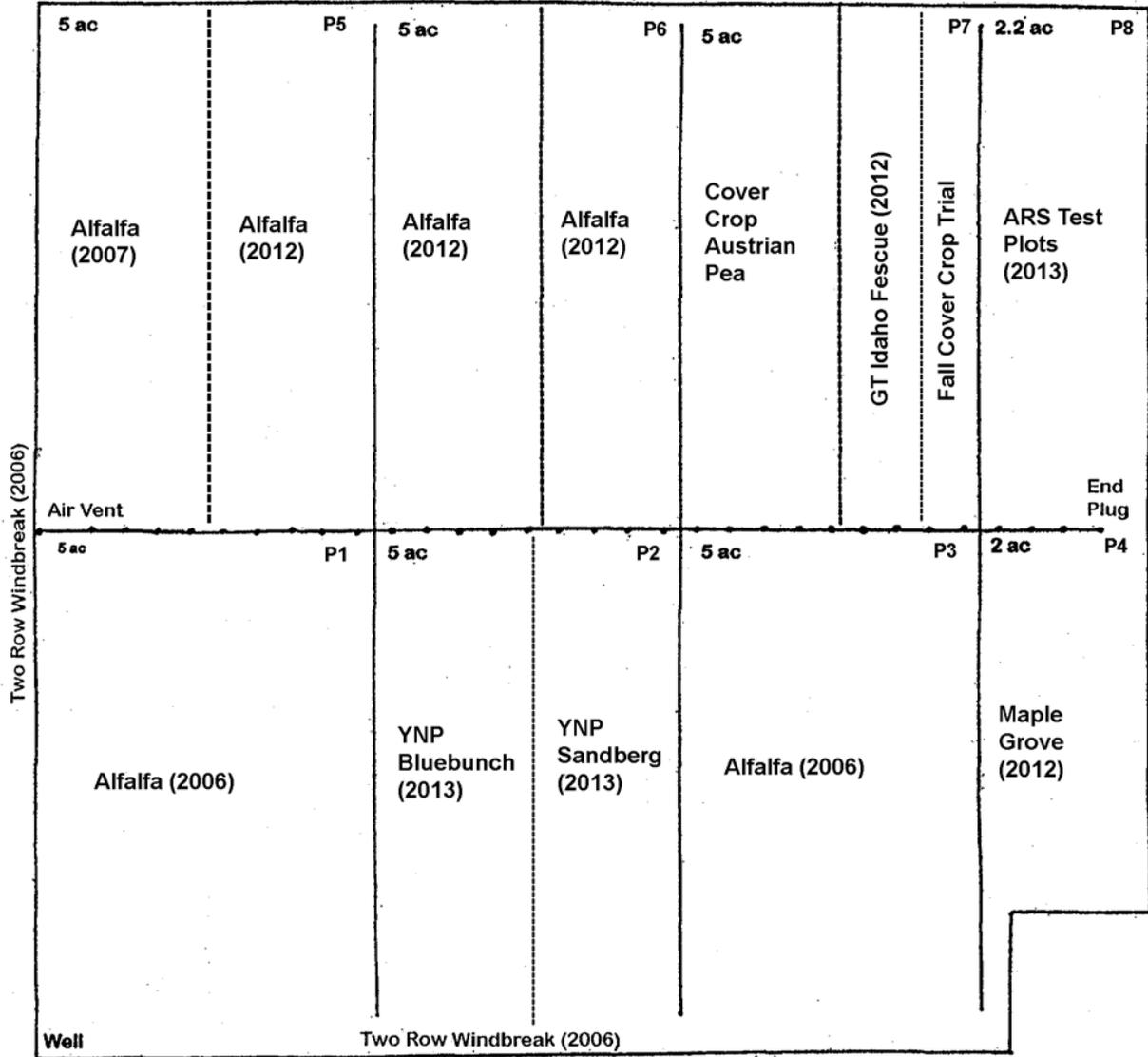
**2013 FIELD ANNUAL PLAN OF OPERATION (continued)**

**PEARL FARM**

<u>Field</u>	<u>Acres</u>	<u>Crop</u>	<u>Operation</u>
P1	5.0	Alfalfa (2006)	Maintain for hay production and to improve soil quality.
P2W	2.5	Bluebunch YNP	Establish for seed production.
P2E	2.5	Sandberg YNP	Establish for seed production.
P3	5.0	Alfalfa (2006)	Maintain for hay production and to improve soil quality.
P4	2.0	Maple Grove (2012)	Manage for Certified seed production.
P5W	2.5	Alfalfa (2007)	Maintain for hay production and to improve soil quality.
P5E	2.5	Alfalfa (2012)	Maintain for hay production and to improve soil quality.
P6	5.0	Alfalfa (2012)	Maintain for hay production and to improve soil quality.
P7W	2.5	Cover Crop	Establish Austrian pea for cover.
P7M	1.0	Idaho Fescue (2012)	Manage for seed production.
P7E	1.5	Grand Teton Fall Cover Crop Trial	Establish fall cover crop trial.
P8	2.2	ARS test plots	Establish and evaluate plots.

Maintain two-row windbreak (Rocky Mountain Juniper and Simon Poplar established on south and west farm borders).

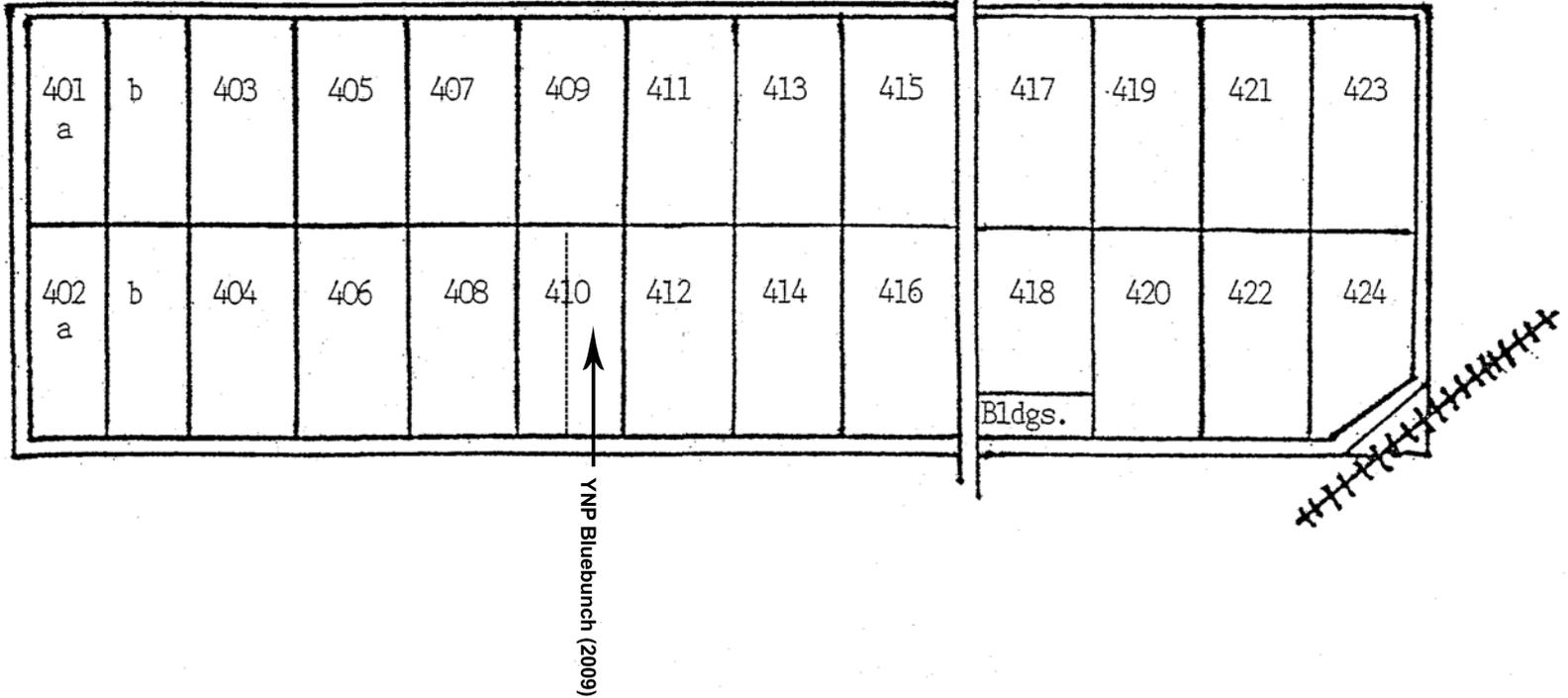
Plant Materials Center  
 Pearl Farm  
 (2013)



Scale 1" = 200'

University of Idaho  
Brewington Farm  
(2013)

EAST AND WEST



**Project Title:** Aberdeen Plant Materials Center Report of Activities

**Project:** USADA-NRCS Aberdeen Plant Materials Center, Aberdeen, Idaho

**Principal Investigators and Contact Information:**

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**Highlights:**

- Development of NRCS Plant Guides
- Progress towards release of Douglas' dustymaiden
- Progress towards release of hoary tansyaster
- Progress towards release of Wyeth buckwheat

**Project Description:**

PlantGuides

The Aberdeen PMC is gathering information on selected plant species to create NRCS plant guides. Plant guides offer the most recent information on plant establishment methods as well as seed and plant production suggestions. General information for the species can also be found in the plant guide, including information on potential uses, ethnobotanical significance, adaptation, and pests and potential problems. In 2012 plant guides were completed or revised for gooseberry leaf globemallow, blue penstemon, arrowleaf balsamroot, tapertip hawksbeard, yellow bee flower, barestem biscuitroot, Hooker's balsamroot and cutleaf balsamroot. In 2013 Aberdeen PMC will produce plant guides for bigflower agoseris and limestone hawksbeard. Plant guides are available at the PLANTS database, [www.plants.usda.gov](http://www.plants.usda.gov), and at the Aberdeen Plant Materials Center website, [www.id.nrcs.usda.gov/programs/plant.html](http://www.id.nrcs.usda.gov/programs/plant.html).

Douglas' Dustymaiden

Fifteen accessions of Douglas' dustymaiden (*Chaenactis douglasii*) were evaluated at Aberdeen PMC from 2009 to 2010. The accessions were evaluated for establishment, growth and seed production. Following evaluation, accession 9076577 was chosen for selected class release. Accession 9076577 was originally collected in Boise County, Idaho near Arrow Rock and Lucky Peak Reservoirs, approximately 0.5 miles west of the dam on Forest Road 268. The site is a mountain big sagebrush/bitterbrush community in coarse granitic soils at 3150 ft elevation. Accession 9076577 ranked at or near the top in percent establishment, plant vigor, height, flower production and seed yield.

In the fall of 2010, a 500 foot row of weed barrier fabric was planted to accession 9076577; however problems encountered during planting resulted in poor germination and establishment. In the fall of 2011, 1,000 new feet of fabric were seeded. Dry winter conditions resulted again in

poor establishment (approximately 25%). Seed was harvested by hand and with backpack vacuum cleaners in summer 2012. A total of 4 lbs dirt weight was cleaned to 1.5 lbs pure live seed (PLS). Release documentation is being developed and official release will occur once the PMC has produced a sufficient amount of early generation seed.

#### Hoarytansyaster

Nine accessions of hoary tansyaster (*Machaeranthera canescens*) were evaluated from 2009 through 2011 for establishment, plant growth and seed production. Accession 9076670 had the best establishment and stands for 2009 and 2010, and had the best rated vigor in 2010. This accession also had the tallest plants in the study. Although we were not able to evaluate seed production in 2010 due to wind storms when seed was ripening, 9076670 was observed to be an excellent seed producer. The population for 9076670 is located near the St. Anthony Sand Dunes in Fremont County, Idaho at 5,000 ft elevation. The site has sandy soils and supports a bitterbrush, Indian ricegrass, rabbitbrush, and scurfpea plant community. The location receives on average between 10 and 15 inches of mean annual precipitation.

In 2010, the original population was revisited to collect additional seed to use in a seed increase planting at IDPMC. In 2010, 500 feet of row of weed barrier fabric was planted. An additional 1,000 feet of row was planted in 2011. Dry winter conditions resulted in poor stands and the site was reseeded in the spring of 2012. An additional 0.6 acres of hoary tansyaster was drill seeded in spring 2012 to investigate agronomics without using weed barrier fabric. We also planted a small 0.08 acre plot of hoary tansyaster with a nurse crop of winter wheat in August, 2012 to evaluate late summer seeding and weed control options without fabric.

The 2010 plants were harvested in fall 2012 using a small-plot combine to compare a single combine harvest with multiple vacuum harvests as done in 2011. The single combining yielded 55 lbs dirt weight which cleaned to 0.72 lbs PLS. The single combining method takes less time in the field; however this method yields correspondingly less seed, and requires significantly more time to clean the seed compared to vacuum harvesting. Release documentation is being developed and official release will occur once the PMC has produced a sufficient amount of early generation seed.

#### Wyethorwhorledbuckwheat

Thirty-nine accessions of Wyeth and sulphurflower buckwheat (*Eriogonum heracleoides* and *E. umbellatum*) were compared in a common garden study from 2007 through 2011. Accession 9076546 Wyeth buckwheat showed good establishment, seed production and longevity compared with the other accessions.

In fall 2011, two, 500 ft rows of weed barrier fabric were planted to accession 9076546. Accession 9076546 was originally collected in Caribou County, Idaho northeast of Soda Springs in an 18 to 20 inch precipitation area occurring with mountain big sagebrush, three-tip sagebrush, bluebunch wheatgrass and basin wildrye. Germination in the weed barrier fabric in 2012 was poor, likely due to drier and warmer than normal winter and early spring conditions. Plants will be propagated in the greenhouse in winter/spring 2013 to be transplanted to the fabric in summer 2013.

**Publications:**

St. John, L. and D. Tilley. 2012. Plant Guide for Hooker's balsamroot (*Balsamorhiza hookeri*). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho 83210.

St. John, L. and D. Tilley. 2012. Plant Guide for cutleaf balsamroot (*Balsamorhiza macrophylla*). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho 83210.

Tilley, D., Cane, J., St. John, L., Ogle, D. and N. Shaw. 2012. Plant guide for yellow beeplant (*Cleome lutea*). USDA Natural Resources Conservation Service. Aberdeen, ID.

Tilley, D., Jensen, S., and L. St. John. 2012. Plant Guide for tapertip hawksbeard (*Crepis acuminata*). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho 83210.

Tilley, D., St. John, L., Ogle, D., and N. Shaw. 2012. Plant Guide for blue penstemon (*Penstemon cyaneus*). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho 83210.

Tilley, D., St. John, L., Ogle, D., and N. Shaw. 2011. Plant guide for Gooseberryleaf globemallow (*Sphaeralcea grossulariifolia*). USDA Natural Resources Conservation Service. Aberdeen, ID.

Tilley, D., St. John, L., and N. Shaw. 2012. Plant Guide for arrowleaf balsamroot (*Balsamorhiza sagittata*). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho 83210.

Tilley, D. and L. St. John. 2012. Plant Guide for barestem biscuitroot (*Lomatium nudicaule*). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho 83210.

**Presentations:**

Tilley, D. and L. St. John. 2012. Aberdeen PMC Report of Activities, 2011. Great Basin Native Plant Selection and Increase Project Annual Meeting; 2012 February 21-22; Salt Lake City, UT.  
<http://www.fs.fed.us/rm/boise/research/shrub/GBNPSIP/GBNPSIPpresentations2012.shtml>

Simonson, B and L, St. John. 2012. Mixing seed with rice hulls. Drill Calibration Workshop July 18, 2012. Boise, ID.

**Management Applications and Seed Production Guidelines:**

Douglas' dustymaiden, hoary tansyaster and Wyeth buckwheat are feasible for commercial seed production. Douglas' dustymaiden establishes well using fall dormant seedings. Hoary tansyaster has no seed dormancy issues and can be established with fall or spring seeding. Weed control in seed production fields of native forbs remains an obstacle, and various control methods are being evaluated. The use of weed barrier fabric is encouraged. Seed ripening is indeterminate and

poses problems for a single harvest system; however high yields can be obtained with multiple harvests conducted by hand or with a vacuum type harvester followed by a final combining.

**Products:**

1. Plant Guides are available for gooseberry leaf globemallow, blue penstemon, arrowleaf balsamroot, tapertip hawksbeard, yellow bee flower, barestem biscuitroot, Hooker's balsamroot, cutleaf balsamroot royal penstemon, hotrock penstemon, sharpleaf penstemon, fernleaf biscuitroot, nineleaf biscuitroot, Gray's biscuitroot, Douglas' dustymaiden, Searls' prairie clover and hoary tansyaster.

2. Propagation Protocols are available for Douglas' dustymaiden, hoary tansyaster, nineleaf biscuitroot, fernleaf biscuitroot and Gray's biscuitroot and Searls' prairie clover.

3. Early generation Certified seed of hoary tansyaster, Douglas' dustymaiden and Wyeth buckwheat is being produced and will be available through Utah Crop Improvement and University of Idaho Foundation Seed Program when release is approved.

## GRAND TETON NATIONAL PARK

### FY2012 Annual 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. The bluebunch wheatgrass field was removed in late 2010 because of poor seed yield. In 2010, a new field of mountain brome was planted for seed production in 2011 and 2012. The mountain brome field was removed after harvest in 2012. The Idaho fescue field was also harvested in 2011 and 2012 and a new Idaho fescue field (1 ac) was established in 2012 for seed production in 2013 - 2014.

**ACCOMPLISHMENTS** – 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. No seed was requested for delivery in 2012. The following table lists species grown for GTNP, field acreage, current seed inventory and seed test date.

Species	Harvest year	Field size (ac)	Inventory PLS pounds	Lbs. shipped 2012	Seed Test date
Mtn. brome	2012	2.5	1802	0	2/1/13
Idaho fescue	2012	0.3	60	0	2/5/13
Mtn. brome	2011	2.5	66	0	9/19/11
Idaho fescue	2011	0.3	83	0	2/22/12
Idaho fescue	2010	0.3	0	0	3/21/11
Bluebunch wht.g.	2010	0.17	0	0	3/21/11
Slender wht.g.	2009	1.0	503	0	5/17/10
Slender wht.g.	2008	1.0	498	0	4/14/09
Slender wht.g.	2007	1.0	0	0	3/20/08
Sandberg b.g.	2007	0.25	0	0	3/19/09
Sandberg b.g.	2009	0.25	0	0	6/4/10
Blue wildrye	2008	2.7	389	0	4/22/09
Blue wildrye	2007	2.7	599	0	3/10/08

## DIGITAL PHOTOS



Grand Teton National Park new Idaho fescue seed increase field at Aberdeen PMC. September 2012.



Grand Teton National Park mountain brome seed drying in shop at Aberdeen PMC. July 2011.

## YELLOWSTONE NATIONAL PARK – GRASS SEED PRODUCTION

**FY2012 Annual Report**  
**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 was harvested from these fields in 2011 and 2012 and will be harvested again in 2013 (with the exception of needleandthread which was removed after harvest in 2012) after which agreement is scheduled to terminate.

**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. The following table lists all species grown for YNP, field acreage, current seed inventory and hay mulch/seed shipped during 2012.

<b>Species</b>	<b>Harvest year</b>	<b>Field size (ac)</b>	<b>Inventory PLS pounds</b>	<b>Lbs. shipped 2012</b>	<b>Seed Test date</b>
Sandberg b.g.	2012	1.0	46	0	2/25/13
Sandberg b.g.	2011	1.0	115	0	2/22/12
Sandberg b.g.	2010	1.0	58	0	3/28/11
Bluebunch wht. g	2012	1.0	110	0	2/5/13
Bluebunch wht.g.	2011	1.0	89	0	2/29/12
Needleand thread (hay)	2012	1.0		2400	N/A

**DIGITAL PHOTOS**



YNP Sandberg bluegrass seed production field at Aberdeen PMC. May 2012.



YNP needleandthread seed field at Aberdeen PMC. June 2012.



YNP bluebunch wheatgrass seed production field at Aberdeen PMC. July, 2012.

## **Seed germination of Douglas' dustymaiden following cold/moist stratification**

**Derek Tilley, Range Scientist Loren St.**

**John, PMC Team Leader Natural**

**Resources Conservation Service Plant**

**Materials Center**

**Aberdeen, Idaho**

Douglas' dustymaiden (*Chaenactis douglasii*) is a short-lived perennial forb native to semi-arid and montane sites in the Intermountain Western region of North America. The species has potential for use in rangeland seedings and low water use landscaping. It is an attractive source of pollen and nectar for a variety of native bees and is also a desirable species for sage-grouse habitat restoration.

Little information is available on seed dormancy in Douglas' dustymaiden, or the requirements necessary to break dormancy for maximum germination. Parkinson and Debolt (2005) observed 12% germination after 30 days of cold stratification at 4°C. However, no other lengths of stratification were tested, nor were TZ tests conducted in their study, so comparisons could not be made to measure improvements in germination following stratification. The Aberdeen Plant Materials Center (PMC) has been working with Douglas' dustymaiden since 2007. Several field studies have been planted, but these have all used dormant fall seedings to naturally stratify the seed.

Information on seed dormancy and stratification requirements for Douglas' dustymaiden is needed to improve greenhouse plant production, and to determine the optimum window for field plantings.

### **Materials and Methods**

Seed for the study was harvested from plants grown at the PMC farm in 2009. The trial included eight replications of 25 seeds. Seed was planted 1/8 to 1/4 inch deep in 12x18 inch greenhouse planting flats into a moist planting medium of a 1:1:1 mixture of coconut fiber, compost and peat. Seed was pressed into the soil for optimum seed-soil contact. The flats were bagged in large polyethylene trash bags with the tops tied closed and then placed in a dark, walk-in cooler set at 36° F. Four stratification treatments were tested, a non-stratified control (0 day), and stratification periods of 30, 60 and 90 days.

Following stratification treatment, the flats were placed in the PMC greenhouse for germination. Temperatures in the greenhouse ranged from 65 to 85° F with a light period from 6:00 am to 10:00 pm. The plants were overhead irrigated with mist nozzles for 2 minutes per hour from 7:00 am to 4:00 pm. Germinants were counted 30 days after placement in the greenhouse. Significance was tested using an Analysis of Variance with a p value of 0.05. Means were separated using a least significant difference (LSD) test.

### **Results and Discussion**

TZ tests conducted by the Idaho State Department of Agriculture determined the seed lot used had 56% viability. None of the treatments in our trial germinated at this level suggesting some seed remained dormant despite the stratification treatments.

The highest germination was obtained with the 90 and 60 day stratification periods; which did not significantly differ from one another (table 1). The 90 and 60 day treatments yielded significantly greater germination rates than the other two treatments. The 30 day stratification treatment likewise yielded better germination than the non-stratified control.

Table 1.

Stratification period	Germination <sup>1</sup>	% of TZ
	-----%-----	
90 days	30.5 a	54.5
60 days	27.0 a	48.2
30 days	14.0 b	25.0
0 days	0.5 c	0.0
P=	<0.00	NA
Critical value (0.05)=	8.4	

<sup>1</sup>Means followed by the same letter were not significantly different at p=0.05.

All cold moist stratification treatments produced significantly higher germination rates than a non-stratified treatment; however none of the treatments yielded germination rates approaching the possible rates suggested by the TZ test. Our results indicate that a 60 to 90 day stratification can give fair germination rates which are likely acceptable for greenhouse plant production. Our results also suggest that late fall to early winter remains the best window for field plantings of Douglas' dustymaiden.

We need to also determine if seed can be dried following stratification for use in direct field seedings. If we can pre-stratify seed and then direct seed in early August, seedlings could establish before winter and get a jump on weeds. This technique would also allow direct seeding in the spring into dead cover crop.

## References

Parkinson, Hilary; DeBolt, Ann. 2005. Propagation protocol for production of container *Chaenactis douglasii* (Hook.) H. & A. USDA FS - Rocky Mountain Research Station, Boise, Idaho. In: Native Plant Network. URL: <http://www.nativeplantnetwork.org> (accessed 3 January 2013). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

**2011 Pollinator Planting, 2013 Progress Report**  
**Fish and Game Farm, Field 28**  
**Derek J. Tilley, PMC Agronomist Loren**  
**St. John, PMC Team Leader Natural**  
**Resources Conservation Service Plant**  
**Materials Center**  
**Aberdeen, Idaho**

**Introduction**

The Conservation Reserve program of the 2008 USDA Farm Bill promotes the establishment of pollinator friendly habitat. The desired goal in these pollinator plantings is to establish a variety of pollinator species with some flowering in each of the three flowering periods – early, mid and late growing season. The mixture can also include native grasses not to exceed 25 % of the total mixture.

Establishment of grasses and grass-dominant plantings including forbs and shrubs are common and largely successful; however, pollinator plantings consisting predominantly of forbs pose problems not typically encountered with grass plantings. Forbs, especially native forbs, are in many cases not competitive against weed species. Forb plantings also severely limit the herbicides available for controlling broadleaf weeds.

Healthy rangeland in the Intermountain West consists of approximately 5 to 25% shrub cover, 40 to 60% grasses and 5 to 20% forbs. There is concern that the 25% grass composition requirement may not provide the necessary competitive ability needed to persist in weed prone sites. More information is needed to understand pollinator planting dynamics and management.

**Materials and Methods**

In 2011, the PMC established 5 acres of pollinator habitat for display and to research management requirements involved in pollinator friendly plantings. The planting was established in field 28 of the PMC Fish and Game farm 5 miles northeast of Aberdeen. Soil at the planting site is a Declo silt loam with pH of 7.4 to 8.4. Average annual precipitation is 9.39 inches.

In 2010, the year prior to planting, the field was planted to field corn and managed for wildlife habitat. The stubble was mowed spring 2011. The field was irrigated in early spring to get weed seeds to germinate. The field was then sprayed with 64 oz Glyphosate/ac on May 11 prior to planting on May 18. The western 2.5 acres of the field were planted to a mixture consisting of 25% grasses (mix 1), while the eastern 2.5 acres were planted to a mixture of 50% grasses (mix 2). The field was irrigated through the growing season to approximate 14 to 16 inches of annual precipitation, the suitable range for the species in the seed mixture. In 2011, the establishment year, the fields were mowed three times after planting to prevent weeds from going to seed. In

2012 and 2013 noxious weeds (broadleaf pepperweed, musk thistle, burdock, Canada thistle, and field bindweed) were spot-treated with 64 oz Glyphosate/ac.

The two pollinator mixes were developed to compare forb establishment and persistence with varying grass composition. The mixes were designed to provide blossoms for foraging insects in all three flowering periods (table 1). Each mixture has the same species components, but they have different proportions of forbs and grasses. The first mix follows NRCS guidelines and contains a 25% grass component and 75% forbs (Tables 2). The second mix is designed to more closely approximate natural healthy rangeland conditions. This mix contains the same species components, but the grasses are doubled to comprise 50% of the total mix, and the forb amounts are halved. The mixtures contain only 7 pollinator species. This reflects the limited number of available forb species suitable for use in arid to semi-arid environments, especially those with late summer bloom periods.

Scientific Name	Common Name	Variety	Bloom Color and Time			Origin
			spring	summer	late summer	
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	Anatone				Native
<i>Leymus cinereus</i>	Basin wildrye	Magnar				Native
<i>Poa ampla</i>	Big bluegrass	Sherman				Native
<i>Achillea millifolium</i>	Western yarrow	Great Northern	☀	☀		Native
<i>Linum perenne</i>	Blue flax	Appar	☀	☀		Introduced
<i>Medicago sativa ssp. falcata</i>	Falcate alfalfa	Don	☀	☀		Introduced
<i>Sanguisorba minor</i>	Small burnet	Delar		☀		Introduced
<i>Onobrychis vicaeifolia</i>	Sainfoin	Common	☀	☀		Introduced
<i>Helianthus annuus</i>	Sunflower	Common			☀	Native
<i>Machaeranthera canescens</i>	Hoary tansyaster	Common			☀	Native

The mixes were separated according to seeding depth, one mix for drilling seed at 1/4 to 1/2 inch and a broadcast mix for shallow (0 to 1/8 inch) seeding. Because the planting was done using a Truax Rough Rider range drill with alternate row seeding capabilities, the standard seeding rates (Ogle and others, 2011b) were also cut in half. By doing an alternate row seeding, the number of rows planted is effectively halved and seeding rates are therefore adjusted. Seeding rates and drill calibrations are shown in the appendix. All seed was mixed with rice hulls as an inert carrier to facilitate flow through seeding equipment using specifications found in St. John and others (2005).

**Table 2. Seed mixture percentages**

#	Variety	Common Name	25% grass % of mix	50% grass % of mix
1	Anatone	Bluebunch wheatgrass	5	10
2	Magnar	Basin wildrye	5	10
3	Sherman	Big bluegrass	15	30
4	Great Northern	Western yarrow	5	2.5
5	Appar	Blue flax	10	7.5
6	Don	Falcate alfalfa	10	5
7	Delar	Small burnet	15	7.5
8	Eski	Sainfoin	20	10
9	Common	Sunflower	10	5
10	Common	Tansyaster	5	2.5

Evaluations took place on July 12, 2011, June 15, 2012 and June 17, 2013. A 200 ft transect was laid diagonally in each field beginning 100 ft from the southwest corner. Plant densities of target species were measured using a frequency grid based on that described by Vogel and Masters (2001). The grid measured approximately 40 x 41 inches, having four ten inch columns (to incorporate 1 drill row per column) and five rows, totaling 20 cells. Counts were made of the cells that contained at least one plant. Evaluations were made at 20 foot intervals making a total of 10 frames evaluated per seed mixture. The total cells were added for each species to determine average plants/ft<sup>2</sup>. It is important to note that because cells with plants were counted and not number of plants per cell, the best possible score is 200 hits per ten frames which converts to 1.85 plants/ft<sup>2</sup>. Actual plant density may be higher than the numbers indicated below.

It was difficult to find target species in the masses of weeds at the time of the first season evaluation. The native grasses were particularly difficult to find and were not counted in the evaluation. In 2012 and 2013 target grass species were more easily identified and were included in the evaluation.

## Results

### 2011

In 2011, the 25% grass seed mix produced approximately 2 times more total forbs than the 50% grass mixture (Table 3). However, overall weed densities were similar for both planting mixes. These differences are to be expected early in the first growing season as the seeded plants are generally not big enough



**Figure 1. A solid stand of witchgrass. The planting was mowed 3 times to reduce the risk of weeds setting seed. Photo take July 20, 2011.**

to cause direct competition for resources. Few target grasses were observed, as young grass leaves are easily missed in the thick weeds.

Despite previous farming practices and weed control efforts, there was an abundance of annual weeds present in both fields. The most prevalent weed species in 2011 included witchgrass (*Panicum capilare*), shepherd's purse (*Capsella bursa-pastoris*), field bindweed (*Convolvulus arvensis*), volunteer wheat (*Triticum aestivum*), lamb's quarters (*Chenopodium album*), prickly lettuce (*Lactuca serriola*), red-root pigweed (*Amaranthus retroflexus*), prostrate pigweed (*A. blitoides*), nightshade, (*Solanum* sp.) and tumble mustard (*Sisymbrium altissimum*). Mowing provided fair control of annual broadleaf weeds, but witchgrass continued to dominate the fields throughout the season (Figure 1). In late summer, sunflowers covered the field with a thick understory of witchgrass (Figure 2).

## 2012

Densities of all seeded species stayed the same or increased from 2011 to 2012. The plants were likely more numerous from volunteering, and were also larger and easier to find. Overall densities of target species were not different between the 25% and 50% grass plots in 2012. In 2012 total target species densities were 4 times greater in the 25% grass mix and 9 times greater in the 50% grass mix compared to 2011, with much of the increase being accounted for by the establishment and observation of grasses in 2012. Grass densities were 2 times higher in the 50% grass mix than the 25% grass mix as expected. There were approximately 2 times more alfalfa and sainfoin plants observed in the 25% grass plots than in the 50% grass plots. Sunflower and blue flax densities were essentially equal between the two treatments in 2012 as volunteers from seed shed the previous year (especially from sunflower) eliminated the original proportions. Yarrow densities were 7 times greater in the 25% grass plots than the 50% grass plots. Hoary tansyaster was observed in the planting but not encountered in the evaluated transects.



**Figure 2. Despite mowing, sunflowers persisted and produced flowers in the first growing season. Photo taken September 12, 2011.**

Total weed density was 40% lower in 2012 than 2011; however weed densities were not significantly different between the 25 and 50% grass treatments. The most abundant weed species encountered in 2012 was spear saltbush (*Atriplex patula*). This species may have mistaken for lamb's quarters in 2011. Other weed species encountered in 2012 included Canada thistle (*Cirsium arvense*), dandelion (*Taraxacum officinale*), kochia (*Bassia scoparia*), sowthistle (*Sonchus* sp.), cheatgrass (*Bromus tectorum*), yellow salsify (*Tragopogon dubius*), and biennial cinquefoil (*Potentilla biennis*). Other species seen in the planting but not in the evaluated

transects included hound's tongue (*Cynoglossum officinale*), bull thistle (*Cirsium vulgare*), musk thistle (*Carduus nutans*), and catnip (*Nepeta cataria*).

2013

The planting composition changed dramatically from 2012 to 2013. Grass and forb target species densities declined in the both plantings. In the 25% grass mixture, grass densities decreased from 0.15 plants/ft<sup>2</sup> to 0.04 plants/ft<sup>2</sup>. Similarly, in the 50% grass planting, densities decreased from 0.30 to 0.14 plants/ft<sup>2</sup>. Forb densities decreased in the 25% grass seeding from 2.49 to 1.01 plants/ft<sup>2</sup>, a 60% reduction, and from 2.83 plants/ft<sup>2</sup> to 1.28 plants/ft<sup>2</sup> in the 50% grass seeding, a decrease of 55%. Many species including falcate alfalfa, small burnet and sainfoin decreased between 33 and 50% from the previous year. Annual sunflower declined as much as 60% from 2012, which explains the majority of the decrease in total target species density for the year.

Most weed species had similar densities compared to 2012 with the exception of prickly lettuce which increased approximately 300%. Prickly lettuce densities increased from 0.5 plants/ft<sup>2</sup> to 1.75 plants/ft<sup>2</sup> in the 25% grass planting and 0.45 plants/ft<sup>2</sup> to 1.45 plants/ft<sup>2</sup> in the 50% grass planting.

### **Discussion**

Acceptable establishment densities for NRCS plantings range from 1 to 2 plants/ft<sup>2</sup> (Ogle et al., 2011a). In 2011, the evaluated plant densities fell short of this standard; however this is likely due to the grasses not being included in the evaluation. In 2012 both treatments averaged more than 2 plants/ft<sup>2</sup>. In 2013 plant densities of target species had decreased to nearly 1 plant/ft<sup>2</sup>.

In the first growing season we saw little pollinator value in the two fields planted as most perennial forbs are not expected to blossom during the first growing season. Additionally, annual weeds forced multiple mowing treatments which removed the majority of flowers available for foraging insects. Annual sunflower persisted and blossomed despite the mowing; however, and provided food for foraging bumblebees in late summer and early fall. In 2012 there was no mowing and the perennial forbs were allowed to flower. Abundant pollinator activity was witnessed at the time of evaluation. Very little tansyaster was seen at the evaluation time; however more was observed later in the season, but was largely overshadowed by sunflower. Sunflower plants were small in June, with the majority of plants showing 2 to 4 true leaves, approximately 3 inches tall. In September the sunflower had formed a dense stand with plants averaging 3 to 8 feet tall.

During the second year the planting appeared to be an excellent pollinator resource. Native and European bees were observed foraging on all of the target forb species. The planting also provided excellent cover and forage for wildlife. Deer were observed in the planting and grazing



**Figure 3. Native bee (bottom left) and bee fly (right) visiting yarrow flowers in June, 2013.**

was observed on sainfoin, small burnet, and prickly lettuce. Birds were also abundant in the planting.

In 2013 target forbs and grasses were less prevalent than in the previous year. Numerous blooms were still available however, and pollinator visitation was observed for all target forbs (figure 3). In the second half of the season the planting site was densely crowded with prickly lettuce which overtopped most of the target species (figure 4).

Weed species present a serious impediment to successful long-term pollinator plantings. Weedy species like prickly lettuce can overtop target forbs potentially making them less visible from the air and reducing pollinator visits. Weeds also compete for resources with target species reducing desired forb densities over time.

Noxious weeds are also a concern. Idaho state noxious weeds observed within the pollinator planting include musk thistle, Canada thistle, field bindweed, broadleaf pepperweed, and hound's tongue. Spot treatments of herbicides may be necessary to control and prevent the spread of noxious weeds. Farming practices and field history indicate that many of these species were not present prior to the planting and may have been introduced with non-certified seed. Use of certified seed is highly recommended to ensure seed quality.



**Figure 4. Prickly lettuce dominates the pollinator planting in mid-summer, 2013.**

Very few options exist for controlling broadleaf weeds in forb plantings. Hand rogueing and spot spraying are only feasible for small, concentrated infestations. Conversion of forb/pollinator plantings to weed dominated ground seems likely.

Future evaluations are scheduled to take place in 2014, and 2015 to monitor plant persistence and long term trends in species densities. However, if noxious weeds continue to be a problem, the planting will be terminated.

Table 3. Pollinator planting plant densities (plants/ft<sup>2</sup>) from July 2011 through June 2013.

Target species	7/12/11	7/12/11	6/15/12	6/15/12	6/17/13	6/17/13
	25% Grass Mix	50% Grass Mix	25% Grass Mix	50% Grass Mix	25% Grass Mix	50% Grass Mix
	-----Plants/ft <sup>2</sup> -----					
Bluebunch wheatgrass	0	0	0.06	0.11	0.00	0.02
Basin wildrye.	0	0	0.06	0.13	0.03	0.08
Big bluegrass	0	0	0.03	0.06	0.01	0.04
Total grasses	0.00	0.00	0.15	0.30	0.04	0.14
Western yarrow	0.02	0.02	0.07	0.01	0	0.02
Blue flax	0.07	0.03	0.07	0.15	0.09	0.17
Falcate alfalfa	0.07	0.02	0.28	0.20	0.16	0.15
Small burnet	0.19	0.07	0.17	0.16	0.07	0.04
Sainfoin	0.08	0.09	0.29	0.15	0.09	0.06
Sunflower	0.16	0.05	1.61	1.86	0.60	0.70
Tansyaster	0	0	0	0	0	0
Total forbs	0.59	0.28	2.49	2.53	1.01	1.14
Total target species	0.59	0.28	2.61	2.83	1.05	1.28
<b>Weed species</b>						
Witchgrass	1.86	1.78	0	0	0.03	0.04
Shepherd's purse	0.36	0.23	0.06	0.07	0.04	0.03
Field bindweed	0	0.01	0	0	0	0.01
Wheat	0.04	0.14	0	0	0	0
Lamb's quarters	0.19	0.07	0	0	0	0
Prickly lettuce	0.04	0.01	0.5	0.45	1.75	1.45
Redroot pigweed	0.25	0.16	0	0	0	0.04
Prostrate pigweed	0.02	0	0	0	0	0
Nightshade	0.01	0	0	0.01	0	0
Tumble mustard	0	0.01	0	0.01	0	0
Spear saltbush	0	0	1.0	0.88	0.05	0.02
Canada thistle	0	0	0.01	0	0.02	0.01
Dandelion	0	0	0.04	0.02	0.01	0.05
Kochia	0	0	0.10	0	0.03	0.01
Sow thistle	0	0	0.04	0.02	0	0
Cheatgrass	0	0	0.01	0	0	0
Salsify	0	0	0.01	0.01	0	0
Cinquefoil	0	0	0	0.01	0	0
Total weed species	2.77	2.41	1.76	1.48	1.93	1.66

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## Appendix. Drill Calibrations

### Mix1drill

Variety	Common Name	% of mix	Pure stand rate*		lb/bu**	lb PLS/ac	bulk seed	volume
			lb PLS/acre	% PLS		PLS*% of mix	(lb/ac)	(% of bu)
Anatone	bluebunch wg	5	4.00	84.60	21.70	0.20	0.24	1.09
Magnar	basin wildrye	5	4.00	92.70	18.50	0.20	0.22	1.17
Delar	small burnet	15	10.00	94.00	23.10	1.50	1.60	6.91
sainfoin	Sainfoin	20	17.00	90.00	28.60	3.40	3.78	13.21
sunflower	sunflower	10	11.50	90.00	23.00	1.15	1.28	5.56

### Mix 1 broadcast

Variety	Common Name	% of mix	Pure stand rate*		lb/bu**	lb PLS/ac	bulk seed	volume
			lb PLS/acre	% PLS		PLS*% of mix	(lb/ac)	(% of bu)
						0.00	0.00	0.00
						0.00	0.00	0.00
Sherman Great	big bluegrass	15	1.00	90.00	17.90	0.15	0.17	0.93
Northern	yarrow	5	0.25	90.00	20.60	0.01	0.01	0.07
Appar	blue flax	15	2.00	97.00	46.10	0.30	0.31	0.67
Don	yellow alfalfa	10	2.50	90.00	60.00	0.25	0.28	0.46
tansyaster		5	1.00	35.00	12.00	0.05	0.14	1.19

\* 1/2 of rate in Ogle and others, 2011b

\*\* St. John and others, 2005

Mix2drill

Variety	Common Name	% of mix	Pure stand rate*		lb/bu**	lb PLS/ac	bulk seed	volume
			lb PLS/acre	% PLS		PLS*% of mix	(lb/ac)	(% of bu)
Anatone	bluebunch wg	10	4.00	84.60	21.70	0.40	0.47	2.18
Magnar	basin wildrye	10	4.00	92.70	18.50	0.40	0.43	2.33
Delar	small burnet	7.5	10.00	94.00	23.10	0.75	0.80	3.45
eski	Sainfoin	10	17.00	90.00	28.60	1.70	1.89	6.60
sunflower	sunflower	5	11.50	90.00	23.00	0.58	0.64	2.78

Mix 2  
broadcast

Variety	Common Name	% of mix	Pure stand rate*		lb/bu**	lb PLS/ac	bulk seed	volume
			lb PLS/acre	% PLS		PLS*% of mix	(lb/ac)	(% of bu)
Sherman	big bluegrass	30	1.00	90.00	17.90	0.30	0.33	1.86
great northern	yarrow	2.5	0.25	90.00	37.00	0.01	0.01	0.02
Appar	blue flax	7.5	2.00	97.00	46.10	0.15	0.15	0.34
Don	yellow alfalfa	5	2.50	90.00	60.00	0.13	0.14	0.23
tansyaster	common	2.5	1.00	35.00	12.00	0.03	0.07	0.60

\* 1/2 of rate in Ogle and others, 2011b

\*\* St. John and others, 2005

## **2013 Commercial Wildflower Seed Mix Evaluation, Initial Progress Report**

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**October 31, 2013**

Commercially produced wildflower seed mixes are commonly available, broadly used for attracting pollinators, and add beauty to small gardens and landscapes. These mixtures are popular with landowners because they are pre-mixed and eliminate the guess work of designing custom mixtures. They also eliminate the need to search and purchase individual species from multiple vendors to create a seed mix.

Most commercial seed mixtures are created to cover a wide range of adaptation and may include plants adapted to extremely low precipitation areas (<9" mean annual precipitation) and plants adapted to wetter environments (>18" mean annual precipitation). This range provides some insurance that at least some of the species in the mixture are adapted to a specific site and may thrive. The problem however is that a significant portion of the species in the mixture is less likely to be adapted to the planting site and thus an unnecessary expense.

The species in the mixtures are selected for their attractiveness to bees, butterflies and other pollinators and are purportedly composed of species well adapted to specific regions or environments. Despite these advantages, suitability of many of the species in the mixes to pollinator plantings for CRP or other NRCS programs is largely unknown. Many species are from North America outside of the Intermountain West; still others are of Eurasian or African origin. Additionally, some commercial mixes may contain plant species that can become invasive, or the mix may not contain appropriate species to provide pollinator forage throughout the year, or may contain plant species that are attractive to humans but provide little forage to the target pollinators. Establishment, persistence, and suitability of many of these species to pollinator plantings are poorly understood in this context. These issues need to be examined before NRCS can recommend commercially designed seed mixes for conservation practices.

### **Materials and Methods**

This trial was conducted on the Aberdeen Plant Materials Center Fish and Game Farm located 5 miles northeast of Aberdeen, Idaho. Soil at the site is a Declo silt loam with pH of 7.4 to 8.4. Average annual precipitation is 9.39 inches. The field had previously been planted to a crop of small grains left standing for wildlife food and cover.

We planted six commercially available wildflower seed mixes designed for use in western North America into non-replicated 90 x 20 ft plots. The mixtures selected were chosen based on their dissimilarity with other mixes in the trial to include the widest possible variety of species (see appendix). Prices of the mixtures ranged from \$23/lb to \$60/lb plus shipping. Mention of a specific mixture or company is not an endorsement by the NRCS.

In mid-May, 2013 the field was mowed to knock down the standing small grain cover and was treated with 64 oz glyphosate per acre to control volunteer grains and emerging annual weeds. On May 23, 2013 the trial was planted using a 3 ft Truax® broadcast seeder pulled by an ATV followed with a Brillion® packer roller. Recommended seeding rates for the various mixes range

from 6 to 20 lbs/acre depending on the desired density of the stand. Each plot in this trial was seeded at a target rate of 10 lbs/ac to obtain a uniform density between the plots. The trial was irrigated approximately 8 hours (2 inches) every ten days during the establishment phase. Irrigation was discontinued on August 1. On July 10, 2013 the site was sprayed with 1 pt/ac sethoxydim to control annual grasses.

Plots were evaluated to determine which species were well adapted to conditions in the PMC service area including the Intermountain and Rocky Mountain Regions and contributed to pollinator foraging. Plant density was evaluated on August 8, 2013 using a 1 m<sup>2</sup> frame placed in the center of the plots 5 paces and 10 paces into the plot. Plots were also visited weekly to observe blooming and insect visitation.

The trial will be evaluated again in 2014 -2016 to observe changes in species composition and to identify any potential management problems that may be associated with using commercial pollinator seed mixes.

## **Results**

### *Initial Density*

Plant density was recorded early in the season on August 8, 2013 when plants could be easily counted (Table 1). Some species documented flowering in the later evaluations were not present at the early density evaluation. These were either located outside of the evaluated frames, or could have germinated later in the season or were unidentifiable at early life stages. Many perennials listed here did not flower the first season and some of the perennial species require a winter stratification period and are not expected to germinate until spring 2014.

Early plant densities were largely composed of annual species that had no stratification requirement. Seed mixtures with a large component of annuals seemed in most cases better equipped to compete against weed species.

Weedy annual species were common throughout the plots. Annual grasses can be significantly reduced by using grass selective herbicides; however we were not able to remove them entirely with a single treatment of sethoxydim. Broadleaf weeds are extremely difficult to control in wildflower plantings. Herbicides used to treat broadleaf weeds will also affect many of the target species in the seed mixtures. Lambs quarters, shepherd's purse and prickly lettuce are common annual weeds in the plots. These are expected to decrease in density as the target species become more competitive.

Table 1. Initial density (plants per meter<sup>2</sup>) of target and weed species from each commercial seed mix.

	AM Dry Area	AM Xeriscape	AM Native	Outside Pride	Applewood	Eden Bros.
Target species	-----plants/m <sup>2</sup> -----					
Cornflower	1.5			2.5	1.5	3.5
Plains coreopsis	1.0			0.5	1.5	2.0
Wild cosmos	0.5					
Baby snapdragon	0.5					
CA poppy	2.5	4.5		3.0	4.0	
Corn poppy	1.0			4.5	4.0	1.0
Siberian wallflower	0.5			0.5		
Sweet alyssum	1.0				3.5	
Indian blanket	1.0	0.5	2.5		1.5	
Birdsfoot trefoil	0.5					
Tidytips		2.5				
Bird's eye		1.5				
Greenthread		0.5				
Blue flax		0.5				0.5
Arroyo lupine		0.5				
Farewell to spring			2.0	0.5	0.5	
Candy tuft				3.0		
Total target	10.0	10.5	4.5	14.5	16.5	7.0
<b>Weed species</b>						
Volunteer millet	0.5	0.5	1.0		1.0	1.0
Green foxtail	3.5	4.0	2.0		3.5	9.0
Lambsquarters	0.5					0.5
Witchgrass	1.5	4.5	7.0	3.5	1.5	
Barnyardgrass	0.5		2.5	1.0	5.0	4.0
Shepherd's purse		1.0	0.5	1.0		0.5
Prickly lettuce			0.5			
Total weed	6.5	10.0	13.5	5.5	11.0	15.0



American Meadows Dry Area



July 22, 2013



August 29, 2013

### American Meadows Western Xeriscape

American Meadows Western Xeriscape mix contains 24 species, mostly native to the PMC service area with some plants being introduced from California. This mix is the closest to what might be recommended for pollinator plantings by the PMC. It contains 12 annuals 10 perennials and 2 biennials.

Nine species in the Xeriscape mix flowered during the first growing season (Table 3). This mixture contained a large percentage of tidytips and California poppy and provided a very yellow dominant appearance. Blanketflower was also present in good numbers. All flowering in the first season was done by annuals and the perennial blanketflower. Tidytips and blanketflower appeared highly attractive to small native bees. California bluebell, greenthread, arroyo lupine and blazingstar were present, but not in large numbers; most were represented by one or two plants.

Table 3. American meadows Western Xeriscape. Colored bars indicate bloom color. Green indicates no flowers in bloom.

	Longevity	8-Aug	19-Aug	4-Sep	10-Sep	20-Sep	27-Sep	
California poppy	Annual	Yellow						
Tidy tips	Annual	Yellow						
Blanketflower	Perennial	Red	Green	Green	Green	Red	Red	
Bird's eye	Annual	Purple				Green		
California bluebell	Annual	Blue		Green				
Greenthread	Annual	Green	Yellow	Green				
Arroyo lupine	Annual	Blue	Green					
Prairie aster	Biennial	Blue	Green					
Blazingstar	Annual	Green		Yellow	Green			
Desert marigold	Ann., Bi.	Green						
Deerhorn clarkia	Annual	Green						
Common wooly sunflower	Perennial	Green						
Blue flax	Perennial	Green						
Five spot	Annual	Green						
Pale evening primrose	Biennial	Green						
Palmer penstemon	Perennial	Green						
Rocky Mountain penstemon	Perennial	Green						
Prairie coneflower	Perennial	Green						
Gooseberryleaf globemallow	Perennial	Green						
Baby blue-eyes	Annual	Green						
Soapwort	Perennial	Green						
Creeping thyme	Perennial	Green						
Strawberry clover	Perennial	Green						
Johnny jump-up	Annual	Green						

American Meadows Western Xeriscape



July 22, 2013



August 29, 2013

### American Meadows Native West

American Meadows Native West mix is composed of 19 species, 7 annuals, 1 biennial and 11 perennials all native to North America (Table 4). However it does contain many species that would not be considered native to the Intermountain or Rocky Mountain Region. Some come from eastern US, coastal western US or from the Southwest, all areas that are very dissimilar from conditions found in our region.

The lack of introduced annuals in the mixture significantly reduced the number of species flowering during the first growing season. Only five species blossomed in 2013, 3 annuals and 2 perennials. The All Native mix was highly red color dominant in 2013 due to the large numbers of Indian blanket. Other prominent species in the floral composition were blackeyed Susan and showy goldeneye.

Table 4. American Meadows Native West. Colored bars indicate bloom color. Green indicates no flowers in bloom.

	Longevity	8-Aug	19-Aug	4-Sep	10-Sep	20-Sep	27-Sep
Indian blanket	Annual	Red					
Farewell to spring	Annual	Pink	Green				
Blackeyed Susan	Perennial	Yellow					
Tidytips	Annual	Green					
Showy goldeneye	Perennial	Yellow					
Blue columbine	Perennial	Green					
Smooth aster	Perennial	Green					
Prairie aster	Biennial	Green					
Deerhorn clarkia	Annual	Green					
Rocky Mountain beeflower	Annual	Green					
Plains coreopsis	Annual	Green					
Fleabane daisy	Perennial	Green					
Blanketflower	Perennial	Green					
Globe gilia	Annual	Green					
Blue flax	Perennial	Green					
Rocky Mountain penstemon	Perennial	Green					
Purple prairie clover	Perennial	Green					
Prairie coneflower	Perennial	Green					
White evening primrose	Perennial	Green					

American Meadows Native West



July 22, 2013



August 29, 2013

### Outside Pride Western Wildflower

Outside Pride Western Wildflower Mix consists of 17 native and introduced species with 9 annuals and 8 perennials (Table 5). Of these, 11 flowered in the first growing season, 8 of which were annuals. California poppy, plains coreopsis, corn poppy and cornflower were frequently visited by European honeybees. Indian blanket and showy goldeneye, both native species, were also visited by native pollinators.

Table 5. Outside Pride Western Wildflower. Colored bars indicate bloom color. Green indicates no flowers in bloom.

	Longevity	8-Aug	19-Aug	4-Sep	10-Sep	20-Sep	27-Sep	
Corn poppy	Annual	Purple				Green		
Plains coreopsis	Annual	Orange					Green	
California poppy	Annual	Orange			Green			Orange
Sweet alyssum	Annual	Green		Green				
Farewell to spring	Annual	Pink			Green			
Cornflower	Annual	Blue						
Indian blanket	Annual	Red	Green				Red	
Candytuft	Annual	Green		Purple			Green	
Siberian wallflower	Biennial	Green		Orange		Green	Orange	
Showy goldeneye	Perennial	Green		Yellow				
Blackeyed Susan	Perennial	Green			Yellow		Green	
Blanketflower	Perennial	Green						
Globe gilia	Annual	Green						
Blue flax	Perennial	Green						
Perennial lupine	Perennial	Green						
Rocky Mountain penstemon	Perennial	Green						
Prairie coneflower	Perennial	Green						

Outside Pride Western Wildflower



July 22, 2013



August 29, 2013



Applewood Western Mix



July 22, 2013



August 29, 2013

### Eden Brothers Western Wildflower Mix

The Western Wildflower Mix from Eden Brothers contains 24 species, 12 annuals, 1 biennial and 11 perennials (Table 7). Flowering during the first season was similar to other mixes containing corn poppy, cornflower, plains coreopsis and wild cosmos. Surprisingly, we did not observe any flowering from California poppy during this season in the Eden Brothers mix.

Table 7. Eden Brothers Western Wildflower Mix. Colored bars indicate bloom color. Green indicates no flowers in bloom.

	Longevity	8-Aug	19-Aug	4-Sep	10-Sep	20-Sep	27-Sep		
Corn poppy	Annual	Purple				Green			
Cornflower	Annual	Blue							
California poppy		Green							
Plains coreopsis	Annual	Orange							
Wild cosmos	Annual	Green		Pink					
Lemon mint	Annual	Green		Purple	Green			White	
Prairie coneflower	Perennial	Green		Orange	Green				
Blackeyed Susan	Perennial	Green		Yellow					
Baby's breath	Annual	Green		White	Green				
Indian blanket	Annual	Green			Red		Green		
Sulphur cosmos	Annual	Green			Orange		Green		
Blue columbine	Perennial	Green							
Siberian wallflower	Biennial	Green							
Lanceleaf coreopsis	Perennial	Green							
Purple coneflower	Perennial	Green							
Blanketflower	Perennial	Green							
Scarlet flax	Annual	Green							
Blue flax	Perennial	Green							
Perennial lupine	Perennial	Green							
Russel lupine	Perennial	Green							
Five spot	Annual	Green							
Rocky Mountain penstemon	Perennial	Green							
Drummond phlox	Annual	Green							
Gloriosa daisy	Perennial	Green							

Eden Brothers Western Wildflower Mix



July 22, 2013



August 29, 2013

## **Discussion**

Of the total 62 species included in the trial, 30 flowered in the first growing season. The vast majority (22 of 30) were annuals, the remainder being 2 biennials and 6 perennials. Flowering was not observed until early August, approximately 11 weeks after planting. Most species had long sustained flowers due to supplemental irrigation and late summer rains. The first frost of the season came on September 19, and all plants had ceased flowering by October 17.

The inclusion of annuals is a good way to get blooms during the first growing season. It is especially important to include annuals in post-fire rehabilitation seed mixtures to provide food for native pollinators that have relatively short foraging ranges and might not be able to reach undisturbed plant communities.

Insect visitation varied between plots due to species composition and density. Overall, corn poppy, California poppy, cornflower, plains coreopsis, and wild cosmos were very attractive to European honeybees. Tidy tips and blanketflower were heavily visited by native bees. Hunt's bumblebee was observed frequently visiting wild cosmos. Butterflies were observed on Indian blanket and blanketflower. All of the flowering species were observed being visited at least once by pollinators.

Eleven of the 62 species planted are cited in the literature as having weedy tendencies (USDA NRCS 2013). Of these, Cornflower, soapwort and Rocky Mountain bee flower are listed as being weedy in western states (Whitson et al 1996). The others are primarily western species that express weedy behavior in the Midwest and eastern US. Rocky Mountain bee flower is native to the PMC service area. It can invade and spread into ditch banks and along roadsides where precipitation accumulates. Cornflower is a concern. This species is known to escape from "wildflower" seedings and spread. It is closely related to the several knapweed species listed as noxious weeds in Idaho and Utah.

In addition to inappropriate target species, wildflower mixes can also contain accidental inclusions of noxious weed seed. Seed used for commerce is not to have any prohibited noxious weeds listed in the state the seed is shipped to or used. However, restricted noxious weed seeds may be included as state seed law allows. The best way to know if noxious weed seed is in a mix is with an accurate purity test and seed tag.

A small number of plants evaluated in the trial have known or suspected toxic properties. Three species, yarrow, desert marigold, and soapwort have been shown to cause disease in sheep when consumed in large volumes (Burrows and Tyrl 2001). Yarrow and desert marigold are native and are commonly present in rangelands used for sheep grazing; however these species should be avoided or used with caution in areas where they might pose a risk to livestock.

In order to prevent the establishment and spread of noxious weeds and other invasive plant species, one must be careful about what seeds are planted. The best way to do this is to use a custom seed mix. If a commercial wildflower mix is used, the mix selected should be appropriate to the region; native species are recommended when possible. Mixes including known invasive or aggressive species such as cornflower should be avoided. Seed mixes should be tested for purity and come with an accurate seed tag. Mixtures should also be clearly labeled with scientific

names included as confusion and uncertainty can arise from the use of common names. Following these steps will help ensure that only appropriate species are planted.

### **Use in NRCS Programs**

The NRCS funds or cost-shares approved pollinator plantings which meet agency specifications. These specifications include seed mixture composition percentages and the rate at which the seed is planted (lb/ac or seeds/ft). To accurately calculate seeding rates, one needs to know: % of each species in the mix by weight, purity of each species, germination or viability of each species and the average number of seeds/lb for each species (Tilley and St. John 2013). This information is commonly lacking in commercial seed mixtures. Of the six mixtures evaluated, only two included percentage information.

Using rough estimates for purity and viability we calculated approximate seeds/ft for the two mixtures where percentages of each species were available based on seeding 10 lbs bulk seed per acre. Based on our calculations, Applewood Seed Western Mix had 128 seeds/ft and Outside Pride Western Wildflower Mix had 93 seeds/ft. NRCS specifications stipulate a target seeding rate of 75 to 100 seeds/ft for broadcast seeding of small seeded species. These numbers suggest that the recommended rate of 10 lbs/ac closely aligns with NRCS broadcast seeding rates. Species component percentages must be available to determine whether or not seeding mixtures meet NRCS standards. Mixtures not providing percentages of species components should not be used for NRCS funded seedings.

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Appendix. Mix and species information									
Common Name	Scientific Name	Origin	Longevity	Eden Brothers	Applewood	Outside Pride	American	American	American
				Western	Seed	Western	Meadows	Meadows	Meadows
				Wildflower	Western	Wildflower	Native West	Dry Area Mix	Western Xeriscape
				Mix	Mix	Mix			Mix
				\$27/lb	\$26/lb	\$23/lb	\$60/lb	\$27/lb	\$40/lb
					% of mix	% of mix			
Yarrow	<i>Achillea millefolium</i>	N. Am.	Perennial					x	
Blue columbine	<i>Aquilegia coerulea</i>	IMW <sup>1</sup> and RMW <sup>2</sup>	Perennial	x			x		
Smooth aster	<i>Aster laevis</i>	Eastern US	Perennial				x		
Priarie aster	<i>Machaeranthera tanacetifolius</i>	Western US (not PNW <sup>3</sup> )	biennial				x		x
Desert marigold	<i>Baileya multiradiata</i>	SW	Ann., bi, per.						x
Cornflower	<i>Centaurea cyanus</i>	N. Am.	annual	x	7.3	8.13		x	
Siberian wallflower	<i>Cheiranthus allionii</i>	Eurasia	Biennial	x		12.19		x	
Garland chrysanthemum	<i>Chrysanthemum coronarium</i>	Mediterranean	Annual					x	
Shasta daisy	<i>Chrysanthemum maximum</i>	Europe	Rhiz-perr.					x	
Deerhorn clarkia	<i>Clarkia pulchella</i>	PNW	Annual		0.92		x		x
Farewell to spring	<i>Clarkia unguiculata</i>	California	Annual		1.83	1.34			
Rocky Mountain bee flower	<i>Cleome serrulata</i>	N. Am (not SE)	Annual				x		
Lanceleaf coreopsis	<i>Coreopsis lanceolata</i>	N. Am (not IMW)	Perennial	x					
Plains coreopsis	<i>Coreopsis tinctoria</i>	N. Am (not IMW)	ann, bi, per	x	0.73	1.02	x	x	
Wild cosmos	<i>Cosmos bipinnatus</i>	Central Am.	Annual	x				x	
Sulphur cosmos	<i>Cosmos sulphureus</i>	Central am.	Annual	x				x	
Purple prairie clover	<i>Dalea purpurea</i>	Midwestern US	Perennial				x		
Sweet william	<i>Dianthus barbatus</i>	Eurasia	Biennial					x	
African daisy	<i>Dimorphotheca sinuata</i>	Africa	Annual					x	
Purple coneflower	<i>Echinacea purpurea</i>	Eastern US	Perennial	x					
Fleabane daisy	<i>Erigeron speciosus</i>	Western US	Perennial				x		
Common woolly sunflower	<i>Eriophyllum lanatum</i>	Western US	Perennial						x
California poppy	<i>Eschscholzia californica</i>	California	Annual	x	11	12.19		x	x

Appendix (cont.)									
Common Name	Scientific Name	Origin	Longevity	Eden Brothers	Applewood	Outside Pride	American	American	American
				Western	Seed	Western	Meadows	Meadows	Meadows
				Wildflower	Western	Wildflower	Native West	Dry Area Mix	Western Xeriscape
				Mix	Mix	Mix			Mix
					% of mix	% of mix			
<b>Blanketflower</b>	<i>Gaillardia aristata</i>	Western US	Perennial	x	12.83	8.13	x	x	x
<b>Indian blanket</b>	<i>Gaillardia pulchella</i>	Eastern US	Annual		3.67	4.06	x	x	
<b>Globe gilia</b>	<i>Gilia capitata</i>	Western US	Annual		1.83	1.34	x		
<b>Bird's eye</b>	<i>Gilia tricolor</i>	California	Annual						x
<b>Baby's breath</b>	<i>Gypsophila elegans</i>	Eurasia	Annual	x				x	
<b>Showy goldeneye</b>	<i>Helionis multiflora</i>	Western US (not PNW)	Perennial		1.21	0.81	x		
<b>Candy tuft</b>	<i>Iberis umbellata</i>	Mediterranean	Annual		11	16.25			
<b>Tidytips</b>	<i>Layia platyglossa</i>	CA, AZ, UT	Annual						x
<b>Baby snapdragon</b>	<i>Linaria maroccana</i>	Morocco	Annual					x	
<b>Scarlet flax</b>	<i>Linum grandiflorum</i>	Algeria	Annual	x					
<b>Blue flax</b>	<i>Linum perenne</i>	Europe	Perennial	x	7.33	12.19	x	x	x
<b>Sweet alyssum</b>	<i>Lobularia maritima</i>	Mediterranean	Annual					x	
<b>Birdsfoot trefoil</b>	<i>Lotus corniculatus</i>	Eurasia	Perennial					x	
<b>Perennial lupine</b>	<i>Lupinus perennis</i>	Eastern US	Perennial	x	14.65	16.25			
<b>Russel lupine</b>	<i>Lupinus polyphyllus</i>	Western US	Perennial	x					
<b>Arroyo lupine</b>	<i>Lupinus succulentus</i>	California	Annual						x
<b>Blazingstar</b>	<i>Mentzelia lindleyi</i>	California	Annual						x
<b>Lemon mint</b>	<i>Monarda citriodora</i>	Southern US	Annual	x					
<b>Five spot</b>	<i>Nemophila maculata</i>	California	Annual	x					x
<b>Baby blue-eyes</b>	<i>Nemophila menziesii</i>	California	Annual						x
<b>White evening primrose</b>	<i>Oenothera caespitosa</i>	Western US	Perennial				x		
<b>Evening primrose</b>	<i>Oenothera lamarckiana</i>	Europe	biennial					x	
<b>Dwarf eve primrose</b>	<i>Oenothera missouriensis</i>	Southern US	Perennial		1.83				
<b>Pale eve primrose</b>	<i>Oenothera pallida</i>	Western US	biennial		1.83				x

Appendix (cont.)									
Common Name	Scientific Name	Origin	Longevity	Eden Brothers	Applewood	Outside Pride	American	American	American
				Western Wildflower Mix	Seed Western Mix	Western Wildflower Mix	Meadows	Meadows	Meadows
					% of mix	% of mix	Native West	Dry Area Mix	Western Xeriscape Mix
<b>Corn poppy</b>	<i>Papaver rhoeas</i>	Europe	Annual	x	7.33	2.03		x	
<b>Palmer penstemon</b>	<i>Penstemon palmeri</i>	SW	Perennial		1.83				x
<b>Rocky Mountain penstemon</b>	<i>Penstemon strictus</i>	Rocky Mtns	Perennial	x	3.67	2.03	x	x	x
<b>California bluebell</b>	<i>Phacelia campanularia</i>	California	Annual						x
<b>Drummond phlox</b>	<i>Phlox drummondii</i>	Eastern US	Annual	x					
<b>Prairie coneflower</b>	<i>Ratibida columnaris</i>	Midwestern US	Perennial	x	1.84	2.03	x	x	x
<b>Gloriosa daisy</b>	<i>Rudbeckia gloriosa</i>	Eastern US	Perennial	x				x	
<b>Blackeyed susan</b>	<i>Rudbeckia hirta</i>	N. am (not SW)	ann, bi, per	x			x	x	
<b>Soapwort</b>	<i>Saponaria officinalis</i>	Eurasia	Perennial						x
<b>Ccatchfly</b>	<i>Silene armeria</i>	Europe	Annual					x	
<b>Gooseberryleaf globemallow</b>	<i>Sphaeralcea grossulariifolia</i>	Western US	Perennial						x
<b>Greenthread</b>	<i>Thelesperma filifolium</i>	Midwestern US	Annual		7.33				x
<b>Creeping thyme</b>	<i>Thymus praecox</i>	Eurasia	Perennial						x
<b>Strawberry clover</b>	<i>Trifolium fragiferum</i>	Eurasia	Perennial						x
<b>Johnny jump-up</b>	<i>Viola tricolor</i>	Eurasia	Annual						x

<sup>1</sup> Intermountain West  
<sup>2</sup> Rocky Mountain West  
<sup>3</sup> Pacific Northwest

## **Effects of long-term refrigerated storage and bagging in polyethylene on hardwood willow cuttings**

Study Number: IDPMC-T-1201-RI  
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Planting healthy, vigorous cuttings is essential to successful establishment of riparian willow plantings for streambank erosion practices. Vigor of cuttings during the initial planting phase is critical to establishment and long-term survival of the cutting. Cuttings are often harvested dormant in late winter prior to the scheduled planting, but schedules frequently become preempted by unforeseen circumstances. Installation is then forced to wait until the completion of groundwork, construction, etc, or until conditions become favorable, or when funding for the planting is approved. Willow cuttings are commonly kept in long-term storage for weeks to months after their scheduled installation date, which raises the question, “how long can cuttings be kept in storage and still retain enough vigor to be successfully used in riparian restoration projects?”

Cutting survival under storage conditions is dependent on water loss and the prevention of infection (Behrens, 1988). Unfavorable conditions can 1) kill cuttings, or 2) reduce rooting potential (Behrens, 1988). Best storage conditions for dormant cuttings are those that cause no water stress and prevent the spread of fungal pathogens. The best means to achieve this is to lower the temperature and increase humidity (Behrens, 1988; Davis and Potter, 1985). If possible, relative humidity should be kept near 100% (Behrens, 1988; Scianna et al., 2005). An optimum temperature for cutting storage is approximately -4° C (24° F) (Behrens, 1988; Cram and Lindquist, 1982).

The majority of cutting storage research involves small diameter cuttings used for nursery stock production. Meeting ideal storage conditions is more feasible with small nursery cuttings than for larger cuttings (poles or posts) intended for riparian bioengineering projects. Many riparian restoration projects are limited in resources and cutting storage locations may include basements, root cellars, walk-in refrigerators or in plastic bags stored outside during winter months.

Storage of dormant, leafless hardwood cuttings during winter months is not problematic and is a well-established practice without any major problems (Behrens, 1988). Cuttings should maintain vigor in freezing conditions outside fairly well if protected from disease, wind, sunshine, or insects. Heeling-in cuttings as well as fall dormant planting have also proven successful as means of storage and establishment (Cram and Lindquist, 1982; Tilley and Hoag, 2009).

However, long term storage effects on hardwood cuttings for restoration in less than ideal conditions are less well understood. Problems arise when storage becomes prolonged and conditions need to be maintained artificially. This study conducted by the Aberdeen Plant Materials Center addresses long term refrigerated storage on larger diameter cuttings of two

willow species commonly used for riparian restoration projects in the Great Basin Region. It also compares the effects of storage in polyethylene versus cuttings stored in open conditions.

### **Materials and Methods**

The test occurred over two seasons. During the first season we tested cuttings stored exposed (not bagged in polyethylene, hereafter referred to as the non-poly treatment) in a dark walk-in cooler. During the second season the cuttings were kept in large black polyethylene bags (hereafter poly treatment) tied shut to retain moisture. Dormant hardwood cuttings for the non-poly treatment were harvested on November 29-30, 2011. Cuttings used in the poly treatment were collected on November 26-28, 2012. Yellow willow (*Salix lutea*) was collected from a native stand at Quaking Aspen Spring at an elevation of 1,585 m (5200 ft) (42.2309642, -112.7885628). Coyote willow (*S. exigua*) was collected from a native stand on the Curlew National Grassland on Hwy 37, approximately 1 mi south of Twin Springs in Rock Creek at 1,554 m (5100 ft) (42.2423708, -112.7495098). All cuttings were trimmed to a length of 60 cm (24 in) with a basal diameter of 1.9 to 2.5 cm (0.75 to 1.0 in). Temperatures in the cooler ranged between from 1 to 2° C (34 to 39° F) with 77 to 82% relative humidity. Relative humidity inside the polyethylene bags was measured at 99%. The cuttings were stored for 60, 120, 180 and 240 days and a 0 day control treatment.

Four replications of 6 cuttings each were placed in 9.5 l (10 qt) galvanized buckets in a growth chamber kept at 22-23° C (71 to 74° F). The design was a randomized complete block with 4 buckets acting as 4 replications. The growth chamber was equipped with six, 34 watt white fluorescent bulbs, 3 on the door and 3 on the back panel with a 24 hr light period. Photosynthetically active radiation (PAR), measured using a Decagon AccuPAR LP-80 ceptometer®, measured 45  $\mu\text{mol}/\text{m}^2\text{s}$ . Relative humidity in the growth chamber was measured at 58%. The buckets were watered daily to maintain water depth at 23 cm (9 in). No soil medium was used in the experiment to facilitate root measurement.

Cuttings were evaluated after 32 days of growth chamber conditions for percent survival (visible active growth, root initials, or healthy green stem tissues) and for average shoot and root biomass. Biomass was measured after air drying for 14 days at 22° C (72° F).

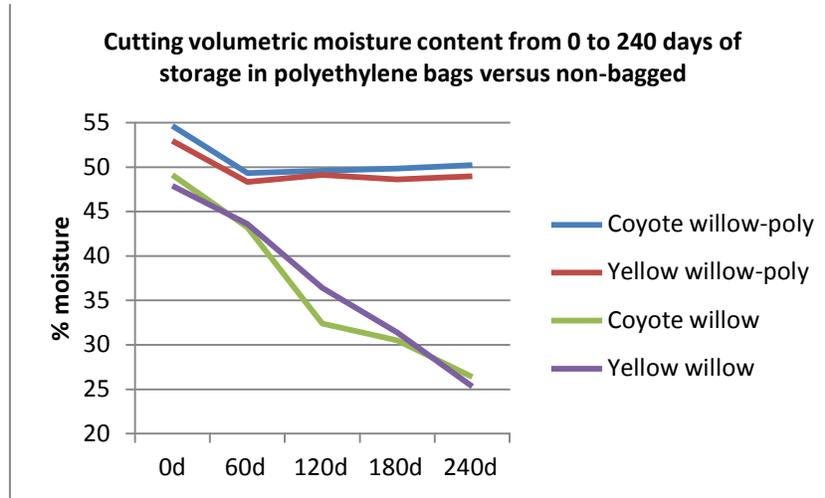
A second set of cuttings for each treatment was used to measure cutting volumetric moisture content. Four replications of one cutting per rep were used for each storage treatment. Fresh weights were measured after storage treatment conclusion, and dry weights were recorded after oven drying at 60° C (140 °F) for 10 days.

Comparisons of cutting survival and growth measurements were made using a one-way ANOVA. Significance was assessed at  $\alpha=0.05$ . Means were differentiated using a Least Significant Difference (LSD) test. Statistical analysis was conducted using Statistix 8 Analytical Software.

## Results

### *Cutting volumetric moisture content*

The 2011 harvested non-poly cuttings began the storage treatment with between 40 and 55% moisture content. The poly treatment cuttings began with slightly higher moisture ranging between 50 and 55%. Cutting moisture decreased steadily in the non-poly cuttings at a rate of approximately 0.1% per day. After 240 days water content ranged from 25 to 30% (figure 1). The cuttings stored in polyethylene lost a small amount of moisture between 0 and 60 days, then leveled off at approximately 50% for the remainder of the trial.



### *Cutting survival*

Fresh cuttings of both species planted with no storage had 100% survival (table 1). Excellent survival was achieved with fresh cuttings and from cuttings bagged in polyethylene up to 180 days of storage but then declined significantly at the 240 day evaluation. Cuttings not bagged in polyethylene had excellent survival with up to 120 days of storage. At 180 days and beyond coyote and yellow willow survival decreased significantly for cuttings in the non-poly treatment.

Table 1. Cutting Survival

	Coyote willow	Yellow willow
0d	100 a <sup>1</sup>	100 a
0d poly	100 a	100 a
120d poly	100 a	100 a
180d poly	96 a-b	100 a
60d	92 a-b	92 a-b
60d poly	88 a-b	100 a
120d	79 a-b	96 a
240d poly	75 b	77 b-c
180d	17 c	58 c
240d	8 c	29 d

<sup>1</sup> Means followed by the same letter are not significantly different at  $P \leq 0.05$  using LSD (least significant difference) test.

### *Root development*

Root biomass of coyote willow was significantly greater in treatments with cuttings stored in polyethylene bags compared to non-bagged cuttings and the 0d control treatment (table 2). Root production of coyote willow cuttings stored in poly did not differ significantly between storage durations. Likewise, root weight of coyote willow cuttings not stored in poly did not differ significantly from one another.

Differences in root growth were detected between storage durations among yellow willow cuttings. Greatest root biomass was found with 180d poly treatment which differed significantly from the 240 and 60d poly treatments but not the 120d poly treatment. Root biomass among the non-poly treatments of yellow willow cuttings did not differ significantly from one another regardless of length of storage.

Table 2. Root biomass

	Coyote willow	Yellow willow
	------(g)-----	
240d poly	0.76 a <sup>1</sup>	0.48 b-c
120d poly	0.67 a	0.57 a-b
60d poly	0.67 a	0.36 c-d
180d poly	0.58 a	0.72 a
0d	0.06 b	0.11 e-f
120d	0.04 b	0.07 f
180d	0.02 b	0.04 f
60d	0.01 b	0.28 d-e
0d poly	0.00 b	0.11 e-f
240d	0.00 b	0.00 f

<sup>1</sup> Means followed by the same letter are not significantly different at  $P \leq 0.05$  using LSD (least significant difference) test.

### *Shoot development*

Poly treatments all produced significantly more shoot growth in coyote willow than the non-poly treatments (table 3). Coyote willow stored in polyethylene also produced more shoot biomass than fresh cuttings of the 0d control treatment. Storage for 180d in poly had two times more shoot production than the next highest rated treatment.

Yellow willow cuttings showed significant difference in shoot production between the 0d poly and 0d non-poly treatment. This may be a reflection of different moisture levels at start of trial. Poly treatments produced significantly more growth of yellow willow shoots than all non-poly treatments but not the 0d control of the 2012 harvested cuttings. 120d poly had significantly greater shoot production than all other treatments, two times more shoot biomass than the next highest rated treatment.

Table 3. Shoot biomass

	Coyote willow	Yellow willow
	------(g)-----	
180d poly	13.76 a <sup>1</sup>	6.60 b
120d poly	6.63 b	12.64 a
60d poly	4.95 b-c	6.93 b
240d poly	3.83 c	8.06 b
60d	0.45 d	2.64 c
0d	0.43 d	2.86 c
120d	0.40 d	1.31 c
180d	0.04 d	0.46 c
0d poly	0.00 d	6.22 b
240d	0.00 d	0.00 c

<sup>1</sup>Means followed by the same letter are not significantly different at  $P \leq 0.05$  using LSD (least significant difference) test.

## Discussion

Although cuttings for the two storage treatments (poly and non-poly) were harvested in different years, fresh cuttings from each treatment (0d poly and 0d non-poly) did not differ significantly from one another in the characters measured.

Mold and fungus development was visible in the polyethylene bagged cuttings at 60 days of storage and beyond. Black spots and a fuzzy white fungus were observed on cut tips and pruned branches. The presence of fungus however did not seem to inhibit survival or growth under shorter lengths of storage when compared to fresh cuttings. Only after 240 days of poly treatment did we observe a significant decrease in survival. We also observed fungus on the non-poly cuttings, but not to the degree of that on the cuttings stored under high relative humidity in the polyethylene.

Our results indicate that non-bagged cuttings stored under refrigerated conditions will retain good vigor for at least four months. Increasing humidity and maintaining cutting moisture levels by bagging the cuttings in polyethylene extends vigor with no loss of survival for up to 6 months. Bagging the cuttings also appears to stimulate root and shoot growth. 120 to 180 days of storage in polyethylene resulted in significantly greater shoot production than all other treatments including freshly harvested cuttings. This information may be useful for stream bank restoration or bioengineering where more root and shoot production is useful for bank protection.

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**Comparative Evaluation  
Basin wildrye and Thickspike wheatgrass  
IDPMC-T-1201-RA (Basin wildrye) IDPMC-  
T-1202-RA (Thickspike wheatgrass) August  
21, 2013**

**Loren St. John PMC Team Leader  
Derek Tilley, PMC Agronomist Natural  
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**Introduction**

In cooperation with Joe Robbins, Agricultural Research Service (ARS) – Forage and Range Research Laboratory, the Aberdeen Plant Materials Center (PMC) planted comparative evaluations of basin wildrye and thickspike wheatgrass to evaluate the performance of some promising accessions in comparison to existing released varieties available on the market. Basin wildrye (*Leymus cinereus*) is a tall, coarse, long-lived native bunchgrass and is useful for wildlife habitat and cover and in calving pasture for its protective cover from wind. Poor seedling vigor can result in poor stands. ‘Magnar’ basin wildrye released by the Aberdeen PMC and ‘Trailhead’ released by the Bridger, MT PMC have been used in the Great Basin, Intermountain West and northern Great Plains. ARS requested that we evaluate accessions UTBWC1, UTBWS2 and UTBWS1 in comparison with Magnar and Trailhead.

Thickspike wheatgrass (*Elymus lanceolatus* ssp. *lanceolatus*) is a long-lived, native, sod-forming grass widely distributed in the northern part of the Intermountain West and northern Great Plains and is well-suited for erosion control on medium to coarse-textured soils. ‘Critana’ was released by the Bridger, MT PMC and ‘Bannock’ was released by the Aberdeen PMC. ARS requested that we evaluate accession UTTS11-1 in comparison with Bannock and Critana.

**Materials and Methods**

A randomized block design with 3 replications for each species was planted in field P8 at the PMC on May 3, 2012. Seed of each entry was planted in plots 7 x 20 feet long with 10 inch row spacing using a modified Tye® drill. The seeding rate for each species and accession was 8 pounds PLS/acre. Seed was mixed with rice hulls to facilitate seed flow through the drill and for drill calibration. Seeding depth was ¼-½ inch deep into a firm, weed-free seedbed. Figure 1 is the plot map for the comparative evaluations. The site was irrigated to field capacity prior to seeding and irrigated after planting to establish and maintain stands. Weeds were controlled by mowing the establishment year. Plots were irrigated to approximate 14 inches annual precipitation.

	North	Fld P8W		
303	<b>Critana</b>			
302	<b>UTTS11-1</b>			
301	<b>Bannock</b>			
203	<b>Bannock</b>			
202	<b>Critana</b>			
201	<b>UTTS11-1</b>			
103	<b>Bannock</b>			
102	<b>Critana</b>			
101	<b>UTTS11-1</b>		Thickspike plots	
305	<b>Trailhead</b>		Basin plots	
304	<b>UTBWS2</b>			
303	<b>UTBWC1</b>			
302	<b>UTBWS1</b>			
301	<b>Magnar</b>			
205	<b>Trailhead</b>			
204	<b>UTBWS2</b>			
203	<b>Magnar</b>			
202	<b>UTBWC1</b>			
201	<b>UTBWS1</b>			
105	<b>UTBWC1</b>			
104	<b>UTBWS2</b>			
103	<b>Trailhead</b>			
102	<b>Magnar</b>			
101	<b>UTBWS1</b>			
	Mainline			

**Figure 1 Plot Map for comparative evaluation of basin wildrye and thickspike wheatgrass accessions.**

Forage yield samples were collected from the middle two rows for a length of 4 feet in the middle of each plot with a mechanical plot harvester. Samples were weighed and grab samples were taken from each accession, weighed fresh and then placed in a drying oven set at 60° C for approximately 5 days to obtain percent dry weight in order to calculate dry forage yield per acre. Statistical analysis was conducted using Statistix 8 analytical software. Significant differences were tested using an ANOVA followed by means separation using a Least Significant Difference (LSD) test when p values were lower than 0.05.

### **2012 Evaluations**

On May 14, plots were beginning to emerge. By the end of July, all plots had established and plant height data was collected on July 30. Table 1 summarizes the plant height data and observational notes.

Table 1. Summary of 2012 evaluation data of thickspike wheatgrass and basin wildrye accessions.

<b>Thickspike wheatgrass</b>	Mean Plant Height (cm)	Notes
Bannock	65.3	Some flowering
Critana	38.0	No flowering
UTTS11-1	65.0	Some flowering
<b>Basin wildrye</b>		
Magnar	59.3	No flowering, typical blue color
Trailhead	61.7	No flowering, typical green color
UTBWC1	60.0	No flowering, green color
UTBWS1	61.7	No flowering, green color
UTBWS2	60.0	No flowering, green color

Bannock and UTTS11-1 thickspike wheatgrass were nearly identical in plant height and both accessions had some flowering. Critana was substantially shorter and was not flowering. There were no discernible differences in plant vigor between the accessions and all plots established well.

The basin wildrye accessions showed minimal differences in plant height and none of them flowered during the first growing season. Magnar displayed its typical bluish colored leaves and Trailhead displayed its typical greenish colored leaves. The non-released accessions displayed the greenish colored leaves very similar to Trailhead. There were no discernible differences in plant vigor between the accessions and all plots established well.

The plots were swathed in late October to approximately 4 inch height and residue removed.

### **2013 Evaluations**

The first evaluation was completed on April 25, 2013 for both the thickspike wheatgrass and the basin wildrye accessions. Percent stand, plant height, and vigor ratings were observed and recorded. The thickspike wheatgrass plots were evaluated a second time on July 15, and seed production ranking and forage yield data was also collected at this time. The basin wildrye accessions were evaluated a second time on August 6. Data is summarized in Table 2.

Plant height for the thickspike accessions did not differ significantly at either date. Plant heights in April ranged from 23.2 cm for Critana to 28.2 cm for UTTS11-1. At the July evaluation, Bannock was the tallest accession (97.2 cm). Percent stand and vigor ratings also failed to show significant differences. Percent stand ranged from 86.3 for UTTS11-1 to 91.3 for both Bannock and Critana, and vigor between the plots in April was fairly uniform between the accessions. UTTS11-1 had the best vigor rating in July. Seed production ranking and forage yield had statistically significant differences with Bannock having the best seed production ranking and UTTS11-1 having the largest forage yield.

Table 2. Summary of 2013 evaluation data for thickspike wheatgrass and basin wildrye accessions

Thickspike wheatgrass							
Accession	Plant ht. (cm) 4/25/13	Plant ht. (cm) 7/15/13.	Percent stand 4/25/13	Vigor 4/25/13	Vigor 7/15/13	Seed prod. rank 7/15/13	Dry forage yield (#/ac) 7/15/13*
Bannock	27.7	97.2	91.3	2.4	2.7	1.5 a	7380 b
Critana	23.2	80.6	91.3	2.6	3.5	2.9 b	6125 b
UTTS11-1	28.2	93.9	86.3	2.4	2.3	2.2 c	11641 a
				1=best		1=best	
				9=worst		9=worst	

\* means followed by the same letter are not significantly different at  $p < 0.05$

Basin wildrye							
Accession	Plant ht. (cm) 4/25/13	Plant ht. (cm) 8/6/13*	Percent stand 4/25/13	Vigor 4/25/13	Vigor 8/6/13 *	Seed prod. rank 8/6/13	Dry forage yield (#/ac) 8/6/13
Magnar	16.0	165.0 a	85.0	3.3	2.3 a	2.7	6772
Trailhead	15.3	153.3 b	78.7	3.7	3.0 b	3.0	6264
UTBWC1	15.0	155.0 b	80.7	3.7	3.0 b	3.0	7175
UTBWS1	13.0	158.3 b	75.3	4.0	3.0 b	3.0	7004
UTBWS2	16.7	153.3 b	69.7	3.3	3.0 b	3.0	7127
				1=best		1=best	
				9=worst		9=worst	

\* means followed by the same letter are not significantly different at  $p < 0.05$

Plant height in April for the basin wildrye accessions ranged from 13.0 cm for UTBWS1 to 16.7 cm for UTBWS2 but differences were not statistically significant. Plant height at the August evaluation found Magnar to be the tallest at 165.0 cm and was statistically different from the other accessions. Percent stand ranged from 69.7 percent for UTBWS2 to 85.0 percent for Magnar. Magnar had the best vigor rating at both evaluations and was significantly better at the August evaluation. Magnar also had the best seed production ranking. UTBWC1 had the greatest forage yield at 7175 pounds per acre but there were no significant differences in yield between the accessions.

Following are photographs of each of the accessions at the second evaluation in 2013:



**Bannock thickspike wheatgrass July 15, 2013**



**Critana thickspike wheatgrass July 15, 2013**



**UTTS11-1 thickspike wheatgrass July 15, 2013**



**Magnar basin wildrye August 6, 2013**



**Trailhead basin wildrye August 6, 2013**



**UTBWC1 basin wildrye August 6, 2013**



**UTBWS1 basin wildrye August 6, 2013**



**UTBWS2 basin wildrye August 6, 2013**

The plots were swathed and residue removed following the August 6 evaluation and will continue to be evaluated in 2014 and 2015 at which time a final summary report will be completed.

**Demonstration Planting of ‘Snowstorm’ Forage Kochia for Green Stripping  
IDPMC-T-1204-Ra  
2012-2013 Progress Report Loren  
St. John PMC Team Leader Derek  
Tilley, PMC Agronomist**

**Introduction**

The purpose of this study is to demonstrate and evaluate accessions of forage kochia (*Bassia prostrata*) in an alternate row seeding with Hycrest II crested wheatgrass in a simulated green stripping or fire break planting.

Forage kochia is a semi-green perennial sub-shrub introduced from southern Eurasia and has been successfully used for green strip or firebreak plantings in the Intermountain West. It is well adapted to the dry areas of the region, establishes easily, and is competitive against annual weeds. Forage kochia is fire tolerant and remains green through the fire season. It is also highly nutritious to livestock and provides food and cover for wildlife and upland game birds.

‘Snowstorm’ forage kochia was released in 2012 by the USDA Agricultural Research Service in Logan, Utah based on improved stature (taller), productivity, and nutritional content compared to ‘Immigrant’. Immigrant was released in 1984 by the USDA Forest Service, Natural Resources Conservation Service, Utah Division of Wildlife Resources and the Idaho, Nevada, Oregon, and Utah Agriculture Experiment Stations. The demonstration planting also includes 3 other test accessions (KZ6X, Pust Sel, and Sah Sel) that were tested along with Snowstorm during the evaluation for the release of Snowstorm.

**Methods**

A firm, moist, weed-free seedbed was prepared in Field 21 at the PMC Fish and Game Farm in late April, 2012. Plots were seeded on May 4, 2012 with a Tye® drill with 10 inch row spacing. The drill box is partitioned to facilitate alternate row seeding. The seed drop tube on every other drill opener was pulled and forage kochia seed was allowed to dribble onto the soil surface during the planting operation. The alternate rows on the drill were left as is in normal operating mode and Hycrest II crested wheatgrass seed was drilled at ¼-½ inch depth. Plots are approximately 7 feet wide x 20 feet long and the demonstration planting is arranged in a randomized complete block design with 4 replications. The seeding rate for the grass was 5 pounds PLS/ac and the seeding rate for forage kochia was 2 pounds PLS/ac. Rice hulls were used to assist in drill calibration and to facilitate seed flow in the drill. After the plots were planted, an all-terrain vehicle (ATV) was driven on the forage kochia rows to press the seed into the soil surface. The plots were irrigated to approximate 12-14 inches annual precipitation during the establishment year and the plots were mowed 3 times to prevent annual broadleaf weed seed formation. Figure 1 is a plot map of the demonstration planting.

	North	Fld 21W
101	Sah Sel	
102	Snow storm	
103	KZ6X Sel	
104	Pust Sel	
105	Immigrant	
201	Sah Sel	
202	Snow storm	
203	KZ6X Sel	
204	Pust Sel	
205	Immigrant	
301	KZ6X Sel	
302	Snow storm	
303	Pust Sel	
304	Immigrant	
305	Sah Sel	
401	Sah Sel	
402	Snow storm	
403	KZ6X Sel	
404	Pust Sel	
405	Immigrant	
	mainline	

**Figure 1. Plot map of Forage Kochia demonstration planting.**

Statistical analysis of evaluation data was conducted using Statistix 8 analytical software. Significant differences were tested using an ANOVA followed by means separation using a Least Significant Difference (LSD) test when p values were lower than 0.05.

### **2012 Evaluations**

On May 16, the plots were observed. The Hycrest II grass rows were beginning to emerge and appeared to be fairly uniform through the planting. No forage kochia seedlings were observed. The plots were evaluated on July 31, 2012 for the number of forage kochia plants in the middle 2 rows of each plot and plant heights were recorded. The following table summarizes the data.

<b>Accession</b>	<b>Mean # plants</b>	<b>Mean Plant height (cm)</b>
Immigrant	7.75	16.50
KZ6X Sel	6.50	17.00
Pust Sel	6.25	18.25
Sah Sel	7.25	16.50
Snowstorm	13.00	21.00

Snowstorm had nearly double the mean number of plants as compared to the other accessions and had the greatest mean plant height. However, no significant differences in the data were detected. Annual weeds including lamb's quarter, field pennycress, red root pigweed, annual kochia, and prickly lettuce were also present.

The Hycrest II seeded rows through the planting established well and were fairly uniform.

On August 16, 2012 the plots were viewed by approximately 16 people during a tour of a nearby pollinator planting demonstration. Observers were shown the different accessions in the trial and discussed the use of forage kochia for grazing and green strip applications.

Casual observations of the plots during the winter (2012) and early spring (2013) found many of the Snowstorm plants with dead top branching and there was obvious vole activity (tunneling) in the weaker plots in rep 1 and rep 2 where some snow had drifted and provided cover for the voles.

### 2013 Evaluations

The plots received no irrigation or other cultural practice during the 2013 growing season. From October 2012 to July 2013, the nearest weather station at the Aberdeen Research and Extension Center had received 5.41 inches of precipitation. Based on 30 year average precipitation, there was a deficit of 2.57 inches for the October-July time period.

The plots were evaluated on May 3 and August 8, 2013 for the number of forage kochia plants in the middle two rows of each plot, plant height, and vigor and are summarized in the following table.

Accession	Mean # plants 5/3/13	Mean # plants 8/8/13	Plant ht. (cm) 5/3/13	Plant ht. (cm) 8/8/13	Vigor 5/3/13	Vigor 8/8/13
Immigrant	10.00	12.75	4.25	37.5	4.75	4.50
KZ6X Sel	10.25	12.50	4.25	43.75	4.50	3.75
Pust Sel	10.75	12.75	3.75	46.25	4.00	3.25
Sah Sel	7.25	7.50	4.50	39.50	6.50	4.50
Snowstorm	9.50	10.75	3.5	58.75	5.50	2.25
					1=best	
					9=worst	

At the May evaluation, Pust Sel had the most number of plants (10.75) and Sah Sel was the tallest accession (4.5 cm). Pust Sel also had the best vigor. In August, Immigrant and Pust Sel had the most number of plants (12.75) and Sah Sel had the least. Snowstorm was the tallest accession at 58.75 cm and Immigrant was the shortest at 37.50 cm. Vigor at the August evaluation ranged from 2.25 (best) for Snowstorm to 4.5 (worst) for Sah Sel. No significant differences in the data were detected. The rows of Hycrest II were uniform and well established and were 60-80 cm tall.

Following are photographs of Immigrant and Snowstorm forage kochia at the August, 2013 evaluation:



**Immigrant forage kochia August 8, 2013**



**Snowstorm forage kochia August 8, 2013**

The plots will continue to be evaluated in 2014 and 2015.

## **2010 Cover Crop Demonstration**

**IDPMC-T-1005 CP**

**Loren St. John, PMC Team Leader**

**Derek J. Tilley, PMC Agronomist**

**Marlon Winger, Idaho State Agronomist**

**Natural Resources Conservation Service**

**Plant Materials Center**

**Aberdeen, Idaho**

### **INTRODUCTION**

On August 19, 2010 the PMC established a cover crop demonstration planting to observe establishment and growth of ‘Dixie’ crimson clover, ‘Purple Bounty’ hairy vetch, ‘Sterling’ rapeseed, ‘Daikon’ forage radish, ‘Purple Top’ turnip, ‘Pacific Gold’ mustard, Austrian winter peas, and sweet clover for late summer cover/green manure applications. Dates of initial emergence, plant height, late fall forage yield and spring forage yield data were collected and photographs of each plot were taken at each of the evaluation dates.

### **METHODS**

The plots were planted in field P7 at the Pearl Farm. The soils are classified as Kimama silt loam, 0-2 percent slope, deep and well-drained. Soil pH is 7.4-8.4. Average annual precipitation is 9.39 inches and the field is sprinkler irrigated. Prior to establishment of the cover crop demonstration the field had been established to ‘Bannock’ thickspike wheatgrass for Foundation seed production for four growing seasons. In the fall of 2009, the seed production field was plowed and the field was mechanically fallowed as needed during 2010 before establishment of the demonstration plots.

The plots were seeded with a modified “Brillion” type broadcast planter on August 19, 2010 into a clean, moist and firm seedbed. Seeding rates followed commercial recommendations and are shown on Table 1. The legumes were inoculated with Rhizobia prior to planting. Plots were 14 feet wide x 80 feet long. A soil test was completed prior to planting and adequate amounts of phosphorus (18 ppm) and potassium (404 ppm) were available and nitrate and ammonium results indicated there were 66 pounds of plant available nitrogen in the top 12 inches of soil. Plots were sprinkler irrigated to apply approximately 1 inch irrigation every 5-7 days during August and early September and then two applications of 1.5 inches the last half of September and early October, at which time irrigation ceased.

The plots were observed for initial emergence and plant height was recorded on October 19, 2010 and May 31, 2011. The non-legume plots were sampled for dry matter forage yield on November 12 and the legume plots were sampled for dry matter forage yield on May 2 and June 3. The reason for the difference in sampling dates between the legume and non-legume plots was that the legume plots had minimal fall growth and the non-legume plots were mostly dead by the spring following planting.

## EVALUATION

Table 1 Summarizes the data collected from the demonstration plots. All the varieties with the exception of Austrian pea and Purple Bounty hairy vetch emerged 5 days after planting. Purple Bounty hairy vetch took 13 days to emerge. The first recording of plant height occurred on October 19 and the tallest variety at that date was Pacific Gold mustard. All legumes were less than 1.5 inches tall. Forage yield data collected from the non-legume plots on November 12 showed Sterling rape to have the greatest forage yield (10,600 pounds per acre). The non-legume plots stayed green through the fall and early winter until air temperatures reached approximately 10° F (late December-early January). The turnip plot had plants that did not winterkill (likely insulated under a snow drift) and it was surprising that the crimson clover did not winterkill. Forage yield data of the legume plots sampled in the spring of 2011 found Austrian winter pea producing 2,700 pounds per acre on May 2 and 3,390 pounds per acre on June 3. Hairy vetch was the tallest crop on May 31 (18 in.).

Table 1. Cover Crop Demonstration Data

Variety	Seeding Rate #/ac	Days to emergence	Plant height (in.) 10/19/10	Plant height (in.) 5/31/11	Forage yield (dry) 11/12/10	Forage yield (dry) 5/2/11	Forage yield (dry) 6/3/11
Pacific Gold Mustard	15	5	20		9,800	n/a	n/a
Purple Top Turnip	3	5	12		10,400	n/a	n/a
Sweet clover	15	5	1.5	14	n/a	1,500	1,962
Sterling Rape	15	5	15		10,600	n/a	n/a
Dixie Crimson Clover	15	5	2	14	n/a	2,000	2,409
Daikon Radish	12	5	12		10,400	n/a	n/a
Austrian winter pea	70	9	1.5	14	n/a	2,700	3,390
Purple Bounty Hairy Vetch	20	13	0.5	18	n/a	1,625	2,468

Following are a series of photographs of the plots.



**Austrian winter pea November 19, 2010**



**Austrian winter pea June 3, 2011**



**Crimson clover November 19, 2010**



**Crimson clover June 3, 2011**



**Hairy vetch November 19, 2010**



**Hairy vetch June 3, 2011**



**Sweet clover November 19, 2010**



**Sweet clover June 3, 2011**



**Mustard November 19, 2010**



**Mustard April 15, 2011**



**Turnip November 19, 2010**



**Turnip April 15, 2011**



**Rape November 19, 2010**



**Rape April 15, 2011**



**Radish November 19, 2010**



**Radish April 15, 2011**

## RECOMMENDATIONS

The species evaluated in the demonstration planting are adapted to irrigated cropland conditions of southeastern Idaho and northern Utah. The non-legume varieties provided more residue during the winter and early spring than the legume varieties. Based on the photographs, it appears that Pacific Gold mustard provided the most uniform and abundant over winter/early spring residue of the non-legume varieties. The non-legumes also suppressed early spring weed growth as seen in the photographs. All the legume varieties overwintered but the best performing legume was Austrian winter pea.

An ideal late summer cover crop would be a mix containing legumes, broadleaf species, warm season grass and a cool season grass (small grain) to increase diversity and cover which will enhance the micro-biotic soil community. The non-legumes in this demonstration limit micro-biotic soil activity and should not be used by themselves as a single component cover crop if the objective is to enhance the micro-biotic soil community.



**Cover Crop Periodic Table**

Cool Season Plants						Warm Season Plants		
Grass						Grass		
Barley	Broadleaf Plants					Pearl Millet (wk)		
Oat (wk)	Arugula					Amaranth (wk)	Foxtail Millet (wk)	
Ryegrass	Flax (wk)	Legumes				Buckwheat (wk)	Proso Millet (wk)	
Wheat	Rape	Turnip (wk)	Field Pea	Chickling vetch (wk)	Medic	Chickpea (wk)	Sunflower (wk)	Sudan grass (wk)
Cereal rye	Kale	Radish (wk)	Lentil	Red Clover	Ladino clover	Cowpea (wk)	Safflower (wk)	Teff (wk)
Triticale	Canola	Beet	Spring Pea (wk)	Crimson clover	Bean (wk)	Soybean (wk)	Chicory	Grain Sorghum (wk)
Annual Fescue (wk)	Mustard	Tyfon (wk)	Vetch	Sweetclover	Alfalfa	Sun Hemp (wk)	Squash (wk)	Corn (wk)

(wk) = winter killed

USDA is an equal opportunity provider and employer

## **2012 Grass Display Nursery**

**IDPMC-T-1205-RA**

## **2013 Progress Report**

**Loren St. John, PMC Team Leader**

**Derek Tilley, PMC Agronomist**

### **INTRODUCTION**

The Aberdeen Grass Display Nursery was planted August 28, 2012 in cooperation with the South Bingham Soil Conservation District. The purpose of the display nursery is to allow the public to view grasses used to conserve soil, provide forage for livestock and wildlife, habitat for wildlife and to improve water quality. The nursery includes 56 accessions showcasing released grasses (and some currently in testing evaluations) of 30 species suited for reclamation, restoration or irrigated pasture plantings in the Aberdeen PMC service area. The display is divided into three sections according to irrigation needs or reflecting natural precipitation ranges; 12 inches or less, 12 to 16 inches, and 16 inches or greater. Each plot is 7 feet wide by 60 feet long. Covar sheep fescue separates the precipitation regimes and the western wheatgrass plots from adjacent plots due to the rate of spread by western wheatgrass.

### **EVALUATIONS**

The plots were evaluated for relative plant density on September 21, 2012 and August 29, 2013 using a frequency based grid. The grid measured approximately 40 x 41 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 two grid lengths (80 inches) into the plot. Counts were made of the cells that contained at least one plant. Several paces were taken and the grid was placed on the rows and counts were made again. A total of 5 grids were recorded for each plot. Total area for one grid is approximately 1m<sup>2</sup>. Total area evaluated is therefore approximately 5m<sup>2</sup>. A conservative estimate of plant density (plants/m<sup>2</sup>) is the total number of cells containing at least one plant divided by five. Numbers for approximate plants/m<sup>2</sup> were then divided by 10.8 to calculate approximate plants/ft<sup>2</sup>. It is important to note that because cells with plants were counted and not number of plants per cell, the best possible score is 100 hits per five frames which converts to 20 plants/m<sup>2</sup> or 1.85 plants/ft<sup>2</sup>. Actual plant density may be higher than the numbers indicated below. The following table shows the evaluation data. The table is arranged in the same order as the plots are planted.

VARIETY	COMMON NAME	SCIENTIFIC NAME	Plant Density	Plant Density
			(Plt/ft <sup>2</sup> )	(Plt/ft <sup>2</sup> )
			9/21/12	8/29/13
OPORTUNITY	Sandberg bluegrass	<i>Poa nevadensis</i>	1.42	1.70
SODAR	Streambank wheatgrass	<i>Elymus lanceolatus</i>	1.44	1.72
BANNOCK	Thickspike wheatgrass	<i>Elymus lanceolatus</i>	1.83	1.67
CRITANA	Thickspike wheatgrass	<i>Elymus lanceolatus</i>	1.76	1.56
VAVILOV*	Siberian wheatgrass	<i>Agropyron fragile</i>	1.78	1.72
VAVILOV II*	Siberian wheatgrass	<i>Agropyron fragile</i>	1.80	1.85
NORDAN*	Crested wheatgrass	<i>Agropyron desertorum</i>	1.83	1.80
HYCREST*	Crested wheatgrass	<i>Agropyron cristatum X desertorum</i>	1.85	1.78
HYCREST II*	Crested wheatgrass	<i>Agropyron cristatum X desertorum</i>	1.78	1.76
ROADCREST*	Crested wheatgrass	<i>Agropyron cristatum</i>	1.74	1.80
DOUGLAS*	Crested wheatgrass	<i>Agropyron cristatum</i>	1.22	0.76
FAIRWAY*	Crested wheatgrass	<i>Agropyron cristatum</i>	1.85	1.83
EPHRAIM*	Crested wheatgrass	<i>Agropyron cristatum</i>	1.85	1.78
WHITMAR	Beardless wheatgrass	<i>Pseudoroegneria spicata</i>	1.76	1.63
ANATONE	Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	0.93	0.76

P-7	Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	0.83	0.69
GOLDAR	Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	0.30	0.31
SECAR	Snake River wheatgrass	<i>Elymus wawawaiensis</i>	1.56	1.06
DISCOVERY	Snake River wheatgrass	<i>Elymus wawawaiensis</i>	1.85	1.77
BOZOISKY *	Russian wildrye	<i>Psathrostachys juncea</i>	1.61	1.80
BOZOISKY II*	Russian wildrye	<i>Psathrostachys juncea</i>	1.76	1.81
<b>COVAR STRIP</b>				
ROSANA	Western wheatgrass	<i>Pascopyrum smithii</i>	1.78	1.85
ARRIBA	Western wheatgrass	<i>Pascopyrum smithii</i>	1.57	1.67
RECOVERY	Western wheatgrass	<i>Pascopyrum smithii</i>	1.20	1.65
<b>COVAR STRIP</b>				
SHERMAN	Big bluegrass	<i>Poa ampla</i>	1.00	1.50
COPPERHEAD	Slender wheatgrass	<i>Elymus trachycaulus</i>	1.74	1.80
PRYOR	Slender wheatgrass	<i>Elymus trachycaulus</i>	1.68	1.74
FIRST STRIKE	Slender wheatgrass	<i>Elymus trachycaulus</i>	1.44	1.74
COVAR*	Sheep fescue	<i>Festuca ovina</i>	1.69	1.80
BLACKSHEEP*	Sheep fescue	<i>Festuca ovina</i>	1.59	1.83
DURAR	Hard fescue	<i>Festuca trachyphylla</i>	1.65	1.78
WINCHESTER	Idaho fescue	<i>Festuca idahoensis</i>	1.26	1.04

PAIUTE*	Orchardgrass	<i>Dactylis glomerata</i>	1.50	1.70
NEWHY*	Hybrid wheatgrass	<i>Elymus hoffmanii</i>	0.37	0.98
RUSH*	Intermediate wheatgrass	<i>Thinopyrum intermedium</i>	1.80	1.81
RELIANT*	Intermediate wheatgrass	<i>Thinopyrum intermedium</i>	1.74	1.74
MANIFEST*	Intermediate wheatgrass	<i>Thinopyrum intermedium</i>	1.24	1.69
MANSKA*	Pubescent wheatgrass	<i>Thinopyrum intermedium</i>	1.50	1.78
MAGNAR	Basin wildrye	<i>Leymus cinereus</i>	1.74	1.19
CONTINENTAL	Basin wildrye	<i>Leymus cinereus</i>	1.74	1.35
TRAILHEAD	Basin wildrye	<i>Leymus cinereus</i>	1.72	1.00
ALKAR*	Tall wheatgrass	<i>Thinopyrum ponticum</i>	1.81	1.80
LARGO*	Tall wheatgrass	<i>Thinopyrum ponticum</i>	1.83	1.80
GARNET	Mountain brome	<i>Bromus marginatus</i>	1.81	1.83
BROMAR	Mountain brome	<i>Bromus marginatus</i>	1.65	1.61
<b>COVAR STRIP</b>				
ORO VERDE*	Perennial rye	<i>Lolium perenne</i>	1.83	1.65
GARRISON*	Creeping foxtail	<i>Alopecurus arundinaceus</i>	1.81	1.85
CLIMAX	Timothy	<i>Phleum pratensis</i>	1.63	1.78
JOHNSTONE*	Tall fescue	<i>Festuca X Lolium</i>	1.81	1.80
POTOMAC*	Orchardgrass	<i>Dactylis glomerata</i>	1.78	1.83

9030693*	Smooth brome	<i>Bromus inermis</i>	1.83	1.80
REGAR*	Meadow brome	<i>Bromus biebersteinii</i>	1.22	1.63
CACHE*	Meadow brome	<i>Bromus biebersteinii</i>	0.94	1.48
FOOT HILLS	Canada bluegrass	<i>Poa compressa</i>	1.13	1.85
WHITE PASS	Blue wildrye	<i>Elymus glaucus</i>	1.52	1.57
UNION FLAT	Blue wildrye	<i>Elymus glaucus</i>	0.20	0.46

\* non-native

The plots with the best stands (1.85 plants per ft<sup>2</sup>) at the August 2013 evaluation were Vavilov II Siberian wheatgrass, Rosana western wheatgrass; Garrison creeping foxtail and Foothills Canada bluegrass. Within the streambank/thickspike wheatgrass group, Sodar had the best stand. Vavilov II had the best stand of the Siberian wheatgrass plots, Fairway the best of the crested wheatgrass plots, Whitmar the best of the beardless/bluebunch wheatgrasses, Discovery the best of Snake River wheatgrass plots and Bozoisky II of the Russian wildrye plots. Rosana had the best stand of the western wheatgrass plots; Copperhead of the slender wheatgrasses, Black Sheep of the fine-leaved fescues and Rush was the best stand of the intermediate wheatgrasses. Continental was the best stand of the basin wildrye plots and Garnet had the best stand of mountain brome. Regar had the best stand of meadow/smooth brome plots.

The primary purpose of the display nursery is to allow observation and provide a training opportunity for those interested in grasses for natural resource conservation. The plots may also be used for other evaluation opportunities as they arise. A brochure has been developed for the display nursery which provides information on each of the accessions planted in the nursery and is available upon request.

# **Curlew National Grassland Off-Center Evaluation**

## **2013 Progress Report**

**Derek J. Tilley, Agronomist  
Loren St. John, Team Leader Natural  
Resources Conservation Service Plant  
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Aberdeen, Idaho**

### **INTRODUCTION**

In November of 2010, the Aberdeen Plant Materials Center (PMC) installed a multi-species planting at an off-center test site located on the USDA-Forest Service Curlew National Grassland approximately 30 miles south of American Falls, Idaho in cooperation with the Caribou/Targhee National Forest. The trial includes accessions of primarily native grasses, forbs and shrubs adapted for use in MLRA 13 Eastern Idaho Plateaus (13 to 18 inch plus precipitation areas). The trial contains 63 accessions of 35 species of native and introduced grasses, forbs and shrubs listed in Table 1. The goal of this trial is to evaluate the adaptability of new conservation releases in mid-elevation big sagebrush/grass ecosystems and compare their establishment, production and longevity against traditionally recommended released plant materials. The site will also serve as a display nursery for the Forest Service and other conservation practitioners to view plant species and releases in a natural setting.

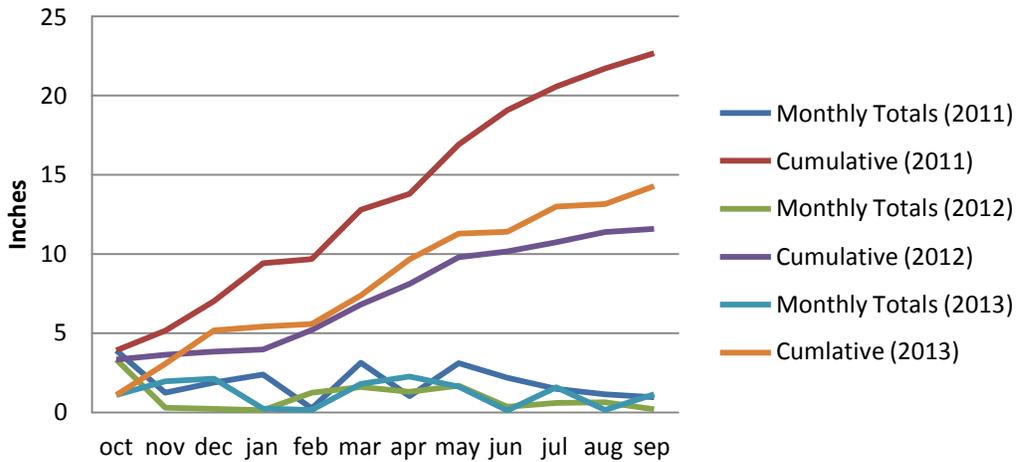
The Curlew test site historically supported a Bonneville big sagebrush/bluebunch wheatgrass plant community. For several decades it has been dominated by crested wheatgrass and bulbous bluegrass. Climatic conditions are semi-arid with mean annual precipitation ranging from 12 to 25 inches, and the frost free period is approximately 90 days or less. The soil at the site is classified as a Samaria-Pollynot complex, 4 to 12 percent slopes, silt loam, well drained and deep (> 80 inches to limiting layer). The elevation is 5,216 ft.

#### *Weather*

There are no weather stations located near the Curlew site or in nearby locations with similar elevation and conditions. The closest weather station is the Bull Canyon weather station located 11 miles north of the Curlew study site at an elevation of 6,418 ft. During water year 2011, Bull Canyon recorded 22.7 inches of precipitation. The Curlew study site, being lower in elevation, probably received less precipitation than Bull Canyon, but the Curlew test site received normal to above normal precipitation for the year (University of Utah, 2012).

Precipitation was very low throughout the Intermountain West in 2012. The Bull Canyon weather station recorded below average precipitation with a cumulative total of 11.58 inches through September, 2012. 2013 was somewhat better for precipitation in the region with a cumulative total of 14.28 inches through September 4, 2013 at the Bull Canyon station.

## Precipitation at Bull Canyon weather station for Water Years 2011-2013



### MATERIALS AND METHODS

The study area was burned by wildfire in 2006. In fall 2009 the study site was plowed and packed, followed by applications of 16 oz/ac 2, 4-D and 64 oz/ac glyphosate on June 18, 2010 and July 29, 2010. The trial was planted on November 17, 2010 using a modified Tye® seed drill with a width of 80 inches (8 rows at 10 inch spacing). Experimental design is a randomized complete block with 3 replications. Appendix 1 is a plot map of the planting. Each plot is one drill width wide (80 in) and 20 ft long. Seeding depths are dependent on species and were planted according to Ogle et al (2010). 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). Pure live seed values were determined by seed lab results or, best estimates when lab results were not available. All seed was mixed with rice hulls as an inert carrier to improve seed flow according to St. John et al (2005). Disturbed areas adjacent to the trial were planted to seed mixture consisting of 40% Anatone bluebunch wheatgrass, 20% Sherman big bluegrass, 15% Bannock thickspike wheatgrass, 10 percent Magnar basin wildrye, 5% Maple Grove Lewis flax, 5% Richfield firecracker penstemon, 5% Great Northern western yarrow, and 0.25 lbs/ac Snake River Plains fourwing saltbush. The plots were mowed to a height of approximately four inches on September 29, 2011 for weed control.



Seeding the Curlew test site with a Tye drill

### *Plant Density*

Plant densities of target species were measured using a frequency grid based on that described by Vogel and Masters (2001). The grid measured approximately 40 x 41 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 two grid lengths (80 inches) into the plot. Counts were made of the cells that contained at least one plant. Several paces were taken and the grid was placed on the rows and counts were made again. A total of 5 grids were recorded for each plot. Total area for one grid is approximately 1m<sup>2</sup>. Total area evaluated is therefore approximately 5m<sup>2</sup>. A conservative estimate of plant density (plants/m<sup>2</sup>) is the total number of cells containing at least one plant divided by five. It is important to note that because cells with plants were counted and not number of plants per cell, the best possible score is 100 hits per five frames which converts to 20 plants/m<sup>2</sup> or 1.85 plants/ft<sup>2</sup>. Actual plant density may be higher than the numbers indicated below. For plants/ft<sup>2</sup> divide by 10.76.

Data were analyzed using the Statistix 8 Analytical software and subjected to an analysis of variance with a significance level of  $p < 0.05$ . In cases where significance was detected, means were separated using a Least Significant Difference (LSD) all pairwise comparison. Analyses were broken into five groups, 1) all species, 2) native grasses, 3) introduced grasses, 4) forbs, and 5) shrubs. All tables have been arranged with accessions ranked from highest plant density to the lowest at the time of the 2011 evaluation.

Initial plant establishment was measured on July 11, 2011 Plant density data was also collected on June 14, 2012, and June 20, 2013.

Densities of volunteer crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Thinopyrum intermedium*), and annual bromes (*Bromus* spp.) were evaluated in the test plots with frequency grids on August 13, 2012. One density frame was evaluated for each accession in the center of the plots of replications 1 and 3. These data will be used to track long term persistence and competition of introduced perennial and annual grasses among the seeded species.

Establishment and performance of the cover crop seeding mixture was evaluated on August 14, 2012 and June 20, 2013. Eight density frames (2 on each side of the planting) were evaluated. Cover class frequency data was also recorded on August 14, 2012 using a 60 meter (200 ft) line-intercept transect on each side of the planting.

### *Forage Production*

On June 26, 2013, biomass clippings were taken from all accessions with densities greater than 5.4 plants/m<sup>2</sup> (0.5 plants/ft<sup>2</sup>). Five representative plants were clipped from plots in each replication. The plants were air dried for 10 days and then weighed. Plant density values were then used to calculate lbs/acre (table 8).

## Table 1. Species and accessions

### Bluebunch wheatgrass (*Pseudoroegneria spicata*)

- Anatone
- Goldar
- P-7
- P-33

### Snake River wheatgrass (*Elymus wawawaiensis*)

- Secar
- Discovery

### Western wheatgrass (*Pascopyrum smithii*)

- Recovery
- Rosana
- Arriba

### Slender wheatgrass (*Elymus trachycaulus*)

- First Strike
- Pryor

### Basin wildrye (*Leymus cinereus*)

- Washoe
- Magnar
- Trailhead
- Continental

### Bluegrass (*Poa* spp.)

- Sherman big bluegrass
- Opportunity Nevada bluegrass
- Mt. Home Sandberg bluegrass
- High Plains Sandberg bluegrass
- Reliable Sandberg bluegrass

### Green needlegrass (*Nassella viridula*)

- Cucharas

### Fescue (*Festuca* spp.)

- 9076469 Idaho fescue
- Covar sheep fescue
- Durar hard fescue

### Streambank/Thickspike wheatgrass (*Elymus lanceolatus*)

- Sodar
- Bannock
- Critana

### Squirreltail (*Elymus elymoides* and *E. multisetus*)

- Fish Creek bottlebrush squirreltail
- Sand Hollow big squirreltail
- Toe Jam Creek bottlebrush squirreltail
- Wapiti bottlebrush squirreltail
- 9019219 bottlebrush squirreltail
- 9092275 bottlebrush squirreltail

### Forbs

- Maple Grove Lewis flax (*Linum lewisii*)

- Appar blue flax (*Linum perenne*)
- Richfield firecracker penstemon (*Penstemon eatonii*)
- Great Northern western yarrow (*Achillea millefolium*)
- Antelope prairie clover (*Dalea candida*)
- Silverleaf phacelia (*Phacelia hastata*)
- 9076577 Douglas' dustymaiden (*Chaenactis douglasii*)
- NBR-1 basalt milkvetch (*Astragalus filipes*)
- Don falcata alfalfa (*Medicago sativa* ssp. *falcata*)
- Timp northern (Utah) sweetvetch (*Hedysarum boreale*)
- Delar small burnet (*Sanguisorba minor*)
- Sainfoin (*Onobrychis viciifolia*)
- Lutana cicer milkvetch (*Astragalus cicer*)
- Stillwater prairie coneflower (*Ratibida columnifera*)

### Shrubs

- Big sagebrush-locally collected, likely Bonneville big sagebrush (*Artemisia tridentata* subsp. *X. bonnevillensis*)
- Snake River Plains fourwing saltbush (*Atriplex canescens*)
- Wytana fourwing saltbush (*A. canescens*)
- Northern Cold Desert winterfat (*Krascheninnikovia lanata*)

### Altai wildrye (*Leymus angustus*)

- Mustang

### Crested wheatgrass (*Agropyron cristatum*)

- Ephraim
- Hycrest
- Hycrest II
- Nordan

### Russian wildrye (*Psathrostachys juncea*)

- Bozoisky Select
- Bozoisky II

### Siberian wheatgrass (*Agropyron fragile*)

- Vavilov
- Vavilov II

### Meadow brome (*Bromus biebersteinii*)

- Regar
- Cache

## RESULTS

2011

Establishment densities ranged from essentially zero plants to 13 plants/m<sup>2</sup> in 2011 (table 2). Eight out of the top ten species to establish were introduced grasses, four of which were crested wheatgrass accessions. The highest ranking native grasses were Fish Creek bottlebrush squirreltail and Pryor slender wheatgrass, both of which are short-lived perennials commonly used as a nurse crop with longer lived species in a seed mixture. In general, forbs had moderate establishment success, while the shrub accessions with the exception of Wyoming big sagebrush had low establishment numbers the first year evaluation.

Native grasses had a broad range of establishment densities (table 3) ranging from 0.2 plants/m<sup>2</sup> for Sand Hollow Germplasm big squirreltail (*Elymus multisetus*) to 11.6 plants/m<sup>2</sup> for Fish Creek Germplasm bottlebrush squirreltail (*E. elymoides*) in 2011. Introduced grasses all had excellent establishment (table 4). The lowest plant density recorded was 6.7 plants/m<sup>2</sup> from Bozoisky Russian wildrye. Cache meadow brome had the highest density with 13.0 plants/m<sup>2</sup>. Forbs (table 5) generally had lower establishment numbers than the grasses; however good stands were observed in many plots. All shrub species had low initial establishment (table 6). No significant differences were detected between means.

2012

Despite drought conditions in 2012, plant densities of native grasses did not generally show dramatic decreases. Slender wheatgrass and squirreltail accessions, known to be short lived perennials, decreased or maintained 2011 densities. Bluebunch wheatgrass densities stayed essentially the same as 2011 with the exception of Anatone which increased in density from 7.6 to 9.5 plants/m<sup>2</sup>. The rhizomatous grass species western wheatgrass, thickspike wheatgrass, and streambank wheatgrass all increased in density from 2011 to 2012.

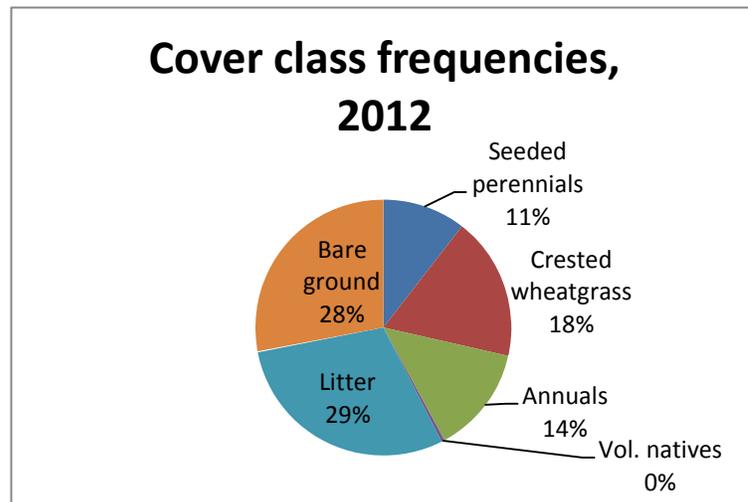
Introduced grass species accessions either increased or decreased in densities from 2011 to 2012. The highest densities were obtained by Hycrest II, Ephraim and Hycrest crested wheatgrass with 14.1, 12.5 and 11.7 plants/m<sup>2</sup> respectively. However these numbers may be inflated due to volunteering from the existing soil seed bank. Cache and Regar meadow brome both decreased under drought stress although Cache maintained a good stand with 10.7 plants/m<sup>2</sup>. Vavilov II Siberian wheatgrass maintained approximately 7 plants/m<sup>2</sup> while Vavilov decreased from 9.6 plants/m<sup>2</sup> to 4.2 plants/m<sup>2</sup>.

Forb densities declined significantly from 2011 to 2012 with many accessions being nearly eliminated from the plots. Don falcate alfalfa and Appar blue flax (both introduced species) maintained the best stands with 3.3 and 3.2 plants/m<sup>2</sup> respectively. Bonneville big sagebrush and Snake River Plains fourwing saltbush had fair stands with 2.0 and 0.7 plants/m<sup>2</sup> respectively.

Densities of volunteer crested wheatgrass and annual bromes are listed in tables 3-6. These data will be used to track persistence and expansion of introduced species over time. The average density of crested wheatgrass and annual bromes throughout all of the evaluated plots in 2012 was 7.0 plants/m<sup>2</sup> and 5.7 plants/m<sup>2</sup> respectively.

In the cover crop areas surrounding the test plots, seeded perennials made up 11% of the cover (6% bluebunch wheatgrass, 2% big bluegrass, 2% thickspike wheatgrass, and 1% blue flax) during 2012. Other seeded cover crop species were observed but not recorded in the line-

intercept transects. Bare ground and litter made up the majority of the cover classes with 28 and 29% respectively. Volunteer crested wheatgrass accounted for 18% of the total cover. Annual grasses, including bulbous bluegrass (*Poa bulbosa*), cheatgrass (*Bromus tectorum*) and an unidentified annual brome comprised 14% of the ground cover. Incidental volunteer native forbs including tapertip hawksbeard (*Crepis acuminata*) and lesser rushy milkvetch (*Astragalus convallarius*) made up less than 1% of the total cover. Plant density measurements for the cover crop are provided in table 7.



### 2013

Seven of the top ten recorded densities in 2013 were from introduced grasses. Crested wheatgrass and Russian wildrye varieties appear well adapted to the site conditions. Most introduced grasses decreased slightly but seem to be well established. The Russian wildrye accessions increased in density from 2012 to 2013. This species is known to take time for establishment.

Several native grasses appear to be holding at acceptable densities. Fish Creek bottlebrush squirreltail continued to look good and had the highest plant density for native species followed by Rosana western wheatgrass and Anatone bluebunch wheatgrass. Short lived perennials such as slender wheatgrass are steadily decreasing and giving way to longer lived species as would be expected. Rhizomatous perennials such as western wheatgrass and thickspike/streambank wheatgrass are increasing in density as plants spread.

Forbs continued to show low plant densities in general. Appar blue flax had the best density with 3.0 plants/m<sup>2</sup> in 2013, but due to high variability was not statistically different from other accessions.

Bonneville big sagebrush had significantly greater plant density than all other shrubs with an average density of 2.9 plants/m<sup>2</sup>, nearly 5 times the density of the next best shrub accession.

In total eight introduced and seven native grasses were clipped and weighed for forage yield. The introduced grasses all had higher forage yields than the native grasses. Hycrest II crested wheatgrass had significantly greater forage produced than all other accessions with an average of 2,400 lbs/acre. In contrast, Bannock thickspike wheatgrass had the best forage yields among the native accessions with 0.2 tons/acre.

**Table 2. All species**

Accession	July 11,	Density	June 20,	Accession (cont.)	July 11,	Density	June 20,
	2011	June 14,	2013		2011	2012	2013
	----- (plants/m <sup>2</sup> )-----				----- (plants/m <sup>2</sup> )-----		
Cache	13.0 a	10.7 a-d	6.8 a-f	Recovery	4.3 h-q	5.8 e-n	4.5 e-l
Hycrest II	12.1 a-b	14.1 a	9.9 a	NBR-1	4.0 i-q	0.0 q	0.5 o-p
Fish Creek	11.6 a-c	9.1 b-f	9.8 a	Durar	3.9 i-q	5.5 e-o	3.2 g-p
Nordan	11.6 a-c	8.7 b-g	6.5 a-g	9076469	3.8 i-q	2.9 i-q	0.1 p
Pryor	11.5 a-d	2.0 k-q	0.1 p	Bannock	3.6 j-q	6.5 d-k	6.1 b-h
Ephraim	11.1 a-e	12.5 a-b	9.7 a	Opportunity	3.5 j-q	4.4 f-q	0.3 o-p
Vavilov	9.6 a-f	4.2 g-q	4.7 d-k	Washoe	3.5 j-q	0.7 p-q	0.5 o-p
Bozoisky II	9.5 a-g	9.0 b-f	9.9 a	Phacelia	3.3 k-q	0.7 p-q	0.1 p
Hycrest	9.0 a-h	11.7 a-c	8.1 a-d	Secar	3.3 k-q	4.9 e-p	3.3 g-p
Covar	8.5 a-i	8.9 b-g	2.1 i-p	9019219	3.1 k-q	2.6 j-q	1.8 j-p
Delar	8.1 b-j	1.2 n-q	1.2 l-p	Sherman	3.1 k-q	4.2 g-q	1.7 j-p
Maple Grove	8.1 b-j	1.3 n-q	1.1 l-p	Trailhead	3.1 k-q	2.5 j-q	2.9 h-p
Anatone	7.6 b-k	9.5 a-e	6.9 a-f	Continental	2.4 l-q	1.8 l-q	2.8 h-p
Don	7.6 b-k	3.3 h-q	1.7 j-p	High Plains	2.4 l-q	2.5 j-q	3.2 g-p
Timp	7.6 b-k	0.6 p-q	1.2 l-p	9092275	2.3 l-q	0.9 o-q	0.1 p
Regar	7.5 b-k	4.5 f-q	2.5 i-p	Magnar	2.3 l-q	0.5 p-q	1.1 l-p
Vavilov II	7.5 b-k	7.7 c-h	9.1 a-b	Bonneville big sagebrush	1.5 m-q	2.0 k-q	2.9 h-p
Appar	7.0 c-l	3.2 h-q	3.0 h-p	Great Northern	1.5 n-q	0.9 o-q	0.9 m-p
Mustang	6.8 d-l	2.5 j-q	2.5 i-p	Richfield	1.5 n-q	0.4 p-q	0.5 o-p
Bozoisky	6.7 e-l	5.7 e-n	7.5 a-e	Wapiti	1.3 o-q	0.1 q	0.1 p
Sodar	6.7 e-l	7.4 c-i	3.9 f-n	Lutana	1.2 o-q	0.1 q	0.1 p
Critana	6.6 e-l	6.4 d-l	3.7 f-o	Stillwater	1.1 p-q	0.1 q	0.0 p
First Strike	6.3 f-m	2.0 k-q	0.6 n-p	Cucharas	0.9 q	0.5 p-q	0.2 p
P-7	6.2 f-n	6.7 d-j	5.5 c-i	Mountain Home	0.9 q	1.0 o-q	1.9 j-p
Sainfoin	5.9 f-o	0.5 p-q	0.7 n-p	Reliable	0.7 q	1.3 n-q	1.5 k-p
P-33	5.8 f-p	4.5 f-q	4.3 e-m	Snake River Plains	0.5 q	0.5 p-q	0.6 n-p
Goldar	4.7 g-q	6.1 d-m	2.7 i-p	Wytana	0.3 q	0.1 q	0.3 o-p
Rosana	4.5 h-q	8.2 b-g	8.7 a-c	Sand Hollow	0.2 q	0.0 q	0.0 p
Toe Jam	4.5 h-q	5.7 e-n	5.1 d-j	Antelope	0.1 q	0.0 q	0.0 p
Douglas' dustymaiden	4.4 h-q	1.7 l-q	0.3 o-p	Northern Cold Desert	0.1 q	0.1 q	0.0 p
Discovery	4.4 h-q	5.5 e-o	5.4 c-i				
Arriba	4.3 h-q	8.7 b-g	5.5 c-i				
LSD (0.05)	4.8	4.7	3.5				

**Table 3. Native grasses**

Accession	Target Species Density			Crested Wheatgrass	Annual Brome
	July 11,	June 14,	June 20,	Density <sup>1</sup>	Density <sup>1</sup>
	2011	2012	2013	August 13, 2012	
	----- (plants/m <sup>2</sup> )-----			----- (plants/m <sup>2</sup> )-----	
Fish Creek	11.6 a	9.1 a	9.8 a	4	5.5
Pryor	11.5 a	2.0 c-h	0.1 j-k	2.5	3
Anatone	7.6 a-c	9.5 a	6.9 a-c	6	3.5
Sodar	6.7 a-d	7.4 a-c	3.9 c-i	7.5	2
Critana	6.6 a-d	6.4 a-e	3.7 c-j	5.5	9.5
First Strike	6.3 a-e	2.0 c-h	0.6 i-k	10.5	4.5
P-7	6.2 a-f	6.7 a-d	5.5 b-e	7	6.5
P-33	5.8 b-f	4.5 a-h	4.3 c-h	9.5	7.5
Goldar	5.7 b-g	6.1 a-f	2.7 d-k	11	4
Rosana	4.5 b-g	8.2 a-b	8.7 a-b	6.5	4
Toe Jam Creek	4.5 b-g	5.7 a-h	5.1 c-g	5	4.5
Discovery	4.4 b-g	5.5 a-h	5.4 b-f	7.5	2
Arriba	4.3 b-g	8.7 a	5.5 b-e	7	1
Recovery	4.3 b-g	5.8 a-g	4.5 c-h	5	4
9076469	3.8 b-g	2.9 b-h	0.1 k	9	8.5
Bannock	3.6 b-g	6.5 a-e	6.1 b-d	10	5
Opportunity	3.5 b-g	4.4 a-h	0.3 j-k	3.5	8.5
Secar	3.3 b-g	4.9 a-h	3.3 c-k	4.5	11
Sherman	3.1 b-g	4.2 a-h	1.7 g-k	8.5	2
9019219	3.1 b-g	2.6 b-h	1.8 g-k	6.5	10.5
High Plains	2.4 c-g	2.5 b-h	3.2 d-k	11.5	3
9092275	2.3 c-g	0.9 e-h	0.1 j-k	9	7
Wapiti	1.3 d-g	0.1 g-h	0.1 k	7	7.5
Cucharas	0.9 e-g	0.5 f-h	0.2 j-k	7.5	3
Mountain Home	0.9 e-g	1.0 d-h	1.9 f-k	6	11
Reliable	0.7 f-g	1.3 d-h	1.5 g-k	7	1.5
Sand Hollow	0.2 g	0.0 h	0.0 k	4.5	12.5
LSD (0.05)	5.5	5.7	3.5		

<sup>1</sup>Not analyzed for statistical significance**Table 4. Introduced grasses**

Accession	Target Species Density			Crested Wheatgrass	Annual Brome
	July 11,	June 14,	June 20,	Density <sup>1</sup>	Density <sup>1</sup>
	2011	2012	2013	August 13, 2012	
	----- (plants/m <sup>2</sup> )-----			----- (plants/m <sup>2</sup> )-----	
Cache	13.0 a	10.7 a-c	6.8 a-c	2.5	2.5
Hycrest II	12.1 a-b	14.1 a	9.9 a	NA	5.5
Nordan	11.6 a-c	8.7 a-d	6.5 a-c	NA	2.5
Ephraim	11.1 a-c	12.5 a-b	9.7 a	NA	6.5
Vavilov	9.6 a-c	4.2 d-e	4.5 b-c	0.5	2.5
Bozoisky II	9.5 a-c	9.0 a-d	9.9 a	2	3
Hycrest	9.0 a-c	11.7 a-b	8.1 a-b	NA	14
Covar	8.5 a-c	8.9 a-d	2.1 c	10	3
Regar	7.5 b-c	4.5 d-e	2.5 c	3.5	1.5
Vavilov II	7.5 b-c	7.7 b-e	9.1 a-b	NA	3
Mustang	6.8 c	2.5 e	2.5 c	8.5	4
Bozoisky	6.7 c	5.7 c-e	7.5 a-b	6.5	2
Durar	3.9 c	5.5 c-e	3.2 b-c	7	4
LSD (0.05)	5.0	5.7			

<sup>1</sup>Not analyzed for statistical significance

**Table 5. Forbs**

Accession	Target Species Density			Crested Wheatgrass Density <sup>1</sup>	Annual Brome Density <sup>1</sup>
	July 11, 2011	June 14, 2012	June 20, 2013		
	----- (plants/m <sup>2</sup> )-----			August 13, 2012 ----- (plants/m <sup>2</sup> )-----	
Delar	8.1 a	1.2	1.2	2	10.5
Maple Grove	8.1 a	1.3	1.1	5.5	12
Don	7.6 a-b	3.3	1.7	7.5	2
Timp	7.6 a-b	0.6	1.2	9.5	11
Appar	7.0 a-c	3.2	3.0	5	15
Sainfoin	5.9 a-d	0.5	0.7	10	12
Douglas' dustymaiden	4.4 b-e	1.7	0.3	6	1
NBR-1	4.0 c-e	0.0	0.5	10.5	2
Phacelia	3.3 d-f	0.7	0.1	10.5	4.5
Great Northern	1.5 e-f	0.9	0.9	7	8
Richfield	1.5 e-f	0.4	0.5	5	10.5
Lutana	1.2 e-f	0.1	0.1	3	14.5
Stillwater	1.1 e-f	0.1	0.0	7	3
Antelope	0.1 f	0.0	0.0	10	5

LSD (0.05) 3.4 N/A N/A

<sup>1</sup>Not analyzed for statistical significance

**Table 6. Shrubs**

Accession	Target Species Density			Crested Wheatgrass Density <sup>1</sup>	Annual Brome Density <sup>1</sup>
	July 11, 2011	June 14, 2012	June 20, 2013		
	----- (plants/m <sup>2</sup> )-----			August 13, 2012 ----- (plants/m <sup>2</sup> )-----	
Bonneville big sagebrush	1.5	2.0	2.9 a	8.5	1.5
Snake River Plains	0.5	0.7	0.6 b	6.5	4.5
Wytana	0.3	0.1	0.3 b	5.5	6.5
Northern Cold Desert	0.1	0.1	0.0 b	10	1.5

LSD (0.05) N/A N/A

<sup>1</sup>Not analyzed for statistical significance

**Table 7. Cover Crop**

	Density <sup>1</sup>	
	July 11, 2011	June 20, 2013
	----- (plants/m <sup>2</sup> )-----	
Crested wheatgrass	9.9	5.1
Cheatgrass	9.3	1.1
Bluebunch wheatgrass	5.3	2.6
Bulbous bluegrass	3.4	3.6
Big bluegrass	2.5	1.4
Thickspike wheatgrass	2.0	1.1
Wyoming big sagebrush	0.5	0.0
Western yarrow	0.1	0.9
Douglas' dustymaiden	0.1	0.0
Lewis flax	0.0	0.4

<sup>1</sup>Not analyzed for statistical significance

**Table 8. Dry Forage Yields**

	June 26, 2013
	---(lbs/acre)---
Hycrest II	2,400 a
Vavilov II	1,480 b
Hycrest	1,480 b
Bozoisky II	1,280 b-c
Nordan	1,040 b-d
Bozoisky Select	1,020 b-d
Ephraim	940 c-d
Cache	560 d-e
Bannock	440 e
P-7	420 e
Anatone	400 e
Discovery	340 e
Fish Creek	300 e
Rosana	260 e
Arriba	120 e
LSD(0.05)	500

### SUMMARY

High densities of volunteer crested wheatgrass at the Curlew seeding are noteworthy. A second year of chemical fallow prior to planting the test accessions to control crested wheatgrass and annual weeds may have significantly reduced competition and led to a more complete plant community conversion. However, deferring planting until the fall of 2011 would likely have resulted in poor germination rates of seeded species due to inadequate moisture during the establishment period.

Introduced wheatgrasses and Russian wildrye show excellent establishment. Most native species did not perform as well as their introduced counterparts, but a few (Fish Creek bottlebrush squirreltail, Anatone bluebunch wheatgrass and Rosana western wheatgrass) have performed well.

This progress report documents data from the first three growing seasons at the Curlew off-center evaluation. Grass plots will be clipped again in the fourth growing season to determine air-dry forage production. Crested wheatgrass densities within the test plots and in the cover crop areas will also be tracked to observe trends in stand composition in the presence of a crested wheatgrass seed bank.

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Fence

Anatone	9076469	Timp	Rosanna	Critana	Secar	Stillwater	Don	Magnar
Goldar	Covar	Delar	Antelope	Cucharas	Wapiti	NBR-1	Maple Grove	Hycrest
P-7	Sodar	Sainfoin	Sand Hollow	Don	Wytana	Sherman	Rosanna	Timp
P-33	Bannock	Lutana	N. C. Desert	Washoe	MACA	Antelope	Great Northern	Bozoisky Sel.
Secar	Critana	MACA	Pryor	Maple Grove	Magnar	High Plains	Secar	Sand Hollow
Discovery	Fish Creek	Stillwater	CHDO	Great Northern	Nordan	9076469	9019219	Wapiti
Recovery	Sand Hollow	WY big sage	Sherman	Anatone	Arriba	Sainfoin 2 bu	Mt. Home	P-7
Rosanna	Toe Jam	S. R. Plains	NBR-1	Trailhead	Durar	First Strike	Critana	S. R. Plains
Arriba	Wapiti	N. C. Desert	Reliable	Timp	Opportunity	Mustang 2 bu	Sodar	Pryor
First Strike	9019219	Wytana	Hycrest	Appar	Sainfoin	Goldar	Phacelia	Cucharas
Pryor	9092275	Mustang	P-33	9019219	P-7	Ephraim	Trailhead	Wytana
Washoe	Maple Grove	Ephraim	Sodar	Recovery	Covar	Bannock	Toe Jam	WY big sage
Magnar	Appar	Hycrest	Mustang	Phacelia	Bozoisky II	Appar	P-33	Discovery
Trailhead	Richfield	Hycrest II	High Plains	Mt. Home	Stillwater	Continental 2 bu	Opportunity	Vavilov
Continental	Great Northern	Nordan	Vavilov	WY big sage	Fish Creek	Hycrest II	Delar 2 bu	Lutana
Sherman	Durar	Bozoisky Sel.	9092275	First Strike	Bozoisky Sel.	Recovery	Anatone	Reliable
Opportunity	Antelope	Bozoisky II	Delar	Ephraim	Cache	Cache	Bozoisky II	Regar
Mt. Home	Phacelia	Vavilov	Discovery	9076469	Goldar	9092275	Richfield	Durar
High Plains	CHDO	Vavilov II	Richfield	Regar	S. R. Plains	N. C. Desert	Covar	CHDO
Reliable	NBR-1	Regar	Lutana	Toe Jam	Vavilov II	Vavilov II	Fish Creek	Arriba
Cucharas	Don	Cache	Bannock	Hycrest II	Continental	Washoe	MACA 2 bu	Nordan

Curlew National Grassland Off-center Evaluation  
Planted November 17, 2010

Rep. 1

Rep. 2

Rep. 3

**PLANT MATERIALS**

**2013**

**IDAHO EVALUATION SUMMARIES FIELD, DSI**

**and DEMONSTRATION PLANTINGS**

**IDAHO DIVISION I  
PLANT MATERIALS PLANTINGS**

**FIELD OFFICE: BONNERS FERRY**

**ID00016 Boundary Creek WRP.** Cropland area planted to permanent perennial species field planting. A mix of Alkar tall wheatgrass, Greenar intermediate wheatgrass, Ranger alfalfa, birdsfoot trefoil, red clover, Sherman big bluegrass, tufted hairgrass, orchardgrass, and timothy at critical area planting rates was dormant planted on 1000 acres in late fall 1999. A 42 foot air-seeder with fertilizer attachment planted mix with 2000 units per acre of nitrogen, phosphorus, potassium, and sulfur applied 1 inch below and to side of seed. FY00 excellent stand establishing with some species as tall as 3-4 feet by early July. In October wild oats were present throughout stand. FY0 permanent wildlife planting mixture established well utilizing the 42-foot air seeder. The drill was calibrated with the producer based upon 14.2 lbs. PLS/acre. A “flush” of wild oats occurred the first year. The stand was seeded the 1<sup>st</sup> week of November 1999. The “so called dormant planting” resulted in some sprouting of clovers due to a warmer than normal late fall. As a result, some mortality occurred in the clovers. An excellent stand of Alkar tall wheatgrass, Greenar intermediate wheatgrass, birdsfoot trefoil, Ranger alfalfa, Latar orchardgrass, timothy and clover exists. The Sherman big bluegrass is “spotty” due to becoming overpowered by the other species in the mix. There are some ridges in the field with quackgrass, which is good cover. IDF&G is actively spot spraying the Canadian thistle. They plan to obtain a boom sprayer in order to treat the acreage more uniformly. FY02 overall stand is good to excellent with the primary species including Alkar tall wheatgrass, Greenar intermediate wheatgrass, Latar orchardgrass and redtop. Some birdsfoot trefoil, clover, timothy, and alfalfa are present in scattered locations. Tufted hairgrass and Sherman big bluegrass were not found. FY04 prescribed burned fall 2004 (15 acres) to rejuvenate existing stand – resulted in excellent response in plant vigor. Stand is primarily Latar, Alkar, Greenar, and alfalfa – general overall stand is predominately wheatgrasses and orchardgrass. Providing excellent wildlife nesting and escape cover. FY11 in the last few years it appears all legumes were sprayed out due to Canada thistle control. There are extensive areas of solid tall and intermediate wheatgrass providing very good nesting cover. However; these species tend to lay down over winter due to wet snow and rain. This thatch build up does responds to cool moist prescribe burns. The best tall stiff structured grasses are Magnar and Trailhead basin wildrye; Bozoisky Russian wildrye and tall wheatgrasses. Of all basin wildryes, Magnar has best cover structure. Other areas have extensive very competitive dominance by orchardgrass. In future only recommend about 10-20% orchardgrass in seed mixtures. Orchardgrass has a “wimpy” structure but is very palatable for all wildlife. Remarks: to plan again; mixes for extensive areas along levees with well drained soils would include stiff structured grasses such as tall wheatgrass and basin wildrye. On wetter basins or fringe areas mixes would include tufted hairgrass and bluejoint reedgrass. As an understory grass, plant Sherman big bluegrass. FY12-13 no evaluations.

**ID06008 Bernie Heinemann.** Riparian Field Planting. Coyote willow (50); 9067541 Peachleaf willow (20); 9067546 Peachleaf willow (20); 9067549 Peachleaf willow (20); 9067375 Peachleaf willow (20); 9067376 Peachleaf willow (20); and 9067560 Peachleaf willow (20) cuttings ordered February 2006. Site characteristics: Porthill silt loam soil, 5 percent slopes, 2000 feet elevation, 24 inch precipitation, non-irrigated, T65N R1W, Section 10. FY06- FY10 no evaluations. FY11 There is good stand of willows along wet fringe areas of the wetland enhancement. There was about 40% mortality due to deer browsing. The remaining willows are about 8 feet tall and are doing well. This is providing good shade and habitat from the Peachleaf willows. Unfortunately I cannot tell which varieties are better. I do know the coyote willow is spreading nicely along the wet fringe area with its creeping root characteristics. I feel it has spread with new shoots about 3 feet beyond what was planted. FY12-13 no evaluations.

**FIELD OFFICE: COUER D’ALENE**

**ID11006 John Burton.** Four pounds of Clearwater Selection Venus penstemon was shipped to field office on March 18, 2011. This seed is being included in a seed mix including 25% Latar orchardgrass, 45% Delar small burnet, 20% hairy vetch and 10% Clearwater Selection Venus penstemon. Seeded May 2011. FY12 grasses have established but no penstemon found. FY 13 evaluation 9/16/13. No penstemon found in planting. Orchardgrass, small burnet and hairy vetch have excellent stand, health and vigor. Indication of failure of the penstemon to establish may have been ¼-½ inch seeding depth for seed mix. Planting cancelled.

**ID13010 Francis Hughes.** Field planting interseeding legumes into existing orchardgrass. Sent 10 lbs Delar small burnet, 10 lbs Shoshone sainfoin, 2 lbs cicer milkvetch and 1.5 lbs alfalfa in December 2012. FY 13 evaluation 10/22/13. Seed was broadcast planted June 26. It appears that there are some seedlings growing in the alfalfa plots. Will evaluate field planting again next spring.

**FIELD OFFICE: PLUMMER**

None

**FIELD OFFICE: SANDPOINT**

None

**IDAHO DIVISION II  
PLANT MATERIALS PLANTINGS**

**FIELD OFFICE: GRANGEVILLE**

**ID02002 Teresa Seloske Forest Field Planting.** Lind Douglas fir (30 plants) and Yakima Douglas fir (13 plants) ordered July 16, 2001. Plants delivered to FO April 3, 2002 by WAPMC. FY02 Planting completed April 6, 2002. Lind Douglas fir 10 percent survival with poor vigor. Yakima Douglas fir 15 percent survival with fair vigor. Survival effected by extremely dry conditions. FY03 very hot dry summer resulted in failure of this planting. File was cancelled at end of 2003. FY06 field determination indicated the Yakima ecotype failed to establish, but the Lind ecotype is still alive. Lind ecotype has not grown much, but there is good survival of this ecotype during field evaluation in July 2006. FY08 this planting initially suffered from very hot dry summers and plant did not appear to be doing well. Following a number of years of root system establishment, this planting is doing somewhat better. The Lind ecotype is doing much better than the Yakima ecotype. The Lind ecotype could probably be recommended on sites where we would normally only recommend ponderosa pine. Next evaluation 2014.

**ID04009 Carl Skyrman. Demonstration planting.** Anatone bluebunch wheatgrass and Secar Snake River wheatgrass. Seed ordered March 8, 2004. Site characteristics: Chard sandy loam soil, northwest aspect, 1820 feet elevation, 16-22 inch precipitation, non-irrigated, T26N R1E NW1/4 Section 13. FY04 – Secar and Anatone were planted side by side in the spring of 2004. Good stands for each with > 5 plants per square foot establishing and it is hard to differentiate between plantings. Anatone plants were a bit more robust than Secar plants during evaluation 7/22/04. FY05 no evaluation. FY06 (4/25/06) good established stand, Carl will spray with Sencore for cheatgrass and ventenata control. FY08 pictures of planting indicate good establishment of most seeded species. FY09-13 no evaluations.

**ID05003 Steve Hunter. Starthistle control project.** Rush intermediate wheatgrass, Tegmar intermediate wheatgrass and Newhy hybrid wheatgrass were ordered February 4, 2005. Site characteristics: 3 acres, MLRA B9, Bluesprin skeletal loam soil, 20 percent slopes, southwest aspect, elevation 2700 feet, 18 inch precipitation zone, non-irrigated, T30, R3, NW ¼ section 36. FY05 not planted. FY06 planted May 22, 2006 into poorly prepared seedbed. Fair stand establishing with about 0.25 plants/ft<sup>2</sup> and fair vigor. FY08 Rush poor stand with 15 percent survival and fair vigor; Tegmar fair stand with 40 percent survival and fair vigor; Newhy poor stand with 25 survival and fair vigor. Plants on site are very stunted. Starthistle plants have been significantly reduced on the site. However, there has been an invasion of ventenata, annual fescue, medusahead and cheatgrass on the site and they are stressing the planted perennial grasses. FY09-13 no evaluations.

**ID05004 Tony Carson (combined with ID04004). Field planting.** Anatone bluebunch wheatgrass, Magnar basin wildrye, Nezpar Indian ricegrass, High Plains Sandberg bluegrass, Rosana western wheatgrass, Sherman big bluegrass, Snake River Plains fourwing saltbush and Northern Cold Desert winterfat were ordered February 4, 2005. Site characteristics: 1 acre, Lickskillett – Tannahill silt loam soil complex, 45 percent slopes, south aspect, elevation 1960 feet, 16 inch precipitation, T28N, R1E, NE ¼ section 12. FY05 seeding was completed in early spring 2005. Half of the seeded area was treated with a straw pellet mulch. Above average spring rainfall resulted in very encouraging initial stand establishment with positively identified plants of Northern Cold Desert winterfat, Rosana western wheatgrass, Nezpar Indian ricegrass, Anatone bluebunch wheatgrass and many small seedlings present on July 13, 2005. FY06 April 25, 2006 excellent stand establishing, primarily seedlings, but also includes a few established grasses and fourwing saltbush. Good soil moisture during evaluation and cooperators will irrigate in 2-3 weeks if no additional rains occur. FY07 Snake River Plains fourwing saltbush fair stand with good vigor and about 35 inches tall. Northern Cold Desert winterfat fair stand with good vigor and about 6 inches tall. Nezpar Indian ricegrass, Sherman big bluegrass and Rosana western wheatgrass poor stands with fair vigor and about 3- 4 inches tall. Too soon to conduct a complete evaluation of stand. FY08 Anatone fair stand with fair vigor; Magnar poor stand with very poor vigor; Nezpar poor stand with poor vigor; High Plains very poor stand; Rosana good stand with good vigor; Sherman good stand with good vigor; Snake River Plains good stand with good vigor; Northern Cold Desert good stand with good vigor. Anatone and

Rosana are the grasses doing the best on this very difficult eroded low fertility site. Both Snake River Plains fourwing saltbush and Northern Cold Desert winterfat are doing very well. Next evaluation 2014.

**ID05006 Gary Crea (combined with ID04008). Feedlot species adaptation trial.** (1<sup>st</sup> planting P27 Siberian wheatgrass, Sodar streambank wheatgrass, Topar pubescent wheatgrass, Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, Rosana western wheatgrass, Durar hard fescue and Alkar tall wheatgrass) (2<sup>nd</sup> planting Newhy hybrid wheatgrass, Critana thickspike wheatgrass, and Rosana western wheatgrass) Seed was ordered on February 4, 2005. Site characteristics: 0.5 acres, MLRA B9, Ferdinand-Flybow-Riggins soil complex, 2-8 percent slopes, west to southwest aspect, 20-24 inch precipitation, non-irrigated, T31N, R1E, SW of SW ¼ of section 27. FY04 overall the stand establishment is excellent due to good rainfall this year. Stand establishment exceeds 2 plants per square foot for all species except Alkar. The grasses are suppressing weeds in the feedlot. FY05 stand is spotty possibly due to excessive weed competition during establishment. FY06-13 no evaluations.

**ID07009 Daryl Mullinix Ventenata Study. Demonstration planting.** Seed ordered February 14, 2007. Site was prepared for planting in fall of 2006 and spring of 2007. Site was planted on May 8, 2007. Layout-(south end) 1. Delar small burnet; 2. Pryor slender wheatgrass; 3. Secar Snake river wheatgrass; 4. Union Flat blue wildrye; 5. Regar meadow brome; 6. Covar sheep fescue; 7. Latar orchardgrass; 8. Bromar mountain brome; 9. Alkar tall wheatgrass; 10. Durar hard fescue; 11. Sherman big bluegrass; 12. Winchester Idaho fescue; 13. Foothills Canada bluegrass; 14. Bozoisky-Select Russian wildrye; 15. Rush intermediate wheatgrass; 16. Tuscany tall fescue; 17. Rosana western wheatgrass; 18. Sodar streambank wheatgrass; 19. Vavilov Siberian wheatgrass; 20. Lutana cicer milkvetch; 21. Syn-1 alfalfa (north end). FY07 Mark Stannard visited the plots on 7/27/07. The weeds were not bad but he mowed the plots to keep the weeds from going to seed. The grasses were doing fairly well. Vavilov was the best performing grass and alfalfa, cicer milkvetch, and small burnet were also doing very well. The ground was very hard and very dry. A lot of the plants were totally dormant. FY08 Mark spoke with Dr. Prather, Univ. of Idaho, and he indicated that he didn't have funding to do ventenata work. Mark prefers that plots not be sprayed. Sandlund talked with Daryl in early March and asked him not to spray the plots and to give them a 20-30 feet buffer strip around the plots not sprayed. The plots have a heavy infestation of ventenata and meadow foxtail. Rich Gribble and Bob Sandlund mowed the plot in late July. Species doing best include: Delar, Tuscany II, Vavilov, Alkar, and Syn-1 alfalfa (getting hammered by deer). All other species are struggling. They recommend that plots be wick with Roundup in 2009 to control meadow foxtail. Spraying plots with sencor and diuron should also be considered. FY09 no evaluation.

**FY10 evaluations:** The meadow foxtail and ventenata competition was very heavy in all plots. In the fall of 2009 the adjacent field was sprayed with Outrider at 2/3 oz per acre. The plots were sprayed in Nov. 2009. The spray application did an excellent job controlling the ventenata and the meadow foxtail. Most of the planted species were having a difficult time prior to the spray application. Unfortunately the spray also had an adverse affect on plants within the plot. 1. Delar small burnet - only a couple of plants remain very poor vigor; 2. Pryor slender wheatgrass - a good population of plants, seeding out, plants are smaller than would be expected; 3. Secar Snake River wheatgrass - poor population and extremely poor vigor; 4. Union Flat blue wildrye - poor stand and poor vigor; 5. Regar meadow brome - none found; 6. Covar sheep fescue - very poor population and vigor; 7. Latar orchardgrass - good population plants are stunted; 8. Bromar mountain brome - none found; 9. Alkar tall wheatgrass - good population and fair vigor; 10. Durar hard fescue - none found; 11. Sherman big bluegrass - none found; 12. Winchester Idaho fescue - none found; 13. Foothills Canada bluegrass - fair population, poor vigor; 14. Bozoisky Russian wildrye - none found; 15. Rush intermediate wheatgrass - good population fair vigor; 16. Tuscany tall fescue - poor population and poor vigor; 17. Rosana western wheatgrass - good population beginning to spread, fair vigor; 18. Sodar streambank wheatgrass - none found; 19. Vavilov Siberian wheatgrass - good population, fair vigor; 20. Lutana cicer milkvetch - none found.; 21. Syn-1 alfalfa - none found. Plot will be sprayed with a broad leaf herbicide. FY12-13 no evaluations.

**ID08008 Sydney Yuncevich Spirit sweetgrass adaptation planting.** Sprigs were ordered on March 11, 2008 for shipping sometime in mid April. FY08 excellent stand with good vigor – sprigs were planted in pots, kept outside and watered occasionally. All survived and they will be planted out next spring. FY09-13 no evaluations.

**ID09008 Daryl Mullinix. Field planting.** 9076516 western wheatgrass was ordered February 2009. Purpose: adaptation and competition with the weed Ventenata. Site Characteristics: MLRA 9B, Chard sandy loam soil, 5- 8 percent slope, north aspect, 1800 feet elevation, 14- 16 inch rainfall, non-irrigated, T27N R1E NW1/4 Section 23. FY09-13 no evaluations.

**ID09010 Jeff Goldman. Field planting.** 9076516 western wheatgrass seed ordered February 2009. Purpose: adaptation and competition with the weed *Ventenata*. Site Characteristics: MLRA 43A, Ferninand silt loam soil, 8- 12 percent slope, east aspect, 3500 feet elevation, 20- 22 inch rainfall, non-irrigated, T30N R3E NW1/4 Section 12. FY09-13 no evaluations.

**ID10009 Tim Bodine. Field planting.** Recovery western wheatgrass, Vavilov II Siberian wheatgrass and Hycrest II crested wheatgrass (2 acres each) seed was ordered March 1, 2010. Purpose: adaptation to control winter annual grass – *ventenata*. Site characteristics: MLRA 43, silt loam soil, 5- 7 percent slopes, south aspect, 3570 feet elevation, 20- 22 inch precipitation, non-irrigated, T31N R2E SE quarter Section 10. FY10-13 no evaluations.

**ID11004 Doug Boggin. Field planting.** Recovery western wheatgrass seed ordered March 3, 2011. Site 1 erosion control planting. Site 2 hayfield conversion. 50 lbs PLS shipped March 2011. FY11-13 no evaluations.

**ID11005 Joseph Peterson field planting.** 200 cuttings of coyote willow and 50 cuttings of white willow were shipped in March 2011. FY11-13 no evaluations.

**ID11007 Daryl Mullinix. Field planting.** Recovery western wheatgrass, Vavilov II Siberian wheatgrass and Rush intermediate wheatgrass seed was ordered March 24, 2011. Purpose adaptation and erosion control. Site characteristics: loamy fine sand soil, 8 percent slopes, NW aspect, 1540 feet elevation, 16 inch rainfall, non-irrigated, T27N R1E SW1/4 Section 23. FY12-13 no evaluations.

**ID13006 Rich Gribble. Warm season grass field planting.** 0.5 lbs Grant's cane bluestem and 0.5 lbs Blackwell switchgrass was shipped March 7, 2012. Purpose: find a pasture grass that will produce during summer heat. Site was planted on May 18, 2012. Bluestem never germinated. Switchgrass germinated early June with approximately 80% survival and 10 plants/ft<sup>2</sup>. Failed bluestem plot was reseeded to switchgrass on August 24, 2012. The seed germinated in early September but was killed by frost on September 19. FY13 no evaluation.

**ID13007 Sue Hagle. Post-ventenata and dogstail grass field planting.** Small replicated plots of Cache meadowbrome, Washoe basin wildrye, Bozoiisky Russian wildrye, Recovery western wheatgrass, Reliant intermediate wheatgrass, Vavilov Siberian wheatgrass, Nezpar Indian ricegrass, appar blue flax, delar small burnet, manska pubescent wheatgrass and Union blue wildrye were seeded April 10, 2012. The site is a forest with understory of dogtail grass and oneflower sunflower. Plots were hand raked for seedbed prep prior to broadcasting. FY12-13 no evaluations.

#### **FIELD OFFICE: LEWISTON**

**ID82001 Pat Richardson. Starthistle control field planting.** Covar sheep fescue planted in early 1980's. FY01 good to excellent stand with 2 plants per foot squared average, excellent vigor, fair spread for bunch grass. Plants are 10 inches tall with seedheads averaging 14 inches tall and 6-inch diameter plants. Overall Covar is providing good starthistle control. Starthistle is present in plot, but not reproducing seed. Where Covar has 4 plants per foot squared, starthistle is not present. Covar is moving slowly downslope into starthistle dominated area. FY04 excellent stand of Covar with excellent vigor, 7 inch height and light infestation of yellow starthistle. FY06 plots were heavily grazed by horses – some plants appear to be uprooted by hoof action. **FY07** good stand with fair vigor – stand is being very heavily grazed to ½ inch stubble height. Stand continues to exclude yellow starthistle with only 3- 4 plants observed within the plots. The edges of the plot are infested with Japanese brome, cheatgrass and medusahead. Plot was measured with GPS unit to determine actual size (203 ft x 80 ft = 0.37 acres). Next evaluation will be in 2013. **FY 13** site has been severely overgrazed. Planting cancelled.

#### **FIELD OFFICE: MOSCOW**

**ID06001A Lee and Roxanne Carrick. Riparian field planting.** Cuttings ordered August 9, 2005. Cuttings to be shipped mid-late October 2005. Site characteristics: MLRA B9, Hampson silt loam soil, 0-3% slopes, NW aspect, 2600 feet elevation, 24 inch precipitation, non-irrigated, T41N R3W NW ¼ Section 3. 85 each of Rivar Mackenzie willow, Curlew Drummond willow, and Silvar coyote willow will be dormant fall planted 2005. FY06 planted November 4, 2006. FY08 Curlew Drummond willow 39 percent survival with good vigor and 24 inch height; Rivar Mackenzie willow 68 percent survival with good vigor and 36 inch height; Silvar coyote willow 22 percent survival with good vigor and 60 inch height. FY09- FY12 no evaluations. FY 13 Evaluated 6/26/13. Drummond with 20 percent survival, 24-36 inch height and 2 foot crown width. Mackenzie willow 31 percent survival, 24-36 inches tall and 1.5 foot crown width. Coyote willow 6 percent survival, 48 inch height. Severe browsing by beaver. Difficult to determine which

were planted and which have moved in on their own. Significant amount of alder moving in. Woods rose, hawthorn and serviceberry planted by landowner are doing okay. Planting cancelled.

**ID06001B Lee and Roxanne Carrick. Riparian field planting.** Plants to be shipped early-mid April 2006. Site characteristics: MLRA B9, Hampson silt loam soil, 0-3% slopes, NW aspect, 2600 feet elevation, 24 inch precipitation, non-irrigated, T41N R3W NW ¼ Section 3. 60 each of Blanchard blue elderberry, Okanogan snowberry, St Maries mockorange and 125 Cheney redosier dogwood will be spring planted in 2006. FY06 planted May 25, 2006. FY08 Cheney redosier dogwood 1 percent survival with poor vigor; St Maries Lewis Mockorange 2 percent survival with poor vigor; Okanogan snowberry 68 percent survival with good vigor and 6- 12 inch height; Blanchard blue elderberry 10 percent survival with fair vigor. FY09- FY12 no evaluations. FY 13 Evaluated 6/26/13. Redosier dogwood 5 percent survival, 36 inch height, 1.5 foot crown width. Mock orange 1.6 percent survival, 36 inch height, 2 foot crown width. Snowberry 58 percent survival, 12 inch height and 1 foot crown width. Elderberry 0 percent survival. Heavy use by deer and beaver. Landowner is continually planting so difficult to know what was originally planted. Planting cancelled.

#### **FIELD OFFICE: NEZPERCE**

**ID09006 Nezperce Field Office. Hwy 95 (Winchester) windbreak planting.** Coyote willow, Laurel willow, golden willow and white willow cuttings were ordered February 2009 from Aberdeen PMC. University of Idaho Nursery provided thinleaf alder, redosier dogwood, Lewis mockorange (syringe), Drummond willow, Mackenzie willow, bittercherry, aspen and black cherry for this project. Plants were stored in a cooler prior to planting. Planting was scheduled for mid April 2009. Weed barrier fabric used on one side of small stream and no fabric on other side. FY09- FY11 no evaluations. FY12 fair to good establishment in weed barrier fabric of all species. Side with no fabric has limited establishment. FY13 no evaluation.

#### **FIELD OFFICE: OROFINO**

**ID13008 Terri Whitefield planting.** Large slump/slide on a southeast facing hillside. The terrain is very steep (~55%) and the soil is a silt loam. The precipitation in the area is around 26". This hillside has some areas that are dominated by medusahead and star thistle, however, where this slide occurred there are some ponderosa pine trees and hawthorne close that provide some shading. Purpose: prevent more weed encroachment and stabilize the soil. Divided site into 3 plots. Plot 1 seeded to 80% Recovery western wheatgrass and 20% Union Flat blue wildrye. Plot 2 seeded to 50% Rush intermediate wheatgrass and 50% Bromar mountain brome. Plot 3 seeded to 100% Lincoln smooth brome. Site was seeded April 25 2012 and evaluated August 14, 2012. Plot 1 looking very good, better than plots 2 and 3. Average 4.4 western wheatgrass plants/ft and 5.0 blue wildrye plants/ft. Plot 2 also had good establishment with approximately 8 plants/ft (not separated by species). Plot 3 had fair establishment with an average of 3.4 plants/ft. FY 13 Evaluated 7/24/13. Plot 1 (Recovery and Union Flat) was rated as a poor stand but had 2 western wheatgrass plants/sq ft and 1 blue wildrye plant/sq ft. Plants were 6-7 inches tall and blue wildrye produced seed heads. Vigor was rated as low good but poor for erosion control and ability to spread. Plot 2 (Rush and Bromar) was covered with a thin layer of soil that had washed onto it from a slide above the plot. Many native and introduced species have moved into the plot and it was impossible to find Rush and Bromar plants. Plot 3 (Lincoln smooth brome) was rated as a poor stand, had 3 plants/sq ft and was rated fair for vigor, ability to spread and erosion control. Plants were 3-4 inches tall. Weather conditions early spring were very hot.

**ID13005 Field Office. Forb and grass display.** Multiple forbs and grasses for display on south side of field office. Request made February 6, 2012. Seed shipped from IDPMC, MTPMC and WAPMC March 2012. Plots were planted spring, 2013.

**ID13020 Phil Glover riparian woody planting.** Golden willow, laurel willow, coyote willow cuttings were ordered from Aberdeen PMC and planted April 18, 2013. Cuttings were hand-planted due to difficulties with water jet but due to wet conditions were able to plant most cutting 16 inches deep. FY 13 Evaluated 7/24/13. Golden and laurel willow approximately 85% survival, coyote 50% survival. Vigor was good for golden and laurel and poor for coyote. Plant height for golden and laurel was 24 inches and 15-20 inches for coyote. No plant injury but heave infestation of reed canarygrass and tansy. Low survival and performance of coyote may be due to hot and dry conditions during summer. Recommend evaluation next growing season and then every 3-5 years depending on plant performance and planting objectives.

## IDAHO DIVISION III PLANT MATERIALS PLANTINGS

### FIELD OFFICE: CALDWELL

**ID07001 Wayne Newbill (Ada County)** field planting. Regar meadow brome and Cache meadow brome irrigated forages trial. Seed ordered August 10, 2006. Seed will be planted in late summer – early fall and surface irrigated (furrows) for establishment. Seed was delivered on 8/18/06. **FY06** weed control using 2 pints Roundup per acre was applied on 8/30/06 followed by discing, corrugating, pre-irrigation, harrowing, seeding with drill – 7 inch spacing on 9/9/06 and final corrugation. Regar is located in west field and Cache is located in east field. Fields were irrigated following planting. Initial evaluation in later fall 2006 indicated best stand establishment was Regar accession. **FY07** Regar - excellent stand, excellent vigor, 18 inch height and 3 plus plants per foot squared. Cache - excellent stand, excellent vigor, 12 inch height and 3 plus plants per foot squared. Cooperators rates Regar good to excellent and Cache good during establishment year. **FY08** Both fields looked very good and had only mild weed issues. There was one cutting of hay and one period of grazing. Yield was reduced due to fact that it took Wayne awhile to find someone to hay the field and it should have been harvested 3 weeks prior to when it was cut and during that time it was not irrigated. Reduced available water did have an effect most notably on the Regar and patches of it did not recover from it as well as hoped. Appears to have gone dormant, I think it will come back in the spring.

**FY08 Regar:** Excellent stand on South end, as you get further down to the end where Wayne land leveled the quality decreases and there are some patches of weeds and lowered yields. There are also a few areas where the grass has gone prematurely dormant, probably due to lack of water during first cutting of hay. Field was grazed for two weeks continuously with 6 young horses. Grazing was fairly short when finished, but plants have recovered nicely. 6 horses x 1.25 Au x .5 Mth = 3.75 AUM's 3.75/ 1.2 Ac = 3.1 AUM's/ac 1 AUM = 915 lbs 915 x 3.1 = 2,836/2000= 1.4 Tons 1.4 + 4.2 tons of hay = 5.6 Tons/ Ac Yield. **FY08 Cache:** Excellent stand throughout even down to North end where the soil is less than desirable, surprising because the soil in this field is very shallow and of poorer quality than the other field. The field seems to have suffered no ill effects from the lack of moisture that affected the West field. It was grazed for one week continuously with 6 young horses. 6 horses x 1.25 Au x .25 Mth = 1.88 AUM's 1.88 / 1ac = 1.9 AUM's/Ac 915 x 1.9 = .9 Tons .9 + 4.2 = 5.1 tons/ Ac yield. **FY09 Regar:** stand quality has decreased since last year with patches dying off – it is believed the hardpan (salt- calcium deposits) on this property at relatively shallow depths is affecting the stand. **FY09 Cache:** stand quality has decreased since last year with patches dying off – it is believed the hardpan (salt- calcium deposits) on this property at relatively shallow depths is affecting the stand. The Regar stand is more effected by this die off than the Cache stand. Newhy hybrid wheatgrass (a very salt tolerant species) will be planted into the patches to determine if stand can be salvaged. **FY10 Regar:** Good stand with 3+ plants/ft<sup>2</sup>, 10 inch height, 3.6 AUMs/ac. **FY10 Cache:** Good stand with 3+ plants/ft<sup>2</sup>, 8 inch height, 2.75 AUMs/ac. Fields were grazed in late spring, mowed during summer and grazed again in fall thus not all production is accounted for under the AUMs/ac figures. **FY10 Newhy:** The dead areas (high calcium carbonates locations) were over-seeded with Newhy RS wheatgrass and look much better this year. Both fields would benefit from applications of 2,4D for clover, plantain and other herbaceous weed control. In addition, irrigated forage grasses require fairly high levels of fertility and both fields would probably benefit from applications of fertilizer (primarily nitrogen since this is intended to be an irrigated grass pasture). **FY11-12** no evaluations. **FY 13** evaluated August 12. Both fields have done well however Cache is doing better. Cache may be better adapted to the dry conditions and saline soils than Regar. Yield 6 tons/ac and plants 13 inches tall. Planting cancelled.

**ID07002 Doug Austin (Ada County).** Field planting. Regar meadow brome, orchardgrass and alfalfa field planting. Seed ordered August 28, 2006. Seed was planted in late summer – early fall and irrigated for establishment. Site characteristics: silt loam soil, 0-2 percent slope, 2800 feet elevation and irrigated. Seed was planted in early September 2006 and irrigated for establishment. **FY07** stand 75% Potomac orchardgrass, 10% Regar meadow brome and 15% alfalfa – cooperator took 3 cuttings of hay (1<sup>st</sup> 0.6 ton/ac; 2<sup>nd</sup> 0.9 ton/ac and 3<sup>rd</sup> 1.5 ton/ac = 3 ton/ac for first year). **FY08** Field had excellent utilization, no species being avoided. Some small 10 feet diameter spots with discolored foliage. Was unclear if this was a excess moisture issue as the soil was slightly muddy and trampled and had more weeds than surrounding areas. However, areas were minimal and overall had excellent weed control. Yielded 47 tons total on 12 acres and then began grazing. Yielded 17 AUM's on 12 acres. May yield some additional AUM's as weather seems to be holding and grass is still up. **FY09** excellent stand of all species with approximately 6 tons of production this year from 4 cuttings. Following haying, fall grazing is planned. Alfalfa has decreased from about 15 percent of stand to 5- 10 percent of stand. No evaluation 2012. **FY 13** Evaluation August 9. Regar 12 inches tall, 5.5-6 tons/ac forage yield. Overall the planting is doing well. Producer indicated that yield has dropped 10-15 % in the past 3 years. Had a major mole infestation last year but owls have since controlled them. Decline may also be due to

introduction of bluegrass from irrigation water and decline in alfalfa stand. Bluegrass has filled in several areas, primarily along edges of the field. Planting cancelled.

**ID08014 Jim Classen. WHIP field planting.** Garrison creeping foxtail seed (18 pounds) ordered April 3, 2008. FY08 Garrison good stand with 4 plants per square foot and excellent vigor. Despite difficulties in planting late (see attached assistance notes from 6/6/08 through 9/3/08) and difficulties in watering due to water seeping into neighbors field the stand is emerging with a good density. Majority of plants are very small around 6 inches, but have developed some seed heads. There are some areas where plants achieved full height and are about 2 feet. The stand is somewhat patchy, but that is largely due to water regime. In areas that received too much water at bottom of pond. There is no Garrison Creeping Foxtail, however yellow nut-sedge, barnyard grass and smartweed are growing, which although weeds are excellent duck and wildlife food. Other areas where it was too dry along the berm have a heavy weed infestation problem mainly Kochia. The bulk of the area is intermittent with mustard and cocklebur. However there is enough grass underneath that I believe next year will largely crowd out weeds. Field was flood irrigated several times over the season for several days. More irrigation was not possible due to flooding neighbor's alfalfa field. When last cutting of hay is removed the pond will be flooded for fall months. That will test the Creeping Foxtail and determine its suitability. FY09 this is an excellent stand of Garrison creeping foxtail, plants are robust and healthy. Some weeds are still present in thinner areas of the planting. On berms where Siberian wheatgrass was planting, a thick stand of kochia exists. FY10 this is an excellent stand with 4 plants/ft<sup>2</sup>, 36-40 inch height and excellent vigor. The inner pond is flooded and the Garrison looks great (100 percent cover); the outer berm built to prevent flooding of adjacent alfalfa field has less water available resulting in a thinner Garrison stand and increased weed pressure. FY11 We are very satisfied with this stand of Garrison creeping foxtail. Plants are healthy and have suppressed weeds to where there is hardly any weed infestation. FY 13 evaluation August 1. Plants average 15 inches tall. Overall the seeding has done really well. Garrison has spread into new areas as expected and broadleaf weeds are not a problem in area where Garrison was established but are surrounding the planting. Recommend status reviews only every couple of years.

**ID09003 Forest Clifton. Erosion control field planting.** Vavilov and Vavilov II Siberian wheatgrass seed was ordered October 30, 2008. Site characteristics: 4 acres; purpose - soil erosion, conservation cover, fire reduction, weed control; soil - Lankbush sandy loam; slope- 30%; aspect - south; elevation - 2600 ft; precipitation - 10"; irrigation - no; T5N R2W Qtr Section NW ¼ of SE Section 32. Seed will be broadcast planted in November and then rolled to press seed into seedbed. FY09 it is too early to determine stand establishment. It appears that more plants are establishing in the Vavilov II side of planting than on the Vavilov side of planting. **FY10** Both the Vavilov and Vavilov II plantings have established nicely except for the lower portion of the accession Vavilov where there are very few seedlings. The seed may have been buried too deep to sprout and a reseed is recommended in this area. The Vavilov planting on the upper slope is thriving; about 5-7 plants per square feet. On the Vavilov II side, there are more plants overall. The Vavilov II accession took a little longer to establish, but now it is looking better than the accession Vavilov. The Vavilov II side has an average of 3 plants per square feet, with some areas at top of slope with densities of 7 plants per square feet. Weeds are not too tall, but there is still pressure in some areas with mustard. The Landowner mowed the stand/weeds in May. Mustard, Russian thistle and kochia are most common on the Vavilov side. Bulbous bluegrass died after being mowed. Overall the wheatgrass has filled significantly this year and the stand is expected to look great next year. FY11 this seeding is establishing well and there are new plants from this year. The plants established on the upper slope (of the Vavilov side) are suppressing weeds and yet, have spread out, leaving bare ground in between plants. While some areas like the upper slope are thriving, other areas struggle with weed pressure and difficult soil. The North end of the Vavilov side is under weed pressure from mustards and field penny cress. The south end of the Vavilov side also has more weed pressure. We talked to Mr. Clifton about mowing during the early spring or spraying to control weed pressure. Also, a reseed of the south end of the Vavilov area this fall could improve current stand. On the south side of the field just behind the house there is an area where very few plants grow in general. We were pleased to see that more grass seedlings than weeds are growing in this area. Although the Vavilov II seeding is under more weed pressure and seems to be having a more difficult time getting strongly established, there are several seedlings that will continue to grow and suppress weeds. Several younger seedlings on the Vavilov II side (particularly on the north end), have great potential. Mr. Clifton did not get a chance to reseed lower portions of the fields this spring due to the strange weather we had, but will try to add seed and reseed the lower portions. No evaluation 2012. FY 13 Evaluation August 29. Vavilov averaging 20 inches tall, Vavilov II averaging 18 inches tall. Overall, Cooperator is pleased with stand. Stand has steadily thickened and spread into new areas. Has had some trouble with cheatgrass and Russian thistle but nothing major. Plans to mow this fall and treat cheatgrass and thistle with herbicide.

**ID11009 CB River Ranch field planting. Formerly ID06002 CB River Ranch WRP upland planting.** Original stand failed. Site Characteristics: Feltham loamy fine sand soil, 3-12 percent slope, NE aspect, 11 inch precipitation. Field sprayed multiple times in 2010 for site preparation. No tillage was performed. Field dormant planted to Vavilov II Siberian wheatgrass in late fall 2010. Germination and good initial stand establishment during March 2011 field visit. With good rains during spring from March through May stand continues to look very good. July 2011 evaluation: Vavilov II Siberian wheatgrass was seeded November 18, 2010. Due to a wet spring this year, the seeding was very successful. It is very easy to see where the seed was drilled because so many seedlings have surpassed the three-leaf stage. Some seedlings have grown just past the three-leaf stage, but other seedlings from this year are producing a seed head. The smaller seedlings on the East side of the field look damaged perhaps from the herbicide applied in the spring; however, green leaves are showing through the brown. Even in some areas (i.e. entrance to field) where there appeared to be no germination early this spring, there is now a stand of seedlings. Large patches of kochia on the north end of the field and near the entrance continue to grow, but are too mature to be sprayed now, will schedule mowing to keep from going to seed. There is some cheatgrass but pressure is minimal and plants are relatively small and they have already gone to seed so will monitor this fall for further herbicide application. Existing Siberian Wheatgrass from previous seeding is still present and plants have enlarged and are vigorous although spotty across the field. No evaluation 2012. FY13 Evaluation July 21. Vavilov averaging 15 inches tall. Stand has established well considering the conditions. Plants per square foot have increased from 0.1 to 0.15 in last two years and has fair vigor and good survival.

**ID12002 Hermis Sparks. Grassed waterway critical area planting demonstration.** Seed mixture includes Vavilov II Siberian wheatgrass, Recovery western wheatgrass, Rush intermediate wheatgrass and Regar meadow brome. Site characteristics: 1 acres; purpose - soil erosion and weed control; soil – Elijah silt loam; slope- 2%; aspect – east and west; elevation – 2631 ft; precipitation - 10”; irrigation – yes; T3N R1W Section 34. Planted late March 2012. FY 13 evaluation August 30. Overall the producer is happy with the planting. It is serving its purpose as erosion control in the grassed waterway. Producer continues to battle weeds brought in by irrigation water. Weeds include reed canarygrass, kochia, sour dock and smart weed.

**ID13009 Alayne Blickle. Pollinator habitat.** 1/2 acre site to be irrigated and mowed during establishment year. Appar, Nezpar, Richfield, whorled buckwheat, yarrow and dustymaiden shipped August 27, 2012. FY 13 Evaluation July 24. Two thirds of seed mix was planted in May. Cooperator decided to change location of planting to riparian area because she couldn't get enough water to the site. She planted the seed mix with a dryland commercial grass seed mix. The commercial seed mix makes up about 99% of the species composition. Were able to identify a few blue flax and yarrow plants.

#### **FIELD OFFICE: EMMETT**

**ID09009 Richard Zamzow. WRP upland field planting.** Vavilov II Siberian wheatgrass. Seed ordered February 2009. Site characteristics: fine sandy loam soil, 2100 feet elevation, 10-12 inch precipitation, aspect-flat. Planting planned for spring 2009. FY09-13 no evaluations.

**ID10002 Randy Heffner. Field planting.** Bozoisky Russian wildrye and Manifest intermediate wheatgrass fall and winter forage trial. Seed ordered September 2, 2009. Site Characteristics: Boise County, MLRA B10, 6 acres, dormant fall planting, Brownlee sandy clay loam, 5-10 percent slope, south aspect, 2800 feet elevation, 14-16 inch rainfall, irrigated, T7N R2E NE1/4 Section 2. FY10- FY13 no evaluations.

**ID13013 Randy Heffner. Field planting.** Compare Manifest to Rush intermediate wheatgrass. Trial initiated August 31, 2012. Seed requested from NDPMC August 31, 2012. Planted 9/15/12 into area that was former feedlot and has limited sprinkler irrigation. FY 13 Evaluated 7/22/13. Manifest has excellent stand and vigor with 9 plants per sq. ft and produced 1900 lbs/ac forage compared to Rush (1400 lbs/ac). Rush is taller with less plant density and Manifest was competing better with weeds compared to Rush.

#### **FIELD OFFICE: MARSING/GRANDVIEW**

**ID11001 Ron Bitner. Vineyard cover crop/erosion control trial.** Vavilov II Siberian wheatgrass, Ephraim crest wheatgrass, Roadcrest crested wheatgrass and Recovery western wheatgrass seed was ordered September 23, 2010. Tall fescue, white mustard and Birdsfoot trefoil seed will be obtain by landowner for this trial. Planting is planned for November 1, 2010 or later. Site characteristics: Canyon County Idaho, MLRA 11, Jacquith loamy fine sand soil, 1- 3 percent slopes, 2630 feet elevation, 7- 11 inch rainfall zone, site is irrigated, T3N R4W SE Quarter Section 5. FY10 the

IDFG 7 ft drill was rented to complete the plantings. The grass planting was completed November 3rd and the Basalt milkvetch was seeded on November 4th. The birdsfoot trefoil, white mustard, and tansy phacelia will be planted in February 2011. FY12-13 no evaluations.

**ID13003 Ron Bitner. Vineyard cover crop.** White prairie clover, yarrow, cicer milkvetch prairie coneflower, blanket flower, phacelia ordered from MTPMC on February 29, 2012. Blue flax and small burnet ordered from IDPMC on February 29, 2012. FY12-13 no evaluation.

**ID13012 Pioneer Seed. Pollinator field planting.** Coordinated through Ron Bitner. Discussed field preparation. Planting scheduled tentatively for 2013.

**FIELD OFFICE: MOUNTAIN HOME**

None

**FIELD OFFICE: PAYETTE**

None

**FIELD OFFICE: WEISER**

**ID94025 Eckhardt** Ephraim crested wheatgrass, Magnar basin wildrye, Mankota Russian wildrye, Trailhead basin wildrye, P27 Siberian wheatgrass, Manska pubescent wheatgrass, Reliant intermediate wheatgrass, Bannock thickspike wheatgrass, Schwendimar thickspike wheatgrass, Greenar intermediate wheatgrass, Sherman big bluegrass, Secar Snake River wheatgrass, Goldar bluebunch wheatgrass, Bozoisky Russian wildrye, Hycrest crested wheatgrass, Rush intermediate wheatgrass demo plots. Site is clay loam soil, non-irrigated, 10-12 inch ppt, 3000 feet elevation, and 5% slopes on NE exposure. Seed ordered July 1994. FY94 and FY95 due to drought conditions, seeding planned for spring 96. FY96 planted April 9, 1996 by hand planting and raking plots to control bulbous bluegrass competition. June 19, 1996 evaluation for establishment: Mankota poor, Manska good, Sherman very poor, Greenar good, Trailhead fair, Reliant good, Bozoisky good, Bannock good. July 8, 1996 establishment: Mankota fair, Manska good, Sherman poor, Greenar good, Trailhead fair, Reliant good, Bozoisky good, Bannock good, Goldar good, Rush excellent, Secar fair. Rush has the best stand establishment to date with Goldar next. FY97 no evaluation. FY98 first set of plots; Reliant is out producing all other plots, Greenar is second in production, Sherman hand planted plot is third in production, Sherman broadcast plot failed, T6633-P is fourth in production. Second set of plots; Bozoisky performed the best with Mankota second, and trailhead the poorest. The wildryes, thickspike wheatgrasses and intermediate wheatgrasses have shown adaptation to this area and could play a roll in revegetating local rangelands. FY99 plots were grazed this spring and grazing preference was evaluated. Plots: Greenar and Reliant were grazed the heaviest, followed by Mankota and Bozoisky Russian wildrye. This was uniform for all replications. Thickspike wheatgrasses and all other varieties had slight utilization. Basin wildryes were not utilized. Grazing preference for the larger plantings: Bozoisky Russian wildrye was used the heaviest, followed by Goldar bluebunch wheatgrass, and Rush intermediate wheatgrass used the least. Cattle are grazing Fourwing saltbush. The producer is very happy with results from these plots and uses the information to make his planting decisions. Cattle in mid May grazed FY00 the small plot species. Grazing preference was for Goldar, Bozoisky, and the intermediate wheatgrasses. The intermediate wheatgrasses are spreading into adjacent plots. Moderate use was made on Magnar and Trailhead. Sherman was used only slightly. Fourwing saltbush was utilized and continues to get taller (20 inches tall). In the large acre sized plots adjacent to a Hycrest planting, grazing preference (mid May) in order are: 1) Goldar, 2) Bozoisky, 3) Rush, and 4) Secar. Use of Goldar was similar too slightly heavier than the Hycrest. FY01 all plots are grazed this year. Utilization was heaviest on Greenar intermediate wheatgrass and Reliant intermediate wheatgrass plots. The larger plantings showed grazing preference was highest for Bozoisky Russian wildrye, then Goldar bluebunch wheatgrass, followed by Rush intermediate wheatgrass. FY03 plots were grazed this fall at time of evaluation. FY04 – Cattle preference (cows were moved into field 4 days prior to evaluation on 10/5/04). Most preferred species during this period was Bozoisky-Select Russian wildrye which was grazed very close. Second most preferred species was Goldar bluebunch wheatgrass which was grazed to a uniform 2 inch stubble height. Secar Snake River wheatgrass and Rush intermediate wheatgrass were not utilized. FY05 no evaluation. FY06 – observations in late June, grazing preference was Goldar bluebunch as first choice, Bozoisky-Select Russian wildrye as second choice, Rush intermediate as third and Secar as least desirable. FY10 Bozoisky Russian wildrye appears to be the preferred grazing species and grazing pressure is affecting stand health and stand is beginning to look very poor. Goldar bluebunch wheatgrass is probably the next preferred grazing species after Russian wildrye. Secar Snake River wheatgrass is the least preferred grazing species in trial. Rush

intermediate wheatgrass is the most aggressive species in the trial and stand survival is high. Because of light grazing pressure, Rush is moving into Goldar bluebunch wheatgrass plots. Next evaluation 2014.

**ID11008 Dean Dryden. Riparian Planting.** Duane Pearson (Emmett), Travis Youngberg (Weiser), Mike Raymond (Weiser), Tom Yankey (Volunteer), Blake Tubbs (Payette), and Dean Dryden (Landowner) participated in a willow planting field day to train and educate staff on planting willow cuttings and poles using the waterjet stinger to stabilize streambank erosion in New Meadows area. 50 poles of Golden Willow (local collection donated by Tom Yankey) and 40 poles of Peachleaf Willow (donated by the PMC) and 5 cottonwood poles (donated by PMC) were planted May 2011. FY12-13 no evaluations.

**ID13001 Soulen Ranch. Field Planting.** Soulen Ranch multi-species demonstration planting for jointed goatgrass control. 1 lb PLS of Rush, Vavilov, Hycrest II, Bozoisky, Hycrest, Reliant, Manska and Vavilov II shipped from IDPMC August 30, 2012. Soils are Gem Reywat complex, 3-5% slopes. Precipitation 12-14 inches. Demo plots to be 6x20 ft with 2 replications. FY13 no evaluations.

**ID13002 Cada Ranch. Field Planting.** Cada Ranch multi species demonstration planting for jointed goatgrass control. 1 lb PLS of Ephraim, Sodar, Magnar, Rush, Vavilov, Bannock, Bozoisky, Reliant, manska, Roadcrest, Vavilov II, Recovery, and Trailhead shipped from IDPMC August 31, 2012. Roadside location with disturbed soils in Cranecreek-Reywat complex with 2-25% slopes. Preipitation 12-14 inches. Demo plots to be 6x20 ft with 2 replications. FY13 no evaluations.

#### **IDAHO DIVISION IV PLANT MATERIALS PLANTINGS**

##### **FIELD OFFICE: BURLEY**

None

##### **FIELD OFFICE: GOODING/FAIRFIELD**

**ID01007 Spring Cove Ranch (Butler) Demonstration planting.** Magnar basin wildrye, Snake River Plain fourwing saltbush, and Northern Cold Desert winterfat ordered March 16, 2001. Site characteristics: Planting 1. Vertisol soil, 11-inch rainfall, irrigated, 3300 feet elevation, south of Pioneer Reservoir. Planting 2. Sodic soil, 12-inch rainfall, irrigated, 3500 feet elevation, near Clover Creek – Hill City Road – southern base of Bennett Mountain foothills. FY01 - FY04 seed not planted due to extreme drought. Cooperator plans to plant fall 2004. FY05 Planting Site 1: Seed again not planted. Dan said he still wants to drill the Magnar next spring (2006) in the planned site (Planting Site 1). Said site in 2005 was too dry. As of 1/10/06 site is under flood waters. Moisture should be good for spring 2006 planting. He said he will drill seed in spring 2006. FY07 Dan has not planted the Magnar yet on account of other farming activities, but still wants to keep the seed and says he will try to get it planted this fall (2007). FY08 Spring Cove Ranch, called Dan last week, he said he did get the Magnar in the ground (about 3 acres or something, small seeding) last fall (fall 2007). He said he disked the ground twice and broadcast the Magnar and left as is. He felt he had enough seed coverage due to the soil condition after working and did not harrow or follow up for seed coverage. He did not take a close look after this growing season but believed he needed another year before making a judgment as not much apparently came. FY09 and FY12 no evaluations. FY 13 all plots died out. Planting cancelled.

##### **FIELD OFFICE: JEROME/ SHOSHONE/HAILEY**

None

##### **FIELD OFFICE: RUPERT**

None

##### **FIELD OFFICE: TWIN FALLS**

**ID00007 Twin Falls SWCD/Twin Falls Highway District. Drought tolerant landscape-weed control demonstration plantings.** Seed ordered March 1, 2000 for late March delivery. Planting 1: Vavilov Siberian wheatgrass, Bozoisky Russian wildrye, and Ladak alfalfa. Planting 2: Hycrest crested wheatgrass, Bozoisky Russian wildrye, and Ladak alfalfa. Planting 3: Secar Snake River wheatgrass, Critana thickspike wheatgrass, Trailhead basin wildrye, Rimrock Indian ricegrass, and Wytana fourwing saltbush. Planting 4: Secar Snake River wheatgrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Nezpar Indian ricegrass, and Snake River Plain fourwing saltbush. Site

characteristics: MLRA B11A, Portneuf silt loam soil, 0-2 percent slopes, north exposure, 3800 feet elevation, 10-12 inch precipitation, irrigated for establishment only, T11S R18E SW1/4 of SW1/4 of Section 13. FY00 due to very dry spring the planting was delayed until better planting conditions occur. FY01 site was planted in mid to late April and sprinkler irrigated in May to assist with plant establishment. Site was also mowed several times during growing season for weed control. Because of mowing, species identification was not possible – estimated initial stand establishment for all plantings are fair with good plant vigor. FY02 introduced plantings are well established - native plantings failed. Introduced seed of Vavilov Siberian wheatgrass (15 lb) and Bozoisky Russian wildrye (5 lb) was ordered on September 15, 2002 to replant failed portion. Planting completed for October 25, 2002 (dormant planting). FY03 field observation determined that little establishment has occurred this year due to drought conditions. FY04 stands were mowed in June and inadequate moisture was available for regrowth. Wytana fourwing saltbush and Snake River Plains fourwing saltbush are becoming more evident with scattered plants throughout plantings 3 and 4. Mowing is keeping the fourwing saltbush short, but does not appear to be killing the shrubs. FY05 this is the first year of above normal spring moist since plantings were installed. Planting 1: good stand of Vavilov (2-3 plants/ft<sup>2</sup>), Bozoisky (2 plants/ft<sup>2</sup>) and alfalfa (< 1 plant/ft<sup>2</sup>) and good vigor for grasses and poor vigor for alfalfa. Planting 2: good stand of Hycrest (3 plants/ft<sup>2</sup>) and thickspike (2 plants/ft<sup>2</sup>). Wytana fourwing saltbush and Snake River Plains fourwing saltbush are becoming more evident and plants are larger than last year throughout the older plantings 3 and 4. FY08 Mowing operations have ceased and overall stands are improving. Planting 1: good stand of Vavilov, Bozoisky and alfalfa with good vigor for grasses and poor vigor for alfalfa. Planting 2: good stand of Hycrest and thickspike. Wytana fourwing saltbush and Snake River Plains fourwing saltbush are becoming more evident and plants are larger than earlier years. FY10 the north planting continues to look fairly good with good stand of Vavilov (2-3 plants/ft<sup>2</sup>), Bozoisky (2 plants/ft<sup>2</sup>) and alfalfa (< 1 plant/ft<sup>2</sup>) and good vigor for grasses and poor vigor for alfalfa; the south planting continues to struggle with poor stands and vigor overall. **Evaluations will no longer be collected for this planting.**

**ID03001 Walt Coiner Field Planting**  
**Evaluations will longer be collected for this planting.**

Species	<u>Stand</u>					<u>Vigor</u>				
	2003	2004	2005	2006	2010	2003	2004	2005	2006	2010
<u>IrrigatedPerennialCover</u>										
Sherman big bluegrass	good	fair	fair	fair	poor	exc.	fair	exc.	exc.	poor
Talon Canada bluegrass	good	exc.	exc.	exc.	good	exc.	exc.	exc.	exc.	good
Foothills C. bluegrass	exc.	exc.	exc.	exc.	good	exc.	exc.	exc.	exc.	good
Durar hard fescue	fair	exc.	fair	good	fair	exc.	exc.	fair	good	fair
<u>Semi-IrrigatedPerennialCover</u>										
Covar sheep fescue	poor	fair	good	good	exc.	fair	good	exc.	exc.	exc.
Quatro sheep fescue	poor	good	exc.	good	exc.	fair	good	exc.	exc.	exc.
Bozoisky R. wildrye	poor	v. poor	good	good	good	fair	poor	good	good	good
Newhy hybrid wheatgrass	poor	failed	fair	fair	failed	fair	v. poor	good	good	failed
Roadcrest c. wheatgrass	good	fair	poor	poor	failed	good	good	good	fair	failed
Vavilov S. wheatgrass	good	exc.	exc.	good	destroyed	good	exc.	exc.	good	destroyed
Ephraim c. wheatgrass	exc.	fair	exc.	exc.	destroyed	good	fair.	exc.	exc.	destroyed
Sodar s. wheatgrass	good	poor	poor	poor	destroyed	fair	poor	poor	poor	destroyed
Paiute orchardgrass	fair	fair	fair	fair	destroyed	fair	fair	fair	fair	destroyed
<u>DrylandPerennialCover</u>										
Vavilov S. wheatgrass	good	exc.	exc.	good	good	good	exc.	exc.	good	good
Bozoisky R. wildrye	poor	v. poor	good	good	failed	fair	poor	good	good	failed
Sherman big bluegrass	v. poor	v. poor	good	good	failed	poor	v. poor	good	good	failed
Rosana w. wheatgrass	fair	good	exc.	exc.	exc.	good	good	exc.	exc.	good

Recommendationsbasedonevaluationyears

Irrigated – Foothills and Talon Canada bluegrass are the best fully irrigated ground cover choices

Semi-irrigated – Vavilov Siberian wheatgrass, Rosana western wheatgrass, Bozoisky Russian wildrye and Ephraim crested wheatgrass provide the best ground cover

Dryland – Vavilov Siberian wheatgrass mixed with Rosana (Recovery) western wheatgrass provides best ground cover

**ID04003 Steve Schuyler. Windbreak field planting.** Siouxland poplar, Carolina poplar, Golden willow and Laurel willow cuttings. Cuttings ordered January 12, 2004. Site characteristics: 0-1 percent slope, north aspect, 8-10 inch precipitation zone, irrigated-gravity, Portneuf silt loam soil. Planted April 10, 2004 – weed barrier fabric was installed – planting protected with snow fence along west edge. FY04 survival and height - 91 percent – 35 inches Laurel willow, 42 percent – 6 inches Carolina poplar, 82 percent – 42 inches Golden willow, 0 percent Siouxland poplar. FY05 replacements ordered February 22<sup>nd</sup> 10 golden willow, 25 Carolina poplar, and 5 Laurel willow. Evaluation August 11, 2005- Laurel willow 94% survival with excellent vigor, 8 feet height and 5 feet crown width; Carolina poplar 58% survival with excellent vigor, 9.3 feet height and 7.5 feet crown width; Golden willow 82% survival with excellent vigor, 9.5 feet height and 11 feet crown width.; Siouxland poplar failed. FY08 Laurel willow 89 percent survival with good vigor and 15.5 feet height; golden willow 82 percent survival with excellent vigor and 20 feet height; Carolina poplar 58 percent survival with excellent vigor and 28 feet height. FY09 Laurel willow 89 percent survival with yellowing leaves possibly iron chlorosis; Golden willow 82 percent survival; Poplar 58 percent survival. FY11 Laurel willow 89 percent survival, Golden willow 82 percent survival and poplar 58 percent survival. A gall problem is affecting the poplars in this planting – in the spring of 2011 chemicals were injected into the soil to deal with the gall issue. The treatments appear to be clearing up the problem. FY12 no evaluations. FY 13 evaluation Laurel willow 89 percent survival, 22 feet tall, 15 foot crown width. Golden willow 82 percent survival, 23 feet tall, 16 foot crown width. Carolina poplar 58 percent survival, 40 feet tall, 16 foot crown width. Poplar still have Poplar Bud Gall Mite and will continue to treat. Fertilizer (N,P,K,S, and Fe) have been applied.

**ID04006 Dickenson 319 Riparian woody planting.** Laurel willow, golden current, Wood's Rose, redosier dogwood, Siberian peashrub, coyote willow, golden willow, chokecherry, blue spruce, and Austrian pine. Plantings are protected from grazing and grass is mowed around pines, spruce, juniper and sumac. FY04 planted in May 2004. Plantings are protected from grazing with a fence and arranged in clumps (copses) for natural appearance. Laurel willow 92 percent survival, excellent vigor, 24-36 inch height. Golden current 100 percent survival, excellent vigor, and 18-24 inch height. Wood's rose 100 percent survival, excellent vigor, and 18-24 inch height. Redosier dogwood 60 percent survival, fair vigor, and 18-24 inch height. Siberian peashrub 100 percent survival, excellent vigor, and 18-24 inch height. Coyote willow 80 percent survival, good vigor and 12-48 inch height. Golden willow 100 percent survival, excellent vigor and 72 inch height. Chokecherry 23 percent survival, poor vigor and 36 inch height. Blue spruce 73 percent survival, good vigor and 36 inch height. Austrian pine 100 percent survival, excellent vigor and 36 inch height. FY05 evaluation August 11, 2005- Laurel willow 100% survival, excellent vigor, 4-8 feet height and 2 feet crown width; Golden current 92% survival, excellent vigor, 4 feet height and 2.5 feet crown width; Wood's rose 100% survival, excellent vigor, 2.5 feet height and 3 feet crown width; Redosier dogwood 83% survival, excellent vigor, 4 feet height and 2 feet crown width; Siberian peashrub 12% survival, very poor vigor; Coyote willow 33% survival, good vigor, 5 feet height and 0.5 feet crown width; Golden willow 90% survival, excellent vigor, and 6 feet height; chokecherry 27% survival, fair vigor and 4.4 feet height; blue spruce 73% survival, fair vigor and 4.5 feet height; Austrian pine 100% survival, excellent vigor and 4.6 feet height; Rocky Mountain juniper 100% survival, excellent vigor and 14 inch height; Skunkbush sumac 80% survival, good vigor and 2 feet height. FY08 Laurel willow 100 percent survival with excellent vigor and 15 feet height; coyote willow failed; Peachleaf willow 80 percent survival with fair vigor and 15 feet height; Simon poplar failed; Carolina poplar failed; Firecracker penstemon failed. FY11 evaluations were conducted too late this year. FY12 no evaluations. FY 13 evaluation Peachleaf willow 9 alive, 15 feet tall and 12 foot crown width. Laurel willow 20 alive, 15 feet tall and 12 foot crown width. Juniper 9 feet tall, 4 foot crown width. Skunkbush sumac 7 feet tall, 4 foot crown width. Survival of Laurel and peachleaf willow is low. Area is poorly kept with severe infestation of weeds. Site is good habitat for quail and ducks, also skunks and magpies and Russian olive is encroaching. Planting cancelled.

**ID05002 Perinne Coulee 319 Riparian planting.** Redosier dogwood (accessions 9023733, 9023739 and 9023740), Laurel willow and Peachleaf willow (accessions (9067375, 9067376, 9067541, 9067546, 9067549 and 9067560) cuttings were ordered February 4, 2005. Planted spring 2005. Survival and identification difficult in 2005. FY07 Peachleaf willow 50 percent survival with good vigor and 10 feet height; Laurel willow and red-osier dogwood failed. FY08 58 percent survival with good vigor and 11 feet height; Laurel 14 percent survival with poor vigor and 2.5 feet height (affected by saline soil conditions. FY09 Peachleaf 25 surviving with 12 feet height and 12 feet crown width; Laurel 11 surviving with feet height. FY11 evaluations were conducted too late this year. FY12 no evaluations. FY 13 evaluation Peachleaf range in height from 6-18 feet and crown width 4-12 feet with good vigor. Laurel willow average 7 feet tall and crown width 4 feet. Peachleaf have better survival. Planting cancelled.

**ID08007 Twin Falls Canal Company. Riparian project.** Laurel willow, peachleaf willow accessions 9067546 and 9067376 and black cottonwood accession 9067538 were ordered March 10, 2008 for delivery in late March. FY08 Peachleaf willow 55 percent survival with fair vigor and 2 feet height; Black cottonwood failed; Laurel willow 37 percent survival with fair vigor and 15 inch height. FY09 Peachleaf 7 surviving with 6 feet height; black cottonwood 1 surviving with 1 foot height; Laurel 7 surviving with 5 feet height. FY11 evaluations were conducted too late this year. FY12 no evaluations. FY13 Evaluation Peachleaf and Laurel willow both average 12 feet tall and 10 foot crown width. Popular fishing place with moderate damage to plants from human use.

**ID09007 Twin Falls Britt Pond. Riparian Planting.** 9076375 peachleaf willow (10 cuttings) and 9076376 peachleaf willow (50 cuttings) cuttings ordered February 2009. Planted on May 8, 2009. FY09 Peachleaf 23 surviving; Laurel 7 surviving. FY11 evaluations were conducted too late this year. FY12 no evaluations. FY 13 evaluation Peachleaf range in height from 6-18 feet and crown width 4-12 feet with good vigor. Laurel willow average 7feet tall and crown width 4 feet. Peachleaf have better survival. Planting cancelled.

**ID09012 Twin Falls East Perrine. Riparian Planting.** 9076375 peachleaf willow (40 cuttings) ordered February 2009. Planted on May 8, 2009. FY11 evaluations were conducted too late this year. FY12 no evaluations. FY 13 evaluation 7 percent survival 24 inch plant height. Appears that some were not planted deep enough to reach water but site is not good for willow. There are no signs of salinity but maybe a contributing factor. Will continue to monitor.

**ID12006 Twin Falls Canal Company Grass Seeding** Vavilov and Roadcrest. Seeded in fall 2011 and reseeded in 2012. This area was significantly disturbed and had been a corral for many years. FY 13 evaluation there are a few small areas where the grass grew but most of the area produces only kochia weed. Not sure of the problem but suspect salt buildup or possibly chemical carryover. Will evaluate again next year.

**ID12007 Twin Falls Canal Company. Riparian planting.** 200 peachleaf willow and 10 laurel willow shipped from PMC May 2012. Planting installed May 21, 2012. FY 13 evaluation 9067541 78 percent survival, 9067546 46 percent survival, 9076375 38 percent survival, Laurel 24 percent survival, 9076376 30 percent survival. All accessions average 30 inches tall and 18 inch crown width. Plant uniformity rated good for all except Laurel which rated fair. Vigor rated good for all accessions.

#### **IDAHO DIVISION V PLANT MATERIALS PLANTINGS**

**FIELD OFFICE: AMERICAN FALLS/ABERDEEN**

None

**FIELD OFFICE: BLACKFOOT**

None

**FIELD OFFICE: FORT HALL**

**ID03002 Shoshone-Bannock Tribe. Demonstration Planting.** Nezpar Indian ricegrass, Goldar bluebunch wheatgrass, Magnar basin wildrye, Sodar streambank wheatgrass, High Plains Sandberg bluegrass, and Sherman big bluegrass seed was ordered September 30, 2002. Planting completed early November 2002. FY03 no evaluation. FY04 Nezpar Indian ricegrass excellent stand and vigor with 24 inch height. Goldar bluebunch wheatgrass excellent stand and vigor with 24 inch height. Magnar basin wildrye excellent stand with good vigor and 36 inch height. Sodar streambank wheatgrass excellent stand and vigor with 30 inch height. Sherman big bluegrass good stand with good vigor and 30 inch height. Very poor stand and vigor with 8 inch height (only 3 plants came up – seed may have been buried too deep). FY05 evaluation June 15, 2005. Magnar excellent stand, 98% survival, excellent vigor and 48 inch height; Nezpar good stand, 90% survival, good vigor and 36 inch height; Goldar good stand, 95% survival, good vigor and 42 inch height; Sodar excellent stand, 98% survival, excellent vigor and 42 inch height; Sherman excellent stand, 98% survival, excellent vigor and 38 inch height; High Plains failed and will be replanted next year and irrigated for establishment. FY06 excellent stands of Goldar bluebunch wheatgrass and Magnar basin wildrye, good stands of Sodar streambank wheatgrass, and Sherman big bluegrass, fair stand of Nezpar Indian ricegrass and High Plains Sandberg bluegrass failed. FY07 no evaluation. FY08 common camas excellent stand with 90 percent survival and excellent vigor. Demo plots – Magnar basin wildrye 98 percent survival with excellent vigor and 48 to 60 inch height; Nezpar

Indian ricegrass very poor stand with 10 percent survival and poor vigor; Goldar bluebunch wheatgrass fair stand with 70 percent survival and good vigor; Sodar streambank wheatgrass excellent stand with 80 percent stand and good vigor; Sherman big bluegrass good stand with 60 percent stand and good vigor; High Plains Sandberg bluegrass failed. FY10 Clearwater Venus penstemon, Snake River Plains fourwing saltbush and Opportunity Nevada bluegrass seed ordered to add to demonstration plots. FY12-13 no evaluations.

**FIELD OFFICE: MALAD**

None

**FIELD OFFICE: MONTPELIER**

None

**FIELD OFFICE: POCATELLO**

None

**FIELD OFFICE: PRESTON**

None

**FIELD OFFICE: SODA SPRINGS**

**ID09002** \_\_\_\_\_ - Recovery western wheatgrass field planting. Seed shipped September 29, 2008. FY09 – FY12-13 no evaluations.

**ID09005 Alan Rasmussen. Riparian field planting.** Laurel willow, white willow, coyote willow, golden willow, 9076375 peachleaf willow, 9067538 peachleaf willow cuttings ordered February 2009. Site characteristics: MRLA 13, 4 acres, Iphil silt loam soil, 0- 2 percent slopes, northwest aspect, 5230 feet elevation, 14-16 inch rainfall, irrigated, T11S R40E NW¼ Section 11. FY10 1- 2 percent survival with fair vigor. FY12 2% survival of peachleaf willow, 8' tall, and 1% survival of golden willow 6.5' tall; 0% survival of other species. FY13 no evaluation.

**ID10001 Curtis Reed. Field planting.** Magnar basin wildrye seed ordered August 30, 2009. Seeding planned for late October 2009. Purpose: vegetative filter strip (dust control). Site characteristics: MLRA 13; silt loam soil; 0-1 percent slope; east aspect; elevation 6240; 18- 20 inch precipitation; non-irrigated; T8S R41E sections 5 and 6. FY10 no evidence of establishment or survival – evaluate next year for final establishment determination. FY11 no evaluation. **Cancelled 2012.**

**ID13004 Wayne Bingham. Field planting.** Existing CRP to native grasses. Secar, Magnar, Nezpar and Anatone shipped on August 31, 2012. FY13 no evaluation.

**IDAHO DIVISION VI PLANT  
MATERIALS PLANTINGS**

**FIELD OFFICE: ARCO**

**ID03003 Hill-Freeman Snake River Plains fourwing saltbush field planting.** Seed ordered October 18, 2002. FY03 one half pound of Snake River Plains fourwing saltbush was included in a five acre marginal pastureland seeding adjacent to Warm Springs Creek on Barton Flat (South Custer County). The entire seeding area of 13.3 acres included a three and a half acre stand of decadent crested wheatgrass. A seed mix of Vavilov Siberian wheatgrass (1.2 lbs/ac), Bannock thickspike wheatgrass (2.0 lbs/ac), Bozoisky Russian wildrye (1.2 lbs/ac), Rincon fourwing saltbush ( 0.25 lbs/ac), and Bighorn skunkbush sumac (0.25 lbs/ac) was broadcast over the seeding area. The area was then rolled to obtain seed to soil contact on a firm weed free seedbed. FY04- FY06 no evaluations. FY07 Vavilov Siberian wheatgrass good stand with good vigor - 2 plants per feet squared; Bannock thickspike wheatgrass good stand with good vigor - 2 plants per feet squared; Bozoisky Russian wildrye poor stand with fair vigor - trace plants per feet squared; Snake River Plains fourwing saltbush failed; Bighorn skunkbush sumac – failed. FY08–13 no evaluations.

**FIELD OFFICE: DRIGGS**

None

**FIELD OFFICE: IDAHO FALLS**

**ID13011 Jesse Fullmer Idaho Falls Field Office. Pollinator planting.** Seed requested and shipped August 2012. Planting delayed until fall 2013.

**FIELD OFFICE: REXBURG**

**ID13014 Raybould. Field Planting.** Testing Siberian wheatgrass in sandy low-precip pivot corners in St. Anthony. 30 lbs PLS Vavilov II shipped on October 23, 2012. FY13 no evaluation.

**ID13015 Raybould. Field Planting.** Testing Siberian wheatgrass in sandy low-precip pivot corners in St. Anthony. 30 lbs PLS Vavilov shipped on October 31, 2012. FY13 no evaluation.

**FIELD OFFICE: RIGBY/TERRETON**

**ID09011 Carl Ball – Hamer Farms. Field Planting. Vegetative cross wind strips demo plantings.** Rush intermediate wheatgrass, Manifest 9092056 int. wheatgrass, Bozoisky Russian wildrye, Mankota Russian wildrye, Luna pubescent wheatgrass, Largo tall wheatgrass and Alkar tall wheatgrass seed ordered April 15, 2009. Site Characteristics: MLRA 11; Corassy Butte loamy sand soil; 2- 4 percent slopes; SW aspect; 4800- 4900 feet elevation; full irrigation; T7N R36E Sections 13 and 14. FY09 strips were planted on June 8, 2009. FY10 Rush intermediate wheatgrass excellent stand, 68 inch height, very good density, outstanding performance, rates very high for use in cross wind strips; Bozoisky Russian wildrye excellent stand, 20 inch height, not enough height for cross wind strips, irrigation may be too much water for this species; Mankota Russian wildrye excellent stand, 20 inch height, not enough height for cross wind strips, irrigation may be too much water for this species; Alkar tall wheatgrass good stand, 68 inch height, not as dense as Rush, outstanding performance, rates very high for use in cross wind strips; Largo tall wheatgrass good stand, 72 inch height, not as dense as Rush, outstanding performance, rates very high for use in cross wind strips; Manifest intermediate wheatgrass fair stand, 50 inch height, drifting sand appears to be affecting stand quality, ergot present in seedheads, not a good choice for cross wind strips; Luna pubescent wheatgrass excellent stand, 53 inch height, drifting sand appears to be affecting stand quality, ergot present in seedheads, not a good choice for cross wind strips. FY12 no evaluations. FY 13 – Wind strips were removed this spring due to sand buildup and weed encroachment. Cooperator plans to install new strips in the future. Planting cancelled.

**FIELD OFFICE: RIGBY/DUBOIS**

**ID89015 Wagoner. Field planting.** Luna pubescent wheatgrass, P-27 Siberian wheatgrass, Sodar streambank wheatgrass, Greenar intermediate wheatgrass, Delar small burnet, Trevois alfalfa field planting on rangeland. Site is gravelly loam soil with a pan at 5-6 inches, non-irrigated, 12-inch rainfall, 6300 feet elevation, and 3% slopes on NE exposure. FY89 ripped rangeland in spring and seeded mix in fall of 1990. FY91 excellent stand establishing with production about 1400 lbs/ac. FY92 clipping data: No Treatment - 318 lbs/ac., chisel only treatment (native species) - 495 lbs/ac., chisel/disc/seed treatment - 1110 lbs/ac. Clipped 7/9/92. FY93 Clipped plots resulted in production of 1200-2000 lbs/ac. FY94 production of about 800 lbs/ac in extremely droughty year. Non treated rangeland producing about 100 lbs/ac this year. FY95 excellent stand Luna and Greenar, Good stand P-27, Sodar and Travois and Poor stand of Delar. Stand produced 1400+ lbs/acre this year. High antelope use of stand was noted. Stand was grazed 3 weeks in spring and 4 weeks in fall with good management. FY96 excellent stand of Trevois and good stands of Luna, P27, Sodar, and Greenar. Very poor stand of Delar. Considered 90% stand overall. Produced 1000 lbs/ac in very poor moisture year. Stand is doing great under good management. FY03 Disc-Seed treatment – near fence good stand of natives – primarily crested wheatgrass in seeding with 5-6 percent sagebrush and 600 pounds per acre production in very dry year. Ripped-Disc-No Seed treatment – sagebrush very heavy with forage producing about 200 pounds per acre and brush producing about 200 pounds per acre in very dry year. Ripped-Disc-Seed treatment – excellent stand of primarily Bozoisky wildrye, Nordan crested wheatgrass, P27 Siberian wheatgrass and some Trevois alfalfa. Very little intermediate wheatgrass left in stand. Production is about 1000 pounds per acre in very dry year. FY05 There is a good stand of native bluebunch wheatgrass, Sandberg bluegrass and Indian ricegrass near west fence-line producing about 750 pounds per acre. The disced and seeded stand near west fence has a good stand of crested wheatgrass with about 5 percent sagebrush invasion and producing about 1000 pounds per acre. The ripped, disced and seeded area has an excellent stand of primarily Nordan crested wheatgrass and Bozoisky Russian wildrye with 3-4 plants per square foot, excellent vigor and producing about 1300 pounds per acre this year. P27 Siberian wheatgrass, Greenar intermediate wheatgrass and Trevois alfalfa are present, but in much lower amounts. Planting will no longer be evaluated, but will be maintained for training purposes.

**ID90025 Wagoner. Rush intermediate wheatgrass field planting on rangeland.** Site is gravelly loam soil with a pan at 5-6 inches, non-irrigated, 12-inch rainfall, 6300 feet elevation, and 3% slopes on NE exposure. FY89 ripped rangeland. FY90 planted April 1990. FY91 excellent stand establishing with no weeds. Production is 1400 lbs/ac. FY92 stand excellent with 1200 lbs/ac production. FY93 excellent stand producing 2000+ lbs/ac. Grazing value - appears to be a highly preferred/selected species according to cooperators. FY94 excellent stand producing 800 lbs/ac in very droughty year. FY95 excellent stand producing 1800+ lbs/acre. Rush is the most productive species in all range trials. FY96 excellent stand with 5-10 plants/ft<sup>2</sup> producing 1000-lbs/ac and good vigor in very low rainfall year. FY03 good to excellent stand with 3 plants per square foot and good to excellent vigor. Producing 700 pounds per acre in very dry year – produces about 1400 pounds per acre in average to favorable years. Sagebrush invasion is about 1-5 percent of plant community. No weeds in stand. **Planting will no longer be evaluated, but will be maintained for training purposes.**

**ID90035 Wagoner. Bozoisky Russian wildrye field planting on rangeland.** Site is gravelly loam soil, non-irrigated, 12-inch ppt, 6200 feet elevation, and 2% slopes on NE exposure. FY90 planted April. FY91 good stand establishing. FY92 excellent stand producing 1100 lbs/ac. FY93 90% + stand and up to 4' tall, estimated production 1200-1400 lbs/ac. FY94 good stand producing about 600 lbs/ac in very droughty year and only 50% of plants produced seedheads this year. FY95 good stand producing 1200+ lbs/acre. This species is doing very well and is well adapted to site. FY96 good stand with 4-5 plants/ft<sup>2</sup> and 1200-lbs/ac production in very low summer rainfall year. FY03 good stand of P27 Siberian wheatgrass and Bozoisky Russian wildrye with 3 plants per square foot and good to excellent vigor. Stand is producing about 800 pounds per acre in a very dry year. Estimate 1400-1600 pounds per acre in an average to favorable moisture year. FY05 the Bozoisky Russian wildrye stand is maintaining very well with approximately 3 plants per square foot, excellent vigor and production about 1200 pounds per acre. Cattle seek out this species year around according to cooperators. **Planting will no longer be evaluated, but will be maintained for training purposes.**

**ID92013 Webster. Field planting.** Regar meadow brome, Bozoisky Russian wildrye, Luna pubescent wheatgrass, Critana thickspike wheatgrass field planting on rangeland. Site is gravelly silt loam soil, non-irrigated, 14-inch rainfall, 6000 feet elevation, and 4% slopes on SE exposure. FY92 site sprayed for weed control, but too dry to seed. FY93 seeding not completed. FY94 very poor moisture conditions, planting not installed. FY95 good stand of all species establishing with good spring moisture. FY96 good stand of all species with 2-4 plants/ft<sup>2</sup> and good vigor on all except Regar has fair vigor. Stand had low production and is still establishing. FY97 good stands for all species with 60% stands and good vigor - they have been slow to establish on this tough site. FY99 Bozoisky and Luna good stands, Regar and Critana fair stands. FY03 good to excellent stand of Bozoisky Russian wildrye and Regar meadow brome with 3 plants per square foot (70% Bozoisky – 30% Regar), good vigor and about 1500 pounds per acre production in a very dry year. Good to excellent stand of Bozoisky Russian wildrye and Trevois alfalfa with 3 plants per square foot (70% Bozoisky – 30% Trevois), good vigor and about 1500 pounds per acre production in a very dry year. Fair to good stand of Critana thickspike wheatgrass with 9 plants per square foot, poor vigor and about 400 pounds per acre production in a very dry year. Good to excellent stand of Luna pubescent wheatgrass with 5 plants per square foot, good vigor and about 1500 pounds per acre production in a very dry year. Bozoisky is heavily grazed (80-90 percent utilization) by cattle and elk and stands are maintaining very well. FY05 Plot 1: good stand with 2 plants per square foot - Bozoisky Russian wildrye 100% survival, Regar meadow brome failed, Trevois alfalfa 50% survival; stand producing about 1300 pounds per acre. Cattle and elk are utilizing the stand at about 60 percent utilization on Bozoisky and 30 percent utilization on alfalfa. Plot 2: excellent stand with 3 plants per square foot – Bozoisky 100 percent survival and Trevois 50 percent survival; stand is producing about 1700 pounds per acre; Cattle and elk are utilizing stand with about 85 percent utilization on Bozoisky and 30 percent utilization on alfalfa. Plot 3; fair stand of Critana thickspike wheatgrass with 9 plants per square foot and fair vigor; stand is producing about 700 pounds per acre. Cattle and elk are not utilizing this plot. Plot 4: good stand of Luna pubescent wheatgrass with good vigor and 5 plant per square foot; stand is producing about 1700 pounds per acre; Cattle and elk are not utilizing this stand. **Planting will no longer be evaluated, but will be maintained for training purposes.**

**FIELD OFFICE: SALMON/CHALLIS**

**ID80100 IDL Bradbury Flat. Multiple Adaptation Evaluation.** Planted March 25, 1980. Evaluations 8/7/84, 8/6/86, 7/12/89, 7/7/92, 11/14/95, 9/99, 5/21/03 and 7/25/07. FY07 evaluation by Dan Ogle, Mark Olson and Nate Matlack FY13 See pending Technical note.

Accession	Stand	Plants/ft <sup>2</sup>	Vigor	Comments
B1574 crested wheatgrass	70%	1.0	good-exc.	

P27 Siberian wheatgrass

65%

0.5

good

Sodar streambank wheatgrass	65%	1.5	good	
AB447 crested wheatgrass	60%	0.5	good	
Secar Snake River wheatgrass	60%	0.25	fair-good	high residue problems
Hatch winterfat	50%	0.5	good-exc.	
AB764 winterfat	50%	0.5	good-exc.	
AB922 fourwing saltbush	1%	< 0.1	fair-good	
AB942 fourwing saltbush	1%	< 0.1	fair-good	

Nezpar Indian ricegrass, Luna pubescent wheatgrass, Goldar bluebunch wheatgrass, Magnar basin wildrye, Topar pubescent wheatgrass, Appar blue flax, NM1143 Firecracker penstemon, Bandera R.M. penstemon, Cedar Palmer penstemon, NM1123 Venus penstemon, AB555 aster, R885a black-eyed susan, Delar small burnet, Immigrant forage kochia, Ladac alfalfa, buckwheat species, and arrowleaf balsamroot failed.

**ID80101 IDL Bradbury Flat. Multiple Adaptation Evaluation.** Planted November 7, 1981. Evaluations 8/7/84, 8/6/86, 7/12/89, 7/7/92, 11/14/95, 9/99, 5/21/03 and 7/25/07. FY07 evaluation by Dan Ogle, Mark Olson and Nate Matlack

FY13 See pending Technical note.

Accession	Stand	Plants/ft2	Vigor	Comments
B1574 crested wheatgrass	50%	0.5	good	
P27 Siberian wheatgrass	60%	0.75	excellent	
Sodar streambank wheatgrass	80%	1.25	excellent	
AB447 crested wheatgrass	65%	0.5	good-exc.	
Secar Snake River wheatgrass	50%	0.25	good-exc.	High residue problems
AB764 winterfat	20%	0.15	poor	
AB585 winterfat	1%	<0.1	very poor	
AB922 fourwing saltbush	3%	0.1	very poor	
AB942 fourwing saltbush	2%	<0.1	very poor	
Immigrant forage kochia	3%	0.1	fair-good	
Bozoisky Russian wildrye	70%	0.5	excellent	
Vinall Russian wildrye	70%	0.7	excellent	

Nezpar Indian ricegrass, Luna pubescent wheatgrass, Goldar bluebunch wheatgrass, Magnar basin wildrye, Topar pubescent wheatgrass, Appar blue flax, NM1143 firecracker penstemon, Bandera R.M. penstemon, Cedar Palmer penstemon, NM1123 Venus penstemon, Delar small burnet, Lodorm green needlegrass, Blair smooth brome, and Paiute orchardgrass failed

**ID82102 BLM Centennial. Multiple Adaptation Evaluation.** Planted late October 1982. Evaluations 8/7/84, 7/28/86, 7/13/89, 6/26/92, 6/20/95. FY99 not evaluated. Evaluated 5/21/03. Evaluated 7/24/07 by Dan Ogle, Mark Olson and Nate Matlack

FY13 See pending Technical note.

Accession	Stand	Plants/ft2	Vigor	Comments
GP52 alfalfa	10%	0.1	fair-good	
BC79 alfalfa	3%	0.05	fair	
RS1 wheatgrass cross	25%	0.5	good	
RS2 wheatgrass cross	15%	0.25	fair	
Newhy hybrid wheatgrass	75%	1.0	good	
Scarlet globemallow	1%	<0.1	fair-good	
Ephraim crested wheatgrass	85%	1.25	fair-good	
Barton western wheatgrass	5%	0.25	poor-fair	
Topar pubescent wheatgrass	1%	<0.1	very poor	
Whitmar beardless wheatgrass	25%	0.25	fair-good	
Goldar bluebunch wheatgrass	25%	0.5	fair-good	
Secar Snake River wheatgrass	50%	0.75	fair-good	
Vinall Russian wildrye	60%	0.75	good-exc.	
Bozoisky Russian wildrye	45%	0.25	excellent	
U7881 alfalfa	1%	<0.1	very poor	

Nordan crested wheatgrass 70% 0.75 good  
 Lutana cicer milkvetch, Canbar Canby bluegrass, Immigrant forage kochia, Bandera R.M. penstemon, Cedar Palmer penstemon, Appar blue flax, Paiute orchardgrass, P27 Siberian wheatgrass, Nezpar Indian ricegrass, Magnar basin wildrye, and yellow sweetclover failed

**ID82103 BLM Spud Alluvial. Multiple Adaptation Evaluation.** Planted late October 1982. Evaluations 8/7/84, 7/28/86, 7/13/89, 6/25/92, 11/14/95, 9/99, 5/20/03 and 7/25/07. FY07 evaluation by Dan Ogle, Mark Olson and Nate Matlack

FY13 See pending Technical note.

Accession	Stand	Plants/ft2	Vigor
Comments	RS1 wheatgrass cross		85%
1.5	fair		
RS2 wheatgrass cross	85%	1.5	fair
Fairway crested wheatgrass	85%	1.5	fair
Immigrant forage kochia	50%	2.0	excellent many young plants
Ephraim crested wheatgrass	75%	1.0	good
Barton western wheatgrass	<5%	0.1	poor
Whitmar beardless wheatgrass	70%	1.0	fair
P27 Siberian wheatgrass	90%	1.5	good
Goldar bluebunch wheatgrass	30%	0.3	poor
Secar Snake River wheatgrass	80%	0.75	fair-good
Vinall Russian wildrye	70%	1.0	good-exc.
Bozoisky Russian wildrye	85%	0.75	excellent

BC79 Synthetic alfalfa, GP52 Synthetic alfalfa, scarlet globemallow, Cedar Palmer penstemon, Appar blue flax, Paiute orchardgrass, Topar pubescent wheatgrass, Nezpar Indian ricegrass, Magnar basin wildrye, and yellow sweetclover failed.

**ID82104 BLM Jeff's Flat. Multiple Adaptation Evaluation.** Planted late October 1982. Evaluations 8/7/84, 7/28/86, 7/13/89, 6/26/92, 9/99 5/19/03 and 7/24/07. FY07 evaluated by Dan Ogle, Mark Olson and Nate Matlack FY13 See pending Technical note.

Accession	Stand	Plants/ft2	Vigor	Comments
GP52 Synthetic alfalfa	1-5%	<0.25	fair	
BC79 Synthetic alfalfa	1-5%	<0.25	fair	
Manchar smooth brome	50%	4	good	
Baylor smooth brome	50%	4	good	
Durar hard fescue	75%	3	good-exc.	
Covar sheep fescue	45%	2	good	
Nordan crested wheatgrass	25%	0.5	fair-good	
P27 Siberian wheatgrass	40%	0.75	good	
Greenar intermediate wheatgrass	65%	4	excellent	
Magnar basin wildrye	5%	0.1	fair	
Vinall Russian wildrye	3%	0.1	poor	
Bozoisky Russian wildrye	5%	0.1	fair	

RS1 wheatgrass cross, RS2 wheatgrass cross, Hycrest crested wheatgrass, Delar small burnet, Lutana cicer milkvetch, Cedar Palmer penstemon, Appar blue flax, Paiute orchardgrass, Sherman big bluegrass, yellow sweetclover failed.

**ID82105 BLM Round Valley. Multiple Adaptation Evaluation.** Planted late October 1982. Evaluations 8/7/84, 8/6/86, 7/12/89, 6/25/92, 11/13/95, 9/99, 5/19/03 and 7/23/07. FY07 evaluated by Dan Ogle, Mark Olson and Nate Matlack

FY13 See pending Technical note.

Accession	Stand	Plants/ft2	Vigor
Comments			
RS1 wheatgrass cross	1%	<0.1	fair
RS2 wheatgrass cross	1%	<0.1	fair
Immigrant forage kochia	2%	<0.1	fair-good
Scarlet globemallow	1%	<0.1	fair
Nordan crested wheatgrass	70%	1.0	good
P27 Siberian wheatgrass	70%	1.0	good-exc.

Vinall Russian wildrye	30%	0.5	good
Bozoisky Russian wildrye	75%	1.5	excellent
Nordan crested wheatgrass	60%	1.0	fair-good

GP52 synthetic alfalfa, BC79 synthetic alfalfa, Critana thickspike wheatgrass, Bandera R.M. penstemon, Cedar Palmer penstemon, Appar blue flax, Paiute orchardgrass, Goldar bluebunch wheatgrass, Secar Snake River wheatgrass, Barton western wheatgrass, Topar pubescent wheatgrass, Whitmar beardless wildrye, Nezpar Indian ricegrass, Magnar basin wildrye, yellow sweetclover failed.

**ID82106 BLM Gooseberry/Sheep Creek. Multiple Adaptation Evaluation.** Evaluated 7/7/92, 5/19/03 and 7/23/07.

FY07 evaluation by Dan Ogle, Mark Olson and Nate Matlack

FY13 See pending Technical note. Accession Stand Plants/ft2 Vigor

	<u>Comments</u>		
Nordan crested wheatgrass	5%	0.1	fair-good
Bozoisky Russian wildrye	10%	0.2	poor-fair
Vinall Russian wildrye	10%	0.3	fair
Sherman big bluegrass	95%	1.5	fair-good
Greenar intermediate wheatgrass	2%	<0.1	very poor
P27 Siberian wheatgrass	1%	<0.1	very poor
Ephraim crested wheatgrass	3%	<0.1	poor
Durar hard fescue	85%	2	good
Covar sheep fescue	80%	2	fair-good
Manchar smooth brome	50%	0.5	fair
Baylor smooth brome	20%	0.25	fair
Fairway crested wheatgrass	5%	0.1	fair

Magnar basin wildrye, Appar blue flax, Paiute orchardgrass, Cedar Palmer penstemon, Bandera R.M. penstemon, Lutana cicer milkvetch, Delar small burnet, RS2 wheatgrass cross, RS1 wheatgrass cross, BC79 synthetic alfalfa, and GP52 synthetic alfalfa failed.

**ID08001 Shiner Ranch. Field Planting.** Vavilov II Siberian wheatgrass seed ordered 9/27/07 and shipped 10/4/07 for November dormant planting.

Seed mixture 1 (5 ac): Vavilov II Siberian wheatgrass, Bozoisky Russian wildrye, falcata alfalfa;

Seed mixture 2 (75 ac): Vavilov Siberian wheatgrass, Bozoisky Russian wildrye, falcata alfalfa

Site Characteristics: Leadore gravelly loam soil, 2-6 % slope. South aspect, 5,600 feet elevation, 8-12 inch rainfall, non-irrigated, T17N R24E NE1/4 Section 2. FY07 - a four acre field planting that contained Vavilov II Siberian wheatgrass, Bozoisky Russian wildrye and falcata (yellow blossom) alfalfa was planted in November 2007. The rest of the planting area was planted to Vavilov Siberian wheatgrass, Bozoisky Russian wildrye and falcata (yellow blossom) alfalfa in November 2007. The Vavilov II and Bozoisky Russian wildrye seed was furnished by the PMC and the falcata alfalfa was purchased by the cooperator. We wanted to evaluate the Vavilov II release with Vavilov, the standard currently available on the market and also evaluate the falcata alfalfa as a potential dryland forage type alfalfa that may do well in this area. A ½ pound of alfalfa was planted per acre. There is some information available on the internet describing this alfalfa. FY11 all three grasses with 90% survival. Bozoisky has fair vigor and plants approximately 26 inches tall. Vavilov and Vavilov II with poor vigor, plants approximately 7 inches tall. Falcate alfalfa with 5% survival. Site is overgrazed. FY12-13 no evaluations.

**FIELD OFFICE: ST. ANTHONY**

**ID06009 John Taft. Henrys Lake WRP.** Field planting of 100 Engelmann spruce and 100 quaking aspen. Planting completed June 20 and 21, 2006 at 7 separate locations. One gallon potted plants; Engelmann spruce - 3 feet tall and quaking aspen 4- 5 feet tall; were planted using a skid steer with mounted 10 inch auger to dig holes. Each tree was planted by hand, pressed in by foot pressure and watered with bucket following planting. Hydrology – soil moisture varied from saturated locations near ponds at south end of project to field capacity at ponds at north end of project.

FY08 – no evaluations.

**FY07 Spruce** – survival is poor with approximately 20% survival overall. Top growth die back is common with approximately half of the surviving plants green near base, but dead above. These are expected to die. Approximately 15 plants throughout entire WRP site show fair to good bud growth. Winter was open and plants were exposed most of winter – this may have resulted in top growth injury. Spring moisture since March has been very poor resulting in

drought injury. Spruce is doing best in sites with saturated conditions. On sites that are drier and better drained, spruce is struggling.

**FY07 Aspen** – survival is good with approximately 50% survival overall. Top growth die back is common with approximately half of the surviving plants leafing along stem and about half sprouting from the base. Winter was open and plants were exposed most of winter – this may have resulted in top growth injury. Spring moisture since March has been very poor resulting in drought injury. Aspen is doing best in sites with very good soil moisture to saturated conditions. On site that are drier and better drained, aspen is struggling.

Site 1 berm near pond - was the only location where wildlife use was evident – probably moose.

Site 2 berm near pond

Site 3 wetland near road junction – aspen are in nearly standing water (water table within 6 inches of surface)

Site 4 upland just across bridge on right side of road

Site 5 upland to east of ponds on south end of property

Site 6 wetlands near ponds on south end of property

FY 13 – planting failed. Cancelled.

**PLANT MATERIALS**

**2013**

**UTAH EVALUATION SUMMARIES FIELD**

**AND DEMONSTRATION PLANTINGS**



## UTAH AREA 1 PLANT MATERIALS PLANTINGS

**UT05003 Swaner Nature Preserve. Riparian planting.** Peachleaf willow (accessions 9067375, 9067376, 9067541, 9067546, 9067549 and 9067560), Redosier dogwood (accessions 9023733, 9023739 and 9023740) and Blanchard blue elderberry cuttings were ordered February 4, 2005. Site characteristics: East Canyon Creek, Summit County, MLRA E47, Echocreek-Kovich loam soil, 1-2 percent slope, NW aspect, 6350 feet elevation, 16 inch precipitation, non-irrigated, T1S R4E SE ¼ Section 18. FY05 peachleaf willow 9067375 85% survival, fair vigor, 12-24" height; peachleaf willow 9067376 100% survival, good vigor, 24-36" height; peachleaf willow 9067541 73% survival, fair vigor, 12-18" height; peachleaf willow 9067546 100% survival, good vigor, 24" height; peachleaf willow 9067549 88% survival, fair vigor, 24" height; peachleaf willow 9067560 85% survival, good vigor, 24-36" height. All peachleaf willows are performing well under severe reed canarygrass competition. Redosier dogwood 9023733 10% survival, very poor vigor, 3" of new growth; redosier dogwood 9023739 failed; redosier dogwood 9023740 100% survival, poor vigor, 6" of new growth; Blanchard blue elderberry failed. Elderberry stock was not in containers and plants were very difficult to handle. Recommend not sending elderberry plants without containers in the future. FY06 peachleaf willow 9067375 50% survival, fair vigor, 18-24" height; peachleaf willow 9067376 77% survival, fair vigor, 24-36" height; peachleaf willow 9067541 57% survival, fair vigor, 18-24" height; peachleaf willow 9067546 67% survival, fair vigor, 18-24" height; peachleaf willow 9067549 67% survival, fair vigor, 24-36" height; peachleaf willow 9067560 78% survival, fair vigor, 36-48" height. All peachleaf willows are performing well under severe reed canarygrass competition and high water this spring. Redosier dogwood 9023733 failed; redosier dogwood 9023739 failed; redosier dogwood 9023740 failed; Blanchard blue elderberry failed. FY08 all dogwood accessions and the elderberry failed. All Peachleaf willow accessions had some survival with accession 9067375 36% survival, 9067376 28% survival, 90673741 4% survival, 9067346 72% survival, 9067349 60% survival and 9067560 24% survival. Accessions range from 24 to 36 inches in height. Quackgrass and Reed canarygrass competition is severe so any Peachleaf survival is impressive. FY10 Peachleaf willow survival: 9067375 – 8 percent, 9067376 – 8 percent, 9067541 – 4 percent, 9067546 – 4 percent, 9067549 – 36 percent and 9067560 – 36 percent; dogwood and elderberry failed. Weed competition from quackgrass and Reed canarygrass is very severe. FY11 no evaluation. FY12 no evaluation. FY 13 evaluation 8/29/13. 9067549 72 % survival, 907560 36 % survival, 907375 32 % survival, 9075456 4 % survival and 907376 0 % survival. Plant height for all surviving accessions is 120 inches and crown width 2 feet. Moderate plant injury to all accessions from disease and wildlife browsing. Moderate weed infestation from Canada thistle and reed canarygrass. Elderberry and redosier dogwood plantings failed. Recommend final evaluation in FY 15.

**UT07004C Zan Harris Logan Field Office.** 9067549 and 9067560 Peachleaf willow accessions and coyote willow cuttings were shipped April 4, 2007. FY08 30 percent survival of 9067549 and 9067560 and 20% survival of coyote willow. Site is heavily infested with Reed canarygrass. FY10 Peachleaf willow survival: 9067549 - 28 percent and 9067560 - 32 percent; Coyote willow survival - 66 percent. This planting is performing very well. FY11 no evaluation. FY12 no evaluation. FY 13 evaluation 9/27/13. 9067549 peachleaf 20 percent survival; 9067560 peachleaf 30 percent survival; Coyote (local cuttings) 80 percent survival. Plant height and crown width for all accessions is 72 inches and 3-4 feet respectively. Plant uniformity is fair, plant injury is light, weed infestation moderate and wildlife use is low. Recommend next evaluation in FY 15.

**UT09003 Lyle Holmgram Tremonton Field Office adaptation trial.** 10 plants of 9008027 silver buffaloberry were ordered February 2009 for delivery in late March. FY10 Silver buffaloberry – 30 percent survival and about 8 inches tall. Site characteristics: MLRA 28A, riparian planting, silt loam soil, 3- 35 percent slopes, south aspect, 4312 feet elevation, 14 inch rainfall zone, non-irrigated, T11N R3W NW Qtr Section 2. FY11 no evaluation. FY12 no evaluation. FY 13 Evaluation 11/7/13. There are no visible plantings on site. West facing steep slope adjacent to salt creek with highly saline soils and currently occupied by Canada thistle, teasil, Russian olive. Planting cancelled.

**UT10001 Basque Cross Ranch Tremonton Field Office field planting.** Vavilov II Siberian wheatgrass seed was ordered September 3, 2009 for shipment on October 13, 2009. Site Characteristics: MLRA 28A; 5 acres; gravelly loam soil; 6- 10 percent slope; south aspect; 5600 feet elevation; 10- 12 inch precipitation; non-irrigated; T13N R12W SE1/4 Section 30. FY10 initial establishment – Vavilov II Siberian wheatgrass good stand with 4 plants per foot squared and excellent vigor; Bozoisky II Russian wildrye plants not apparent; Oahe intermediate wheatgrass good stand with 4 plants per foot squared and excellent vigor; Ranger alfalfa fair stand with 0.2 plants per foot squared and excellent vigor. Overall planting is establishing very well. FY11 no evaluation. FY12 no evaluation. FY 13 evaluation 11/7/13.

Oahe has best stand at about 80 percent, Vavilov II and Ranger alfalfa at 50 percent and Bozoiksy 11 5 percent. Light plant injury from rodents and moderate weed infestation from kochia and lambsquarter. The pasture is grazed in the spring. Overall the planting looks healthy and growing well, especially the intermediate wheatgrass. Recommend next evaluation in FY15.

**UT11004 Lyle Holmgren Tremonton Field Office field planting.** Washoe basin wildrye, Trailhead basin wildrye, Magnar basin wildrye, Newhy RS wheatgrass, Recovery western wheatgrass and Silver buffaloberry seed was ordered January 14, 2011 for delivery in early February. Silver buffaloberry plants (20) were ordered for delivery in late February. Site characteristics: MLRA 28A, riparian planting, silt loam soil, 3- 35 percent slopes, south aspect, 4312 feet elevation, 14 inch rainfall zone, non-irrigated, T11N R3W NW Qtr Section 2. FY12 no evaluation. FY 13 Evaluation 11/7/13. There are no visible plantings on site. West facing steep slope adjacent to salt creek with highly saline soils and currently occupied by Canada thistle, teasil, Russian olive. Planting cancelled.

**UT12001 Val Simmons Provo Field Office saline demonstration plots.** Recovery western wheatgrass, Bozoisky Russian wildrye, Newhy hybrid wheatgrass, Mankota Russian wildrye, Rosana western wheatgrass, Shoshone manystem wildrye, Garrison creeping foxtail seed was ordered June 2, 2011. Site characteristics: MLRA D28, strongly alkali silty clay soil, 1-2 percent slopes, south aspect, 4540 feet elevation, 14-16 inch rainfall, non-irrigated. FY 13 evaluation 9/24/13. Extreme heavy grazing pressure due to broken fence and little to no grass to evaluate. Landowner will repair fence and planting will be evaluated again in FY 14.

**UT12002 Earl Christiansen Provo Field Office demonstration planting.** Nezpar Indian ricegrass, Bannock thickspike wheatgrass, First Strike slender wheatgrass and Snake River Plain fourwing saltbush seed was ordered June 2, 2011. Site characteristics: MLRA D28, fine sandy loam soil, 2- 4 percent slopes, north aspect, 4550 feet elevation, 12- 14 inch rainfall, non-irrigated. FY12 no evaluation. FY 13 combined with UT12003 (see information below).

**UT12003 Earl Christensen Provo Field Office demonstration Planting.** Vavilov II Siberian wheatgrass, Bozoisky-Select Russian wildrye and First Strike slender wheatgrass seed ordered June 2, 2011. Site characteristics: MLRA D28, fine sandy loam soil, 2- 4 percent slopes, north aspect, 4550 feet elevation, 12- 14 inch rainfall, non-irrigated. FY12 no evaluation. FY 13 Evaluation 9/24/13 (combined with planting 12002). Vavilov II 60 % stand, Nezpar Indian ricegrass 1 plant. No other accessions observed. Site is heavily infested with Russian thistle and also looked to have been heavily grazed late spring and early summer. Some regrowth on grasses but most were 4-6 inches tall. Will work with landowner to manage grazing and evaluate again next spring/early summer.

**UT12013 Les Adams Field Planting.** Pasture mix trial. Rush, Recovery, Regar, Delar, and Appar requested and shipped October 2012. FY 13 Planting was evaluated July 10. Good seedbed conditions and spring moisture was favorable however, bulbous bluegrass competition was severe and springtime soil moisture dried earlier than normal. Delar and Recovery had best stand with 1 plant per square foot and 10 percent survival. Some seed production on Delar and Recovery. Soil tests indicated sufficient nutrients. Will evaluate again next year.

## UTAH AREA 2 PLANT MATERIALS PLANTINGS

**UT99001 Graymont Western (Lime plant) – Fillmore FO.** Vavilov Siberian wheatgrass critical area planting. 20 pounds of Vavilov seed was ordered November 19, 1998. The Vavilov will be planted in a mix, which will include Nordan crested wheatgrass, Sodar streambank wheatgrass, Critana thickspike wheatgrass, Nezpar Indian ricegrass, and forbs and shrubs. Site characteristics are a crushed gravelly – silty material lain over rock – cobble material; this material hardens to a near cemented pavement when packed and as moisture occurs; rainfall is about 8-10 inches; site is very windy. Site modifications recommended included 10 ton per acre composted straw, fertilizer based on soil tests, ripping prior to seeding resulting in a rough - rocky soil surface with about 50% of surface being exposed rock to provide micro-sites where seedlings would be protected from constant winds were recommended. FY99 no evaluation. FY00 Three site preparation treatments were installed in the fall/spring of 1998/1999 including 1. Planting directly into shallowly scarified site where soil surface was shattered and smooth; 2. Planting into moderately ripped site where soil surface was rough with approximately 25 percent of surface exposed angular rock; and 3. Planting into severely ripped site where soil surface was very rough with approximately 50 percent of surface exposed large angular rock. Company Manager indicated the past two years were dry winters with below normal rainfall season long. The mid growing season evaluation, on June 6, 2000, indicated Sodar streambank wheatgrass, Bannock or Critana thickspike wheatgrass, Vavilov Siberian wheatgrass, Nezpar Indian ricegrass, penstemon species, scarlet globemallow, winterfat, fourwing

saltbush, and Wyoming big sagebrush were all planted and present to some degree on each treatment. Treatment 1 had a 5-10 percent stand present, plants were very small (stunted), and not reproducing (no seedheads present). Treatment 2 had a 30-40 percent stand present, plants were average sized, and a few were reproducing. Treatment 3 had a 70-90 percent stand, plants were tall for site (high vigor), and a high percentage of plants were reproducing. FY01 Graymont has produced a publication "Assessment of Revegetated Test Benches and Reference Transects at Cricket Mountain Plant" that describes the success of this trial. **FY06** May 16<sup>th</sup> – planting is excellent with approximately 75% Vavilov Siberian wheatgrass, 20% Nordan crested wheatgrass-Sodar streambank wheatgrass-Critana thickspike wheatgrass, 1% Nezpar Indian ricegrass, and 4% Richfield firecracker penstemon-Immigrant forage kochia-sweetclover-fourwing saltbush. The most severely disturbed site has an excellent stand and the moderately disturbed site has a good to excellent stand. The control with no ripping has a poor to failed stand. There are also plantings completed in years following the test plantings. The sites are typically moderately disturbed with good to excellent stands and species mixtures include additional species including Bozoiisky Russian wildrye, rabbitbrush, Immigrant forage kochia and penstemon. On one west slope the seeding mixture included fourwing saltbush, shadscale in mixture with grasses and forbs. Due to droughty conditions, this planting only established shadscale approximately 60% of community and fourwing saltbush 10% of community. From these observations, the strongest species appear to be Vavilov Siberian wheatgrass, Bozoiisky Russian wildrye, Richfield firecracker penstemon, Immigrant forage kochia, shadscale and fourwing saltbush. FY12 no evaluation. FY 13 planting cancelled.

**UT03001 Merlin Webb – Cedar City FO.** Seed shipped February 2003. Rimrock Indian ricegrass, Critana thickspike wheatgrass, Trailhead basin wildrye, Volga mammoth wildrye, Nezpar Indian ricegrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Vavilov Siberian wheatgrass, P-27 Siberian wheatgrass, Snake River Plains fourwing saltbush broadcast seeded into good seedbed on February 22, 2003 - rained soon after planting. FY03 no evaluation. FY04 stand/survival – Planting # 1 P27 fair/100%, Bannock fair/100%, Nezpar fair/100%, Mesa alfalfa fair/100% and Volga failed. Planting # 2 Vavilov fair/100%, Nezpar fair/100%, Bannock fair/100%, Magnar poor/25%, Volga failed, and Snake River Plains failed. FY05 Planting # 1 P27 fair stand with ½ plant/ft<sup>2</sup> – Bannock fair stand with ¼ plant/ft<sup>2</sup> – Nezpar poor stand with 1/10 plant/ft<sup>2</sup> – alfalfa poor stand with 1/10 plant/ft<sup>2</sup> – Volga failed. Mix has about 1 plant/ft<sup>2</sup>. Planting # 2 Vavilov good stand with 4 plants/ft<sup>2</sup> - Nezpar poor stand with 1/10 plant/ft<sup>2</sup> – Bannock fair stand with ½ plant/ft<sup>2</sup> – Magnar and Volga failed – Snake River Plains fourwing saltbush fair stand with ¼ plant/ft<sup>2</sup>. Mix has 4.9 plants/ft<sup>2</sup>. Vavilov had the best survival of all plants in this trial and thus was able to respond to better moisture conditions that occurred this year. FY08 Plot 1 - Volga fair stand, Nezpar poor stand, P27, Bannock and alfalfa failed. Plot2 - SRP fourwing saltbush good stand, Magnar and Volga fair stand, Bannock and Vavilov poor stand and Nezpar very poor stand. FY10 Planting # 1 P27 failed – Bannock failed – Nezpar poor stand – alfalfa failed – Volga poor stand. Sand dropseed dominates the site with globemallow very common. Planting # 2 Vavilov good stand with 0.5 plants/ft<sup>2</sup> - Nezpar very poor stand – Bannock very poor stand – Magnar fair stand - Volga fair stand – Snake River Plains fourwing saltbush fair stand. Vavilov dominates the site following excellent spring and summer rain in 2010. **Next evaluation planned for 2014.**

**UT07002 Niels Hansen seed increase planting. Northern Cold Desert winterfat** seed shipped February 8, 2007. Seed will be planted the spring of 2007. FY07 In the spring of 2007 6.5 acres of Northern Cold Desert Germplasm Winterfat was planted. The seeding rate was approximately 2 lbs per acre in rows five feet apart using a ten foot double disk grain drill with all but three of the drops taped shut. Row spacing was 5 feet. Soil had been prepared in the fall of 2006 with no tillage in the spring and soils were firm. On 3/20/07 seed was placed in a groove 1/4 to 1/2 inch deep, but there was no packing wheel. The actual seeding rate was less due to adding too many rice hulls with the seed and occasional plugging. There were very harsh spring conditions for germination because there was no rain. It rained the second week in June and some winterfat germinated, but there was no rain again for four weeks. About 30 plants survived. They grew a foot tall by fall of 2007 and had heavy seed production. FY08 in fall of 2007 part of the winterfat field was replanted using left-over seed. The DWR cone seeder with 1/4 inch depth bands was used for this planting. In spring of 2008 the field was tilled for several reasons: no new seedlings were observed; the stand was too thin for production; and a significant encroachment of squarrose knapweed was observed. Landowner is holding back a half acre of this land where there were about 30 winterfat plants that grew where he spilled some seed cleaning the drill. These plants were hand-transplanted to a five foot spacing and will be sprinkle irrigated because he believes winterfat responds well to midsummer moisture. In fall of 2008 or spring of 2009 additional winterfat seed will be planted into weed barrier material. The other 6 acres have been spot sprayed with Milestone, sprayed with glyphosate first week of June, tilled twice in June, and sprayed with glyphosate and 2,4-D July 12. Some weed seed will persist next year, but weeds that have sprouted are gone. FY09 - FY13 no evaluations.

**UT07005 Niels Hansen seed increase planting Bozoisky II Russian wildrye.** In the spring of 2007 cooperators planted 6 acres of Bozoisky II Russian wildrye after fall tillage and spring application of glyphosate. A ten foot grain drill with all but four drops taped closed was used for planting. There were no packer wheels and site was sprinkled. Row spacing was 35 inches. This was sprinkle irrigated every two weeks, with some being irrigated every four weeks. This was not adequate irrigation scheduling for sprouting seed, but was mandated by the irrigation company since it was a short water year. Weeds (prostrate knotweed) were sprayed once with 2,4-D in June and again with Weedmaster in July. The spring planted Russian wildrye established well, though with the cool soil temperatures at 6000 feet it didn't sprout significantly until the last of May. It was planted in March. Four ton/acre of turkey manure was applied to field in August 2007 and then 67 lbs/acre Urea was applied in May of 2008 after a soil test showed low N levels. Site was irrigated with subsurface drip on four of the 6 acres. FY09-13 no evaluations.

**UT07006 Niels Hansen seed increase planting Gooseberry Leaf Globemallow.** In April 2007 1/2 acre of Gooseberry Leaf Globemallow was planted in 30 rows using the DWR cone seeder at 1/4 inch depth. It was planted after 1 quart per acre application of glyphosate. No emergence occurred until late May. Due to early planting, weed pressure was too high; kochia and Russian thistle dominated the stand. A weed wick was used for weed control in June, mowed between rows and cooperators also did a lot of hand weeding. A significant number of plants survived. In the spring of 2008 landscape fabric was laid and plants were pulled through to control weeds and facilitate seed collection. FY09-13 no evaluations.

**UT08009 Stuart Johnson – Richfield FO field planting.** Rush intermediate wheatgrass and Regar meadow brome seed ordered May 27, 2008. Planting scheduled for July- August. Location is a mountain sage site, loamy soil, 2-3 percent slopes, north aspect, 7000+ feet elevation, 16 inch rainfall, T22S R3W NE ¼ Section 33. FY08 The seed was delivered to Stuart on June 30<sup>th</sup>. He plans to plant the seed by the end of July. 2009 will be the first growing season for evaluations. FY09 no evaluation. FY10 two sites were seeded; Site 1: embankment around an irrigation pond; Rush intermediate wheatgrass has a fair stand; Regar meadow brome failed; site is heavily grazed to a 2 inch stubble height. Site2: stream diversion area; evidence of Rush intermediate wheatgrass establishment; Regar meadow brome failed; due to equipment traffic to repair stream down cuttings only remnant stand still exists. FY11-13 no evaluations.

**UT09001 Niels Hansen seed increase planting Vavilov II Siberian wheatgrass.** Cooperator intends to plant Vavilov II Siberian wheatgrass in a dormant fall planting in 2008 or spring of 2009 after treatment of glyphosate for weed control of knapweed. FY09-13 no evaluations.

**UT10002 Niels Hansen seed increase planting Vavilov II Siberian wheatgrass.** 50 PLS of Foundation seed shipped 11/12/09. FY10-13 no evaluations.

### UTAH AREA 3 PLANT MATERIALS PLANTINGS

**UT86018 Smith – Roosevelt FO** Hycrest crested wheatgrass, Ephraim crested wheatgrass, Appar blue flax, Arriba western wheatgrass, T28606 needle and thread, Magnar basin wildrye, and Nordan crested wheatgrass field planting. FY90 Hycrest, Ephraim, Appar, Magnar, Nordan all 80-100 % survival. Arriba and T28606 are less than 40% survival. FY91 and FY92 no evaluations. FY93 Hycrest, Ephraim, Appar, Nordan, and T28606 doing best. Magnar and Arriba poor stands. Sagebrush invading site, heavy use by elk, and Appar has many new seedlings. FY94 Hycrest, Appar, Arriba, and Nordan all have good stands. Ephraim, T28606 and Magnar have fair stands. All species are adapted to site and wildlife use is heavy. FY95 no change except vigor has improved due to excellent moisture year. FY96 Hycrest, Ephraim, Appar, T28606 and Nordan have good vigor. Fair vigor for Arriba and Magnar. FY97 Hycrest, Ephraim, Appar, Arriba and Nordan good stands. T28606 and Magnar fair stands. Many sagebrush seedlings within plots, particularly heavy in Arriba western wheatgrass and T28606 needle and thread. FY98 Hycrest, Ephraim, Appar, Arriba, Magnar, and Nordan all have excellent vigor. T28606 has good vigor. FY99 very heavy wildlife use in winter and spring. Poor regrowth due to dry spring/ summer and fair regrowth following late summer rains. Planting is being invaded by sagebrush. FY00 Heavy spring use by wildlife and a very dry spring and summer. Rains began in early September and plants began to green-up. Evaluation indicated good vigor for Ephraim, Appar, Arriba, T28606, Nordan and fair vigor for Hycrest and Magnar. FY01 fair to poor vigor for all species following two years of drought and heavy wildlife use. Sagebrush invasion is effective plant growth and vigor. FY03 good stands of Hycrest, Ephraim, Arriba and Nordan. Fair stands of T28606 needle and thread and Magnar. Appar failed. Area is experiencing heavy wildlife

use. FY04 Stands are experiencing heavy wildlife use – no livestock use for the last two years. Good vigor and stands of Hycrest, Ephraim and Nordan. Fair vigor and stands of Arriba, T28606 and Magnar. Poor stand and vigor of Appar – most plants are along the edge of planting. FY05 Stands are experiencing heavy wildlife use – no livestock use for the last three years. Good to excellent vigor and stands of Hycrest, Ephraim, Nordan, Arriba and T28606. Fair vigor and stand of Magnar. Appar failed. FY10 Hycrest, Ephraim, Arriba and Nordan continue to have good stands. T28606 and Magnar have fair stands. **Next evaluation 2014.**

**UT93005 Smith – Roosevelt FO** Trailhead basin wildrye, Magnar basin wildrye field planting for erosion control. FY94 planted October 1993 and initial evaluation indicated Magnar with best seedling establishment and Trailhead doing best in run in areas. FY95 both Trailhead and Magnar rated good stands. Magnar is best adapted. FY96 good stands for both, good vigor for both, good drought tolerance for both, all seedheads of both species eaten by wildlife. FY97 excellent stands and plant vigor for both cultivars. Plant height about 50 inches for Magnar and 38 inches for Trailhead. Magnar has excellent seed production and Trailhead has fair seed production. FY98 excellent vigor and long seedheads for both cultivars. Magnar is a more robust and taller plant than Trailhead. FY99 no evaluation. Excellent stands of each with good vigor and approximately 50 inch height. Basal areas are getting larger, but no seed production this year due to spring/summer drought. FY00 due to very dry spring and summer with rains coming in early September resulting in green-up, both Trailhead and Magnar had fair vigor and only 36-40 inches of growth. FY01 both Magnar and Trailhead have poor vigor after very dry spring and summer (7.7 inches of precipitation this year). Each plant only has 2-3 reproductive stems, which probably did not produce seed this year. FY03 – Fair vigor for both Magnar (45 inch height – 0.5 AUM/ac) and Trailhead (38 inch height – 0.3 AUM/ac). Elk are using the fall green-up. FY04 due to lack of summer thunder storms there is only a fair stand with fair vigor for both Magnar and Trailhead. FY05 Magnar fair stand with good vigor, 50 inch height, 0.6 AUMs/ac – Trailhead fair stand with good vigor, 40 inch height and 0.4 AUMs/ac. FY10 fair stand with good vigor for both Magnar (42 inch height) and Trailhead (38 inch height). FY12 evaluated November 21, 2012 good stands of Magnar and Trailhead with 3 plants/ft producing approximately 500 and 450 lb/ac respectively. Plants are small ranging 10-12 inches from drought and moderate grazing. **Next evaluation 2014.**

**UT98005 Prevedel – Roosevelt FO** Rush intermediate wheatgrass sprinkler irrigated field planting. Materials ordered 3/30/98. FY98 planted August 16, 1998 into excellent seedbed. FY99 excellent stand with excellent vigor and 20 plants per square foot. In early August plants went from very palatable to coarse. Fall rains softened it up making it more palatable to elk now utilizing field. FY00 stand produced approximately 3000 pound/acre under sprinkler irrigation. Elk graze stand until it gets rank, but will graze regrowth. Cooperator states Rush is an excellent grass for intensive grazing systems. FY01 excellent stand and vigor with 7 AUMs per acre. Cooperator is very satisfied with Rush intermediate wheatgrass performance. FY03 Rush is doing very well in the excessive heat of this summer and is becoming more dominant in the pasture mix of Rush, Regar meadow brome and Paiute orchardgrass. Still producing about 7 AUM/ac. FY04 good stand and vigor – Rush is out performing Regar meadow brome pastures. Both Rush and Regar stands are being invaded by quackgrass. FY05 good to excellent stand with excellent vigor and producing 13 AUMs/ac irrigated. FY06 good to excellent stand with excellent vigor and producing 13 AUMs/ac irrigated. Early warm up and severe summer heat limited production. FY07 Prevedel trial looked good. Brett tried to plant alfalfa with the Rush but it has not done well. Furthermore with the alfalfa in it does not allow him to spray out weeds (knapweed) in the spring without affecting the alfalfa. He has decided he will end up spraying out the weeds and alfalfa and going back to a grass only pasture. He indicated that to increase the vigor of the pastures he needs/plans to fertilize. FY10 good stand with 4 plants per foot square, excellent vigor and approximately 4.5 AUMs/ac. Stand might benefit from fertilization. FY12 Evaluated November 27, 2012 good stand with 3 plants/ft producing approximately 3,000 lbs/ac. **Next evaluation 2014.**

**UT07001 James Wheeler – Monticello FO** field planting. Seed of P-7 bluebunch wheatgrass, Anatone bluebunch wheatgrass, Regar meadow brome, Cache meadow brome, Rush intermediate wheatgrass, Topar pubescent wheatgrass, Paiute orchardgrass, Bozoiisky Russian wildrye, Vavilov Siberian wheatgrass and Sherman big bluegrass were ordered on August 28, 2006. A dormant fall planting is scheduled for late October to early November. Site characteristics include MLRA 36, silty clay loam soil, 0-2 percent slopes, NE aspect, 14-16 inch precipitation, T32S R26E NE ¼ Section 31. FY06 seed was drill planted into prepared seedbed on November 17, 2006. Soil moisture and fall rain was good prior to and after planting. It turned cold and snowy soon after planting. FY07 this area is suffering from the current drought conditions. Kyle explained that they did have some grass coming up from the planting in the spring but not much since. We walked around and looked and in fact did find some dormant grass plants that had become established. Dan indicated that it looks as if they got established enough for them to come up this next spring. We did

see quite a few weeds in the planting but that is to be expected in the early stages of a new planting. Kyle and his Dad are optimistic and look forward to this coming spring to see how the grasses come back. FY10 Rush intermediate wheatgrass excellent stand with excellent vigor; Vavilov Siberian wheatgrass good stand with excellent vigor; P27 Siberian wheatgrass fair stand with excellent vigor. Anatone bluebunch wheatgrass, Regar meadow brome, Cache meadow brome, Topar intermediate wheatgrass, Paiute orchardgrass poor to very poor stands. FY11 no evaluations. FY12 seeding was viewed to be well established but was visited too late for evaluation. FY13 no evaluation.

**UT08004 Kyle Wheeler Monticello FO irrigated forages field planting.** Rush intermediate wheatgrass, Tegmar intermediate wheatgrass, Regar meadow brome, Cache meadow brome and Paiute orchardgrass seed ordered Jan. 14, 2008. Site Characteristics: silty clay loam soil, 0-3% slope, 7000 feet elevation, 10-12" rainfall zone and irrigated. FY10 good to excellent stand of all species planted. FY11 no evaluation. FY12 seeding was viewed to be well established but was visited too late for evaluation. FY13 no evaluation.

**UT11001 Monument Valley High School (Monticello) demonstration planting.** Nezpar Indian ricegrass, Paloma Indian ricegrass, Rimrock Indian ricegrass, Cochise spike dropseed, Vavilov II Siberian wheatgrass, P27 Siberian wheatgrass and Volga mammoth wildrye seed ordered March 30, 2010. Planting planned for fall 2010. Purpose – field/demonstration planting – FFA project. Site characteristics – MLRA 35, 5 acres, Monue-Sheppard complex fine sandy loam, 1-3 percent slope, 5180 feet elevation, 7- 8 inch rainfall, T43S R16E SW1/4 Section 32. FY10 planted fall 2010. FY11 no evaluation. FY12 no seed established; site had 15 days of 40-60 mph winds which completely rearranged dunes. FY 13 cancelled.

**UT11002 Grand County demonstration plantings.** Paloma Indian ricegrass, Nezpar Indian ricegrass, Viva galleta, Arriba western wheatgrass, Recovery western wheatgrass, Secar Snake River wheatgrass, Discovery Snake River wheatgrass and Jemez NM olive seed plants ordered July 12, 2010. Seed for 6 demonstration plot locations in Grand County. Plantings intended to determine replacement species for tamarisk removal projects. FY12, 2 small grass plants (3 leaf stage) believed to be Arriba found in the plots. All other species had 0% establishment. FY 13 no evaluation.

**UT11003 Chris Carter Castle Dale FO field planting.** P27 Siberian wheatgrass, Vavilov II Siberian wheatgrass, Nezpar Indian ricegrass, Northern Cold Desert winterfat and Immigrant forage kochia seed was ordered September 22, 2010. Seeding is planned for late fall (dormant) 2010. Site characteristics – MLRA 34, Killpack/Sagar loam soil, 0-3 percent slopes, 5700 feet elevation, 7- 9 inch precipitation zone, non-irrigated, T17S R9E SE ¼ Section 24. FY12, nothing germinated, will reevaluate summer 2013. FY 13 no evaluation.

**UT11005 Lee Thayne Price FO demonstration plantings.** Toe Jam Creek squirreltail, Discovery Snake River wheatgrass, Secar Snake River wheatgrass, Arriba western wheatgrass, Recovery western wheatgrass, Nezpar Indian ricegrass, Rimrock Indian ricegrass, Viva galleta, Vavilov II Siberian wheatgrass, Bannock thickspike wheatgrass, Sodar streambank wheatgrass and Northern Cold Desert winterfat seed was ordered March 24, 2011. Plots will be established at two locations (upland and bottomland -with expected additional moisture with early spring runoff). FY12, nothing germinated, will reevaluate 2013. FY13 no evaluation.

**UT12008 Price City River Walk.** Seed of multiple species was ordered June 7, 2011. Plants will be greenhouse propagated fall- winter 2011- 2012 and planted in spring 2012. FY12, All the species were germinated and grown in containers in a greenhouse. Very high success with germination except for the Bridger Select Rocky Mountain Juniper. They had to be taken to a nursery in Salem where they were put in an incubator. Some success was seen after that. After the plants had grown sufficiently, they were transplanted into larger pots to continue growing and getting root ball mass high before transplanting outside. Many, but not all of the plants were planted outside next to the Price River Walkway. In order to help the plants survive, they were given supplemental water. We intend on doing this for the first couple of years then seeing if they will remain established on their own. All plants were doing well throughout the year. To date there have probably been around 300 containerized plants planted along the walkway. In all, we had approximately 1,600 containerized plants in the greenhouse. FY 13 no evaluation.