USDA NRCS
Natural Resources Conservation Service

Aberdeen Plant Materials Center

2004 Annual Technical Report

United States
Department of
Agriculture

Natural Resources
Conservation Service

Aberdeen, Idaho

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NOTICE TO RELEASE
ANATONE GERMPLASM BLUEBUNCH WHEATGRASS
(SELECTED CLASS NATURAL POPULATION)

The United States Department of Agriculture, Forest Service, Rocky Mountain Research Station; United States Department of the Interior, Bureau of Land Management, Idaho State Office; Utah Department of Natural Resources, Division of Wildlife Resources; Utah State University Agricultural Experiment Station; United States Department of Agriculture, Natural Resources Conservation Service; University of Idaho, Agricultural Experiment Station propose the release of Anatone Germplasm bluebunch wheatgrass (*Psuedoroegneria spicata* [Pursh] A. Löve ssp. *spicata)* for restoration of disturbed sites within the natural range of this species.

Anatone is a natural, non-manipulated bluebunch wheatgrass population accession originating from Asotin County in Southeastern Washington. It is a long-lived perennial bunchgrass better adapted to low elevation, semi-arid sites with long, hot growing seasons than other bluebunch wheatgrass accessions or available releases. Its seedling vigor and establishment also exceed those of other accessions and released cultivars. Anatone's ready germination, rapid development, ability to compete with exotic annuals, and drought tolerance make it an excellent choice for restoration of cheatgrass (*Bromus tectorum* L.) infested landscapes. It can also be used to convert stands of introduced perennial grasses to native plant communities in areas where it once existed. Anatone is

widely adapted throughout the natural range of this species, and can be used to restore extensive disturbances once occupied by shrubs and bunchgrass. Bluebunch wheatgrass is one of the most common native grasses of the Intermountain West. There is a need for a release that can be used in the drier portions of the species range to improve species diversity, resilience, and habitat values.

Scientific Name: *Pseudoroegneria spicata* (Pursh) A. Löve ssp. *spicata*. Synonyms include *Festuca spicata* Pursh, *Agropyron spicatum* (Pursh) Scribner & Smith, *Elymus spicatus* Gould, and *Elytrigia spicata* (Pursh) D. Dewey.

Common Name: Bluebunch wheatgrass, 'Anatone' wheatgrass.

Germplasm Identification: The germplasm will be referred to as 'AnatoneGermplasm' bluebunch wheatgrass to identify and document the original collection site.

Identification Number: Anatone has been identified by the Forest Service as AGSP B53-88.

Origin: Extensive collections of bluebunch wheatgrass were obtained by scientists of the Natural Resources Conservation Service (formerly the Soil Conservation Service) between 1934 and 1938 from the Palouse Prairie, Snake River Canyon, and adjacent areas in Idaho, eastern Oregon, and eastern Washington. Collections from this region performed exceptionally well when planted throughout the Intermountain West. Results of this earlier work prompted further evaluations of materials from the area for big game habitat improvement in central and southern Idaho beginning in 1968. Additional collections from this area were acquired for comparative trials at low elevation, semiarid areas of the Intermountain region as a cooperative study with Idaho BLM and USDA, Forest Service, Rocky Mountain Research Station. Stanley Kitchen collected Anatone bluebunch wheatgrass in 1988 about 4.8 km (3.0 miles) east of Anatone, Asotin County, Washington (N 46^{o} 9.57' W 117^{o} 4.72'). Numerous other collections were made in close proximity from southeastern Washington, northeastern Oregon, and western Idaho area. Subsequent collections have been made from this region since 1988.

The Anatone Germplasm collection site is approximately 0.8 km (0.5 mile) south of Highway 129 near Mill Creek Road at the edge of Mill Creek Canyon. Plants occur on a series of closely related soils. Soils on the flats and ridge tops are identified by USDA-NRCS as the Neconda soil series. The Gwinly-Mallory #36 soil series dominates slopes of 3 to 30%, and the Gwinly-Mallory #37 soil series complex occupies slopes of 30 to 70%. These soils are shallow to moderately deep, well drained, and derived from weathered basalt. Surface layers are typically dark or grayish brown very stony silt loam to cobbly clay loam. Underlying soils vary in depth from 25 to 50 cm (10 to 20 inches), and depth to underlain basalt may vary from 25 to 100 cm (10 to 40 inches). Sub soils are dark grayish brown very cobbly silty clay loam. Rocky and extremely stony loam soils are common. Soils are well drained, but permeability may be slow and available water capacity is low to moderate. Soils are calcareous below a depth of about 85 cm (34

inches). Elevation at the collection site is 975 m (3,200 ft), but the Neconda soil type ranges from 975 to 1097 m (3,200 to 3,600 ft).

Other species associated with bluebunch wheatgrass at the Anatone collection site include Idaho fescue (*Festuca idahoensis* Elmer), Sandberg bluegrass (*Poa secunda* J. Presl), arrowleaf balsamroot, (*Balsamorhiza sagittata* [Pursh] Nutt.), mountain big sagebrush (*Artemisia tridentata Nutt. ssp. vaseyana* [Rydb.] Beetle), stiff sagebrush (*Artemisia rigida [Nutt.] Gray)*, current (*Ribies spp*), serviceberry (*Amelanchier alnifolia* Nutt.), and Wyeth eriogonum (*Eriogonum umbellatum* Torr.).

Average annual precipitation at the collection site during the period 1951 through 1978 was 508 mm (20 inches), but in 2 of every 10 years, total annual precipitation may be as low as 440 mm or as high as 600 mm (17.5 to 23.87 inches). Precipitation is well distributed throughout the year with nearly all months receiving more than 25 mm (1.0 inch) moisture. November through January monthly precipitation averages more than 50 mm (2 inches) while February through June average slightly less. Average daily maximum temperature for the entire year is 13 ^{o}C. Maximum daily temperatures may equal or exceed 27 ^{o}C for nearly 7 months (April through October). Average daily minimal temperatures remain high throughout the year with averages minimal monthly temperatures below freezing only in December and January. The frost-free period ranges from 110 to 135 days. Based on these conditions, the region would be classified as having a long growing season with high temperatures, particularly during the summer months (NOAA 1997, USDA-NRCS, Lewiston, ID, data on file).

The collection site is classified as Major Land Resource Area B9, Palouse and Nez Perce Prairie, by the USDA-NRCS (Anonymous 1981), Intermountain Semi desert Province 342 by Bailey (1995), and EPA Level III Ecoregion 10, Columbia Plateau (U.S. Environmental Protection Agency 2000).

Description: Anatone Germplasm bluebunch wheatgrass is similar in general appearance to 'Goldar' bluebunch wheatgrass, 'Whitmar' beardless wheatgrass (*Pseudoroegneria spicata* [Pursh] A. Löve ssp. *inermis* [Scribner & J.G. Smith] A. Löve), and 'Secar' Snake River wheatgrass (*Elymus wawawaiensis* J. Carlson and Barkworth). The selection is a densely tufted perennial bunchgrass with abundant, long, narrow, light green leaves that are 45 to 50 cm (18 to 20 inches) long. Plants occur as distinct large bunches with numerous leaves creating a characteristic tufted growth habitat. Anatone is a diploid (2n=14) and cross-pollinating. Leaves are mostly basal, erect to lax. Some upper cauline leaves are flat, but mostly involute throughout their length and less than 2mm wide. Blades and sheaths are glabrous. Stems are also numerous, erect, and usually less than 1 m tall (40 inches) with very fine, narrow, lax heads. Spikes are slender, mostly 10 to 15 cm long (4 to 6 inches); spikelets are distinct but not as long as the internodes. Seeds are about 10 mm long, rarely longer than 13 mm. Glumes are short, 5 to 10 mm long, unequal in length, with slightly blunt ends narrowing to a short tip. About 70 percent of the lemmas produce a short, divergent awn that is 8 to 9 mm long.

'Whitmar', 'Goldar' and 'Secar' were all collected from southeastern Washington. Whitmar beardless bluegrass, collected from a prairie-grassland receiving 500 mm of annual precipitation, is an awnless form. It was developed by selection from a spaced planting after the ecotype had been tested in outplanting nurseries (Anonymous 1964; Hein 1958; Kelley, C. [n.d.b]). The original collection site of Whitmar is near Colton, Whitman County, Washington, and the cultivar exhibits similar adaptive traits to arid sites (Anonymous 1947; Mann 1954; Wolf and Morrison 1957) as Anatone. Goldar bluebunch wheatgrass, a cultivar with divergent awns that are 1 to 2 cm long, originated from an open park within a ponderosa pine (*Pinus ponderosa* Douglas ex P. & C. Lawson) woodland (Gibbs and Young 1989). It was collected at a higher elevation and moister climate than Anatone. P-7 is a genetically diverse, multiple-origin polycross of 25 bluebunch wheatgrass collections. Twenty-four of these are diploid while one is tetraploid. Most P-7 plants are without awns (Jones et al. 2002; Larson et al. 2000). Secar, once considered a bluebunch wheatgrass, but later recognized as a new allotetraploid species, Snake River wheatgrass, is awned (Carlson and Barkworth 1997; Jones et al. 1991; Kelley [n.d.b]; Morrison 1981). It is distinguished from bluebunch wheatgrass by its more compact spikelets, shorter internodes, lanceolate glumes, and smaller seeds.

Method of Selection: Anatone Germplasm bluebunch wheatgrass was selected from a series of comparative field trials involving approximately 80 collections from eight Western states: Washington, Oregon, Idaho, Nevada, Utah, Wyoming, Colorado, and Montana. Field plantings of 53 collections, including Goldar and Secar Snake River wheatgrass were established at the Orchard Research Site near Boise, Idaho, and at Nephi, Utah, in the spring of 1989 and 1990 (Monsen et al. 1999). Plantings were evaluated to compare and evaluate establishment, growth habit, growth rate, seasonal growth, vigor, plant stature, seed production, and survival. Seeds of 47 natural populations were examined to determine optimum germination at near freezing temperatures (Kitchen and Monsen 1994, 1999). In addition, greenhouse trials were conducted to develop an index of seedling vigor based on germination and emergence in relation to planting depth. Seed production and seed quality studies were conducted at the Spanish Fork Station, Brigham Young University Field Center in conjunction with wildland and nursery collections from the Orchard and Nephi sites. The USDA-ARS Forage and Range Research Laboratory in Logan, Utah conducted direct seedlings at Blue Creek and Green Canyon, Utah involving 48 perennial grass accessions including Goldar, Secar, P-7, and Anatone. Scientists from the USDA, ARS Forage and Range Research Laboratory, Logan, Utah also conducted DRN tests of a wide array of collections throughout the West, including Anatone and many other sources furnished by the USDA, Forest Service, Shrub Laboratory. Seed production fields varying in size from 0.4 to 40 ha have been established in Utah (1997, 1998, and 1999); Colorado (1998); Washington (1999), and Idaho (2002).

Environmental Considerations and Evaluation: This release is a native species that is widely distributed throughout the western United States. The collection site is in close proximity to the collection locations of Goldar bluebunch wheatgrass and Whitmar beardless wheatgrass and the closely related Secar Snake River wheatgrass. Study sites

have been established and maintained under similar ecological conditions in which bluebunch wheatgrass naturally exists. No attempt has been made to segregate or eliminate genetic characteristics inherent to this ecotype. No definitive attributes have been reported that would suggest this selection would interfere with or prevent natural recovery of associated plants existing in native plant communities. Seed production fields established under cultivation have not demonstrated cultural problems. This species is not regarded as having any adverse negative characteristics that would preclude its use (see attached Environmental Evaluation of Plant Materials Releases). It is an important species that is widely used to restore disturbed areas and re-establish native plant communities.

Anticipated Use: Anatone Germplasm bluebunch wheatgrass can be used to restore extensive areas once dominated by big sagebrush/bluebunch wheatgrass communities and foothill regions dominated by bunchgrass communities in western North America. It is particularly useful for seeding semiarid regions supporting only remnant populations of this species. Anatone is better able to establish on dry sites than other bluebunch wheatgrass cultivars, and it competes relatively well with exotic annuals. It can be used in conjunction with other native plants to re-establish native communities in areas presently occupied by exotic annuals or sites where stands of introduced perennial grasses have been established if the site is properly prepared. It is an important species for re-establishing native communities to regain species diversity, increase seasonal forage quality, improve wildlife habitat, and reduce the incidence of extensive and destructive wildfires. It is also a key species in the successional recovery of important shrub and woodland communities.

Area of Adaptation: Anatone Germplasm bluebunch wheatgrass is widely adapted to the Palouse Prairie, Snake River drainage, southern Idaho, northern Nevada, northern Utah and other areas where the species naturally exists. It is recommended for areas receiving at least 250 to 300mm (10 to 12 inches) of annual precipitation, and it is particularly well adapted to sites with long growing seasons. Whitmar and Secar are recommended for areas receiving similar amounts of annual precipitation, although Secar can be used on sites receiving as little as 200 mm (8 inches) (Ogle and others 2003). Anatone does well on sites that receive fall rains prompting regrowth. It also establishes well and persists on exposed slopes where growth may begin early in the season and where extremely high daily temperatures may occur during the summer and fall months. Anatone is adapted to light and medium-textured soils that are normally well drained and may dry early in the growing season, but it will grow and remain green well into the summer if soil moisture is available. It is adapted to a broad range of sites occupied by big sagebrush. Anatone can be planted on sites supporting mountain big sagebrush (*Artemisia tridentata* Nutt. ssp. *vaseyana* [Rydb.] Beetle), basin big sagebrush (*A. tridentata* Nutt. ssp. *tridentata)* or Wyoming big sagebrush (*A. tridentata* Nutt. spp. w*yomingensis* Beetle & Young). It is also well adapted to upper bench lands and mountain slopes with antelope bitterbrush (Purshia tridentata [Pursh] DC.), Idaho fescue (*Festuca idahoensis* Elmer), bitter cherry (Prunus emarginata [Dougl.] Walp.). It can also be seeded on shallow and rocky soils supporting stiff sagebrush (*Artemisia rigida* Nutt) It has survived well when seeded on heavy-textured soils previously occupied by

black greasewood (*Sarcobatus vermiculatus* [Hook.] Torr.), but it would not be recommended as a replacement for species in salt desert shrub communities.

Increase and Distribution: The USDA Natural Resources Conservation Service, Plant Materials Center, Aberdeen, Idaho will maintain Generation 1 seed. This seed can be requested from the Utah Crop Improvement Association and the Idaho Foundation Seed Program. Growers may produce G2, G3, and G4 generations of seed.

Prepared by: This Notice for the Release of Anatone Germplasm bluebunch wheatgrass was prepared by Stephen B. Monsen (retired), Stanley G. Kitchen, Kelly Memmott, Botanists, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Provo, UT, and Nancy Shaw, Botanist, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Boise, ID; Mike Pellant, Coordinator, Great Basin Restoration Initiative, USDI, Bureau of Land Management; Boise, ID; Stanford Young, Secretary/Manager, Utah Crop Improvement Association, Utah State University, Logan, UT; Dan Ogle, Plant Materials Specialist, USDA Natural Resources Conservation Service, Boise, ID; Loren St. John, Team Leader, USDA Natural Resources Conservation Service, Aberdeen Plant Materials Center, Aberdeen, ID; and as a joint release by these agencies and Utah Department of Natural Resources, Division of Wildlife Resources; University of Idaho, Agricultural Experiment Station; and Utah State University, Agricultural Experiment Station.

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SIGNATURES FOR RELEASE OF:

ANATONE GERMPLASM BLUEBUNCH WHEATGRASS (SELECTED CLASS NATURAL POPULATION) *Pseudoroegneria spicata* (Pursh) A. Löve ssp. *spicata* (synonyms include *Festuca spicata* Pursh, *Agropyron spicatum* (Pursh) Scribner & J.G. Smith, *Elymus spicatus* Gould, and *Elytrigia spicata* (Pursh) D. Dewey

USDA-FS	**Director, Rocky Mt. Exp. Stn.**	**Date**
USDI-BLM	**Idaho State Director**	**Date**
State of Utah	**Director, DWR**	**Date**
Utah State Univ.	**Director, Utah Ag. Exp. Stn.**	**Date**
Univ. of Idaho	**Director, Idaho Ag. Exp. Stn.**	**Date**
USDA-NRCS	**Idaho State Conservationist**	**Date**
USDA-NRCS	**Director ESD, Washington, DC**	**Date**

Environmental Evaluation of Plant Materials Releases

Name of person scoring:	**Loren St. John Dan Ogle**	**Date of scoring:**	**3/19/03**
Scientific Name:	**Pseudoroegneria spicata spicata**	**Common Name:**	**Bluebunch Wheatgrass**
Release Name:	**Anatone**		

Is the plant native to the US? **Yes**

Is the plant native to the area of intended use? **Yes**

Authority used to determine native status: **NRCS PLANTS Database**

What is the intended area of use for this plant? **Intermountain west**

What is the intended use for this plant? **Erosion control, rangeland restoration**

Areas in which the release is known to be invasive or has a high probability of being invasive: **None**

Summary of Criteria from Section A	**Score**
Part 1. Impact on Habitats, Ecosystems, and Land Use	**3**
Part 2. Ease of Management	**14**
Part 3. Conservation Need and Plant Use	**8**
Part 4. Biological Characteristics	**28**

Final Determination of Release Based on the Environmental Evaluation:

X ☐ **OK to Release**

☐ **OK to Release but qualify use and intended area of use***

☐ **Do Not Release - NPL determines if release is made***

☐ **Do Not Release - document and destroy materials**

I certify that this Environmental Evaluation was conducted with the most accurate and current information possible.

/s/ Loren St. John 3/19/03

Signature of Person Scoring Date

Signature of NPL indicating that it is OK to make the release:

National Program Leader, PM **Date**

Section A. Scoring of Criteria for Impact, Management, Need and Biological Characteristics

Circle the appropriate number for each of the following criteria. Add up the scores for each part and record at the end of each part. Comments which clarify answers or provide supporting information may be included in the right margin of the worksheet or attached on a separate sheet of paper.

Part 1: Impact on Habitats, Ecosystems, and Land Use

This section assesses the ability of the species or release to adversely affect habitats, ecosystems, and agricultural areas.

1) Ability to invade natural systems where the species does not naturally occur

a) Species not known to spread into natural areas on its own 0
b) Establishes only in areas where major disturbance has occurred in the last 20 years (e.g., natural disasters, highway corridors) **3**
c) Often establishes in mid- to late-successional natural areas where minor disturbances occur (e.g., tree falls, streambank erosion), but no major disturbance in last 20-75 years 6
d) Often establishes in intact or otherwise healthy natural areas with no major disturbance for at least 75 years 10

2) Negative impacts on ecosystem processes (e.g., altering fire occurrence, rapid growth may alter hydrology)

a) No perceivable negative impacts **0**
b) Minor negative impacts to ecosystem processes 2
c) Known significant negative impacts to ecosystems processes 6
d) Major, potentially irreversible, alteration or disruption of ecosystem processes 10

3) Impacts on the composition of plant communities where the species does not naturally occur

a) No negative impact; causes no perceivable changes in native populations **0**
b) Noticeable negative influences on community composition 5
c) Causes major negative alterations in community composition 10

4) Allelopathy

a) No known allelopathic effects on other plants **0**
b) Demonstrates allelopathic effects on seed germination of other plants 3
c) Demonstrates allelopathic effects to mature stages of other plants 5

5) Impact on habitat for wildlife or domestic animals (aquatic and terrestrial), including threatened and endangered species (coordinate with USFWS and state Heritage Programs as appropriate)

a) No negative impact on habitat, or this criteria not applicable based on intended use for the plant — **0**
b) Minor negative impact on habitat (e.g., decreased palatability; lower wildlife value; decreased value for undesirable animal species) — 2
c) Significant negative impact on habitat (e.g., foliage toxic to animals; significantly lower value for wildlife; excludes desirable animal species from an area) — 5

6) Impact on other land use

a) No negative impacts on other land uses — **0**
b) Minor impacts (plant could invade adjacent areas and decrease its value) — 3
c) Significant impacts (plant may alter the system or adjacent lands significantly enough to prevent certain uses) — 5

Total Possible Points 45

Total Points for Part 1 3

Part 2. Ease of Management

This part evaluates the degree of management which might be needed to control the species or release if it becomes a problem, or eradicate the species or release if it is no longer desirable.

1) Level of effort required for control

a) Effective control can be achieved with mechanical treatment — 0
b) Can be controlled with one chemical treatment — **2**
c) One or two chemical or mechanical treatments required or biological control is available or practical — 5
d) Repeated chemical or mechanical control measures required — 10

2) Effectiveness of community management to potentially control the plant release

a) No management is needed, the plant release is short-lived and will significantly decrease or disappear within 5 years under normal conditions without human intervention — 0
b) Routine management of a community or restoration/preservation practices (e.g., prescribed burning, flooding, controlled disturbance, pasture renovation) effectively controls the release — **2**
c) Cultural techniques beyond routine management can be used to control the release — 4
d) The previous options are not effective for managing or controlling the release — 10

3) Side effects of chemical or mechanical control measures

a) Control measures used on release will have little or no effect on other plants 0
b) Control measures used on release will cause moderate effects on other plants **3**
c) Control measures used on release will cause major effects on other plants 5

**If spreads by seed, or both seed and vegetative means, go to #4
**If spreads by vegetative means only, go to #5

4) Seed banks

a) Seeds viable in the soil for 1 year or less 0
b) Seeds remain viable in the soil for 2-3 years 1
c) Seeds remain viable in the soil for 4-5 years **3**
d) Seeds remain viable in the soil for more than 5 years 5

5) Vegetative regeneration under natural conditions

a) Regeneration from resprouting of cut stumps **1**
b) Regeneration from pieces of the root left in the soil 3
c) Regeneration from root or stem parts left in the soil 5

6) Resprouts after cutting above-ground parts

a) Does not resprout or resprouts but the release is sterile and does not produce seed 0
b) Resprouts and produces seed in future years **3**
c) Resprouts and produces seed in same year 5

Total Possible Points 40
Total Points for Part 2 14

Part 3. Conservation Need and Plant Use

This part evaluates the importance of the species or release to meet a conservation need.

1) Potential Use(s) of the Plant Release

a) Used for low-priority issues or single use 1
b) Has several uses within conservation **2**
c) Has many uses within conservation as well as outside of conservation 4
d) Has high-priority use within conservation 5

2) Availability of Other Plants to Solve the Same Need

a) Many other plants available 1
b) Few other plants available **3**
c) No other plants available 5

3) Consequences of <u>Not</u> Releasing This Plant

a) No impact to conservation practices	0
b) Minor impact on one or more conservation practice	1
c) Serious impact on one conservation practice	**3**
d) Serious impact on more than one conservation practices	5
Total Possible Points	**15**
Total Points for Part 3	**8**

<u>Part 4. Biological Characteristics</u>

This part evaluates the biological properties which indicate the natural ability of the species or release to propagate and maintain itself under natural conditions. Note: these criteria relate to the species <u>under natural conditions</u>, as opposed to the species under managed conditions used to increase the species, i.e. seed increase programs, or specific propagation methods which do not normally occur in nature.

1) Typical mode of reproduction under natural conditions

a) Plant does not increase by seed or vegetative means (<u>skip to #11</u>)	0
b) Reproduces almost entirely by vegetative means	1
c) Reproduces only by seeds	**3**
d) Reproduces vegetatively and by seed	5

2) Reproduction (by seed or vegetative) in geographic area of intended use

a) Reproduces only outside the geographic area of intended use	1
b) Reproduces within the geographic area of intended use	3
c) Reproduces in all areas of the United States where plant can be grown	**5**

3) Time required to reach reproductive maturity by seed or vegetative methods

a) Requires more than 10 years	1
b) Requires 5-10 years	2
c) Requires 2-5 years	3
d) Requires 1 year	**5**

<u>** If reproduces only by seed, skip to #5</u>

4) Vegetative reproduction (by rhizomes, suckering, or self-layering)

a) Vegetative reproduction rate maintains population (plant spreads but older parts die out)	1
b) Vegetative reproduction rate results in moderate increase in population size (plant spreads <3' per year)	3
c) Vegetative reproduction rate results in rapid increase in population size (plant spreads >3' per year)	5

** If reproduces only vegetatively, skip to #11

5) Ability to complete sexual reproductive cycle in area of intended use

a) Not observed to complete sexual reproductive cycle in the geographic area of intended use, but completes sexual reproduction in distant areas of the United States — 1

b) Not observed to complete sexual reproductive cycle in the geographic area of intended use, but completes sexual reproduction in adjoining geographic areas — 3

c) Observed to complete the sexual reproductive cycle in the geographic area of intended use — **5**

6) Frequency of sexual reproduction for mature plant

a) Almost never reproduces sexually — 0

b) Once every five or more years — 1

c) Every other year — 3

d) One or more times a year — **5**

7) Number of viable seeds per mature plant each reproductive cycle

a) None (does not produce viable seed) — 0

b) Few (1-10) — 1

c) Moderate (11-1,000) — **3**

d) Many-seeded (>1,000) — 5

8) Dispersal ability

a) Limited dispersal (<20') and few plants produced (<100) — **1**

b) Limited dispersal (<20') and many plants produced (>100) — 3

c) Greater dispersal (>20') and few plants produced (<100) — 7

d) Greater dispersal (>20') and many plants produced (>100) — 10

9) Germination requirements

a) Requires open soil and disturbance to germinate — **1**

b) Can germinate in vegetated areas but in a narrow range or in special conditions — 5

c) Can germinate in existing vegetation in a wide range of conditions — 10

10) Hybridization

a) Has not been observed to hybridize outside the species — **0**

b) Hybridizes with other species in the same genera — 3

c) Hybridizes with other genera — 5

11) Competitive ability (of established plants)

a) Poor competitor for limiting factors	**0**
b) Moderately competitive for limiting factors	5
c) Highly competitive for limiting factors	10
Total Possible Points	**70**
Total Points for Part 4	**28**

References

Many of the criteria used in this rating system were adapted from the following sources:

Hiebert, Ron D. and James Stubbendieck. 1993. Handbook for Ranking Exotic Plants for Management and Control. US Department of the Interior, National Park Service, Denver, CO.

Randall, John M., Nancy Benton, Larry E. Morse, and Gwendolyn A. Thornhurst. 1999. Criteria for Ranking Alien Wildland Weeds. The Nature Conservancy, Arlington, VA.

Section B. Scoring and Interpretation

Based on the scores from above, circle the points range you scored to determine the appropriate interpretation. The interpretation will be used to determine the course of action for the release.

Part	Points Scored	Interpretation
Part 1. Impacts on Habitats, Ecosystems, and Land Use	0-15	**Low** chance plant is going to affect the environment
	16-25	**Mod**erate chance plant is going to affect the environment
	26-45	**High** chance plant is going to affect the environment
Part 2. Ease of Management	0-20	**Easy** to control
	21-30	**Mod**erate to control
	31-40	**Diff**icult to control
Part 3. Conservation Need and Plant Use	0-5	**Low** need
	6-9	**Mod**erate need
	10-15	**High** need
Part 4. Biological Characteristics	0-25	**Low** chance plant is going to propagate and increase itself
	26-40	**Mod**erate chance plant is going to propagate and increase itself
	41-70	**High** chance plant is going to propagate and increase itself

Release Documentation

For

Anatone Bluebunch Wheatgrass

Site Adaptability Studies

Seed Collection:

Eighty native seed collections of bluebunch wheatgrass (*Pseudoroegneria spicata* [Pursh] A. Löve ssp. *spicata*) and Snake River wheatgrass (*Elymus wawawaiensis* J. Carlson and Barkworth) were obtained in 1988 and 1989. Bluebunch wheatgrass was acquired in eight western states from principal locations in Idaho, Colorado, Montana, Nevada, Oregon, Utah, Washington, and Wyoming. Snake River wheatgrass was also collected from southeastern Washington and northeastern Oregon. A primary objective was to select and develop plant materials adapted to the more arid areas of the species range, particularly sites in the Lower Snake River Plain and portions of the Great Basin. Plants exhibiting good seedling vigor, adaptability to arid sites, and competitive attributes to compete with annual weeds were also emphasized. Unaltered germ plasm was emphasized to provide material that would be native to specific regions. Previous site adaptability trials in central Idaho beginning in 1979 reveled that material from the Palouse Prairie exhibited these characteristics, and collections were concentrated from this region. 'Goldar' and 'Whitmar' bluebunch wheatgrass are currently the only two released cultivars available, and both originate from this region. Goldar does not have sufficient drought tolerance to persist in the more arid regions where the species naturally occurs. Whitmar is an awnless form selected, in part, for this trait. Limited selection was made to promote this cultivar, yet it exhibits many of the seedling vigor and drought tolerance traits of Anatone. The selection processes used to develop this cultivar may have diminished some adaptive traits.

Field Evaluation Studies

Field plantings were established to evaluate initial establishment, survival over time, annual growth, plant vigor, seed production, and phenological growth responses on arid study sites naturally occupied by this species. Containerized seedlings of 53 of the bluebunch wheatgrass and Snake River wheatgrass collections were planted at the Orchard Research Site, Ada County, Idaho, and at Nephi, Juab County, Utah, in the spring 1989 and 1990. At each field location, plantings were arranged in three blocks with a completely randomized block design. Within blocks, a plot of 24 plants represented each accession. Data were collected during the years of 1989, 1991, 1993, 1994, 1995, and 2001.

<u>Orchard Research Study Site Description</u>

The site is located on the Lower Snake River Plain, about 32 km southeast of Boise, Idaho at an elevation of about 955 m. Mean annual precipitation is 200 to 300 mm and the average frost-free season is 140 to 190 days, Appendix 1. Soils are sandy, mixed, mesic Xeric Torriorthents. Native vegetation at the site was dominated by basin big sagebrush (*Artemisia tridentata* Nutt. ssp. *tridentata*), Wyoming big

sagebrush (*Artemisia tridentata* Nutt. ssp. *wyomingensis* Beetle & Young*)*, Sandberg bluegrass (*Poa sandbergii* J. Presl), Thurber needlegrass (*Achnatherum thurberianum* [Piper] Barkworth), and bluebunch wheatgrass. This area is typical of the drier regions of the Snake River Plain and portions of the Great Basin supporting big sagebrush and native bunch grasses including bluebunch wheatgrass. During the period of field evaluations, the area was subjected to periods of extremely low precipitation.

Description of Nephi/Levan Research Study Site

The Nephi site is 13 km southwest of Nephi, UT, on the Utah State University Agricultural Experiment Station's Nephi farm. Elevation is 1,580 m. The soil is deep with a clay loam texture and located on a 0 to 2 percent slope. Mean annual precipitation is 340 mm with 67 percent occurring from November to May, Appendix 2. Monthly precipitation during the first growing season was slightly below normal, particularly during the months of April, May, and June when transplants were becoming established. Mean annual temperature is 9.7 ^{o}C. This study site initially supported some basin big sagebrush, Wyoming big sagebrush, antelope bitterbrush (*Purshia tridentate [Pursh] DC.*), bluebunch wheatgrass, and western wheatgrass (*Pascopyrum smithii [Rydb.] Love)*. The site has been used for testing dryland grains, oil crops, numerous introduced and native forage grasses, broadleaf herbs, shrubs, and some seasonal livestock grazing trials.

Results -- Plant Establishment and Survival

Orchard Study Site - All five collections of Snake River wheatgrass, 'Secar' (B24); Enterprise, OR (B51); Colton, WA (B66); Wawawai, WA (B79); Penawawa, WA (B82), established and persisted better than most all collections of bluebunch wheatgrass, Table 1. With the exception of the Asotin (B54) collection that is in close proximity to the Anatone (B53) and Colton (B67) collection sites, total survival in 2001 of each Snake River wheatgrass collections exceeded any other collection of bluebunch wheatgrass under study. Total survival is a percentage of plants actually alive at the 2001, and is based on the numbers alive in 1990. Accessions with high initial establishment percentages are more likely to record high total survival rates. Collections of bluebunch wheatgrass from southeastern Washington, northeastern Oregon, and extreme western Idaho established better under arid conditions than collections from any other region. Bluebunch wheatgrass collections with the highest total survival in 2001 consisted of material from Asotin, WA (B54); Dodge, WA (B7); Colton, WA (B67); and Levan, UT (B34). Total survival percentages of these collections were not significantly different from the five collections of Snake River wheatgrass.

Persistence of plants that initially established is an important index of the adaptability of each accession to the individual study site. All five Snake River wheatgrass collections including Secar ranked in the top eight positions for survival in 2001. Collections of bluebunch wheatgrass from Colton, WA (B67); Brownlee Dam. ID (B49); Pataha, WA (B77); Dodge, WA (B76); Roosevelt, WA (B74); Asotin, WA (B54); Grande Ronde, WA (B52); and Anatone, WA (B53) recorded the highest survival percentages in 2001 of all bluebunch wheatgrass accessions under test. Survival percentages were not significantly different among these accessions or among the Snake River wheatgrass accessions. However, percent survival for the Colton accession was 97 percent compared with 79 percent for the Anatone accession.

All southeastern Washington/northeastern Oregon/western Idaho collections of bluebunch wheatgrass are within a radius of about 100 kilometers. Most collections from southwestern Washington are located within 20 to 40 kilometers from the Anatone collection site, and appear as similar genetic material.

Although the origin of Goldar bluebunch wheatgrass is from Asotin County in southeastern Washington, the total or long-term survival of this cultivar (B25) was significantly lower at the Orchard site than other collections assembled from this same region. Total survival of many other accessions of bluebunch wheatgrass from other regions also surpassed that of Goldar (B25). In addition, Goldar plants exhibited poor survival during the period between 1990 and 2001. Of the initial plants that established in 1990, only 32 percent survived for the 11-year period. In comparison, survival percentages of other accessions from southwestern Washington ranged from 97 percent Colton (B67) to 79 percent Anatone (B54).

Establishment and persistence of material collected from local stands in close proximity of the Orchard study site included Birds of Prey (B26) and Crows Nest (B 27). These accessions failed to establish or survive at even moderate percentages. In addition, collections from central Utah, Levan (B34), failed to persist well from the time of initial establishment (1990) to 2001.

Table 1. Percent survival of bluebunch wheatgrass and Snake River wheatgrass accessions planted at the Orchard study site in 1989. Within years accessions followed by different letters differ at <0.05. Survival at the juvenile stage in 1990 and the mature stage in 1995 are based on the plants surviving from the previous stage. Survival in 2001 is based on the number of plants alive in 1990. Overall survival is the percent of plants to survive through the 2001 season. **Bold print designates Snake River wheatgrass accessions.**

Origin	Accession Number Survival	1989 Transplant Survival	1990 Juvenile Survival	1995 Adult Survival	2001 Adult	Total Survival
Enterprise, OR	**B51**	**75 ab**	**85 a**	**95 a**	**93 a**	**79 a**
Penawawa, WA	**B82**	**79 a**	**81 ab**	**95 a**	**84 a**	**71 ab**
Wawawai, WA	**B79**	**63 abcd**	**72 abcd**	**95 a**	**88 a**	**64 abc**
Asotin, WA	B54	71 abc	75 abc	87 a	82 a	60 abcd
Colton, WA	**B66**	**53 abcde**	**56 abcde**	**100 a**	**98 a**	**54 abcde**
Secar	**B24**	**60 abcde**	**65 abcde**	**89 a**	**86 a**	**54 abcde**
Dodge, WA	B76	58 abcde	63 abcde	100 a	83 a	53 abcde
Colton, WA	B67	46 abcde	50 abcde	100 a	97 a	49 abcdef
Lavan, UT	B34	61 abcd	68 abcde	73 a	69 a	47 abcdefg
Roosevelt, WA	B74	47 abcde	54 abcde	94 a	82 a	44 bcdefgh
Grand Gorge, WA	B52	47 abcde	54 abcde	78 a	80 a	43 bcdefghi
Pataha, WA	B77	49 abcde	50 abcde	86 a	86 a	43 bcdefghi
Anatone, WA	B53	44 abcde	46 abcde	86 a	79 a	38 bcdefghij
Baker, OR	B68	44 abcde	56 abcde	78 a	65 a	35 bcdefghij
Connell, WA	B80	38 abcde	46 abcde	55 a	63 a	35 bcdefghij
Snowville, UT	B45	49 abcde	57 abcde	79 a	50 a	33 cdefghij
Lewiston, ID	B55	51 abcde	54 abcde	73 a	62 a	33 cdefghij
Crows Nest, ID	B27	42 abcde	56 abcde	52 a	52 a	32 cdefghij
Colton, WA	B83	46 abcde	47 abcde	63 a	59 a	31 cdefghij
Walla Walla, WA	B75	29 abcde	38 abcde	65 a	74 a	28 cdefghij
Maryhill, WA	B72	38 abcde	44 abcde	58 a	56 a	26 cdefghij
Salmon, ID	B57	40 abcde	46 abcde	55 a	55 a	24 defghij
Livingston, WA	B81	33 abcde	42 abcde	68 a	59 a	23 defghij
Lamoille Cyn, NV	B43	33 abcde	44 abcde	52 a	58 a	22 defghij
Roosevelt, WA	B73	51 abcde	53 abcde	65 a	42 a	21 defghij
Denio, NV	B41	28 abcde	31 bcde	82 a	76 a	21 defghij
Goldar	B25	47abcde	56 abcde	60 a	32 a	21 deghij
Riggins, ID	B64	47 abcde	46 abcde	55 a	39 a	19 efghij
Council, ID	B48	42 abcde	40 abcde	43 a	42 a	18 efghij
Dingle, ID	B61	53 abcde	51 abcde	33 a	22 a	17 efghij
Brownlee Dam, ID	B49	19 cde	19 de	91 a	88 a	17 efghij
Arco, ID	B60	15 de	31 bcde	78 a	45 a	17 efghij
Yakima, WA	B84	21 cde	32 bcde	66 a	38 a	13 fghij
Salt Lake City, UT	B30	46 abcde	46 abcde	27 a	19 a	10 fghij
Wallowa Mtns., OR	B50	29 abcde	38 abcde	48 a	20 a	8 fghij
Pittsburg Landing, ID	B46	17cde	19 de	68 a	68 a	8 fghij
Immigrant Pass, NV	B42	26 abcde	32 bcde	38 a	29 a	8 fghij
Riggings, ID	B65	29 abcde	31 bcde	45 a	39 a	7 ghij
Mona, UT	B33	44 abcde	43 abcde	46 a	18 a	7 ghij
Pittsburg Landing, ID	B47	17 cde	17 e	30 a	34 a	7 ghij
Lindon, UT	B31	22 bde	19 de	74 a	18 a	6 hij

Table 1 continued

Hyde Park, UT	B32	18 cde	24 cde	18 a	16 a	4 hij
Yuba Dam, UT	B28	29 abcde	32 bcde	39 a	22 a	4 hij
Birds of Prey, ID	B26	13 de	15 e	77 a	43 a	4 hij
Fairfield, ID	B63	24 bcde	22 cde	25 a	11 a	4 hij
Provo, UT	B29	25 bcde	15 e	64 a	27 a	4 hij
Grandview Cyn., ID	B58	22 bcde	25 cde	53 a	27 a	4 hij
Yuba Dam, UT	B62	38 abcde	39 abcde	44 a	16 a	4 hij
Pequop Summit, NV	B44	6 e	14 e	57 a	8 a	3 hij
The Dalles, OR	B71	24 bcde	29 bcde	5 a	5 a	1 hij
Arco, ID	B59	19 cde	21 de	50 a	17 a	1 hij
Paradise Valley, NV	B40	18 cde	18 de	42 a	7 a	1 hij
Frisco, UT	B36	35 abcde	31 bcde	27 a	0	0 j

Nephi Study Site - Bluebunch wheatgrass accessions survived much better at the Nephi study site than any accessions of Snake River wheatgrass, indicating that bluebunch wheatgrass is better adapted to more mesic sites within the range of this species and Snake River wheatgrass is better adapted to more arid conditions. Accessions of bluebunch wheatgrass from Anatone, WA (B53) and Colton, WA (B67) survived and preformed better than any other accession including material from southeastern Washington/northeastern Oregon/western Idaho. Total survival of accessions from Council, ID (B48); Colton, WA (B67); Yuba Dam, UT (B28); Wallowa, OR (B50); and Anatone, WA (B53) exceeded 50 percent. However, plant survival of the Anatone (B53) accession from 1990 to 2001 exceeded the other accessions. Total survival of plants from the Council, ID (B48) accession exceeded any other accession under study, but significant loss of plants occurred from 1990 to 2001 indicating persistence of this accession is only fair or poor.

Selections of bluebunch wheatgrass from Utah populations near the Nephi planting site were much better adapted to this location than accessions from most other regions. Accessions from Yuba Dam, UT (B28), Levan, UT (B34), and Provo, UT (B29) had high total survival and persisted well during the study period. However, survival of accessions from the Anatone region equaled or excelled the Utah and all other accessions.

Goldar (B25) bluebunch wheatgrass preformed much better at this site as it receives higher amounts of precipitation than the Orchard study site. However, total survival and survival from 1990 to 2001 of Goldar (B25) was both lower than Anatone (B53) and three Utah accessions. Based on plantings at the Idaho and Utah study sites, the Anatone, WA and Colton, WA accessions demonstrated better adaptability to a wider range of sites than accessions from other regional locations.

Table 2. Survival percentages of bluebunch wheatgrass and Snake River wheatgrass Accessions planted at the Nephi study site in 1989. Within years accessions followed by different letters differ at <0.05. Survival at the juvenile stage in 1990 and the adult stage in 1995 is based on the plants surviving from the previous stage. Survival in 2001 is based on the number of plants alive in 1990. Overall or total survival is the percent of plants to survive through the 2001 season. **Bold print designates Snake River wheatgrass accessions.**

Accession Number	Origin	1989 Transplant Survival	1990 Juvenile Survival	1995 Adult Survival	2001 Adult Survival	Total Survival
B48	Council, ID	63 abcdef	40 abcdefg	74 a	54 ab	60 a
B83	Colton, WA	65 abcde	63 abc	98 a	88 ab	56 ab
B28	Yuba Dam, UT	92 a	71 ab	90 a	72 ab	53 abc
B50	Wallowa Mtns. OR	75 abc	61 abcd	94 a	78 ab	50 abc
B53	Anatone, WA	54 abcdefg	54 abcdesg	95 a	96 ab	50 abc
B29	Provo, UT	63 abcdef	51 abcdef	91 a	89 ab	47 abc
B34	Levan, UT	65 abcde	61 abcd	100 a	77 ab	46 abc
B25	Goldar	51 abcdefg	51 abcdef	88 a	84 ab	43 abc
B70	Prouder Park, CO	89 ab	86 a	90 a	50 ab	43 abc
B52	Grande Ronde, WA	57 abcdefg	56 abcde	85 a	78 ab	43 abc
B61	Dingle, ID	68 abcdef	53 abcdef	97 a	76 ab	42 abc
B43	Lamoille Cyn. NV	56 abcdefg	46 abcdefg	94 a	91 ab	40 abc
B67	Colton, WA	72 abc	57 abcde	93 a	73 ab	40 abc
B68	Baker, OR	61 abcdef	57 abcde	90 a	72 ab	40 abc
B32	Hyde Park, UT	51 abcdefg	43 abcdefg	95 a	93 ab	40 abc
B80	Connell, WA	71 abc	42 abcdefg	100 a	100 a	40 abc
B32	Conners Pass, NV	78 abc	64 abc	96 a	65 ab	39 abc
B31	Lindon, UT	61 abcdef	42 abcdefg	100 a	92 ad	39 abc
B60	Evanston, WY	72 abc	71 ab	96 a	56 ab	39 abc
B70	**Wawawai, WA**	**68 abcd**	**47 abcdefg**	**72 a**	**77 ab**	**38 abc**
B69	Meeker, CO	54 abcdgeg	47 abcdefg	94 a	74 a	36 abc
B66	**Colton, WA**	**74 abc**	**47 abcdefg**	**82 a**	**76 ab**	**36 abc**
B55	Lewiston, ID	71 abc	47 abcdefg	82 a	65 ab	35 abc
B54	Asotin, WA	50 abcdefg	54 abcdef	92 a	65 ab	38 abc
B47	Pittsburg Landing, ID	38 abcdefg	35 abcdefg	94 a	93 ab	32 abc
B75	Walla Walla, WA	50 abcdefg	43 abcdefg	88 a	72 ab	31 abc
B27	Crows Nest, ID	67 abcde	51 abcdef	85 a	54 ab	29 abc
B56	Lolo, MT	40 abcdefg	40 bcdefg	97 a	57 ab	29 abc
B49	Brownlee Dam, ID	43 abcdefg	35 bcdefg	83 a	80 ab	28 abc
B46	Pittsburg landing, ID	57 abcdefg	36 bcdefg	83 a	75 ab	26 abc
B24	**Secar**	**46 abcdefg**	**38 bcdefg**	**84 a**	**68 ab**	**25 abc**
B65	Riggins, ID	56 abcdefg	44 abcdefg	86 a	75 ab	24 abc
B64	Riggins, ID	51 abcdefg	29 bcdefg	86 a	74 ab	22 abc
B62	Yuba Dam, UT	47 abcdefg	43 abcdefg	92 a	49 ab	21 abc
B30	Salt Lake City, UT	50 abcdefg	35 bcdefg	100 a	50 ab	19 abc
B33	Mona, UT	40 abcdefg	22 cdefg	95 a	54 ab	17 abc
B45	Snowville, UT	50 abcdefg	31 bcdefg	85 a	49 ab	15 abc
B82	**Penawawa Cyn., WA**	**64 abcdef**	**28 bcdefg**	**67 a**	**60 ab**	**15 abc**
B74	Roosevelt, WA	44 abcdefg	18 cdefg	63 a	61 ab	15 abc
B59	Arco, ID	53 abcdefg	32 bcdefg	67 a	48 ab	15 abc

Table 2, continued

B41	Denio, NV	25 cdefg	14 cdefg	100 a	100 a	14 abc
B37	Grt Basin Natl. Park, NV	57 abcdefg	42 abcdefg	75 a	29 b	14 abc
B71	The Dalles, OR	47 abcdefg	31 bcdefg	88 a	55 ab	13 abc
B51	**Enterprise, OR**	**32 cdefg**	**22 cdefg**	**92 a**	**50 ab**	**11 abc**
B42	Immigrant Pass, NV	13 fg	11 defg	100 a	92 ab	10 abc
B76	Dodge, WA	42 abcdefg	25 bcdefg	73 a	36 a	8 abc
B72	Maryhill, WA	47 abcdefg	29 bcdefg	65 a	26 b	8 abc
B26	Birds of Prey, ID	46 abcdefg	19 cdefg	60 a	49 b	7 abc
B58	Grandview, ID	25 cdefg	26 bcdefg	67 a	30 b	7 abc
B36	Frisco, UT	74 abc	64 abc	63 a	8 b	6 bc
B63	Fairfield, ID	42 abcdefg	11 defg	71 a	44 b	6 bc
B57	Salmon, ID	6 g	6 efg	77 a	75 ab	4 bc
B44	Pequop Summit, WA	15 efg	13 defg	72 a	33 b	3 bc
B40	Paradise Valley, NV	18 defg	10 defg	57 a	22 b	3 bc
B77	Pataha, WA	29 cdefg	6 fg	25 a	33 b	1 bc
B84	Yakima, WA	6 g	3g	100 a	33 b	1 bc
B73	Roosevelt, WA	43 abcdefg	10 defg	57 a	6 b	1 bc
B35	Minersville, UT	54 abcdefg	17 cdefg	100 a	0	0

Plant vigor and annual growth were recorded between 1989 and 1995 and data was used to determine the health of each accession. Plant vigor, annual height, and crown measurements were summarized each year to create index values representing overall health and growth indices. Plant heights and crowns were given approximately equal value by adding the centimeters representing each together. This number was multiplied by plant vigor to provide an index of the general health of each accession. Index values were compared by year using analysis of variance. The index values for the Orchard and Nephi sites were not significantly different, thus data from both sites was combined to compare the overall differences among accessions, Table 3.

Plants from southeastern Washington/northeastern Oregon/western Idaho are larger and reach maturity faster than accessions from other regions. They also grow rather quickly in the early spring months. These growth attributes are similarly expressed in both bluebunch wheatgrass and Snake River wheatgrass collections obtained from this central region. The growth index of mature plants of Snake River wheatgrass from Enterprise, OR (B51) recorded in 1995 exceeded all other accessions in general health and plant vigor. Of all accessions under study, three of the top nine accessions were Snake River wheatgrass species. Although the index values of bluebunch wheatgrass from Grande Rhonde, WA (B52); Colton, WA (67); Anatone, WA (B54); Baker, OR (B68); Brownlee Dam, ID (B49); and Lewiston, ID (B67) are lower than the Enterprise accession, ratings are not significantly different among the entire group. The index ratings are significantly better than Secar Snake River wheatgrass, which, in turn, is significantly better than Goldar bluebunch wheatgrass.

The growth index can be used to evaluate the vigor and rate of maturation of individual accessions. Index values recorded in 1991, 1993, and 1994 indicate the vigor of young developing plants and are indicative of plant vigor and establishment capabilities, Table 3. The index values of Goldar and three accessions of Snake River wheatgrass including Secar exceed values of other accessions in 1991. By 1993, the index vales of nearly all accessions from the Washington/Oregon/Idaho region are similar and exceed values of all other accessions. As plants attain mature stature, the index values for Goldar, Secar, and a few other accessions from the same region diminish significantly. In contrast, accessions from Anatone, Colton and a few additional accessions from the same closely related location recorded high values as young and mature plants.

Table 3. Growth Index values for 25 collections of Snake River wheatgrass and bluebunch wheatgrass grown at Orchard Research Site, Ada Co., Idaho and Nephi, Juab Co., Utah. The index was derived for each accession by summing the mean height and crown dimensions (cm) and multiplying the result by a subjective vigor rating of 1-5 with 5 indicating greatest vigor. Within years, means followed by different letters differ significantly ($p<0.05$) (Monsen et al. 1999). **Bold print distinguishes Snake River wheatgrass accessions.**

	Year				
Accession	1989	1991	1993	1994	1995
Enterprise, OR	**76 b c**	**147 b c d e f g**	**510 a b c d**	**458 a b c**	**719 a**
Grande Ronde, WA	61 c d	133 c d e f g h I	528 a b c d	521 a	612 a b
Colton, WA	50 d e	151 b c d e f g	558 a b c	466 a b c	611 a b
Anatone, WA	35 e f g	163 b c d e	520 a b c d	459 a b c	610 a b
Baker, OR	82 b	155 b c d e f g	539 a b c d	532 a	601 a b
Brownlee Dam, ID	44 d e f	162 b c d e f	591 a	484 a b	600 a b
Wawawai, WA	**101 a**	**210 a**	**579 a b**	**507 a**	**586 a b**
Lewiston, ID	80 b	161 b c d e f	524 a b c d	434 a b c	586 a b
Penawawa Canyon, WA	**83 b**	**189 a b**	**486 a b c d e**	**454 a b c**	**581 a b**
Secar	**49 d e f**	**173 a b c d**	**474 a b c d e**	**423 a b c d**	**567 b c**
Colton, WA	**75 b c**	**137 c d e f g h**	**485 a b c d e**	**454 a b c**	**531 b c d**
Wallowa Mtns, OR	57 c d e	125 b c d e f g h i	427 b c d e	415 a b c d e	494 b c d
Dayton, WA	51 d e	112 e f g h i j	411 c d e f	373 b c d e	485 b c d e
Lamoille Canyon, NV	44 d e f	91 h i j	430 b c d e	348 c d e f	469 b c d e
Pittsburg Landing, ID	43 d e f	107 g h i j	507 a b c d	359 c d e f	443 c d e f
Dingle, ID	45 d e f	130 c d e f g h i	435 a b c d e	423 a b c d	441 c d e f
Goldar	26 f g	179 a b c	500 a b c d e	440 a b c	438 c d e f
Riggins, ID	61 c d	124 d e f g h i	349 e f g h	364 c d e f	399 f g
Levan, UT	46 d e f	110 f g h i j	414 c d e f	323 d e f	395 f g
Evanston, WY	42 d e f	106 g h i j	381 d e f g	314 e f	352 f g
Crows Nest, ID	46 d e f	87 h i j	281 f g h	217 g h	329 f g
Arco, ID	43 d e f	92 h i j	412 c d e f	275 f g	312 f g
Salmon, ID	42 d e f	115 e f g h i	257 g h	271 f g	302 f g
Snowville, UT	42 d e f	84 i j	281 f g h	305 f g	272 g
Birds of Prey, ID	20 g	63 j	226 h	175 h	261 g

Leaf and culm heights of all bluebunch wheatgrass and Snake River wheatgrass are similar within and among species and accessions, Table 4. The greatest differences were recorded in crown diameter. Based on crown diameter, plants from the Grande Rhonde (B52) and Anatone (B53) accessions are the largest specimens of all accessions under study. Anatone bluebunch wheatgrass plants are slightly larger than those of Goldar particularly when grown under arid conditions. Under favorable moisture conditions, Anatone plants are usually similar in leaf and stem heights as Secar, but have much larger crowns. Crown diameters of plants from Anatone also exceed those from Asotin (B54), Colton (B67), Roosevelt (73), and Connell (B80).

Seasonal periods of growth generally reflect the inherent adaptability of different populations to climatic conditions from the site of origin. Most accessions of bluebunch wheatgrass and Snake River wheatgrass begin growth early in the season and attain near maximum size within a few weeks, Table 5. Plants from the Anatone site follow this growth pattern, but continue to grow and retain some green leaves late into the summer months until soil moisture is exhausted. In comparison, plant collections from very arid regions typically senesce and become dormant in late spring or early summer as daily temperatures increase. Plants from the Anatone site also resume growth in the fall if moisture becomes available, and plants can remain green and active into the early winter months. The seasonal growth pattern of Anatone is extremely important in providing competition to the establishment and persistent of annual weeds, particularly fall germinating winter annuals such as cheatgrass. Early spring and late fall growth of Anatone furnishes competition to germinated seedlings in both the spring and fall months. In addition, plants that retain some green leaves into the summer months reduce the period when wildfires are likely to occur.

Table 4. Leaf and stem heights, crown size, and number of culms per plant of different bluebunch wheatgrass and Snake River wheatgrass accessions growing at the Nephi, UT study site, 2001. **Bold print distinguishes Snake River wheatgrass accessions.**

Accession Number	Origin	Leaf Height (cm)	Stem Height (cm)	Crown Diameter (cm)	Number Culms
B24	**'Secar'**	**46**	**81**	**79**	**74**
B25	'Goldar'	41	66	93	94
B27	Crows Nest, ID	40	71	48	27
B28	Yuba Dam, UT	41	68	67	37
B29	Provo, UT	44	76	80	43
B33	Mona, UT	43	71	88	72
B34	Levan, UT	39	78	72	63
B43	Lamoille Cyn., NV	45	76	82	96
B44	Pequop Summit, NV	45	71	58	52
B48	Council, ID	41	65	76	36
B50	Wallowa Mtns, OR	41	70	72	57
B51	**Enterprise, WA**	**46**	**88**	**77**	**108**
B52	Grande Rhonde, WA	50	76	100	84
B53	Anatone, WA	46	74	98	98
B54	Asotin, WA	45	72	82	42
B55	Lewiston, ID	52	80	91	75
B56	Lolo, MT	44	71	72	62
B60	Evanston, WY	45	68	62	66
B62	Yuba dam, UT	41	72	65	63
B66	**Colton, WA**	**44**	**81**	**69**	**50**
B67	Colton, WA	42	71	68	43
B69	Meeker, CO	44	74	92	74
B74	Roosevelt, WA	45	82	68	49
B76	Dodge, WA	44	71	88	52
B79	**Wawawai, WA**	**56**	**86**	**96**	**136**
B80	Connell, WA	45	70	84	75
B82	**Penawawa Cyn.,WA**	**49**	**86**	**84**	**80**

Table 5. Weekly growth rates of different accessions of bluebunch wheatgrass and Snake River wheatgrass, Orchard, ID study site, March 5 to March 26, 1997. **Bold print distinguishes Snake River wheatgrass accessions**.

Origin	Heights				Crowns			
	3/5	3/12	3/19	3/26	3/5	3/12	3/19	3/26
	(cm)							
B24, Secar	**30**	**38**	**34**	**33**	**49**	**54**	**47**	**53**
B25, Goldar	10	7	20	20	20	17	17	33
B27 Crows Nest	16	16	15	12*	26	28	30	33
B28 Yuba Dam	19	17	*		34	34		
B34 Levan	37	18	17	15	29	21	27	25
B43 Lamoille, NV	22	17	17	15	35	31	33	22
B45 Snowville	10	12	12	18	19	39	24	25
B50 Wallawa	12	15	17	*	25	22	20	
B51 Enterprise	**27**	**26**	**26**	**25**	**43**	**43**	**43**	**43**
B52 Grande Ronde	32	23	24	22	43	50	42	43
B53 Anatone	28	30	25	33	49	43	43	48
B54 Asotin	40	34	34	25	49	52	51	50
B60 Evanston	14	18	13	*	26	27	26	
B66 Colton	**46**	**43**	**45**	**45**	**68**	**62**	**66**	**68**
B67 Colton	52	46	49	43	58	58	58	45
B74 Roosevelt	44	47	52	40	54	61	62	60
B76 Dodge	34	33	33	27	50	53	51	58
B79 Wawawai	**41**	**44**	**43**	**30**	**69**	**67**	**60**	**60**
B82 Penawawa	**37**	**39**	**41**	**30**	**60**	**54**	**57**	**60**
B89 Antelope Island	15	10	17	17*	17	10	20	22
B90 Boise	27	23	17	24	27	26	20	26

* Plant senescence detected

Seed Features, Germination, Seedling Vigor and Establishment Studies

A series of closely related seed germination, planting depth trials, seed weight, and seed production trials were conducted and reported by Kitchen and Monsen (1994). Seeds collected from 47 naturally occurring populations of bluebunch wheatgrass and commercial collections of 'Hycrest' crested wheatgrass and Goldar bluebunch wheatgrass were germinated under laboratory conditions at 15/25 and 2 ^{o}C to determine near-optimum and near- freezing germination rates. Indices of germination rate were calculated using methods modified from Maguire (1962). In addition, greenhouse experiments were conducted to determine germination and emergence success from a planting depth of 0.4 cm. Seed weights for nine selected populations of bluebunch wheatgrass were also collected and weighed from native parental populations, common garden plantings, and field studies sites at Orchard, ID and Nephi, UT from 1988 to 1993.

Greenhouse germination rate indices varied from 25.2 to 51.2 at 15/25 ^{o}C and from 9.6 to 20.5 at 2 ^{o}C, Table 6. Cold-germination rate, seedling emergence success, and mean dry shoot weight of the Anatone accession were superior to all other accessions including Goldar. At 2 ^{o}C the germination rate index of Anatone approached that recorded for Hycrest crested wheatgrass, Table 7. Seeds of Anatone are programmed to germinate in the early spring at cool soil temperatures, which enhances seedling establishment and allows emerging seedlings to compete with early germinating weeds. Difference in germination rate is due to the rapid initiation of the coleoptile. The germination rate index of Anatone is significantly better than accessions from areas throughout the Snake River Plain and Great Basin where competition with annual weeds is a significant problem to artificial restoration and natural recruitment.

Seedling success of Anatone from a deep planting trial was superior to all bluebunch accessions and closely compared with Hycrest crested wheatgass, Tables 6, 7. In addition, the size or dry shoot weights of Anatone seedlings were also greater than any other bluebunch wheatgrass accession tested and compared favorably with Hycrest crested wheatgrass. The ability of this accession to germinate quickly at cold temperatures and emerge from deep planting trials affirms its superiority in seedling establishment and seedling vigor attributes.

Field plantings of a series of native and introduced perennial grass cultivars conducted as part of a Northern Great Plains Regional Grass Trials by scientists from the USDA, ARS Laboratory, gan, Utah included the Anatone accession, (Data on file at USDA, ARS Laboratory, Blair Waldron, Logan, UT). Direct seeding trials were established at Green Canyon, UT and Blue Creek, UT in 2000. Field ratings completed in the seedling year, 2001, recorded stand frequency and stand vigor, Table 9. Stand ratings of Anatone exceeded most accessions of bluebunch wheatgrass including Goldar, and equaled or exceeded the ratings of most other species under evaluation including many cultivars of crested wheatgrass.

Table 6. Mean germination rate, emergence percentage, dry shoot weight (mg), and number of seeds per gram for 47 collections of bluebunch wheatgrass from natural occurring populations and the cultivar, 'Goldar' (Kitchen and Monsen 1994) produced under agricultural conditions.

Geographic region	Germination rate index		Deep planting		
County, state	15/25 °C	1 °C	Emergence	Dry shoot weight	Seeds g-1
			%	mg	
Palouse Prairie					
Anatone	34.8	20.5	66	9.5	228
Asotin, WA	40.3	16.0	65	7.1	259
Garfield, WA (1)	39.1	20.3	25	4.0	276
Garfield, WA (2)	42.3	19.3	50	5.0	298
Whitman, WA	38.5	16.6	53	5.7	255
Nez Perce, ID	40.8	15.0	43	6.8	233
Snake River Canyon Area					
Adams, ID	33.1	-----	48	7.5	216
Idaho, ID (1)	34.5	14.4	39	5.6	260
Idaho, ID (2)	30.2	13.6	53	4.7	274
Idaho, ID (3)	29.7	14.6	41	4.1	243
Washington, ID (1)	33.3	14.3	43	7.2	176
Washington, ID (2)*	30.4	-----	16	2.5	240
Washington, ID (3)	36.3	16.7	53	5.4	197
Baker, OR (1)	33.9	13.3	38	5.6	196
Baker, OR (2)	28.5	11.8	25	2.7	253
Baker, OR (3)	31.7	12.8	58	5.7	176
Baker, OR (4)	27.0	15.3	59	5.7	178
Snake River Plain					
Ada, ID	33.9	14.8	40	4.0	258
Butte, ID	35.5	16.8	19	5.6	309
Clark, ID	29.7	14.6	8	0.6	437
Owyhee, ID	30.4	12.0	8	2.2	374
Malheur, OR	25.2	11.0	20	2.0	264
Western Great Basin					
Elko, NV	27.0	13.1	24	3.4	262
Eureka, NV	29.3	14.3	36	3.7	270
Humboldt, NV (1)	32.7	10.6	22	3.4	323
Humboldt, NV (2)	33.2	17.6	17	2.8	273
Eastern Great Basin					
Bear Lake, ID	32.7	14.2	25	2.7	376
Cache, UT	28.0	12.5	39	3.8	344
Davis, UT (1)	33.4	15.3	14	5.5	301
Davis, UT (2)**	29.3	12.2	-----	-----	285

Juab, UT (1)	29.8	15.0	14	3.5	343
Juab, UT (1)	33.3	13.9	12	3.3	317
Juab, UT (1)	31.5	13.0	5	5.5	403
Salt Lake, UT	28.4	12.0	8	3.3	312
Utah, UT	25.9	12.6	15	3.0	432
Utah, UT (2)	29.5	14.4	12	5.8	262
Salmon River Valley					
Custer, ID	40.1	18.1	28	2.7	352
Lemhi, ID	46.5	17.5	44	7.3	279
Bitterroot River Valley					
Missoula, MT	36.8	12.3	55	4.7	254
Ravalli, MT	37.6	15.3	39	3.6	237
Upper Colorado Plateau					
Garfield, CO	36.0	10.2	23	3.0	360
Moffat, CO	33.5	11.0	58	4.3	356
Rio Blanco, CO	33.0	10.8	34	3.9	356
Uinta, WY	32.9	13.0	6	2.5	378
Colorado Front Range					
Larimer, CO (1)	31.2	10.9	8	1.6	375
Larimer, CO (2)**	26.1	9.6	-----	------	403
Larimer, CO (3)	33.3	14.1	21	2.5	318
Cultivar					
Goldar'	51.2	17.8	47	8.4	201
Overall mean	33.4	14.2	32	4.4	291

*The 1 ^{o}C germination rate test was omitted for these accessions due to lack of seed.

**These accessions were not used in the greenhouse emergence test.

Table 7. Mean germination rate, emergence percentage, dry shoot weight (mg), and number of seeds per gram for select accessions of bluebunch wheatgrass and Hycrest crested wheatgrass (Kitchen and Monsen 1999).

This table summarizes data in Table 6 and compares performance of all bluebunch wheatgrass accessions in Table 6, Goldar, Anatone, and Hycrest crested wheatgrass. The Goldar and Hycrest seed was produced in seed fields, all other accessions were wildland collections.

	Germination Rate Index		Deep Planting		
Accession(s)	15/25 °C	1 °C	Emergence	Dry Shoot Weight	Seeds g^{-1}
			%	mg	
Mean of 48 bluebunch wheatgrass accessions	33.4	14.2	32	4.4	291
Goldar	51.2	17.8	47	8.4	201
Anatone	34.8	20.5	66	9.5	228
Hycrest	47.1	26.8	69	12.2	----

Table 8. Mean number of seeds per gram for nine accessions of bluebunch wheatgrass collected from native parent populations and from common garden and nursery sites at Orchard, Idaho and Nephi and Spanish Fork, Utah from 1988 to 1993. Within accessions means followed by the same letter are not significantly different (p>0.05) (SNK) (Kitchen and Monsen 1999).

	Seed Collection Site and Year[1]				
Accession	**P-88/89**	**P-93**	**0-93**	**N-93**	**S-93**
	----------seeds g^{-1}----------				
Brownlee, ID	175b	173b	170b	175b	136a
Anatone	228c	------	205b	194a	186a
Provo, UT	262b	263b	------	------	217a
Salmon, ID	279c	250b	------	------	186a
Asotin, WA.	------	282b	286b	------	172a
Grand Rhonde, WA	298c	------	210b	164a	------
Levan, UT	316d	254c	233b	196a	196a
Hamilton, CO	356c	256b	------	214a	211a
Meeker, CO	356d	302c	------	236b	218a

[1]P-88/89 or P-93 = Parent site or naturally occurring population collected in 1988/89 or 1993. O-93 = Orchard, ID common garden, 1993 collection. N-93 = Nephi, UT common garden 1994 collection. S-93 = Spanish Fork, UT nursery, 1993 collection.

Table 9. Performance of selected grass accessions at Green Canyon and Blue Creek, UT. Collections were seeded in November 1999 with a cone seeder at a rate of 40 PLS ft^{-2}. Data were collected in 2000 after the first growing season. Stand frequency is based on the grid method described by Vogel and Masters (2001). Dry matter yield (DMY) is expressed in kg ha^{-1}. Stand vigor: Visual rating: 1-9 (9=best). Obs=observations, 14 possible (Data provided by Blair Waldron, USDA-ARS, Logan, UT).

Species	Entry	DMY (kg ha^{-1})	Obs.	Stand freq (%)	Obs.	Stand vigor	Obs.
Bluebunch wheatgrass	ACC_238_2X	1670	6	42	6	6.2	6
Bluebunch wheatgrass	ANATONE	1855	5	54	5	7.2	5
Bluebunch wheatgrass	GOLDAR	2109	6	46	6	7.0	6
Bluebunch wheatgrass	P4_4x	2089	6	46	6	6.3	6
Bluebunch wheatgrass	P5_2X	1918	5	52	5	7.8	5
Bluebunch wheatgrass	P7_2X	1706	5	40	5	6.6	5
Crested wheatgrass	CD2	2226	6	30	6	7.3	6
Crested wheatgrass	DOUGLAS	1507	6	46	6	5.5	6
Crested wheatgrass	FAIRWAY	1693	7	39	7	6.0	7
Crested wheatgrass	HXB28	2560	6	41	6	7.8	6
Crested wheatgrass	HYCREST	3858	6	39	6	7.5	6
Crested wheatgrass	I28	2820	7	49	7	7.9	7
Crested wheatgrass	KAZAK_SIB	1471	4	32	5	4.6	5
Crested wheatgrass	NE_AC1	2024	6	37	6	5.7	6
Crested wheatgrass	NE_AC2	2574	7	50	7	6.7	7
Crested wheatgrass	NORDAN	2806	6	48	6	7.7	6
Crested wheatgrass	NORDAN_HYLD_HDMD	2566	5	36	5	6.6	5
Crested wheatgrass	P27	2192	5	46	6	5.7	6
Crested wheatgrass	PUB_SIBERIAN	1514	7	46	7	6.6	7
Crested wheatgrass	ROADCREST	1828	5	39	6	5.2	6
Crested wheatgrass	RUFF_HYLD_HDMD_C	2872	6	49	6	6.8	6
Crested wheatgrass	VAVILOV	2712	6	45	6	6.8	6
Indian ricegrass	NEZPAR_IRG	1130	3	34	6	2.5	6
Indian ricegrass	RIMROCK_IRG	568	2	35	5	2.2	5
Russian wildrye	BOZETET	1076	6	47	6	6.8	6
Russian wildrye	BOZOISKY	929	6	28	6	4.8	6
Russian wildrye	MANKOTA	743	6	31	6	4.0	6
Russian wildrye	ND_SYN_1831_2x	562	6	43	6	4.7	6
Russian wildrye	ND_SYN_1981_2x	1179	5	44	5	6.6	5
Russian wildrye	ND_SYN_1983_4x	915	5	44	5	6.8	5
Russian wildrye	SYNA	1182	3	48	4	6.5	4
Russian wildrye	TETRA1	609	4	43	5	5.6	5
Russian wildrye	TETRACAN	931	6	43	6	6.0	6
Snake River wheatgrass	E21	1436	6	34	6	6.0	6
Snake River wheatgrass	E25	1155	4	33	5	4.8	4
Snake River wheatgrass	E29	1528	6	47	6	5.7	6
Snake River wheatgrass	SECAR	605	3	44	5	3.0	4
Snake River wheatgrass	SECAR_YAKIMA	860	4	34	5	5.4	5

Squirreltail	SANDHOLLOW_ST	1437	6	33	6	5.3	6
Thickspike wheatgrass	BANNOCK	2236	5	57	5	6.4	5
Thickspike wheatgrass	CRITANA	1983	5	50	5	6.8	5
Thickspike wheatgrass	CRITANAXBANNOCK	1891	6	55	6	6.7	6
Thickspike wheatgrass	SODAR	1282	6	48	6	5.8	6
Western wheatgrass	ARRIBA	2085	5	69	5	6.6	5
Western wheatgrass	FLINTLOCK	996	5	62	6	5.2	6
Western wheatgrass	NE_EXP_1	855	5	70	5	4.8	5
Western wheatgrass	RODAN	1447	3	59	5	4.0	4
Western wheatgrass	ROSANA	748	5	61	5	6.2	5

Seed Production:

Seed production fields have been in place since 1999, and first-year harvests from nine locations report yields ranging between 168 to 195 kg ha^{-1}. Mature stands produce between 195 and 328 kg ha^{-1}, although yields as high as 563 kg ha^{-1} have been reported. Bulk seed production of Anatone (170 kg ha^{-1}) exceeded that of a same-age Goldar field (156 kg ha^{-1}) at the Aberdeen NRCS Plant Center, but seed production from much larger and mature fields in central Washington report that Anatone produced only half the rate as established fields of Secar.

Anatone seeds are relative large and easy to clean. Approximately 60 percent of all seeds support a short awn that is easily removed, and does not create problems in harvesting or processing.

Wildland stands of Anatone normally produce some seeds each year. The number of seed stocks that develop are reflective of the conditions of the planting site. Seed stocks were counted from planting sites at Orchard, ID and Nephi, UT at various years but no clear pattern was recognized among collections or annual growing conditions. Anatone plants produced about average number of stocks at the Orchard site in 1997, Table 11. Individual accessions appear to adjust to climatic conditions by reducing vegetative growth and seed stock formation. Plants from the Anatone location were able to produce seed under arid conditions in sufficient amounts to repopulate an existing stand.

Table 10. Seed production of Anatone bluebunch wheatgrass from cultivated plantings in Utah, Colorado, Idaho, and Washington

Planting Location	Hectares Planted	Age of Planting	Yields kg ha^{-1}	Comments
Sanpete Co., UT				
Spring City				
2001	2.2	2 years	168	Weedy site
2002	2.2	3 years	195	Moderate stand
2003	2.2	4 years	240	Mature stand
Ft. Green				
1999	0.6	2 years	294	Mature plants
Utah Co., UT				
Spanish Fork				
2002	1.82	2 years	0	Frost destroyed crop
2003	1.82	3 years	225	
Montezuma Co., CO				
2000	2.0	2 years	226	
2001	38.0	3 years	304	
2002	38.0	4 years	177	Drought problems
2003	42.0.	5 years	328	
Payette Co., ID				
Field 1				
2001	2.83	1 year	140	
2002	2.83	2 year	56	
2003	2.83	3 year	56	
Field 2				
2001	1.6	1 year	141	
2002	1.6	2 year	168	
2003	1.6	3 year	140	
Field 3				
2002	2.88	1 year	337	
2003	2.88	2 year	563	
Bingham Co., ID				
2002		1year	120	Spring frosts
Lincoln Co., WA				
2002	44.5	1 year	123	
2003	58.7	2 year	210	

Table 11. Number of seed stocks per plant for different accessions of bluebunch Wheatgrass and Snake River wheatgrass accessions growing at the Orchard, ID study site, 1997. **Bold print distinguishes Snake River wheatgrass accessions**.

Accession	Origin	Number Seed Stocks
B24	**'Secar'**	**63.0**
B25	'Goldar'	29.0
B27	Crows Nest, ID	71.0
B28	Yuba Dam, UT	71.0
B34	Levan, UT	50.6
B43	Lamoille Cyn., NV	108.4
B45	Snowville, UT	33.2
B50	Wallawa Mtns.,OR	33.0
B51	**Enterprise, OR**	**61.6**
B52	GrandeRonde,WA	112.9
B53	Anatone, WA	76.9
B54	Asotin, WA	46.7
B60	Evanston, WY	39.3
B66	**Colton, WA**	**63.0**
B67	Colton, WA	119.6
B74	Roosevelt, WA	87.4
B79	**Wawawai**	**138.5**
B82	Penawawa, WA	59.7
B83	**Colton, WA**	**103.0**

Areas of Adaptation

Anatone bluebunch wheatgrass demonstrates adaptability to areas outside its native region. From plantings conducted in the northern region of the Snake River Plain and central Utah, the over-all performance of Anatone was better than any other accession including Goldar. DNA studies conducted by scientists at the USDA, ARS Laboratory, Logan Utah, indicate that plant materials from Asotin, Garfield, and Whitmar Counties, Washington; Umatilla, Grant, and Wallowa Counties, Oregon; and Washington County, Idaho are genetically quite similar, Fig 1. Materials from Ada and Idaho Counties, Idaho are closely grouped together, but are also aligned with materials from southeastern Washington/northeastern Oregon/western Idaho. In addition, materials from Humboldt, Elko, Lander, and Eureka Counties, Nevada are also closely grouped together, yet are aligned as a part of a broad group with the Washington/Oregon/Idaho collections. The broad genetic relationship of bluebunch wheatgrass from these geographical regions would suggest plant materials from certain areas within the regions could have wide ecological adaptability. This has been conformed by the broad adaptability exhibited from field plantings of the Anatone selection.

Anatone is adapted to the sagebrush communities, foothill and mountainous regions where mountain brush species are intermixed with bunchgrasses. It persists in open parks and with moderate density of over story shrubs. It is adapted to well-drained and heavy texture soils, including rocky but deep profiles. It naturally grows with numerous other herbaceous species, but does persist and dominates many areas.

Table 12. Collection sites of bluebunch wheatgrass accessions included in DNA trials . Data on file Dr. Steve Larson, USDA, ARS Laboratory, Logan, Utah.

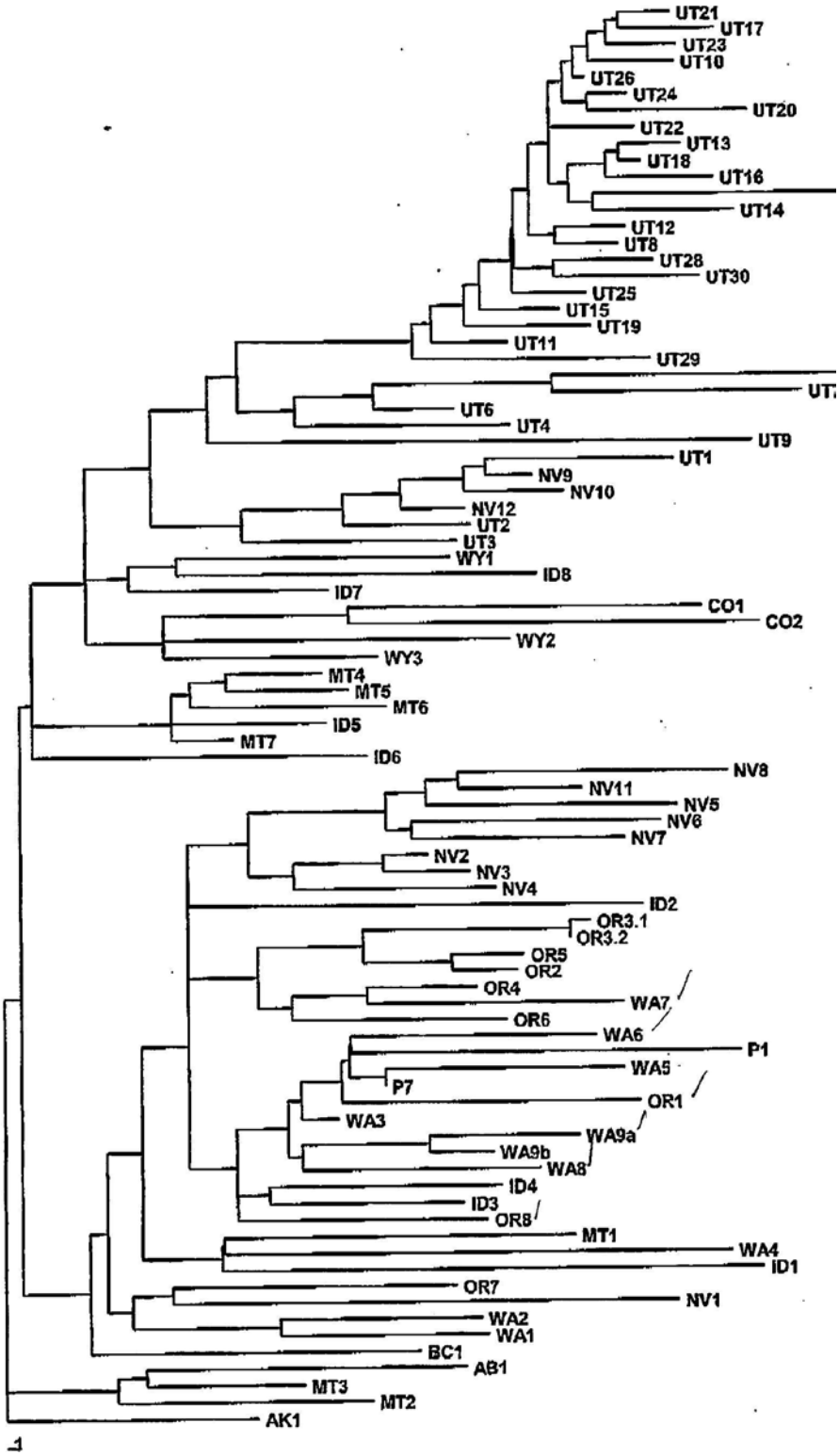
OTU Identification	Seed Origin
AB1	Old man Dam, AB
AK1	Milepost 289, Richardson Hwy
BC1	Slocan, BC
CO1	Poudre Park, Lamar Co., CO
CO2	Black Hawk, Gilpin Co., CO
ID1	Winchester, Lewis Co., ID
ID2	Brownlee Dam, Washington Co., ID
ID3	Hell's Canyon, Idaho Co., ID
ID4	Boise, Ada Co., ID
ID5	Salmon, Lemhi Co., ID
ID6	Magic Reservoir, Blaine Co., ID
ID7	Arco, Butte Co., ID
ID8	Aston Hill, Fremont Co., ID
MT1	Grinnell Glacier, Glacier N. P., MT
MT2	Lolo, Missoula Co., MT
MT3	Drummond-Garrison, Powell Co., MT
MT4	Lewis and Clark Co., MT
MT5	Broadwater Co., MT
MT6	Madison Co., MT
MT7	Livingston, Park Co., MT
NV1	Fish Springs, Washoe Co., NV
NV2	Cottonwood Creek, Humboldt Co., NV
NV3	Winnemucca, Humboldt Co., NV
NV4	Owyhee Desert, Elko Co., NV
NV5	Battle Mt. Lander Co., NV
NV6	Lone Mt., Elko Co., NV
NV7	Elko, Elko Co., NV
NV8	Eureka, Eureka Co., NV
NV9	Toano, Elko Co., NV
NV10	Montello, Elko Co., NV
MV11	Pinto Summit, Eureka Co., NV
MV12	Comins Lake, White Pine Co., NV
OR1	Hermiston, Umatilla Co., OR
OR2	Potamus Point, Marrow Co., OR

Table 12 , continued

OR3.1	Stumbough Ridge, Morrow Co., OR
OR4	Walla Walla RD., Umatilla Co., OR
OR5	Indian Creek, Grant Co., OR
OR6	Wallowa-Minam, Wallowa, OR
OR7	Burns, Harney Co., OR
OR8	Imnaha, Wallowa Co., OR
P1	Unknown
P7	Multiple Origin
UT1	Devil's Playground, Box Elder Co., UT
UT2	Curlew Junction, Box Elder Co., UT
UT3	Pinyon Flat, Box Elder Co., UT
UT4	Cold Water Canyon, Box Elder Co., UT
UT5	Logan Canyon, Box Elder Co., UT
UT6	Mantua, Box Elder Co., UT
UT7	Hardware Ranch, Cache Co., UT
UT8	Ogden Canyon, Weber Co., UT
UT9	Antelope Island, Davis Co., UT
UT10	Chriss Creek, Juab Co.,
UT11	North Tintic, Tooele Co., UT
UT12	Salt Lake City, Salt Lake Co., UT
UT13	Lindon, Utah Co., UT
UT14	Orem, Utah Co., UT
UT15	Paul Bunyan Woodpile, Juab Co., UT
UT16	Hobble Creek, Utah., UT
UT17	Mona, Juab Co., UT
UT18	Springville, Utah Co., UT
UT19	Yuba Dam, Juab Co., UT
UT20	Antelope Mt., Millard Co., UT
UT21	Spencer Fork, Sanpete Co., UT
UT22	Mud Springs, Millard Co., UT
UT23	Levan, Juab Co., UT
UT24	Mayfield, Sanpete Co., UT
UT25	Pigeon Hollow, Sanpete Co., UT
UT26	Ephraim, Sanpete Co., UT
UT27	Salina Canyon, Sevier Co., UT
UT28	Pigeon Water, Duchesne Co., UT
UT29	La Point, Uintah Co., UT
UT30	Antelope Canyon, Duchesne Co., UT
WA1	White Salmon, Klickitat Co., WA
WA2	Roosevelt, Klickitat Co., WA
WA3	Connell, Adams Co., WA
WA4	Steptoe Butte, Whitman Co., WA
WA5	Union Flat-Almota, Whitman Co., WA
WA6	Colton, Whitman Co., WA
WA7	Asotin-Wenaha, Garfield Co., WA

Table 12, continued

WA8	Asotin Co., WA
WA9a	Anatone, Asotin Co., WA
WAb	Anatone, Asotin Co., WA
WY1	Moon Lake, Sublette Co., WY
WY2	Flaming Gorge, Sweetwater Co., WY
WY3	Hiland, Natrona Co., WY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WY1
ID8
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CO1
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WY2
WY3
MT4
MT5
MT6
ID5
MT7
ID6
NV8
NV11
NV5
NV6
NV7
NV2
NV3
NV4
ID2
OR3.1
OR3.2
OR5
OR2
OR4
WA7
OR6
WA6
P1
WA5
P7
OR1
WA3
WA9a
WA9b
WA8
ID4
ID3
OR8
MT1
WA4
ID1
OR7
NV1
WA2
WA1
BC1
AB1
MT3
MT2
AK1

Summary-Justification for Release

Anatone bluebunch wheatgrass is more widely adapted than any released cultivar throughout the broad region where this species naturally occurs. It is particularly adapted to mid and low elevations with more arid climatic conditions. It is superior to Goldar, and compares favorably to Secar at low elevations. Whitmar bluebunch wheatgrass was not included in any of the adaptability and survival studies. This cultivar was selected from a site near Colton, WA that is similar to the Anatone location. It has demonstrated excellent establishment traits and adaptability to arid regions. Only awnless plants were originally collected, and only certain plants within a spaced planting were selected for increase. The extent in which these selection measures may have diminished the germ plasm is not known, but it is apparent that material from this general region has superior traits that should be promoted. The objective of our selection process has been to provide an unaltered cultivar. Attempts were made to retain the genetic integrity of the native material from the Anatone location. The Anatone selection clearly demonstrates superior seedling survival and vigor from all accessions under study. Seeds germinate quickly from cold temperatures, and seedlings are much more vigorous and robust than other selections, comparing favorably with Hycrest crested wheatgrass. Under field plantings, seedling establishment and vigor exceeds accessions of other bluebunch wheatgrass and many other species. This selections provides a bluebunch wheatgrass accession that is much more drought tolerant than any cultivars currently available, and also furnishes an ecotypes with superior seed germination and seedling vigor.

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE, ROCKY MOUNTAIN RESEARCH STATION
PROVO, UTAH

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
BOISE, IDAHO

UTAH DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES
EPHRAIM, UTAH

UTAH STATE UNIVERSITY, AGRICULTURAL EXPERIMENT STATION
LOGAN, UTAH

UNIVERSITY OF IDAHO, AGRICULTURAL EXPERIMENT STATION
MOSCOW, IDAHO

NOTICE OF RELEASE, MAPLE GROVE GERMPLASM LEWIS FLAX SELECTED CLASS NATURAL POPULATION

The United States Department of Agriculture, Forest Service, Rocky Mountain Research Station; United States Department of Agriculture, Natural Resource Conservation Service; Utah Department of Natural Resources, Division of Wildlife Resources; Utah State University, Agricultural Experiment Station; and University of Idaho, Agricultural Experiment Station announce the release of a selected ecotype of Lewis flax (*Linum lewisii* Pursh) for restoration of disturbed sites in the central intermountain west region.

As a Selected Class (Natural Track) release, this plant will be referred to as Maple Grove Germplasm Lewis flax in reference to its collection site origin and in recognition of the distinct taxonomy and biology of this North American native forb in relation to the commonly planted blue flax (*Linum perenne* L.) cultivar 'Appar' with its European origin (Pendleton et al. 1993).

This alternative (pre-variety) release is justified because no named germplasm is currently available for this species and as a result of increasing demands for native forb plant materials to be available for use in restoration of degraded western rangelands and for limited horticultural uses. Although 'Appar' blue flax was originally released as a Lewis flax cultivar (Howard and Jorgensen 1980), recent work has determined that 'Appar' is morphologically and reproductively aligned with accessions of the European species *Linum perenne* (blue flax) which, with 'Appar', have been shown to be collectively distinct from North American Lewis flax collections (Pendleton et al. 1993). Apparently, the South Dakota population that 'Appar' was originally collected from did not represent native germplasm but rather a naturalized population of the European

species. Further justification for release of this germplasm is found in its overall superior performance in drought tolerance, plant longevity, seedling vigor, seed production, and rust resistance when compared with other western North American collections (Kitchen 1995).

Collection Site Information: The original collection of Maple Grove Germplasm was made in 1988 by Dr. Susan E. Meyer on Fishlake National Forest lands approximately 1 km northeast of Maple Grove Campground. Access is by US Highway 50 between the towns of Salina and Scipio, Utah. The Maple Grove Campground turnoff is approximately 20 km northwest of Salina. The collection site is situated on a northeast facing alluvial fan at 1,910 to1,920 m elevation and 10 to 15 percent slope, extending from the east side of the Pahvant Range. The soil at this location is a deep, well drained loam with variable amounts of gravel and cobble. Mean annual precipitation at Scipio (1,615 m) is 300 mm. Although Scipio has a lower elevation than the collection site, the elevational enhancement on precipitation is at least partially offset by a more severe rain shadow effect associated with the collection site. Subsequently, we estimate mean annual precipitation for the collection site to be 330 to 360 mm, two thirds of which occurs from October 1 to April 30. Mountain big sagebrush is the landscape dominant with scattered clones of Gambel oak also present. Common herbaceous associates include bluebunch wheatgrass, muttongrass, needle-and-thread grass, western wheatgrass, gooseberry-leaf globemallow, and mountain buckwheat.

Description: Lewis flax, *Linum lewisii* is a relatively short-lived (5-7 yrs.) perennial forb with few to many ascending stems arising from a woody caudex. Stems are generally un-branched below with alternately-spaced linear to oblong sessile leaves, 4 to 30 mm long distributed throughout. Herbage is glabrous and somewhat glaucous. Perfect flowers are borne in showy cymose clusters on most to all stems. Normal flowers have five petals, sepals, stamens, stigmas, and carpels. Petals vary in length from 12 to 25 mm and in color from deep blue to white. New flowers open daily and the flowering period may last for several weeks. Flowers open early in the day and petals are usually shed within 24 hrs of opening. The fruit is a 10-celled round to ovoid capsule, 6 to 8 mm long, which opens along inter-cell sutures at maturity. The flattened dark brown seeds are relatively small at 360 to 530 per g., or 10,200 to 15,000 per oz., (163,200 – 240,000 per lb.; Kitchen and Meyer 2001) and become mucilaginous when wet. The plant is anchored by a prominent tap root and is not rhizomatous.

Mature plants of Maple Grove Lewis flax are generally 75 to 90 cm tall under cultivation and 30 to 50 cm tall under natural conditions. Leaf, flower, fruit, and seed size and stem number per plant are mid-range for the species. The light blue petal color is also intermediate for the species. Flowering generally begins by mid-May and lasts for 4 to 6 weeks. Fruits ripen from early July to mid August depending upon climatic conditions.

Method of Selection: Maple Grove Lewis flax was selected based on a series of field and greenhouse trials conducted from 1989 to 1993 comparing 19 collections assembled from Utah (13), Nevada (2), Idaho (1), Washington (1), Colorado (1), and South Dakota (1), in comparison with ‘Appar’ blue flax (Kitchen 1995). Containerized stock from G0

seed was planted in a randomized block design near Orchard, ID and Nephi, UT in 1989. Survival and vigor at the two sites were evaluated for 2 and 4 years, respectively. Seed production and rust resistance were evaluated at the Nephi site in 1990 and 1991. Greenhouse trials assessing emergence and survival from deep plantings were established in 1991 to evaluate seedling vigor using G0 seed at the USDA Forest Service, Shrub Sciences Laboratory. Stand establishment and seed production in drill rows was evaluated for the Maple Grove accession of Lewis flax in comparison to 'Appar' blue flax at the Utah Division of Wildlife Resources, Great Basin Research Center, Ephraim, Utah and USDA Natural Resources Conservation Service, Aberdeen Plant Material Center, Aberdeen, ID from 2001 to 2003. Maple Grove was selected for release over other accessions based upon drought tolerance, plant longevity, seedling vigor, seed production, and rust resistance.

Ecological Considerations and Evaluation: This release is of a native species with widespread distribution throughout western North America. The selection is of a species with recognized benefits and no negative impacts on wild or domestic animals. No attempts have been made to alter the genetic makeup of the selection. Seed production fields have revealed no cultural problems using normal agronomic practices. The selection was rated as "OK to release" when evaluated with the "Worksheet for Conducting an Environmental Evaluation of NRCS Plant Releases."

Anticipated Use: Anticipated uses of Maple Grove Lewis flax will include biodiversity enhancement of restoration and reclamation plantings, wildlife habitat improvement, erosion control, and beautification within its zone of adaptation in the intermountain west. It is anticipated that the release will have primary application in restoration seed mixes developed by government and private entities requiring a component of native forbs. Limited horticultural use is also expected including revegetation of highway right-of-ways.

Areas of Adaptation: As a species, Lewis flax is widely distributed in North America occurring from Alaska to Texas and from California to Quebec (NatureServe 2003). The ecological distribution of Lewis flax ranges from salt-desert shrub to sub-alpine meadow and is represented by an unknown number of ecotypes. The breath of ecotypic adaptation (generalists vs. specialists) is also largely unknown.

Maple Grove Lewis flax is potentially adapted to sites receiving 300 to 500 mm annual precipitation typified by pinyon-juniper, mountain big sagebrush, mountain brush, and dry coniferous forest types of the central intermountain region of the western United States (eastern Nevada, Utah, Western Colorado, southern Idaho, southwestern Wyoming). It is best adapted to sites with well-drained to moderately well-drained soils receiving 300 to 400 mm annual precipitation. It is not shade tolerant and has therefore limited application in closed woodland and forested types. Response to variation in soil pH is unknown.

Availability of Plant Materials: G3 seed will be maintained by the Aberdeen Plant Materials Center. Growers may produce two generations (G4 and G5) from the G3 seed.

Prepared by: This notice of release for Maple Grove Lewis flax was prepared by Stanley G. Kitchen, Research Botanist, USDA Forest Service, Rocky Mountain Research Station, Provo, UT; Loren St. John, Team Leader, USDA Natural Resources Conservation Service, Aberdeen Plant Materials Center, Aberdeen ID; Dan Ogle, Plant Materials Specialist, USDA Natural Resources Conservation Service, Boise ID, Stanford Young, Secretary/Manager, Utah Crop Improvement Association, Utah State University, Logan, UT; and Scott Walker, Utah Department of Natural Resources, Division of Wildlife Resources, Great Basin Research Center, Ephraim, UT; as a joint release by these agencies and the Utah State University, Agricultural Experiment Station and the University of Idaho, Agricultural Experiment Station.

References

Howard, C.G. and K.R. Jorgensen. 1980. 'Appar' Lewis flax (*Linum lewisii*, Pursh) description, adaptation, use, culture, management, and seed production. USDA Soil Conservation Service, Plant Materials Center.

Kitchen, S.G. 1995. Return of the native: a look at select accessions of North American Lewis flax, p. 321-326 In: B.A. Roundy, E.D. McArthur, J.S. Haley, and D.K. Mann, comps. Proceedings: wildland shrub and arid land restoration symposium; 1993 October 19-21; Las Vegas, NV. Gen Tech. Rep. INT-GTR-315. Ogden, UT: USDA Forest Service, Intermountain Research Station.

Kitchen, S.G. and S.E. Meyer. 2001. Update entry for Lewis flax in the Uniform Classification of Weed and Crop Seeds (Handbook No. 25) and add the same to Rules for Testing Seeds. Seed Technologist Newsletter 75: Proposal No. 29.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: February 23, 2004).

Pendleton, R.L., S.G. Kitchen, and E.D. McArthur. 1993. The great escape-a report on the origin of 'APPAR' Lewis flax (Abstract), p. 42-43. In: Published abstracts of the Annual Meeting of the Society for Range Management; 1993; February 14-19; Albuquerque, NM.

SIGNATURES FOR RELEASE OF:

MAPLE GROVE GERMPLASM LEWIS FLAX (SELECTED CLASS NATURAL POPULATION) *Linum lewisii* Pursh

USDA-FS	**Director, Rocky Mtn. Res. Stn.**	**Date**
USDA-NRCS	**Idaho State Conservationist**	**Date**
USDA-NRCS	**Director ESD, Washington DC**	**Date**
State of Utah	**Director, DWR**	**Date**
Utah State Univ.	**Director, Utah Agr. Exp. Stn.**	**Date**
Univ. of Idaho	**Director, Idaho Agr. Exp. Stn.**	**Date**

Environmental Evaluation of Plant Materials Releases

Name of person scoring: L. St. John **Date of scoring:** 2/27/03

Scientific Name: Linum lewisii **Common Name:** Lewis flax

Release Name: Maple Grove (proposed)

Is the plant native to the US? **Yes**

Is the plant native to the area of intended use? **Yes**

Authority used to determine native status: **USFS Shrub Sciences Lab**

What is the intended area of use for this plant? **Intermountain west**

What is the intended use for this plant? **Erosion control, biodiversity, beauty**

Areas in which the release is known to be invasive or has a high probability of being invasive:

Summary of Criteria from Section A	**Score**
Part 1. Impact on Habitats, Ecosystems, and Land Use	**3**
Part 2. Ease of Management	**17**
Part 3. Conservation Need and Plant Use	**6**
Part 4. Biological Characteristics	**39**

Final Determination of Release Based on the Environmental Evaluation:

X---- ☐ **OK to Release**

☐ **OK to Release but qualify use and intended area of use***

☐ **Do Not Release - NPL determines if release is made***

☐ **Do Not Release - document and destroy materials**

I certify that this Environmental Evaluation was conducted with the most accurate and current information possible.

/s/ Loren St. John 2/27/03

Signature of Person Scoring Date

Signature of NPL indicating that it is OK to make the release:

National Program Leader, PM **Date**

Section A. Scoring of Criteria for Impact, Management, Need and Biological Characteristics

Circle the appropriate number for each of the following criteria. Add up the scores for each part and record at the end of each part. Comments which clarify answers or provide supporting information may be included in the right margin of the worksheet or attached on a separate sheet of paper.

Part 1: Impact on Habitats, Ecosystems, and Land Use

This section assesses the ability of the species or release to adversely affect habitats, ecosystems, and agricultural areas.

1) Ability to invade natural systems where the species does not naturally occur

a) Species not known to spread into natural areas on its own — 0

b) Establishes only in areas where major disturbance has occurred in the last 20 years (e.g., natural disasters, highway corridors) — **3**

c) Often establishes in mid- to late-successional natural areas where minor disturbances occur (e.g., tree falls, streambank erosion), but no major disturbance in last 20-75 years — 6

d) Often establishes in intact or otherwise healthy natural areas with no major disturbance for at least 75 years — 10

2) Negative impacts on ecosystem processes (e.g., altering fire occurrence, rapid growth may alter hydrology)

a) No perceivable negative impacts — **0**

b) Minor negative impacts to ecosystem processes — 2

c) Known significant negative impacts to ecosystems processes — 6

d) Major, potentially irreversible, alteration or disruption of ecosystem processes — 10

3) Impacts on the composition of plant communities where the species does not naturally occur

a) No negative impact; causes no perceivable changes in native populations — **0**

b) Noticeable negative influences on community composition — 5

c) Causes major negative alterations in community composition — 10

4) Allelopathy

a) No known allelopathic effects on other plants — **0**

b) Demonstrates allelopathic effects on seed germination of other plants — 3

c) Demonstrates allelopathic effects to mature stages of other plants — 5

5) Impact on habitat for wildlife or domestic animals (aquatic and terrestrial), including threatened and endangered species (coordinate with USFWS and state Heritage Programs as appropriate)

a)	No negative impact on habitat, or this criteria not applicable based on intended use for the plant	**0**
b)	Minor negative impact on habitat (e.g., decreased palatability; lower wildlife value; decreased value for undesirable animal species)	2
c)	Significant negative impact on habitat (e.g., foliage toxic to animals; significantly lower value for wildlife; excludes desirable animal species from an area)	5

6) Impact on other land use

a)	No negative impacts on other land uses	**0**
b)	Minor impacts (plant could invade adjacent areas and decrease its value)	3
c)	Significant impacts (plant may alter the system or adjacent lands significantly enough to prevent certain uses)	5

Total Possible Points 45

Total Points for Part 1 3

Part 2. Ease of Management

This part evaluates the degree of management which might be needed to control the species or release if it becomes a problem, or eradicate the species or release if it is no longer desirable.

1) Level of effort required for control

a)	Effective control can be achieved with mechanical treatment	0
b)	Can be controlled with one chemical treatment	2
c)	One or two chemical or mechanical treatments required or biological control is available or practical	**5**
d)	Repeated chemical or mechanical control measures required	10

2) Effectiveness of community management to potentially control the plant release

a)	No management is needed, the plant release is short-lived and will significantly decrease or disappear within 5 years under normal conditions without human intervention	0
b)	Routine management of a community or restoration/preservation practices (e.g., prescribed burning, flooding, controlled disturbance, pasture renovation) effectively controls the release	**2**
c)	Cultural techniques beyond routine management can be used to control the release	4
d)	The previous options are not effective for managing or controlling the release	10

3) Side effects of chemical or mechanical control measures

a) Control measures used on release will have little or no effect on other plants — 0
b) Control measures used on release will cause moderate effects on other plants — **3**
c) Control measures used on release will cause major effects on other plants — 5

**If spreads by seed, or both seed and vegetative means, go to #4
**If spreads by vegetative means only, go to #5

4) Seed banks

a) Seeds viable in the soil for 1 year or less — 0
b) Seeds remain viable in the soil for 2-3 years — 1
c) Seeds remain viable in the soil for 4-5 years — **3**
d) Seeds remain viable in the soil for more than 5 years — 5

5) Vegetative regeneration under natural conditions

a) Regeneration from resprouting of cut stumps — **1**
b) Regeneration from pieces of the root left in the soil — 3
c) Regeneration from root or stem parts left in the soil — 5

6) Resprouts after cutting above-ground parts

a) Does not resprout or resprouts but the release is sterile and does not produce seed — 0
b) Resprouts and produces seed in future years — **3**
c) Resprouts and produces seed in same year — 5

Total Possible Points **40**
Total Points for Part 2 **17**

Part 3. Conservation Need and Plant Use

This part evaluates the importance of the species or release to meet a conservation need.

1) Potential Use(s) of the Plant Release

a) Used for low-priority issues or single use — 1
b) Has several uses within conservation — **2**
c) Has many uses within conservation as well as outside of conservation — 4
d) Has high-priority use within conservation — 5

2) Availability of Other Plants to Solve the Same Need

a) Many other plants available — 1
b) Few other plants available — **3**
c) No other plants available — 5

3) Consequences of <u>Not</u> Releasing This Plant

a) No impact to conservation practices	0
b) Minor impact on one or more conservation practice	**1**
c) Serious impact on one conservation practice	3
d) Serious impact on more than one conservation practices	5
Total Possible Points	**15**
Total Points for Part 3	**6**

<u>Part 4. Biological Characteristics</u>

This part evaluates the biological properties which indicate the natural ability of the species or release to propagate and maintain itself under natural conditions. Note: these criteria relate to the species <u>under natural conditions</u>, as opposed to the species under managed conditions used to increase the species, i.e. seed increase programs, or specific propagation methods which do not normally occur in nature.

1) Typical mode of reproduction under natural conditions

a) Plant does not increase by seed or vegetative means (<u>skip to #11</u>)	0
b) Reproduces almost entirely by vegetative means	1
c) Reproduces only by seeds	**3**
d) Reproduces vegetatively and by seed	5

2) Reproduction (by seed or vegetative) in geographic area of intended use

a) Reproduces only outside the geographic area of intended use	1
b) Reproduces within the geographic area of intended use	3
c) Reproduces in all areas of the United States where plant can be grown	**5**

3) Time required to reach reproductive maturity by seed or vegetative methods

a) Requires more than 10 years	1
b) Requires 5-10 years	2
c) Requires 2-5 years	3
d) Requires 1 year	**5**

<u>** If reproduces only by seed, skip to #5</u>

4) Vegetative reproduction (by rhizomes, suckering, or self-layering)

a) Vegetative reproduction rate maintains population (plant spreads but older parts die out)	1
b) Vegetative reproduction rate results in moderate increase in population size (plant spreads <3' per year)	3
c) Vegetative reproduction rate results in rapid increase in population size (plant spreads >3' per year)	5

** If reproduces only vegetatively, skip to #11

5) Ability to complete sexual reproductive cycle in area of intended use

a) Not observed to complete sexual reproductive cycle in the geographic area of intended use, but completes sexual reproduction in distant areas of the United States 1

b) Not observed to complete sexual reproductive cycle in the geographic area of intended use, but completes sexual reproduction in adjoining geographic areas 3

c) Observed to complete the sexual reproductive cycle in the geographic area of intended use **5**

6) Frequency of sexual reproduction for mature plant

a) Almost never reproduces sexually 0

b) Once every five or more years 1

c) Every other year 3

d) One or more times a year **5**

7) Number of viable seeds per mature plant each reproductive cycle

a) None (does not produce viable seed) 0

b) Few (1-10) 1

c) Moderate (11-1,000) **3**

d) Many-seeded (>1,000) 5

8) Dispersal ability

a) Limited dispersal (<20') and few plants produced (<100) 1

b) Limited dispersal (<20') and many plants produced (>100) 3

c) Greater dispersal (>20') and few plants produced (<100) **7**

d) Greater dispersal (>20') and many plants produced (>100) 10

9) Germination requirements

a) Requires open soil and disturbance to germinate **1**

b) Can germinate in vegetated areas but in a narrow range or in special conditions 5

c) Can germinate in existing vegetation in a wide range of conditions 10

10) Hybridization

a) Has not been observed to hybridize outside the species **0**

b) Hybridizes with other species in the same genera 3

c) Hybridizes with other genera 5

11) Competitive ability (of established plants)

a) Poor competitor for limiting factors	0
b) Moderately competitive for limiting factors	**5**
c) Highly competitive for limiting factors	10
Total Possible Points	**70**
Total Points for Part 4	**39**

References

Many of the criteria used in this rating system were adapted from the following sources:

Hiebert, Ron D. and James Stubbendieck. 1993. Handbook for Ranking Exotic Plants for Management and Control. US Department of the Interior, National Park Service, Denver, CO.

Randall, John M., Nancy Benton, Larry E. Morse, and Gwendolyn A. Thornhurst. 1999. Criteria for Ranking Alien Wildland Weeds. The Nature Conservancy, Arlington, VA.

Section B. Scoring and Interpretation

Based on the scores from above, circle the points range you scored to determine the appropriate interpretation. The interpretation will be used to determine the course of action for the release.

Part	Points Scored	Interpretation
Part 1. Impacts on Habitats, Ecosystems, and Land Use	0-15	**Low** chance plant is going to affect the environment
	16-25	**Mod**erate chance plant is going to affect the environment
	26-45	**High** chance plant is going to affect the environment
Part 2. Ease of Management	0-20	**Easy** to control
	21-30	**Mod**erate to control
	31-40	**Diff**icult to control
Part 3. Conservation Need and Plant Use	0-5	**Low** need
	6-9	**Mod**erate need
	10-15	**High** need
Part 4. Biological Characteristics	0-25	**Low** chance plant is going to propagate and increase itself
	26-40	**Mod**erate chance plant is going to propagate and increase itself
	41-70	**High** chance plant is going to propagate and increase itself

Release Documentation
For
Maple Grove Lewis Flax

Stanley G. Kitchen, USDA Forest Service, Rocky Mountain Research Station, Shrub Sciences Laboratory
Loren St. John, USDA Natural Resources Conservation Service, Aberdeen Plant Materials Center

Common Garden Studies

Common gardens were established at two sites in the spring of 1989 with greenhouse-reared transplants of Lewis flax and the blue flax cultivar 'Appar' as part of cooperative research studies conducted by the USDA Forest Service, Intermountain Research Station, Shrub Sciences Laboratory and the USDI Bureau of Land Management, Idaho State Office. The primary objective was to evaluate drought tolerance. Lewis flax transplants were grown using seed collected from 14 native populations representing four western states (Table 1). A randomized block design was used with three replications (plots) for each accession planted at each site. Individual plots consisted of four rows of six plants each (24 total). Within and between row spacing was 60 and 120 cm, respectively.

Common garden sites were located near Orchard, ID and Nephi, UT. The Orchard site lies approximately 32 km southeast of Boise at an elevation of 970 m. The soil is a deep sandy loam with good to moderately good drainage and 0 to 2 percent slope. Mean annual precipitation is 280 mm occurring primarily during winter and spring. Native vegetation in the surrounding area is dominated by Wyoming big sagebrush. The second site is located 13 km southwest of Nephi, Utah on the Utah State University Agricultural Station farm. Elevation is 1,590 m. The soil is a deep, loamy clay on a 0 to 2 percent slope. Mean annual precipitation is 340 mm. Native vegetation is dominated by basin big sagebrush. Both sites had been in cultivation and were fallowed prior to planting.

Plants were rated annually for survival and vigor from 1989 to 1992. Individual vigor scores on a scale of 1 (low) to 5 (high) were assigned subjectively to each surviving plant based on abundance and condition of leaves and stems, flower production, and overall succulence. In the spring of 1990 a naturally occurring rust infestation developed in the Nephi plots. Plants were scored on a scale of 0 (no visible evidence of rust) to 5 (visible evidence of infection on more than 90 percent of plant parts). In May 1990 all plants at this site were treated with the systemic fungicide, Plantvax.

Mean transplant survival 5 months after planting at the Orchard site was 19.2 percent (Table 2). Survival of eight Lewis flax accessions was not significantly different than for 'Appar' blue flax. In 1990 mean survival had dropped to 15.7 percent. 'Appar' and five Lewis flax populations were not significantly different at this point. Mean survival after 2 years was less than 5 percent for all accessions. This site is clearly too droughty for long-term persistence of flax accessions tested. Although the Maple Grove accession had a

Table 1-Collection site information for 19 Lewis flax accessions. Studies are: common gardens (1), seed production (2), greenhouse emergence (3), and field seedings (4).

Collect Name	County	State	Elevation	Mean Annual Precip.	Vegetation Type	Studies
			m	*mm*		
Confusion Range	Millard	UT	1,870	220	Desert shrub-grass	1,2,3,4
Potosi	Clark	NV	1,850	250	Pinyon-juniper	1,2,3
Burr Trail	Garfield	UT	2,030	250	Pinyon-juniper	1,2,3,4
Yuba Dam	Juab	UT	1,630	330	Sagebrush-grass	1,3,4
Mona	Juab	UT	1,540	340	Sagebrush-grass	1,2,3
Cove Fort	Millard	UT	1,760	340	Sagebrush-grass	1,2,3
Maple Grove	**Millard**	**UT**	**1,920**	**350**	**Sagebrush-grass**	**1,2,3**
Lava Hot Springs	Bannock	ID	1,460	360	Sagebrush-grass	1,2,3,4
Little Antelope Summit	White Pine	NV	2,270	360	Pinyon-junper-Mtn. brush	3
Black Hills	Custer	SD	1,340	360	Ponderosa pine-Mtn. mahogany	3
Fort Collins	Larimer	CO	1,760	380	Ponderosa pine-Mtn. mahogany	3
Asotin	Asotin	WA	320	380	Palouse grassland	1,2,3,4
Provo Overlook	Utah	UT	1,970	430	Sagebrush-grass	1,2,3,4
Blue Springs Hill	Box Elder	UT	1,570	430	Sagebrush-grass	1,2,3
Hyde Park	Cache	UT	1,540	440	Sagebrush-grass	1,2,3
Richmond	Cache	UT	1,710	470	Sagebrush-grass	1,2,3
Parley's Summit	Summit	UT	2,060	580	Mountain brush	1,2,3
Panguitch Lake	Garfield	UT	2,580	580	Ponderosa pine-bitterbrush	3
Elk Knoll	Sanpete	UT	3,160	710	Subalpine herbland	3
'Appar'	--	--	--	--	--	1,2,3,4

Table 2-Survival and vigor of 14 Lewis flax accessions and 'Appar' blue flax at the Orchard, ID common garden planted March 1989. Survival for all accessions was less than 5 percent in 1991. Plant vigor is on a scale of 1 (low) to 5 (high). Within columns, means followed by the same letter are not significantly different at the *P* < 0.05 level (Student-Neuman-Keuls multiple range test).

Collection	Transplant Survival		Vigor 1990
	1989	1990	
	--------- *percent* ----------		
Confusion Range	33a	31ab	4.1a
Potosi	31ab	28abc	3.4ab
Burr Trail	31ab	26abcd	3.4ab
Yuba Dam	10bcde	10cdef	3.0abc
Mona	26abc	24abcd	3.4ab
Cove Fort	2e	2f	4.0a
Maple Grove	**10bcde**	**8def**	**3.6ab**
Lava Hot Springs	13bcde	10cdef	2.6abcd
Asotin	8cde	7def	2.9abcd
Provo Overlook	25abc	22abcde	3.3ab
Blue Springs Hill	19abcd	15bcdef	1.5cd
Hyde Park	21abcd	9cdef	1.6cd
Richmond	17abcd	7def	1.3d
Parley's Summit	7de	2f	2.0bcd
'Appar'	35a	35a	3.8ab

relatively low 1989 survival rating at this site, its 1990 mean vigor rating (3.6) was greater than the overall mean (2.9) and not significantly lower than any other accession.

Transplant survival at the Nephi common garden during the second growing season (1990) was uniformly high with a mean of 95.3 percent. Considerable among-accession variation in mortality was observed from 1990 to 1992 (Figure 1). Maple Grove survival in 1992 (78 percent) was higher than all but the Asotin, WA accession (96 percent). Mortality was significantly correlated with 1990 mean rust index values ($r^2 = 0.52$) even though visible evidence of rust infection was absent in 1991 (possibly due to the fungicide treatment). Mean rust index varied among accessions from 0.0 ('Appar') to 4.6. Maple Grove mean rust index was 0.4 and was among the lowest for the native Lewis flax accessions. Although mean vigor ratings varied annually reflecting variation in environmental conditions, the four-year mean for Maple Grove germplasm (2.88) was the highest of all flax accessions, 'Appar' included (Table 3).

Individual Plant Seed Production

Flower, fruit, and seed production were determined on an individual plant basis at the Nephi common garden in 1990 and repeated in 1991. Two weeks before flowering, eight

vigorous, non-border plants were selected from the three plots representing each accession. Flower bearing stems were counted after flowering had ceased. Estimates of

Figure 1-Survival of eight representative Lewis flax accessions and 'Appar' blue flax at the Nephi common garden. Greenhouse-reared seedlings were planted in April 1989. Mortality from 1989 to 1992 was significantly correlated with severity of rust infection ($P < 0.05$, $r^2 = 0.52$).

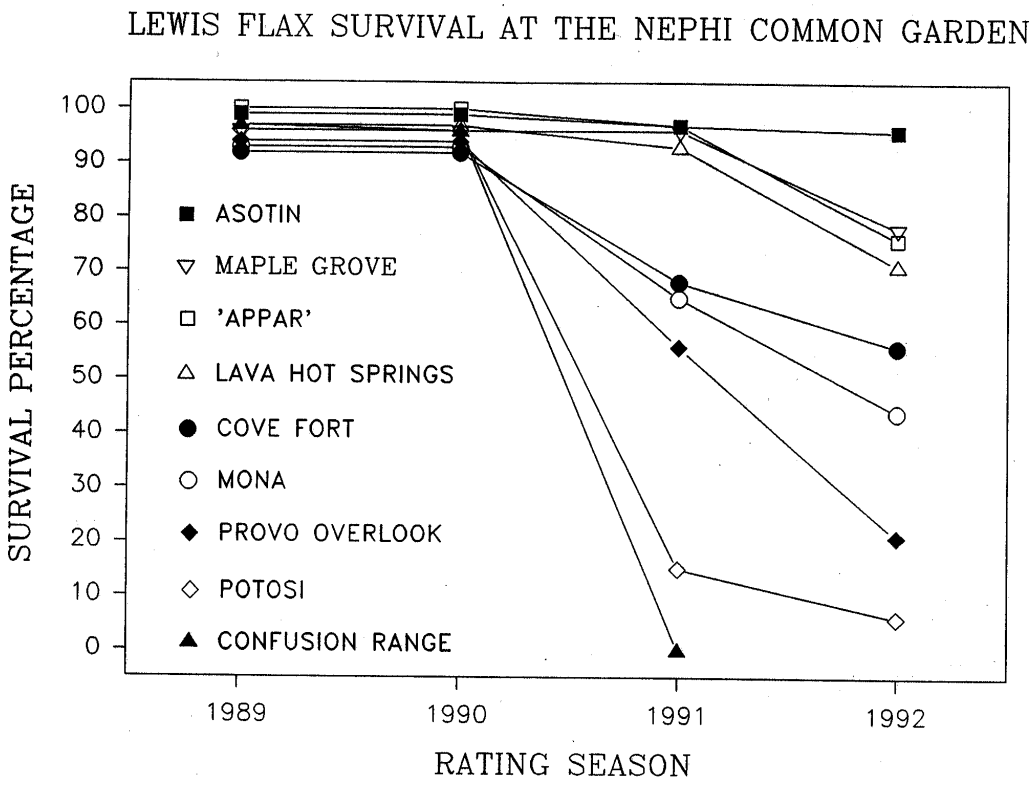


Table 3-Mean vigor ratings and rust indices for transplants of 14 Lewis flax accessions and 'Appar' blue flax at the Nephi common garden. Plant vigor is on a scale of 1 (low) to 5 (high). Rust index values were scored from 0 (no infection) to 5 (visible evidence of infection on more than 90 percent of the plant). Within columns, means followed by the same letter are not significantly different at the $P < 0.05$ level (Student-Newman-Keuls multiple range test).

Collection	Mean Vigor				Mean Rust
	1989	1990	1991	1992	Index (1990)
Confusion Range	2.9a	2.3b	--	--	4.6a
Potosi	2.6abcd	2.2bc	1.4c	2.5abc	1.0d
Burr Trail	2.7abcd	2.0cd	1.6e	2.2abc	1.4c
Yuba Dam	2.9a	2.1cd	1.8e	2.2abc	1.8b
Mona	2.4dce	2.4abc	2.9bcd	2.5abc	1.2c
Cove Fort	2.7abc	2.0cd	2.8cd	2.4abc	1.0d
Maple Grove	**2.9a**	**2.6a**	**3.4abc**	**2.6abc**	**0.4f**
Lava Hot Springs	2.5bcde	2.4ab	2.9cd	2.1abc	0.6e
Asotin	2.2	1.9de	3.3abc	2.9a	0.3f
Provo	2.8ab	2.1cd	2.4d	2.3abc	1.7b
Overlook					
Blue Springs Hill	2.6abcd	2.0cd	3.1bc	1.8bc	1.0d
Hyde Park	2.4de	2.1cd	3.5abc	2.0bc	0.6e
Richmond	2.9a	1.9de	2.9bcd	1.7c	1.0d
Parley's Summit	2.1e	1.7e	3.6ab	2.2abc	0.1g
'Appar'	2.9a	2.1cd	3.9a	2.5abc	0.0g

the mean number of flowers and fruits per stem were determined by counting fruits and aborted flowers on a sub-sample of 20 (1990) or 10 (1991) stems for each study plant. Twenty fruits were harvested from each plant (1990 only) just prior to ripening and harvested seeds were used to estimate mean fruit fill for each plant. Seed weight was determined using four replications of 100 seeds. Estimates of the total number and weight of seeds produced by each plant were calculated from these data. Four accessions of Lewis flax with the highest levels of mortality (apparently related to high rust infection during the previous year) were not samples in 1991.

For both study years, "Appar' blue flax plants produced more flowers and fruits per plant than all Lewis flax accessions tested (Table 4). The number of flower bearing stems per plant and the number of flowers per stem varied considerably among Lewis flax

accessions and between study years. Further studies of the mechanisms that control these variables and the relative importance of these variables in determining whole plant fecundity may provide valuable insight both for agronomic seed production and in understanding the ecology of this species in its varied natural environments. Variation in fruit set percentage was primarily associated with differences in the two study years. The Maple Grove 2-year mean for fruits per plant (2,687) was a close second among Lewis flax accessions.

Table 4-Stem, Flower, and fruit production for 13 Lewis flax collections and 'Appar' blue flax at the Nephi common garden in 1990 and 1991.

Accession	Year	Stems per plant	Flowers per stem	Flowers per plant	Fruit set	Fruits per plant
					%	
Confusion	1990	80	26	2,029	.81	1,644
Range	1991	--	--	--	--	--
Potosi	1990	50	31	1,467	.75	1,072
	1991	--	--	--	--	--
Burr Trail	1990	85	21	1,790	88	1,601
	1991	--	--	--	--	--
Mona	1990	86	29	2,420	67	1,621
	1991	53	25	1,386	51	712
Cove Fort	1990	83	34	2,745	80	2,194
	1991	32	37	1,184	48	563
Maple	**1990**	**65**	**36**	**2,309**	**79**	**1,845**
Grove	**1991**	**56**	**30**	**1,692**	**50**	**842**
Lava Hot	1990	61	34	2,018	76	1,576
Springs	1991	25	38	1,051	50	527
Asotin	1990	36	37	1,293	88	1,125
	1991	45	22	1,192	34	403
Provo	1990	124	20	2,562	62	1,686
Overlook	1991	--	--	--	--	--
Blue	1990	63	36	2,256	86	1,927
Springs	1991	71	31	2,052	39	805
Hill						
Hyde Park	1990	45	33	1,467	79	1,175
	1991	57	37	2,006	49	987
Richmond	1990	51	33	1,601	75	1,193
	1991	40	25	1,043	57	594
Parley's	1990	26	46	1,150	87	1,006
Summit	1991	44	38	1,690	34	581
'Appar'	1990	92	60	5,678	67	3,859
	1991	84	48	4,060	57	2,313

As was expected (due to the high number of fruits produced), per plant seed production for ‘Appar’ blue flax exceeded that of all Lewis flax accessions in 1990 and 1991, both in terms of seed number and seed weight (Table 5). Estimates of fruit fill (mean of 87.5 percent; 1990 only) were similar for all accessions. Lewis flax seed size varied from 343 to 527 seeds per gram. ‘Appar’ blue flax seeds were smallest at 641 per gram. At 452 seeds per gram, Maple Grove seed size was intermediate for that observed for Lewis flax accessions that were tested. The 2-year estimate of total per-plant seed weight produced by the Maple Grove plants (57 g) was 64 percent of that yielded by ‘Appar’ plants (89g) and among the highest observed for the Lewis flax accessions.

Table 5- Seed production per plant for 13 accessions of Lewis flax and ‘Appar’ at the Nephi common garden. Within columns, means followed by the same letter are not significantly different at the *P* < 0.05 level (Student-Newman-Keuls multiple range test).

Accession	Mean seed number per plant		Seeds per	Mean seed weight per plant	
	1990	1991	gram	1990	1991
Confusion Range	15,114b	--	465	33abc	--
Potosi	9,548b	--	343	28bc	--
Burr Trail	14,784b	--	428	35abc	--
Mona	14,466b	7,122b	360	40ab	20b
Cove Fort	18,820b	5,626b	474	40ab	12b
Maple Grove	**17323b**	**8,418b**	**452**	**38ab**	**19b**
Lava Hot Springs	13,788b	5,266b	392	35abc	13b
Asotin	7,544b	4,031b	513	15c	8b
Provo Overlook	14,781b	--	365	40ab	--
Blue Springs Hill	16,865b	8,046b	481	35abc	17b
Hyde Park	10,375b	9,871b	362	29bc	27ab
Richmond	10,582b	5,939b	381	28bc	16b
Parley’s Summit	8,988b	5,805b	527	17bc	11b
‘Appar’	34,012a	23,126a	641	53a	36a

Seedling Emergence and Vigor

Seedling vigor was evaluated for 19 Lewis flax accessions and ‘Appar’ by means of greenhouse seedling emergence trials. A randomized block design was used to partition

variation due to greenhouse position. For each accession, three 70-cm rows of 50 seeds each were planted at a depth of 3.2 cm in a well-drained loamy sand. Row spacing was 6 cm. Water was added periodically so as to not be limiting. Seedling emergence and growth were evaluated weekly for 6 weeks after planting. Emergence percentages were adjusted based upon the results of laboratory germination percentages. Successful emergence varied from 89 to 18 percent. Maple Grove emergence (68 percent) was not significantly different than the highest values observed. Emergence and growth rates were similar for all intermountain collections from semi-arid environments.

Field seedings of 'Appar' blue flax and six Lewis flax accessions were established in the fall of 1991 at both common garden sites and at a third site 13 km north of Dugway, UT. Seeds were planted using a modified garden planter into sets of four parallel furrows 2.5 m in length. Seeding rate was approximately 67 seeds per m of row and seeding depth was 1 to 2 cm. Three of these plots were planted for each accession at each site in a randomized complete block design.

Mean seedling emergence in the spring of 1992 was 18, 23, and 63 percent at the Orchard, Nephi, and Dugway sites, respectively. Among-accession variation was relatively low and not predictable based on performance at any other site or on the greenhouse emergence trial results. Seedlings at the Orchard and Dugway sites failed to survive to the summer of 1993 while plants at the Nephi site were generally vigorous, producing flowers and seed in the second year of growth. Although the Maple Grove accession was not included in these trials, those that were demonstrated the ability of Lewis flax accessions from a variety of semi-arid sites to establish from seed with success similar to that experienced by 'Appar' blue flax.

Cultivated Seed Production

The selection of the Maple Grove germplasm for potential release over other possible Lewis flax accessions was made in 1997 after a review of the data presented above. At that time questions remained regarding the establishment, growth, and seed production of Maple Grove germplasm using established agronomic practices. In addition there was essentially no seed available for increase. Consequently, approximately 200 container stock plants were green-house reared from G0 seed during the winter of 1997-1998. These seedlings were transplanted to the Snow Field Station in Ephraim, UT in May 1998. Seed (G1) was collected from these transplants in 1998 and 1999. Seed of both years was combined and used for establishing drilled seeding trials in 2000 at the Aberdeen Plant Materials Center (PMC) and the Snow Field Station.

On May 24, 2000 two 26 m (84 ft) rows each of 'Appar' blue flax and Maple Grove Lewis flax G1 were seeded in field 15 at the Aberdeen PMC home farm. Seed was planted with a Planet Junior seeder pulled by a tractor. The seeding rate was 82-98 pure live seeds (PLS) per m (25-30 PLS per ft) and rows were spaced 91 cm (36 in) apart. During the establishment year, the Maple Grove accession had the best stand. On September 8, 2000 the plots were evaluated for percent stand, plant height, and vigor. Percent cover for 'Appar' ranged from 40 – 45 percent and plants were 6 – 10 cm tall.

The Maple Grove accession had a 65 – 75 percent stand and plants were 8 – 12 cm tall. Vigor for both accessions was good but the Maple Grove accession clearly had the best vigor.

Observations during the 2001 growing season indicated that the Maple Grove accession appeared to have a slightly better stand than 'Appar' but overall plant health and vigor were equal. On June 1, both accessions were flowering. On July 2, the plots were observed for seed ripeness and both accessions were in the late milk to early dough stage. On July 24, three randomly located 3 m (10 ft) plots were harvested from both accessions for seed yield comparison. All remaining Maple Grove plants were harvested for seed increase. Seed was bagged, allowed to dry, and cleaned.

On May 8, 2002 the trial was evaluated for basal cover and plant height. Maple Grove had 67 percent basal cover and averaged 28 cm tall. 'Appar' had 44 percent basal cover and averaged 31 cm tall. Plots were harvested for seed yield comparison a second time on July 19, 2002 using 2001 protocols. All Maple Grove plants were again harvested for seed increase.

Data in Table 6 show Maple Grove yielded 92 and 119 percent of what 'Appar' produced in 2001 and 2002, respectively. This difference in seed production must be qualified due to the substandard stand of 'Appar' as evidenced by basal cover data. Long-term yield data for Appar is 806 kg per ha (720 lbs per acre). By comparing these yield data for the Maple Grove germplasm (mean 632 kg per ha) to the long-term data of 'Appar', it is estimated that Maple Grove may produce seed yields of 70 to 90 percent of that of 'Appar'.

Table 6-Two-year comparative seed yields for Maple Grove Lewis flax and "Appar' blue flax at the Aberdeen PMC.

	Maple Grove		Appar	
Sample	2001	2002	2001	2002
	---------- kg/ha ----------			
1	636	422	472	162
2	632	504	744	781
3	640	960	852	796
Mean	636	628	689	580
	(568 lb/a)	(561 lb/a)	(615 lb/a)	(518 lb/a)

The total 2001 harvest for Maple Grove germplasm at the Aberdeen PMC (including the sample data) was 1.89 kg of seed. This is equivalent to 404 kg per ha (361 lbs per a), which is 50 percent of the long-term yield of 'Appar'. In 2002, the total seed harvest was 2.18 kg or 465 kg per ha (415 lbs per acre), which is 57 percent of the long-term yield of 'Appar'.

Seed was not harvested from these plots in 2003 because the Maple Grove plants had begun to die out and 'Appar' volunteer plants (from un-harvested seeds on neighboring rows) were becoming established in their place.

Drill rows of Maple Grove and 'Appar' were also planted at the Snow Field Station in 2000. As was the case at the Aberdeen PMC, Maple Grove produced a better stand than did 'Appar' at this site. Seed yields were compared by harvesting four replications of 10 plants from both flaxes for 2 years. Using these sampling protocols, we found that Maple Grove yield was 62 percent that of 'Appar' across 2 years. Seed was harvested 2 to 3 weeks earlier at this site than at the Aberdeen PMC.

Based on these data, we estimate that seed yield for Maple Grove germplasm will vary from 50 to 75 percent of what 'Appar' might yield when comparing similar stands.

Bushel weight of the Maple Grove seed harvested at the Aberdeen PMC in 2001 and 2002 was 18.6 and 18.1 kg (41 and 40 lbs) per bushel, respectively. Long-term bushel weight of Appar is 19.2 kg (47.5 lbs).

Maple Grove seed that was harvested in 2001 at the Aberdeen PMC was seeded on 0.7 ha (1.8 a) in field 3 of the same on May 31, 2002 and has been entered into certification with the Idaho Crop Improvement Association. A good stand was established. Seed yield in 2003 was 279 kg (615 lbs) or 383 kg per ha (342 lb per a). Test results indicate a purity of 99.2 percent and germ of 89 percent resulting in an inventory of 246 kg (542 lbs) pure live seed. Bushel weight was 17.6 kg (38.8 lbs).

Field longevity (sustained productivity) for Maple Grove Lewis flax will be evaluated at the Aberdeen PMC in coming years. The production field at Aberdeen will be replaced as needed using G2 see currently in cold storage (USDA Forest Service, Shrub Sciences Lab) or G1 seed if available. The Forest Service will attempt to recollect seed from the original collection site to facilitate long-term maintenance of the germplasm.

Note 1-Reciprocal crossing trials using 10 North American Lewis flax, 10 European flax, and three 'Appar' flax (certified seed and two putative original collections) accessions were conducted in 1992 as part of a study to determine taxonomic affinities for these flax taxa. Cross-pollination of Lewis flax plants with 'Appar" and European plants produced essentially no viable seeds (high levels of fruit and seed abortion) while 'Appar' and European crosses yielded good levels of fruit set (92 to 100 percent) and fill (65 to 74 percent). An absence of off-types among regenerating seedlings in common garden and seed production sites supports the conclusion that 'Appar' blue flax and North American Lewis flax populations have natural reproductive barriers that insure genetic isolation.

ON-CENTER ACTIVITIES

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 District Seed Increase (DSI) programs.

The following table illustrates seed shipments from the Aberdeen Plant Materials Center for Fiscal year 1996 through 2004:

Release Name	1996	1997	1998	1999	2000	2001	2002	2003	2004	TOTAL POUNDS
					POUNDS PLS					
Anatone bluebunch wheatgrass [2/]	-	-	-	-	-	-	-	-	20	20
Appar prairie flax	455	150	950	115	320	300	470	65	0	2825
Bannock thickspike wheatgrass	215	175	425	610	275	250	550	25	0	2525
Delar small burnet	0	0	550	0	451	150	75	0	1250	2476
Ephraim crested wheatgrass	713	1000	100	50	260	455	696	0	200	3474
Snake River Plains fourwing saltbush	-	-	-	-	-	-	25	5	2	32
Goldar bluebunch wheatgrass	175	200	200	370	175	100	375	250	200	2045
Hycrest crested wheatgrass	1000	1550	0[1/]	0	0	0	0	0	0	2550
Magnar basin wildrye	0	250	180	901	517	1035	490	150	245	3768
Maple Grove Lewis flax [2/]	-	-	-	-	-	-	-	-	240	240
Nezpar Indian ricegrass	0	325	350	100	900	150	75	340	0	2240
P-27 Siberian wheatgrass	250	1000	200	25	150	200	500	0	0	2325
Clearwater Selection Penstemon	0	0	1	0	1	10	1	10	4	27
Richfield Selection Penstemon	0	0	6	5	5	1	7	6	3	33
Paiute orchardgrass	400	250	0	250	101	450	200	0	0	1651
Regar meadowbrome	10	0	305	800	670	1061	207	50	50	3153
Rush intermediate wheatgrass	75	400	1820	1000	215	525	0	0	0	4035
Sodar streambank wheatgrass	0	100	250	100	860	500	500	200	0	2510
Tegmar dwarf intermed. wheatgrass	0	0	200	0	100	0	0	0	200	500
Northern Cold Desert winterfat-	-	-	-	-	-	-	8	3	8	19
TOTAL POUNDS	3293	5400	5537	4326	5000	5187	4179	1104	2422	36,448

[1/] Foundation seed production of Hycrest crested wheatgrass was transferred to Meeker, Colorado Environmental Plant Center.
[2/] Approved for release in 2004.

Aberdeen Plant Materials Center

2004 FIELD ANNUAL PLAN OF OPERATION

HOME FARM

Field	Acres	Crop	Operation
1	1.7	Bannock (2000)	Manage for Foundation Seed production.
2	2.3	Bannock (1999)	Manage for Foundation seed production.
3	1.8	Maple Grove Flax (2002)	Manage for Certified seed production.
4	1.4	Constructed Wetland Ponds (1992)	Manage per constructed Wetland project plan.
5	2.4	Magnar (2000)	Manage for Foundation seed production.
6	2.4	Anatone Bluebunch (2004)	Establish and manage for Certified seed production.
7	3.2	Regar (2003)	Establish and manage for Foundation seed production.
8	3.2	Ephraim (2003)	Establish and manage for Foundation seed production.
9	3.2	Potatoes (2004)	U of I will plant potatoes.
10	3.2	Magnar (1995)	Manage for Foundation seed production.
11	1.1	Anatone Bluebunch (2002)	Manage for Certified seed production. Establish grass road on north side of field.
11	0.2	9067402 Mutton grass (2002)	Manage for increase and potential release.
12	1.4	USFS Forbs (2004)	Establish and evaluate for potential release.
13N	0.1	Penstemon (2003)	Manage for Certified seed production.
13S	1.3	Fallow (2003)	Fallow as needed to control weeds.
14	1.2	Woody Display Nursery (1995)	Maintain display of woody conservation plants. Manage Durar/Covar cover crop.
	-	Penstemon (1996)	Manage for Certified seed production (final year).
15	1.4	Field windbreak (2000)	Maintain Simon poplar field windbreak.
		USFS Flax test (2000)	Maintain and evaluate according to project Plan.
16	1.0	Fallow	Fallow as needed for weed control.
17	0.5	Hybrid Poplars (1998)	Manage and evaluate according to project plan.

Aberdeen Plant Materials Center

2004 FIELD ANNUAL PLAN OF OPERATION (continued)

HOME FARM

Field	Acres	Crop	Operation
18-19	0.9	Fourwing and winterfat (1999)	Manage for Certified seed production.
20	1.5	Grass Display Nursery (2002)	Manage for display.
Headquarters			Maintain buildings and grounds.

Aberdeen Plant Materials Center

2004 FIELD ANNUAL PLAN OF OPERATION

FISH AND GAME FARM

Field	Acres	Crop	Operation
21W	2.3	Alfalfa (2001)	Manage for hay production and wildlife benefits.
21E	1.4	Pipe yard (2004)	Establish permanent yard for pipe storage.
21N	1.3	Bozoisky Cover crop	Maintain as needed for permanent cover.
22W	1.5	Bannock (2003)	Manage for Foundation seed production.
22E	2.6	Goldar (2002)	Manage for Foundation seed production.
22E	1.3	Willow IEP (1984)	Maintain as needed.
23W	2.4	Wildlife Food Plot (2004)	Establish and maintain corn for wildlife use.
23M	--	Windbreak	Maintain and irrigate as needed.
23E	2.2	Wildlife Food Plot (2004)	Establish and maintain wheat for wildlife use.
24	1.1	Windbreaks	Maintain and irrigate as needed.
24W	2.2	Paiute (2001)	Manage for Foundation seed production.
24E	1.5	Durar Cover Crop	Maintain as needed.
25	5.1	Alfalfa (2003)	Establish and manage for hay production and wildlife benefits.
26W	1.0	Wildlife Food Plot (2004)	Establish and maintain wheat for wildlife use.
26E	2.7	Willow Increase Block (1994)	Irrigate according to irrigation plan and control weeds. Maintain Durar/Covar mix between rows for permanent cover.
27	4.4	Wildlife Food Plot (2004)	Establish and maintain corn for wildlife use.
28	5.3	Alfalfa (2004)	Establish and manage for hay production and wildlife benefits.
29W	1.3	Willows (1994)	Irrigate and control weeds according to Wetland Project plan.
29E	3.7	Goldar (2000)	Manage for Foundation seed production.

Aberdeen Plant Materials Center

2004 FIELD ANNUAL PLAN OF OPERATION (continued)

FISH AND GAME FARM

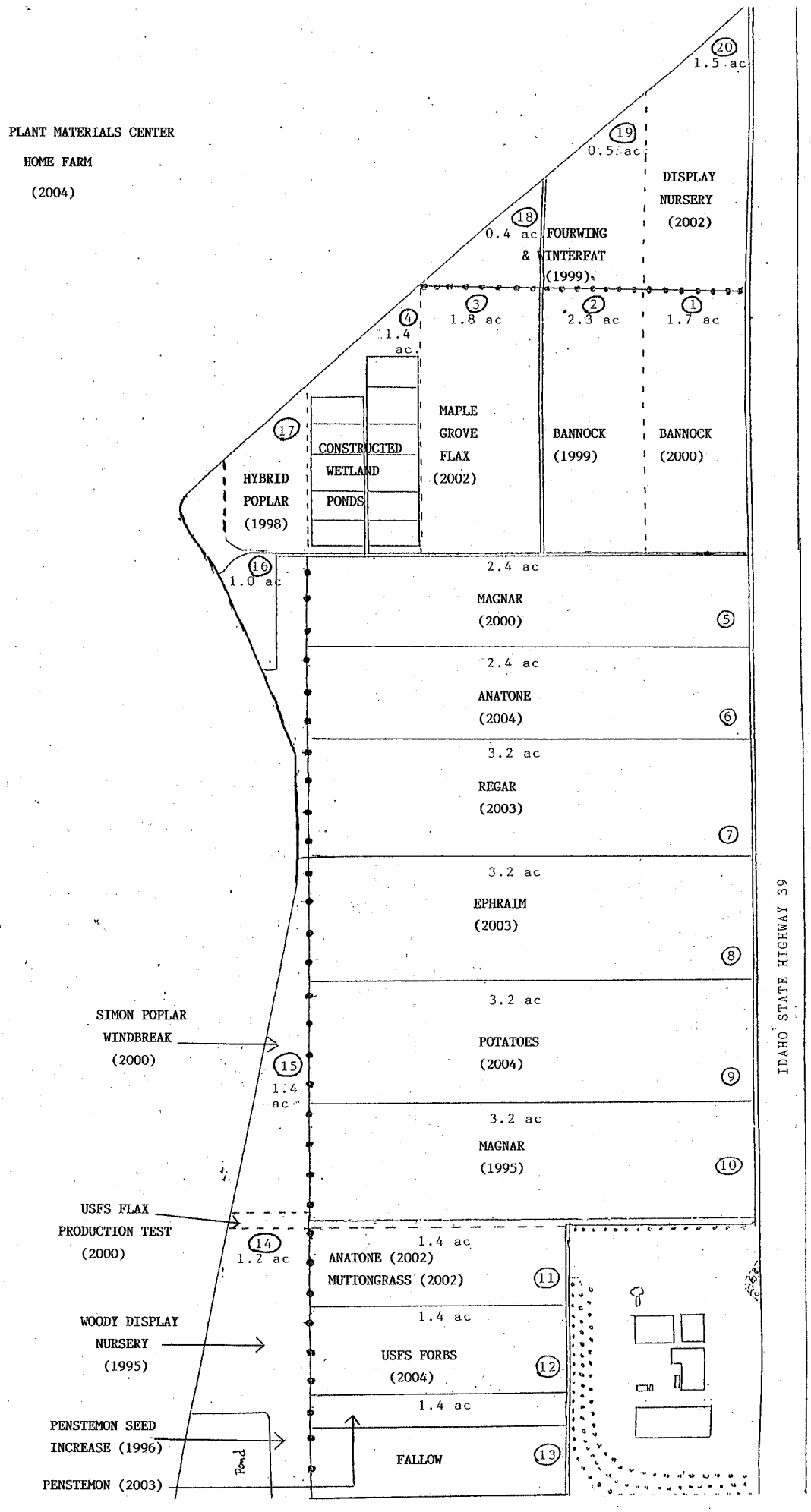
Field	Acres	Crop	Operation
30W	0.7	Windbreak/Guard Row	Maintain and irrigate as needed.
30W	2.5	Potatoes (2004)	University to plant potatoes. University will plant wildlife food plot for mitigation on University Farm.
30E	2.3	USFS Grasses (2004)	Establish and evaluate for potential release.
31	5.1	Alfalfa (1995)	Manage for hay production and wildlife benefits.
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.

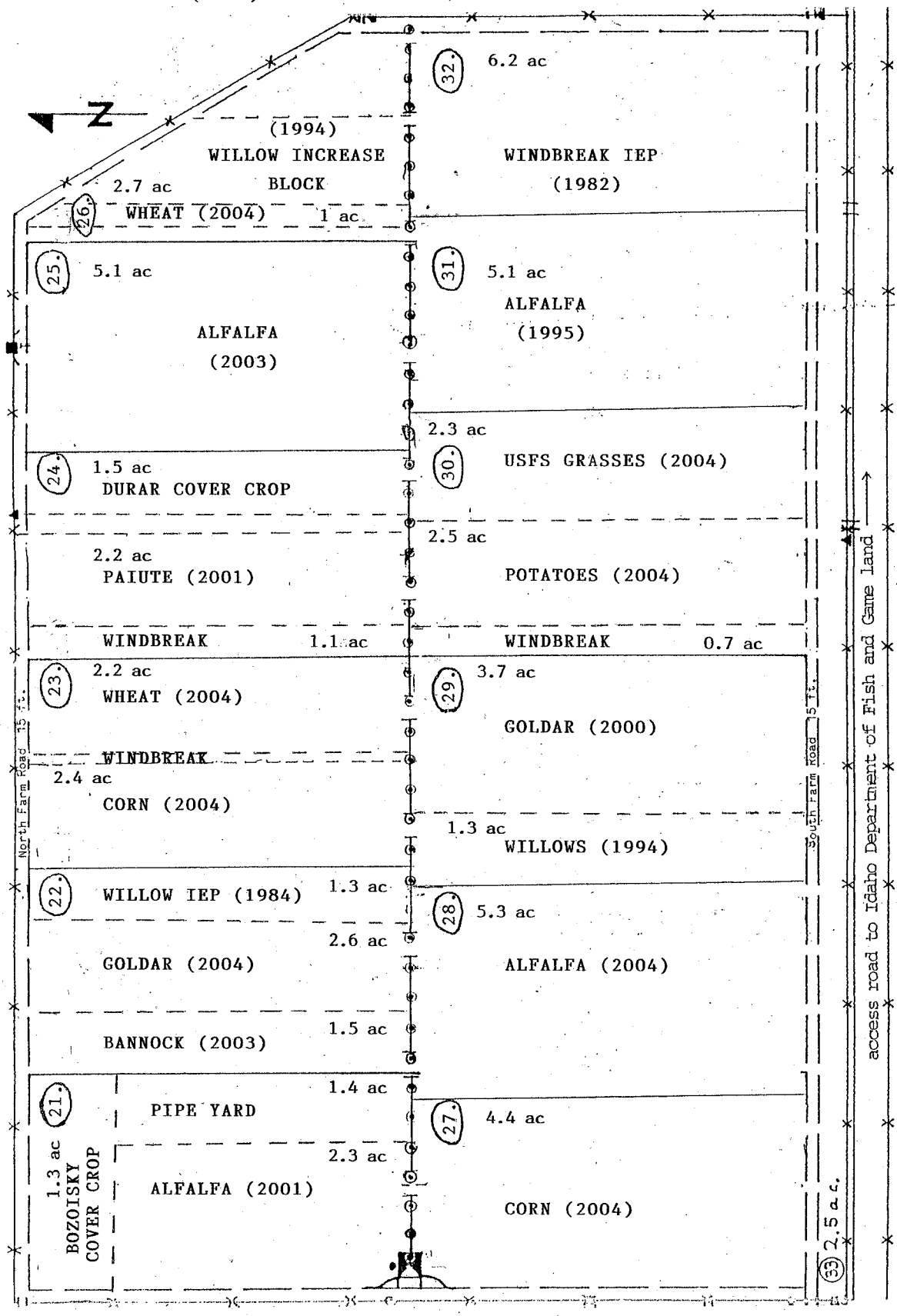
Irrigated, permanent grass cover seedings will not be mowed prior to July 1 and not after August 1 and will be irrigated a minimum of 3 times. Non-irrigated grass cover seedings will not be mowed. Early mowing or mowing of non-irrigated grass cover requires notification to and inspection by Fish and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

BREWINGTON FARM (U of I)

Field	Acres	Crop	Operation
409	4.25	Nezpar (2000)	Manage for Foundation seed production.


PLANT MATERIALS CENTER
HOME FARM
(2004)
20
1.5 ac
19
0.5 ac
DISPLAY
NURSERY
(2002)
18
0.4 ac
FOURWING
& WINTERFAT
(1999)
3
1.8 ac
2
2.3 ac
1
1.7 ac
4
1.4
ac.
MAPLE
GROVE
FLAX
(2002)
BANNOCK
(1999)
BANNOCK
(2000)
17
CONSTRUCTED
WETLAND
PONDS
HYBRID
POPLAR
(1998)
16
1.0 ac
2.4 ac
MAGNAR
(2000)
5
2.4 ac
ANATONE
(2004)
6
3.2 ac
REGAR
(2003)
7
3.2 ac
EPHRAIM
(2003)
8
3.2 ac
POTATOES
(2004)
9
3.2 ac
MAGNAR
(1995)
10
SIMON POPLAR
WINDBREAK
(2000)
15
1.4
ac
USFS FLAX
PRODUCTION TEST
(2000)
14
1.2 ac
1.4 ac
ANATONE (2002)
MUTTONGRASS (2002)
11
WOODY DISPLAY
NURSERY
(1995)
1.4 ac
USFS FORBS
(2004)
12
PENSTEMON SEED
INCREASE (1996)
1.4 ac
FALLOW
13
PENSTEMON (2003)
Pond
IDAHO STATE HIGHWAY 39

FISH & GAME FARM
(2004)



CONSERVATION PLAN MAP

UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

SCS-CONS-228 Rev. 6-71
(File Code CONS-14)

2004 Progress Report
1998 Hybrid Poplar Initial Evaluation Planting
Field 17, Aberdeen PMC
Loren St. John, Team Leader

The purpose of the Hybrid Poplar Initial Evaluation Planting is to evaluate accessions of hybrid poplar currently being grown in Oregon and Washington for adaptability to northern Utah and the Upper Snake River Plain of southeast Idaho. Hybrid poplar used for fiber, fuel and other lumber products is becoming a large agroforestry business in Oregon, Washington, and western Idaho. Presently there is no commercial production of hybrid poplar in southeast Idaho or northern Utah.

Five accessions of hybrid poplar considered to be very productive and the most cold tolerant were obtained from Mount Jefferson Farms, Salem, Oregon. These accessions were planted in a complete randomized block design with 'Imperial', 'Siouxland', 'Robust', and 'Canam' as standards of comparison. The cuttings planted were dormant, 9 inches long and approximately 3/4 inch in diameter. The standards of comparison were collected at the PMC after spring growth had initiated.

Weed barrier material was installed in the clean-tilled field prior to planting. The cuttings were then hand planted through the weed barrier on May 28, 1998 so that only one bud was above the soil surface. Planting a cutting with only one bud above the soil surface increases the chance that the cutting will develop a single trunk which is desirable for wood production. Weed control needs were minimal because of the installation of weed barrier material. On June 1, 1999 forty-three plots were re-planted. The replacements were for those plots that did not establish during the first growing season. The evaluation planting is irrigated with a solid-set handline sprinkler system.

Between-row weed control was accomplished with mechanical cultivation between 1998 and 2000. The between-row area was seeded to a mixture of 'Durar' hard fescue and 'Bighorn' sheep fescue (3.5 pounds PLS per acre of each species) in June, 2001. The grass seeding is well established and controlling weeds.

In March, 2003 before buds began to break, the trees were pruned to remove all basal branches to encourage a single dominant trunk that is preferred for saw logs. No more than 50 percent of the branches on a single tree were removed. During the growing season sprouts and side branches below the prune line were removed periodically.

The plots were evaluated on September 17, 2004 and the data is summarized in Table 1. Accession no. 9076418 (OP-367) and 9076421 (52-225) continued to have the best survival. Accession no. 9076418 (OP-367) was the tallest (mean plant height 1148 cm – 452 inches) and also had the largest D.B.H. (mean 22.3 cm – 8.8 inches). This accession continues to appear to be the best adapted to the soil and climate in the Snake River Plains of southeastern Idaho. Accession no. 9076418 (OP-367) and Imperial had the best vigor ratings from the original planting. No pests were observed on the plants this year.

Of the plots re-planted in 1999, Robust continued to have the best survival and the tallest average height. Siouxland had the largest mean D.B.H. (15.0 cm – 5.9 inches) of the plots that were re-planted in 1999.

The planting will be pruned early next year during dormancy to reduce side branching and will be evaluated again next fall. The plots will be harvested in 5 years to evaluate wood production.

Table 1.
2004 Evaluation Data
1998 Hybrid Poplar Initial Evaluation Planting

Accession Number	Number Survived	Percent Survival	Plant Height (cm) Minimum	Mean	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	8	88.9	896	1148	1461	22.3	2.0
9076419 (184-411)	1	11.1	--	--	502	4.0	4.0
9076420 (50-197)	0	11.1	--	--	753	--	9.0
9076421 (52-225)	7	77.7	95	732	1018	10.3	6.8
9076422 (15-29)	4	44.4	580	672	791	6.3	7.4
Canam	2	22.2	420	716	1012	2.0	6.5
Robust	3	33.3	551	665	760	16.0	5.7
Siouxland	5	55.5	740	996	1186	15.8	4.4
Imperial	5	55.5	795	923	1156	15.0	3.6

Re-planted Hybrid Poplar 1999

Accession Number	Number Re-planted	Percent Survival	Plant Height (cm) Minimum	Avg.	Maximum	D.B.H. [1/] Mean (cm)	Vigor [2/]
9076418 (OP-367)	1	0	--	--	--	--	9.0
9076419 (184-411)	8	12	--	--	580	8.0	8.1
9076420 (50-197)	8	12	--	--	--	--	9.0
9076421 (52-225)	1	0	--	--	--	--	9.0
9076422 (15-29)	4	0	--	--	--	--	9.0
Canam	7	57	350	612	896	8.0	7.4
Robust	6	83	869	1046	1156	14.0	4.7
Siouxland	4	75	680	864	1217	15.0	4.5
Imperial	4	25	--	--	744	14.0	7.8

[1/] D.B.H. is diameter at breast height (1.4 m from ground surface)
[2/] Rated 1 – 9, with 1 best, 9 worst

Great Basin Native Plant Selection and Increase Project
FY 2003 Annual Report

Project Title: Establishment and Maintenance of Certified Foundation (G1) Seed

Project Location: NRCS Aberdeen, ID Plant Materials Center

Principal Investigators: Loren St. John, Center Manager
Dan Ogle, Plant Materials Specialist, Boise, ID

Contact Information: Aberdeen Plant Materials Center, P.O. Box 296, Aberdeen, ID 83210. Email - LorenStjohn@id.usda.gov

Plant Materials Specialist, USDA-NRCS, 9173 West Barnes Drive, Suite C, Boise, ID 83709. Email - Dan.Ogle@id.usda.gov

Description of Project: To produce Certified Foundation (G1) seed of Maple Grove Lewis flax, Anatone bluebunch wheatgrass, Snake River Plains Germplasm fourwing saltbush and Northern Cold Desert Germplasm winterfat to facilitate commercial production. Evaluate procedures for production of rooted cuttings of fourwing saltbush. Establish demonstration planting near Boise, ID.

Status Report:

Seed Production

Maple Grove Flax - Seeded 1.8 acres field 3 on May 31, 2002. Field swathed July 22, combined July 28 2003. Produced 615 pounds (342 pounds per acre), bushel weight 38.8 pounds per bushel. Seed analysis pending.

Anatone bluebunch wheatgrass - Seeded 1.0 acres field 11 on May 31, 2002. Field direct combined July 11, 2003. Produced 240 pounds (240 pounds per acre), bushel weight 22.1 pounds per bushel. Seed analysis pending.

Snake River Plains Germplasm fourwing saltbush - Produced approximately 98 pounds (seed analysis pending). Shipped 5 pounds Certified seed.

Northern Cold Desert Germplasm winterfat - Produced approximately 15 pounds (seed analysis pending). Shipped 3 pounds Certified seed.

Propagation Studies

Propagation of rooted fourwing saltbush from cuttings

Based upon cutting trials conducted in 2002, four hundred cuttings (320 female and 80 male) were harvested on August 18, 2003. Cuttings were treated with rooting hormone and planted into 40 inch^3 deep pots and placed in the greenhouse. One half of the cuttings were set on heat pads set at 85º F to evaluate the need for bottom heat. Following is a summary of rooting success and growth rates evaluated November 7, 2003:

		Leader length (cm)		
	% rooted	minimum	average	maximum
Female cuttings (bottom heat)	28.75	1.75	5.70	36
Female cuttings (no heat)	20.60	0.50	9.25	38
Male cuttings (bottom heat)	27.50	1.00	9.00	25
Male cuttings (no heat)	7.50	12.00	15.00	23

There appears to be some advantage to bottom heat during root development. The best rooting success (50 percent) was achieved from cuttings harvested August 19, 2002 which was significantly greater than achieved in 2003. In 2002, cuttings were propagated under mist as compared to overhead irrigation used in 2003. It appears there is a need to evaluate irrigation strategies to improve rooting success.

Greenhouse seedling establishment study: to evaluate fourwing saltbush seedling emergence based upon number of propagules planted per cell (5 versus 10 per cell) and to identify number of days to emergence, growth rates and transplant dates.

As reported in 2002, 75 percent of the seedlings had red stems and 25 percent had white stems at time of transplant. The question arose as to whether or not this phenological difference could be an indication of the sex of the plant. Plants are being maintained to determine if this is possible.

Establishment of Demonstration Planting near Boise

BLM burned site in fall of 2002. Site was sprayed by PMC on May 1, 2003 with Roundup and 2,4-D at 64 oz and 16 oz. per acre respectively. Spot treatment was applied May 13, 2003. Excellent kill was achieved. Due to limited breakdown of dead grass clumps that would inhibit proper seed placement with drill and to ensure a clean seedbed, the decision was made to delay seeding until the fall of 2004. The delay will allow another opportunity to apply herbicide and allow for further breakdown of the dead grass clumps. Seed of 76 accessions were obtained and a planting plan developed.

USDA Forest Service, Region 1
Native Grass and Forb Initial Evaluation
2003-2005
Preliminary Report (July 20, 2004)
Derek J. Tilley, Range Conservationist (Plants)
Loren St. John, Team Leader Aberdeen Plant Materials Center

INTRODUCTION

The purpose of this study is to evaluate native perennial grass and forb collections for use in revegetation and beautification projects in the Rocky Mountain and sagebrush steppe ecosystems of Montana and Northern Idaho. Large areas of national forest are in unsatisfactory ecological condition. Many areas are infested with invasive weeds such as cheatgrass, knapweed species, yellow starthistle, and leafy spurge. These weeds cause many problems and detract from the health and beauty of the ecosystem. When dry, the weeds provide flash fuels for fires. Increased fires create the potential for erosion and degradation of water quality and watershed values. Weeds also decrease plant community diversity, reduce habitat for wildlife and compete with threatened and endangered species.

In 2003, FS R1 collected forty one accessions of five native perennial grass species and eleven accessions of three native forb species which were sent to the USDA-Natural Resources Conservation Service-Plant Materials Center at Aberdeen, Idaho for evaluation. Of these, 37 grass and ten forb collections were chosen for testing based on seed quality and/or quantity. Total usable collections included: twelve bluebunch wheatgrass (*Pseudoroegneria spicata*), seven blue wildrye (*Elymus glaucus*), thirteen Idaho fescue (*Festuca idahoensis*), one Sandberg bluegrass (*Poa secunda*), three tufted hairgrass (*Deschampsia caespitosa*), eight common yarrow (*Achillea millefolium*), one lupine (*Lupinus* sp.) and one pearly everlasting (*Anaphalis margaritacea*). Appendix 1 lists the accessions collected, the size of each collection and collection location. This is a preliminary report of evaluations conducted in June and July, 2004.

MATERIALS AND METHODS

Harvested plant materials were cleaned at the PMC seed cleaning facilities using a wide range of machines and settings. Each accession was treated separately due to differences in the quality of pre-cleaned materials and variation in seed size. Appendix 2 provides general information regarding machine calibration and settings used for species. Adjustments will have to be made to achieve best seed purity results. Estimated viability was obtained using the kerosene heater “popping” method outlined in Ogle and Cornforth (2000). Some collections were also evaluated for viability using standard germination tests.

A seedling emergence trial was conducted in the greenhouse at the Aberdeen Plant Materials Center from February to March, 2004. The goal of this study was to determine if any accessions emerged quicker or had better seedling vigor than others. No significant differences were detected (data not shown).

The native grass field trial is being conducted at the Aberdeen Plant Materials Center, Fish and Game farm located approximately 5 miles northeast of Aberdeen, Idaho. Experimental design was a randomized complete block with four replications. Individual plots were 20 feet long and contained one row; rows were planted on three foot centers. Experimental design also contained plots of known industry standards from each species for comparison. Soil at the site is a Delco silt loam with pH of 7.4 to 8.4. Average annual precipitation is 8.75 inches. Ground was plowed in the fall of 2003 and subsequently disked and roller packed in the spring prior to planting.

Plots were seeded on May 10 and 11, 2004. Bluebunch wheatgrass and Idaho fescue were planted using a Planet Jr., while Blue wildrye, Sandberg bluegrass and tufted hairgrass were planted using a belt seeder. Planters were calibrated to plant approximately 25 Pure Live Seeds (PLS) per foot of row for large seeded species (bluebunch wheatgrass and blue wildrye) and 50 PLS per foot of row for small seeded species (Idaho fescue, Sandberg bluegrass and tufted hairgrass). Each species block contained at least two released cultivars to use as standards for comparison. Border rows of 'Tegmar' intermediate wheatgrass (*Thinopyrum intermedium*) were planted on the outside of the blocks to eliminate edge effect. Plots were sprinkler irrigated as needed throughout the growing season. Weeds were controlled with herbicide treatments and between row cultivating.

The first evaluation was conducted on June 14, 2004 when all species had reached a one to two leaf stage. Plots were evaluated for percent stand, plant density and seedling vigor. Percent stand was measured using a twenty foot rope marked with one foot increments stretched the length of the plot and anchored at either end. Plants intercepting the one foot increments are summed and recorded as a percentage. Plant density was measured by counting seedlings found in the middle two feet of row and converted to average plants per foot of row. Seedling vigor is measured on an ordinal scale of one to nine (one being most healthy and nine being dead). Entire plots were viewed and given a rating based on overall apparent vigor. Data from percent stand and plant density was analyzed for Analysis of Variance (ANOVA) and means were separated using Duncan's Multiple Range Test.

The native forb trial was planted on May 19, 2004 at the Aberdeen Plant Materials Center Home Farm approximately two miles north of Aberdeen. Site information, bed preparation and experimental design are identical to the grass trial. There are two industry standards included in the common yarrow plots, Eagle and Great Northern. There are no releases of lupine or pearly everlasting that would be comparable to our material. Yarrow plots were seeded with a target rate of 50 PLS per foot using a belt seeder. Lupine plots were seeded at 25 PLS per foot, and pearly everlasting plots were seeded at 50 PLS per foot using a Planet Jr. A border row of 'Appar' blue flax (*Linum perenne*) was planted on

either side of the trial to reduce edge effect. First evaluation was conducted on July 19, 2004. Plants ranged from two to six leaf stage. Forb plots were evaluated in the same manner as the grass plots.

2004 EVALUATIONS AND DISCUSSION (PRELIMINARY)

Evaluation of blue wildrye showed no significant differences in percent stand. Plant density showed low levels of significance. Accession 9076447 rated highest (39.0%), and Elkton rated lowest at 16.4%. Best vigor was recorded in accessions 9076446, 9076447 and Mariposa (1.8). Poorest vigor rated was 3.8 from 'Arlington' (see Table 1).

One collection of Sandberg bluegrass was compared against four industry releases (Table 2). Evaluations showed high levels of significance in all three categories solely due to the fact that accession 9076465 performed so poorly. Percent stand: worst accession 9076465 (26.5) best Mountain Home Source (95.5). Plant density: worst accession 9076465 (2.4) best Mountain Home (36.8). Seedling vigor: worst accession 9076465 (8.3) best Hanford Source (2.5).

Idaho fescue evaluations showed high significant differences in both rated categories. Accessions 9076469 and 9076437 had the highest percent stand at 75.0%. Industry standard Winchester Source ranked only slightly lower at 73.8% stand (see Table 3). The lowest rating came from accession 9076444 at 16.8%. Accession 9076473 had the highest plant density at 11 plants/foot of row. Lowest density was observed in accession 9076444 with an average 1.8 plants/foot. Best seedling vigor was observed in Winchester (2.8), while accession 9076444 showed the poorest vigor (7.8).

Bluebunch wheatgrass evaluations showed numerous collections outperforming industry standards (Table 4). Accession 9076436 ranked highest for percent stand at 81.8%. Plant density and seedling vigor comparisons showed accession 9076433 on top with 14.38 plants/foot of row and a 2.5 rating for vigor. Accession 9076463 ranked lowest in all three evaluations (27.8 % stand, 2.5 plants/foot and a vigor rating of 7.0).

Percent stand of 'Willamette' tufted hairgrass were significantly higher than all other accessions (86.0%). Lowest percent stand was observed in accession 9076435 (53.0%). Accession 9076429 had the best seedling vigor rating of 4.8, while accession 9076435 showed the lowest vigor (7.8). Plant density showed no significant differences (see Table 5).

Yarrow plots failed to show significant differences in percent stand, plant density or seedling vigor. Trends, however, show accession 9076460 first in all but one category, seedling vigor, where it placed second. Lupine and pearly everlasting plots had essentially no germination (data not shown).

This is a preliminary report of evaluations conducted in June and July, 2004. The trial will be evaluated again in late September, and a report summarizing the evaluations conducted during 2004 will be prepared.

REFERENCES

Ogle, D., and B. Cornforth. 2000. Technical Note 35: A Quick Method to Estimate Germination Percentages for Seed Species. USDA-NRCS, Boise, ID. ID-TN35, Mar. 2000. 3p. (9 KB) (ID# 2250)

TABLES

Table 1. Blue wildrye

Accession No.	% Est. viability	% PLS[3/]	% stand 6/14	Density[1/] 6/14	Vigor[2/] 6/14
9076439	79	71.1	92.8[4/]	38.1 a-b[5/]	2.3
9076445	77	69.3	91.5	30.1 a-c	2.8
9076446	80	72	91.5	22.8 b-c	1.8
9076447	72	64.8	93.0	39.0 a	1.8
9076448	66	59.4	72.3	22.6 b-c	3.3
9076449	69	62.1	95.8	36.6 a-b	2.0
9076472	82	73.8	87.5	26.0 a-c	3.0
Mariposa	*	94	95.8	28.4 a-c	1.8
Arlington	*	93	91.5	31.5 a-c	3.8
Elkton	*	92	95.5	16.4 c	3.5
LSD (0.05)			22.1	13.7	1.8

[1/] Plants per foot of row
[2/] Rated 1-9 with 1 best, 9 worst; not analyzed for significance
[3/] Percent PLS of USFS R1 collections based on estimated 90% purity
[4/] No significant difference detected between accessions
[5/] Means followed by the same letter are not significantly different
* Data not available from source

Table 2. Sandberg bluegrass

Accession No.	% Est. viability	% PLS	% stand 6/14	Density 6/14	Vigor 6/14
9076465	40	36	26.5 b	2.4 b	8.3
Sherman	80	75.8	84.8 a	29.1 a	2.5
High Plains	84	75.6	80.8 a	24.6 a	4.0
Hanford	88	85.0	91.5 a	27.5 a	6.0
Mtn. Home	76	74.3	95.5 a	36.8 a	5.0
LSD (0.05)			16.8	12.3	1.2

Table 3. Idaho fescue

Accession No.	% Est. viability	% PLS	% stand 6/14	Density 6/14	Vigor 6/14
9076473	58	52.2	62.5 a-b	11.0 a	3.8
9076431	61	54.9	37.8 c-e	2.5 b	6.5
9076432	76	68.4	50.0 b-c	6.1 a-b	6.0
9076437	61	54.9	75.0 a	7.4 a-b	4.5
9076438	80	72.0	72.3 a	7.4 a-b	5.8
9076443	45	40.5	68.3 a-b	10.5 a	5.0
9076444	13	11.7	16.8 e	1.8 b	7.8
9076453	50	45	69.5 a-b	7.6 a-b	5.5
9076462	30	27	34.8 c-e	2.3 b	6.8
9076467	71	63.9	48.5 b-d	5.1 a-b	6.3
9076469	68	61.2	75.0 a	10.4 a	3.5
9076471	67	60.3	27.8 d-e	3.9 b	6.5
9076427	45	40.5	54.3 a-c	7.3 a-b	5.5
Joseph	*	*	52.8 a-c	5.6 a-b	5.0
Winchester	*	*	73.8 a	9.9 a	2.8
Nezpurs	*	*	37.3 c-e	1.9 b	7.0
LSD (0.05)			19.3	5.0	1.9

Table 4. Bluebunch wheatgrass

Accession No.	% Est. viability	% PLS	% stand 6/14	Density 6/14	Vigor 6/14
9076426	76	68.4	70.8 a-c	9.9 a-b	3.0
9076428	56	50.4	49.8 c	5.8 b-c	5.0
9076433	75	67.5	77.8 a-b	14.4 a	2.5
9076434	69	62.1	61.3 a-c	7.9 b-c	4.0
9076436	69	62.1	81.8 a	8.1 b-c	3.3
9076441	56	50.4	69.5 a-c	6.8 b-c	4.0
9076442	86	77.4	70.8 a-c	7.3 b-c	3.0
9076450	73	65.7	57.0 b-c	6.8 b-c	3.8
9076463	58	52.2	27.8 d	2.5 c	7.0
9076464	65	58.5	64.0 a-c	10.8 a-b	3.0
9076466	64	57.6	66.5 a-c	11.4 a-b	2.8
Goldar	79	81.5	66.8 a-c	8.0 b-c	2.5
Anatone	87	85.4	51.5 c	5.8 b-c	3.5
P-7	85	81.1	66.8 a-c	5.5 b-c	3.0
LSD (0.05)			20.6	5.3	1.9

Table 5. Tufted hairgrass

Accession No.	% Est. viability	% PLS	% stand 6/14	Density 6/14	Vigor 6/14
9076429	49	44.1	68.0 b	19.0[1/]	4.8
9076430	52	46.8	62.8 b-c	17.8	6.5
9076435	55	49.5	53.0 c	6.1	7.8
Willamette	*	81	86.0 a	23.0	5.3
Tillamook	*	81	69.8 b	21.8	5.5
LSD (0.05)			11.6	11.6	1.5

[1/] No significant difference detected between accessions

Table 6. Common yarrow

Accession No.	% Est. viability	% PLS	% stand 7/16	Density 7/16	Vigor 7/16
9076454	84	75.6	37.5[1/]	2.4[1/]	4.8
9076456	73	65.7	32.0	1.5	6.0
9076457	86	77.4	32.0	0.3	5.5
9076458	80	72.0	59.7	2.8	3.8
9076459	91	81.9	47.2	1.3	4.0
9076460	67	60.3	75.0	3.1	3.5
9076474	37	33.3	45.9	2.9	5.8
9076475	71	63.9	45.9	3.0	4.5
Great Northern	93	71.6	45.9	2.3	2.8
Eagle	*	*	33.3	0.5	5.5
LSD (0.05)			33.6	3.3	3.2

[1/] No significant difference detected between accessions

Appendix 1. Collection data

Accession No.	Species	Date collected	Fresh wt. (lbs)	Cleaned wt. (lbs)	Forest	Location	Elevation (ft)
9076426	Bluebunch wheatgrass	7/17/2003	6	2.34	Lolo	N 46 51 38.6 W 114 10 18.4	4300
9076427	Idaho fescue	8/1/2003	1.5	0.22	Helena	N 46 28 20 W 111 54 42	5700
9076428	Bluebunch wheatgrass	8/1/2003	1.7	0.40	Helena	N 46 28 20 W 111 54 42	5700
9076429	Tufted hairgrass	8/6/2003	0.2	0.04	Lolo	N 46 42 31.3 W 114 35 31.6	4480
9076430	Tufted hairgrass	8/6/2003	0.6	0.12	Lolo	N 46 42 23.9 W 114 35 37.3	4480
9076431	Idaho fescue	7/22/2003	1.4	0.88	Beaver-Deer	N 45 51 15 W 112 22 08	7200
9076432	Idaho fescue	7/22/2003	1.3	1.02	Beaver-Deer	N45 51 27.3 W 112 28 48.2	6300
9076433	Bluebunch wheatgrass	8/6/2003	28	1.64	Beaver-Deer	N 45 42 47.7 W 112 35 10.3	7600
9076434	Bluebunch wheatgrass	8/12/2003	5.5	0.20	Beaver-Deer	N 45 42 47.7 W 112 35 10.3	7600
9076435	Tufted hairgrass	8/18/2003	4	0.60	Beaver-Deer	N 46 09 0.08 W 112 28 0.499	6400
9076436	Bluebunch wheatgrass	7/29/2003	7	1.00	Beaver-Deer	N45 2.247 46 W 111 56.904 08	6300
9076437	Idaho fescue	7/31/2003	9	2.40	Beaver-Deer	N45 7.332 36 W 111 51.832 43	8200
9076438	Idaho fescue	7/31/2003	3	0.94	Beaver-Deer	N 44 58.982 92 W 111 55.523 57	7500
9076439	Blue wildrye	8/20/2003	3.3	2.42	St. Joe Dist.	T43NR5E section 21	4600
9076440	Bluebunch wheatgrass	8/2/2003	0.8	0.12	Beaver-Deer	T7NR14W section 4 SW	5550
9076441	Bluebunch wheatgrass	7/25/2003	1.4	0.40	Beaver-Deer	T8NR14W section32-33 S	5850
9076442	Bluebunch wheatgrass	8/4/2003	1.1	0.44	Beaver-Deer	T5NR14W section 22 NW	6760
9076443	Idaho fescue	8/1/2003	1.3	0.40	Beaver-Deer	T4NR15W section 10	6460
9076444	Idaho fescue	7/29/2003	0.4	0.12	Beaver-Deer	T 7NR14W section 4	5890
9076445	Blue wildrye	8/21/2003	0.5	0.28	Flathead	T26NR22W section 26	5130
9076446	Blue wildrye	8/18/2003	2.1	0.78	Flathead	T29NR17W section 28,33,34	4500
9076447	Blue wildrye	8/19/2003	0.7	0.36	Flathead	T32NR25W section 22	5250
9076448	Blue wildrye	8/13/2003	1.4	0.46	Flathead	T30NR18W section 23	?
9076449	Blue wildrye	8/13/2003	1.9	0.95	Flathead	T29NR17W section 34	4600
9076450	Bluebunch wheatgrass	8/21/2003	0.4	0.22	Flathead	T26NR21W section 33	5000
9076451	Bluebunch wheatgrass	8/25/2003	0.1	0.03	Flathead	T26NR22W section 29	5700
9076452	Bluebunch wheatgrass	8/21/2003	0.3	0.08	Flathead	T26NR21W section 33	4980
9076453	Idaho fescue	8/25/2003	0.3	0.08	Flathead	T26NR22W section 29	5700
9076454	Common yarrow	8/21/2003	0.2	0.02	Flathead	T26NR22W section 15	4300
9076455	Common yarrow	8/13/2003	trace	trace	Flathead	T30NR18W section 23	3800
9076456	Common yarrow	8/21/2003	0.5	0.04	Flathead	T26NR21W section 33	4980
9076457	Common yarrow	9/4/2003	0.7	0.08	Flathead	T33NR21W section 26	4000
9076458	Common yarrow	8/20/2003	1.4	0.20	Flathead	T26NR21W section 29	?

9076459	Common yarrow	9/4/2003	2.5	0.86	Bitterroot	T2NR20W section 2,10,11	5600
9076460	Common yarrow	9/22/2003	0.5	0.38	Lolo	N46 42 14.7 W114 35 56.8	4500
9076461	Pearly everlasting	9/23/2003	1.8	0.03	Lolo	N46 41 48.5 W114 36 10.5	4600
9076462	Idaho fescue	7/24/2003	0.4	0.20	Bitterroot	T2NR20W section 11	5600
9076463	Bluebunch wheatgrass	7/24/2003	1.8	0.54	Bitterroot	T2NR20W section 2	5700
9076464	Bluebunch wheatgrass	7/14/2003	17.5	1.86	Gallatin	N45 40 08.32279 W1100026.177	5500
9076465	Sandberg bluegrass	7/15/2003	7	1.58	Gallatin	N45 58 43.57899 W1110012.792	6700
9076466	Bluebunch wheatgrass	7/30/2003	17	1.88	Gallatin	N452733.66724 W1104630.334	7200
9076467	Idaho fescue	7/30/2003	19	5.25	Gallatin	N452743.68577 W1104630.334	7400
9076468	Bluebunch wheatgrass	7/31/2003	9.5	0.00	Gallatin	N444430. W1110954	6570
9076469	Idaho fescue	8/4/2003	12.5	3.92	Gallatin	N454842. W1104642.	7200
9076470	Lupine	8/4/2003	9.5	1.08	Gallatin	N454842. W1104642.	7600
9076471	Idaho fescue	7/16/2003	17.5	3.00	Gallatin	N45 58 06. W110 57 24.	6400
9076472	Blue wildrye	8/1/2003	4.5	3.08	ID Panhandle	T45NR2W sec. 26	2800
9076473	Idaho fescue	7/25/2003	1	0.46	ID Panhandle	T48NR3W section 12	2400
9076474	Common yarrow	7/15/2003	15	0.98	Custer	T25NR46E section 19	4000
9076475	Common yarrow	9/5/2003	2.1	0.12	ID Panhandle	T19N R4E section 15	5200

Appendix 2. Seed cleaning calibrations

Blue Wildrye (*Elymus glaucus*)

1. Thrashing
    A. 3/8” screen followed by ¼” screen
2. Air screen cleaner
    A. screens
        1. top-4.350
        2. middle-3.550
        3. bottom-6 X 32
    B. valves
        1. 2.25
        2. 4.75
        3. 1.60
        4. intake-closed
    C. adjustments
        1. blower speed-4.4
        2. sieve boat-10
3. Debearder
    A. adjustments
        1. brush speed-10
        2. vacuum-on
4. Gravity table
    A. adjustments
        1. sieve boat-10
        2. blower speed-5
            i. valve-2.5
    B. table angle
        1. slope-1.0
        2. pitch-0.5

Bluebunch Wheatgrass (*Pseudoroegneria spicata*)

1. Thrashing
    A. #14 screen
    B. 3/8” screen top and ¼” screen bottom
2. Clipper
    A. screens
        1. 6-24
        2. #12
3. Air screen cleaner
    A. screens
        1. top-3.95 round
        2. middle-3.150 round
        3. bottom-6 X 24 slit
    B. valves
        1. 2.5
        2. 5.3
        3. 2.5
        4. intake-closed
    C. adjustments
        1. blower speed-6
        2. sieve boat-10
4. Indent cleaner
    A. spool-7.5
    B. adjustments
        1. catchpan-4.0
        2, sieve speed-10
5. Debearder
    A. adjustments
        1. brush speed-10
        2. gate-1.5
4. Gravity table
    A. adjustments
        1. sieve boat-10
        2. blower speed-8
            i. valve-3.0
    B. table angle
        1. slope-1.0
        2. pitch-0.5

Idaho Fescue (*Festuca idahoensis*)

1. Thrashing
    A. 3/8” screen
2. Clipper
    A. screens
        1. #12 top
3. Air screen cleaner
    A. screens
        1. top-3.750 round
        2. middle-2.350 round
        3. bottom-solid blank
    B. valves
        1. 2.1
        2. 5.25
        3. 2.5
        4. intake-closed
    C. adjustments
        1. blower speed-4.5
        2. sieve boat-10

Sandberg Bluegrass (*Poa secunda*) and Tufted Hairgrass (*Deschampsia caespitosa*)

1. Thrashing
    A. 3/8” screen
2. Air screen cleaner
    A. screens
        1. top-3.150 round
        2. middle-2.10
        3. bottom-6 X 32
    B. valves
        1. .25
        2. 2.5
        3. 3.5
        4. intake-closed
    C. adjustments
        1. blower speed-3.5
        2. sieve boat-10

USDA Forest Service, Region 1
Native Grass and Forb Initial Evaluation
2004 Progress Report
Derek J. Tilley, Range Conservationist (Plants)
Loren St. John, Team Leader Aberdeen Plant Materials Center

INTRODUCTION

The purpose of this study is to evaluate native perennial grass and forb accessions for potential use in revegetation, stabilization and beautification projects in the Rocky Mountain and sagebrush steppe ecosystems of Montana and northern Idaho. Large areas of national forest are in unsatisfactory ecological condition. Many areas are infested with invasive weeds such as cheatgrass, knapweed species, yellow starthistle, and leafy spurge. These weeds cause many problems and detract from the health and beauty of the ecosystem. When dry, the weeds provide flash fuels for fires. Increased fires create the potential for soil erosion and degradation of water quality and watershed values. Weeds also decrease plant community diversity, reduce habitat for wildlife and compete with threatened and endangered species. The goal of this study is to identify if accessions under evaluation have potential to be released as germplasm for commercial seed production and use in revegetation projects in the Rocky Mountain and sagebrush steppe ecosystems of Montana and northern Idaho.

In 2003, The USDA-Forest Service, Region 1, (FS R1) collected seed of five native perennial grass species from forty one locations and three native forb species from eleven locations which were sent to the USDA-Natural Resources Conservation Service-Plant Materials Center (PMC) at Aberdeen, Idaho for evaluation. From the total collections received at the PMC, 37 grass and ten forb collections were chosen for testing based on seed quality and/or quantity. Total usable collections included: twelve bluebunch wheatgrass (*Pseudoroegneria spicata*), seven blue wildrye (*Elymus glaucus*), thirteen Idaho fescue (*Festuca idahoensis*), one Sandberg bluegrass (*Poa secunda*), three tufted hairgrass (*Deschampsia caespitosa*), eight common yarrow (*Achillea millefolium*), one lupine (*Lupinus* sp.) and one pearly everlasting (*Anaphalis margaritacea*).

Appendix 1 lists the accessions collected, collection locations and the size of each seed collection. This report summarizes the evaluations conducted during 2004.

MATERIALS AND METHODS

Harvested seed collections were cleaned at the PMC seed cleaning facilities using a wide range of machines and settings. Each accession was treated separately due to differences in the quality of pre-cleaned materials and variation in seed size. Appendix 2 provides general information regarding machine calibration and settings used for each species. Minor adjustments were made to the seed cleaning equipment to achieve the best seed purity for each collection. Estimated viability was obtained using the kerosene heater

"popping" method outlined in Ogle and Cornforth (2000). Some collections were also evaluated for viability using standard germination tests.

A seedling emergence trial was conducted in the PMC greenhouse from February to March, 2004 to determine if any accessions emerged quicker or had better seedling vigor. No significant differences were detected (data not shown).

GRASSES

The native grass field evaluation trial is being conducted at the PMC, Fish and Game farm located approximately 5 miles northeast of Aberdeen, Idaho. Experimental design was a randomized complete block with four replications. Individual plots were 20 feet long and contained one row; rows were planted on three foot centers. The experimental design also included plots of known industry standards from each species for comparison. Soil at the site is a Delco silt loam with pH of 7.4 to 8.4. Average annual precipitation is 9.39 inches. The planting site was plowed in the fall of 2003 and then disked and roller packed in the spring prior to planting.

Plots were seeded on May 10 and 11, 2004. Bluebunch wheatgrass and Idaho fescue accessions were planted using a Planet Jr. seeder. Blue wildrye, Sandberg bluegrass and tufted hairgrass accessions were planted using a belt seeder. Planting equipment was calibrated to plant approximately 25 Pure Live Seeds (PLS) per foot of row for large seeded species (bluebunch wheatgrass and blue wildrye) and 50 PLS per foot of row for small seeded species (Idaho fescue, Sandberg bluegrass and tufted hairgrass). Seeding depth ranged from ¼ inch for small seeded accessions to ½ inch for the larger seeded accessions. Each species block contained at least two released cultivars to use as standards for comparison. Border rows of 'Tegmar' intermediate wheatgrass (*Thinopyrum intermedium*) were planted on the outside of the blocks to reduce edge effect. Plots were sprinkler irrigated as needed during the growing season. Weeds were controlled with herbicides and between row cultivation.

The first evaluation was conducted on June 14, 2004 when all grasses had reached the one to two leaf stage. Plots were evaluated for percent stand, plant density and seedling vigor. Percent stand was measured using a twenty foot rope marked with one foot increments stretched the length of the plot and anchored at either end. Plants intercepting the one foot increments are summed and recorded as a percentage. Plant density was measured by counting seedlings found in the middle two feet of row and converted to average number of plants per foot of row. Seedling vigor was measured on a subjective scale of one to nine (one being most healthy and nine being dead). Each plot was assessed and given a rating based on overall apparent vigor.

The second evaluation during 2004 was completed during the week of September 27. All accessions were rated for percent stand and plant volume. Plant volume was measured as plant height x width1 x width2 and recorded in cubic inch units. Blue wildrye and bluebunch wheatgrass were rated for percent of plants in flower per plot. Idaho fescue, Sandberg bluegrass and tufted hairgrass had not begun flowering by the time of the evaluation. Seed yield data was not collected during the first year of establishment,

because seed harvest during the first year of establishment is not generally recommended. Seed yield data will be collected beginning in the second growing season (2005). All species except blue wildrye were evaluated for plant density as described above. Plant density for the blue wildrye accessions was not collected during the second evaluation due to very tight and uniform stands that rendered data collection of plant density impossible.

All data except plant vigor evaluations were subjected to an Analysis of Variance (ANOVA) and means were separated using Duncan's Multiple Range Test using the MSTAT-C Microcomputer Statistical Program (Freed et al, 1991).

FORBS

The native forb evaluation trial was planted on May 19, 2004 at the PMC Home Farm approximately two miles north of Aberdeen. Site information, seedbed preparation and experimental design are identical to the grass trial. There are two industry standards included in the common yarrow plots, Eagle and Great Northern. There are no releases of lupine or pearly everlasting that would be comparable to the collections received for testing, so no standards of comparison were included for these two species. Yarrow plots were seeded with a target rate of 50 PLS per foot using a belt seeder. Lupine plots were seeded at 25 PLS per foot, and pearly everlasting plots were seeded at 50 PLS per foot using a Planet Jr. seeder. A border row of 'Appar' blue flax (*Linum perenne*) was planted on either side of the trial to reduce edge effect. The first evaluation was conducted on July 19, 2004. Plants ranged from two to six leaf stage.

Forb plots were evaluated in the same manner as the grass plots. The first evaluation included data collection for percent stand, density and seedling vigor. The second evaluation was conducted during the week of September 27 and data was collected on percent stand, density, plant volume and percent flower.

This is a progress report of evaluations conducted during 2004, the first year of evaluations. The trials will be evaluated again in 2005, 2006 and 2007, and reports summarizing the evaluations from each subsequent year will be prepared.

2004 EVALUATIONS DISCUSSION (PRELIMINARY)

BLUE WILDRYE

The first evaluation of blue wildrye showed no significant differences in percent stand between the accessions tested. Plant density showed low levels of significance. Accession 9076447 rated highest (39.0 plants/foot), and Elkton (a western Oregon accession) rated lowest at 16.4 plants/foot. Best vigor was recorded from accessions 9076446, 9076447 and Mariposa (1.8). Poorest vigor rated was 3.8 from Arlington (a western Oregon accession) (see Table 1).

During the second evaluation there was again no significant difference in percent stand for the blue wildrye accessions. All accessions had stands ranging from 90 to 100% except accession 9076448 which had a stand of 76.4%. Mariposa, Elkton and accession 9076472 showed high percentages of flowering (93.4, 92.5 and 80.0% respectively). The other industry release, Arlington, had 55% flowering. The remainder of the accessions had little to no flower production ranging from 0.0 to 18.8%. Accessions showed a wide range of plant volumes from 117.3 in^3 (accession 9076439) to 768.0 in^3 (Mariposa) with Mariposa significantly higher than the rest of the plants in the trial.

Table 1. Blue wildrye

Accession No.		% Est. viability	% PLS[3/]	% Stand 6/14	Density[1/] 6/14	Vigor[2/] 6/14	% Stand 9/29	% Flower 9/29	Plant vol. (in^3) 9/29
9076439		79	71.1	92.8[4/]	38.1 a-b[5/]	2.3[4/]	98.6[4/]	1.5 c	117.3 c
9076445		77	69.3	91.5	30.1 a-c	2.8	100.0	0.0 c	132.5 b-c
9076446		80	72.0	91.5	22.8 b-c	1.8	98.6	18.8 c	288.5 b-c
9076447		72	64.8	93.0	39.0 a	1.8	100.0	3.5 c	132.5 b-c
9076448		66	59.4	72.3	22.6 b-c	3.3	76.38	1.8 c	225.0 b-c
9076449		69	62.1	95.8	36.6 a-b	2.0	100.0	3.0 c	193.3 b-c
9076472		82	73.8	87.5	26.0 a-c	3.0	97.2	80.0 a	256.8 b-c
Mariposa		*	94.0	95.8	28.4 a-c	1.8	95.8	93.8 a	768.0 a
Arlington		*	93.0	91.5	31.5 a-c	3.8	100.0	55.0 b	353.5 b
Elkton		*	92.0	95.5	16.4 c	3.5	94.4	92.5 a	299.0 b-c
LSD (0.05)				22.1	13.7	1.8	20.4	20.1	195.3

[1/] Plants per foot of row
[2/] Rated 1-9 with 1 best, 9 worst; not analyzed for significance
[3/] Percent PLS of USFS R1 collections based on estimated 90% purity
[4/] No significant difference detected between accessions
[5/] Means followed by the same letter are not significantly different
* Data not available from source

SANDBERG BLUEGRASS

One collection of Sandberg bluegrass was compared against four industry releases (Table 2). The first evaluation showed high levels of significance in all three categories solely due to the fact that accession 9076465 performed so poorly. The Mountain Home Source had the best stand (95.5%) and greatest density (36.8 plants per foot) and 'Sherman" had the best vigor (2.5) at the first evaluation.

At the second evaluation Sherman dwarfed all other Sandberg bluegrass accessions in the trial. Sherman plants had an average volume of 262.4 in^3, while the next largest, accession 9076465, measured a mere 8.8 in^3. Sherman also had the best stand (95.8%) and plant density (11.9) during the second evaluation. Accession 9076465 continued to perform poorly in percent stand and plant density (25.0 % and 0.75 plants per foot respectively).

Table 2. Sandberg bluegrass

Accession No.		% Est. viability	% PLS[3/]	% stand 6/14	Density[1/] 6/14	Vigor[2/] 6/14	% Stand 9/29	Density 9/29	Plant vol. (in^3) 9/29
9076465		40	36.0	26.5 b[4/]	2.4 b	8.3	25.0 d	0.75 c	8.8 b
Sherman		*	75.8	84.8 a	29.1 a	2.5	95.8 a	11.88 a	262.4 a
High Plains		84	75.6	80.8 a	24.6 a	4.0	76.4 b	9.25 a-b	5.7 b
Hanford		*	85.0	91.5 a	27.5 a	6.0	47.2 c	6.13 b	0.9 b
Mtn. Home		*	74.3	95.5 a	36.8 a	5.0	65.3 b	8.75 a-b	4.5 b
LSD (0.05)				16.8	12.3	1.2	17.4	4.41	42.2

[1/] Plants per foot of row
[2/] Rated 1-9 with 1 best, 9 worst; not analyzed for significance
[3/] Percent PLS of USFS R1 collections based on estimated 90% purity
[4/] Means followed by the same letter are not significantly different
* Data not available from source

IDAHO FESCUE

The first evaluation of Idaho fescue indicated a wide range in stand establishment. Accession 9076469 had the best stand averaging 80.5%. Accession 9076469 also ranked first in plant density with 12.0 plants/foot of row. Seedling vigor ratings showed industry release Winchester as the most vigorous with a rating of 2.8. Accession 9076444 had the poorest ratings of stand, density and plant vigor (16.8 % stand, 1.8 plants/foot and 7.8 vigor).

The second evaluation showed industry release Winchester having the best percent stand at 75.0% followed closely by accession 9076469 with 72.2%. Accession 9076444 again had the poorest stand with 16.7%. Accession 9076469 had the greatest plant density rating of 6.8 plants/foot but did not differ significantly from accessions 9076427, 9076438, 9076437 and Winchester (5.1, 5.0, 4.8 and 4.8 plants/foot respectively). Winchester had the largest volume (28.1 in^3) followed by accession number 9076427 with a volume of 22.3 in^3. The smallest plants were those from accession 9076432 at 1.5 in^3.

Table 3. Idaho fescue

Accession No.		% Est. viability	% PLS[3/]	% stand 6/14	Density[1/] 6/14	Vigor[2/] 6/14	% Stand 9/29	Density 9/29	Plant vol. (in^3) 9/29
9076473		58	52.2	48.5 c-d[4/]	6.8 a-e	6.0	41.7 b-c	4.1 b-d	4.6 b-c
9076431		61	54.9	39.0 d-e	3.0 d-e	6.3	55.6 a-b	2.4 c-e	11.8b
9076432		76	68.4	48.8 c-d	4.8 b-e	7.0	36.1 b-d	3.0 b-e	1.5 c
9076437		61	54.9	71.0 a	8.8 a-c	4.5	57.0 a-b	4.8 a-b	5.1 b-c
9076438		80	72.0	75.0 a	9.0 a-c	5.3	58.4 a-b	5.0 a-b	1.5 c
9076443		45	40.5	68.3 a-b	7.9 a-d	6.0	54.2 a-c	4.1 b-d	7.0 b-c
9076444		13	11.7	16.8 f	1.8 e	7.8	16.7 d	1.3 e	2.6 b-c
9076453		50	45.0	66.8 a-c	7.9 a-d	5.0	51.4 a-c	4.4 b-c	10.0 b-c
9076462		30	27.0	34.8 d-f	2.3 e	6.8	30.6 c-d	1.9 d-e	5.7 b-c
9076467		71	63.9	48.5 c-d	5.1 b-e	6.3	44.4 b-c	3.3 b-e	3.4 b-c
9076469		68	61.2	80.5 a	12.0 a	3.0	72.2 a	6.8 a	11.8 b
9076471		67	60.3	27.8 e-f	3.9 c-e	6.5	41.7 b-c	2.4 c-e	5.1 b-c
9076427		45	40.5	69.5 a	11.3 a	3.0	59.7 a-b	5.1 a-b	22.3 a
Joseph		*	*	50.0 b-d	4.5 b-e	5.0	54.2 a-c	3.0 b-e	9.5 b-c
Winchester		*	*	73.8 a	9.9 a-b	2.8	75.0 a	4.8 a-b	28.1 a
Nezpurs		*	*	37.3 d-e	1.9 e	7.0	44.5 b-c	1.5 e	5.7 b-c
LSD (0.05)				17.8	4.7	0.5	20.8	2.0	8.1

[1/] Plants per foot of row
[2/] Rated 1-9 with 1 best, 9 worst; not analyzed for significance
[3/] Percent PLS of USFS R1 collections based on estimated 90% purity
[4/] Means followed by the same letter are not significantly different
* Data not available from source

BLUEBUNCH WHEATGRASS

Bluebunch wheatgrass evaluations conducted in June 2004 showed numerous collections outperforming industry standards (Table 4). Accession 9076436 ranked highest for percent stand at 81.8%. Plant density and seedling vigor comparisons showed accession 9076433 as the best with 14.4 plants/foot of row and a 2.5 rating for vigor. Accession 9076463 ranked lowest in all three evaluations (27.8 % stand, 2.5 plants/foot and a vigor rating of 7.0).

Percent stand ranged from 83.3% (accession 9076466) to 33.3% (accession 9076463) at the second evaluation. Accession 9076433 had the best plant density at 5.8 plants/foot followed closely by accession 9076466 with 5.5 plants/foot. Lowest density was recorded by accession 9076463 (1.3 plants/foot). Density measurements may; however, be misleading, because a good stand of very small plants will show a much higher density than a good stand of robust plants (compare accession 9076433 with P-7). Plant volume measurements were dominated by the industry standards. P-7, Anatone and Goldar had the greatest volumes with 147.8, 125.0 and 109.8 in^3 respectively. The next largest plant volume came from accessions 9076426, 9076464 and 9076436 at 64.0 in^3. Accession 9076426, P-7 and Anatone all showed high first-year flower production (65.0, 58.8 and 48.8 %). There was also a large group of accessions that showed very little flower production: Goldar, 9076450, 9076466, 9076436, 9076441, 9076463, 9076442, 9076433 and 9076434 ranged from 22.5% down to 2.5% flower production.

Table 4. Bluebunch wheatgrass

				% stand	Density[1/]	Vigor[2/]	% Stand	Density	Plant vol. (in^3)	% Flower
Accession No.		% Est. viability	% PLS[3/]	6/14	6/14	6/14	9/29	9/29	9/29	9/29
9076426		76	68.4	70.8 a-c[4/]	9.9 a-b	3.0	75.0 a-c	4.5 a-c	64 c	65.0 a
9076428		56	50.4	49.8 c	5.8 b-c	5.0	54.2 b-d	3.3c	54.8 c-d	38.8 b-c
9076433		75	67.5	77.8 a-b	14.4 a	2.5	72.2 a-c	5.8 a	31.5 d-e	3.8 d
9076434		69	62.1	61.3 a-c	7.9 b-c	4.0	73.6 a-c	4.1 a-c	22.3 e	2.5 d
9076436		69	62.1	81.8 a	8.1 b-c	3.3	81.9 a	4.1 a-c	64.0 c	11.3 d
9076441		56	50.4	69.5 a-c	6.8 b-c	4.0	66.7 a-c	3.8 a-c	31.5 d-e	11.3 d
9076442		86	77.4	70.8 a-c	7.3 b-c	3.0	77.8 a-b	3.8 a-c	22.3 e	3.8 d
9076450		73	65.7	57.0 b-c	6.8 b-c	3.8	50.0 c-d	3.0 c-d	31.5 d-e	17.5 c-d
9076463		58	52.2	27.8 d	2.5 c	7.0	33.3 d	1.3 d	22.8 e	5.0 d
9076464		65	58.5	64.0 a-c	10.8 a-b	3.0	77.8 a-b	4.0 a-c	64.0 c	37.5 b-c
9076466		64	57.6	66.5 a-c	11.4 a-b	2.8	83.3 a	5.5 a-b	27.0 d-e	11.3 d
Goldar		*	81.5	66.8 a-c	8.0 b-c	2.5	72.2 a-c	3.9 a-c	109.8 b	22.5 c-d
Anatone		*	*	51.5 c	5.8 b-c	3.5	68.1 a-c	3.5 b-c	125.0 a-b	48.8 a-b
P-7		*	*	66.8 a-c	5.5 b-c	3.0	75.0 a-c	3.5 b-c	147.8 a	58.8 a-b
LSD (0.05)				20.6	5.3	1.9	21.7	1.8	27.3	21.5

[1/] Plants per foot of row
[2/] Rated 1-9 with 1 best, 9 worst; not analyzed for significance
[3/] Percent PLS of USFS R1 collections based on estimated 90% purity
[4/] Means followed by the same letter are not significantly different
* Data not available from source

TUFTED HAIRGRASS

Percent stand of 'Willamette' tufted hairgrass were significantly higher than all other accessions at the first evaluation (86.0%). Lowest percent stand was observed in accession 9076435 (53.0%). Accession 9076429 had the best seedling vigor rating of 4.8, while accession 9076435 showed the lowest vigor (7.8). Plant density showed no significant differences (see Table 5).

At the second evaluation, Willamette, Tillamook and accession 9076429 had 93.1, 84.7 and 79.1 percent stand but did not differ significantly. Lowest percent stand came from accession 9076435 at 57.0%. Plant density measurements were tight among the tufted hairgrass plots. Densities ranged from 6.3 plants/foot (Willamette) to 4.1 plants/foot (accession 9076435). Plant volume showed a broad range of measurements (Willamette, 68.7 in^3 to accession 9076435, 16.6 in^3) and also did not differ significantly.

Table 5. Tufted hairgrass

				% stand	Density[1/]	Vigor[2/]	% Stand	Density	Plant vol. (in^3)
Accession No.		% Est. viability	% PLS[3/]	6/14	6/14	6/14	9/29	9/29	9/29
9076429		49	44.1	68.0 b[5/]	19.0[1/]	4.8	79.2 a-b	5.6a-b	31.0[4/]
9076430		52	46.8	62.8 b-c	17.8	6.5	72.2 b-c	5.5 a-b	48.7
9076435		55	49.5	53.0 c	6.1	7.8	57.0 c	4.1 b	16.6
Willamette		*	81.0	86.0 a	23.0	5.3	93.1 a	6.3 a	68.7
Tillamook		*	81.0	69.8 b	21.8	5.5	84.7 a-b	5.4 a-b	60.2
LSD (0.05)				11.6	11.6	1.5	16.4	1.8	49.1

[1/] Plants per foot of row
[2/] Rated 1-9 with 1 best, 9 worst; not analyzed for significance
[3/] Percent PLS of USFS R1 collections based on estimated 90% purity
[4/] No significant difference detected between accessions
[5/] Means followed by the same letter are not significantly different
* Data not available from source

COMMON YARROW

Yarrow plots failed to show significant differences in percent stand, plant density or seedling vigor in the first evaluation. Trends, however, show accession 9076460 first in all but one category, seedling vigor, where it placed second. Lupine and pearly everlasting which were also included in the forb trial had essentially no germination (data not shown).

Accession 9076460 recorded the best percent stand at the second evaluation (73.6%), while accession 9076456 had the lowest stand at 29.15%. No significant difference was detected for plant density. Means ranged from 3.0 plants/foot (accession 9076458) to 0.3 plants/foot (accession 9076457). Industry standards Great Northern and Eagle had the largest plant volumes (753.8 and 691.5 in^3 respectively). Great Northern also had the greatest percentage of flowering plants (38.8%).

Table 6. Common yarrow

Accession No.		% Est. viability	% PLS[3/]	% stand 7/16	Density[1/] 7/16	Vigor[2/] 7/16	% Stand 9/29	Density 9/29	Plant vol. (in^3) 9/29	% Flower 9/29
9076454		84	75.6	37.5[4/]	2.4[4/]	4.8	48.6 a-b[5/]	2.4[4/]	441.0 a-b	22.5 a-c
9076456		73	65.7	32.0	1.5	6.0	29.1 b	1.9	342.0 b	16.3 a-c
9076457		86	77.4	32.0	0.3	5.5	31.9 a-b	0.3	679.0 a	22.5 a-c
9076458		80	72.0	59.7	2.8	3.8	63.9 a-b	3.0	595.8a-b	32.5 a-b
9076459		91	81.9	47.2	1.3	4.0	45.9 a-b	1.3	513.3 a-b	37.5 a
9076460		67	60.3	75.0	3.1	3.5	73.6 a	2.9	481.3 a-b	37.5 a
9076474		37	33.3	45.9	2.9	5.8	50.0 a-b	1.8	323.0 b	6.3 c
9076475		71	63.9	45.9	3.0	4.5	48.6 a-b	2.6	507.0 a-b	12.5 b-c
Great Northern		93	71.6	45.9	2.3	2.8	45.9 a-b	1.8	753.8 a	38.8 a
Eagle		*	*	33.3	0.5	5.5	37.5 a-b	0.5	691.5 a	15.0 a-c
LSD (0.05)				33.6	3.3	3.2	36.8	2.7	283.6	21.4

[1/] Plants per foot of row
[2/] Rated 1-9 with 1 best, 9 worst; not analyzed for significance
[3/] Percent PLS of USFS R1 collections based on estimated 90% purity
[4/] No significant difference detected between accessions
[5/] Means followed by the same letter are not significantly different
* Data not available from source

SUMMARY

Collections showed a wide range of variability for the evaluated traits when compared against industry releases and against each other. Some accessions appear to be competing well and show promise as potential future selected class releases. However, it is not recommended that release decisions be made based on evaluations from a single growing season during the establishment year. Evaluations from season two and beyond will provide more information regarding the long term growth, development, winter hardiness and seed production of the tested accessions. Evaluations planned for next year include: percent stand, plant volume, above ground biomass and seed yield.

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Ogle, D., and B. Cornforth. 2000. Technical Note 35: A Quick Method to Estimate Germination Percentages for Seed Species. USDA-NRCS, Boise, ID. ID-TN35, Mar. 2000. 3p. (9 KB) (ID# 2250)

Appendix 1. Collection data

Accession No.	Species	Date collected	Fresh wt. (lbs)	Cleaned wt. (lbs)	Forest	Location	Elevation (ft)
9076426	Bluebunch wheatgrass	7/17/2003	6	2.34	Lolo	N 46 51 38.6 W 114 10 18.4	4300
9076427	Idaho fescue	8/1/2003	1.5	0.22	Helena	N 46 28 20 W 111 54 42	5700
9076428	Bluebunch wheatgrass	8/1/2003	1.7	0.40	Helena	N 46 28 20 W 111 54 42	5700
9076429	Tufted hairgrass	8/6/2003	0.2	0.04	Lolo	N 46 42 31.3 W 114 35 31.6	4480
9076430	Tufted hairgrass	8/6/2003	0.6	0.12	Lolo	N 46 42 23.9 W 114 35 37.3	4480
9076431	Idaho fescue	7/22/2003	1.4	0.88	Beaver-Deer	N 45 51 15 W 112 22 08	7200
9076432	Idaho fescue	7/22/2003	1.3	1.02	Beaver-Deer	N45 51 27.3 W 112 28 48.2	6300
9076433	Bluebunch wheatgrass	8/6/2003	28	1.64	Beaver-Deer	N 45 42 47.7 W 112 35 10.3	7600
9076434	Bluebunch wheatgrass	8/12/2003	5.5	0.20	Beaver-Deer	N 45 42 47.7 W 112 35 10.3	7600
9076435	Tufted hairgrass	8/18/2003	4	0.60	Beaver-Deer	N 46 09 0.08 W 112 28 0.499	6400
9076436	Bluebunch wheatgrass	7/29/2003	7	1.00	Beaver-Deer	N45 2.247 46 W 111 56.904 08	6300
9076437	Idaho fescue	7/31/2003	9	2.40	Beaver-Deer	N45 7.332 36 W 111 51.832 43	8200
9076438	Idaho fescue	7/31/2003	3	0.94	Beaver-Deer	N 44 58.982 92 W 111 55.523 57	7500
9076439	Blue wildrye	8/20/2003	3.3	2.42	St. Joe Dist.	T43NR5E section 21	4600
9076440	Bluebunch wheatgrass	8/2/2003	0.8	0.12	Beaver-Deer	T7NR14W section 4 SW	5550
9076441	Bluebunch wheatgrass	7/25/2003	1.4	0.40	Beaver-Deer	T8NR14W section32-33 S	5850
9076442	Bluebunch wheatgrass	8/4/2003	1.1	0.44	Beaver-Deer	T5NR14W section 22 NW	6760
9076443	Idaho fescue	8/1/2003	1.3	0.40	Beaver-Deer	T4NR15W section 10	6460
9076444	Idaho fescue	7/29/2003	0.4	0.12	Beaver-Deer	T 7NR14W section 4	5890
9076445	Blue wildrye	8/21/2003	0.5	0.28	Flathead	T26NR22W section 26	5130
9076446	Blue wildrye	8/18/2003	2.1	0.78	Flathead	T29NR17W section 28,33,34	4500
9076447	Blue wildrye	8/19/2003	0.7	0.36	Flathead	T32NR25W section 22	5250
9076448	Blue wildrye	8/13/2003	1.4	0.46	Flathead	T30NR18W section 23	?
9076449	Blue wildrye	8/13/2003	1.9	0.95	Flathead	T29NR17W section 34	4600
9076450	Bluebunch wheatgrass	8/21/2003	0.4	0.22	Flathead	T26NR21W section 33	5000
9076451	Bluebunch wheatgrass	8/25/2003	0.1	0.03	Flathead	T26NR22W section 29	5700
9076452	Bluebunch wheatgrass	8/21/2003	0.3	0.08	Flathead	T26NR21W section 33	4980
9076453	Idaho fescue	8/25/2003	0.3	0.08	Flathead	T26NR22W section 29	5700
9076454	Common yarrow	8/21/2003	0.2	0.02	Flathead	T26NR22W section 15	4300
9076455	Common yarrow	8/13/2003	trace	trace	Flathead	T30NR18W section 23	3800
9076456	Common yarrow	8/21/2003	0.5	0.04	Flathead	T26NR21W section 33	4980
9076457	Common yarrow	9/4/2003	0.7	0.08	Flathead	T33NR21W section 26	4000

Appendix 1. Collection data (continued)

Accession No.	Species	Date collected	Fresh wt. (lbs)	Cleaned wt. (lbs)	Forest	Location	Elevation (ft)
9076458	Common yarrow	8/20/2003	1.4	0.20	Flathead	T26NR21W section 29	?
9076459	Common yarrow	9/4/2003	2.5	0.86	Bitterroot	T2NR20W section 2,10,11	5600
9076460	Common yarrow	9/22/2003	0.5	0.38	Lolo	N46 42 14.7 W114 35 56.8	4500
9076461	Pearly everlasting	9/23/2003	1.8	0.03	Lolo	N46 41 48.5 W114 36 10.5	4600
9076462	Idaho fescue	7/24/2003	0.4	0.20	Bitterroot	T2NR20W section 11	5600
9076463	Bluebunch wheatgrass	7/24/2003	1.8	0.54	Bitterroot	T2NR20W section 2	5700
9076464	Bluebunch wheatgrass	7/14/2003	17.5	1.86	Gallatin	N45 40 08.32279 W1100026.177	5500
9076465	Sandberg bluegrass	7/15/2003	7	1.58	Gallatin	N45 58 43.57899 W1110012.792	6700
9076466	Bluebunch wheatgrass	7/30/2003	17	1.88	Gallatin	N452733.66724 W1104630.334	7200
9076467	Idaho fescue	7/30/2003	19	5.25	Gallatin	N452743.68577 W1104630.334	7400
9076468	Bluebunch wheatgrass	7/31/2003	9.5	0.00	Gallatin	N444430. W1110954	6570
9076469	Idaho fescue	8/4/2003	12.5	3.92	Gallatin	N454842. W1104642.	7200
9076470	Lupine	8/4/2003	9.5	1.08	Gallatin	N454842. W1104642.	7600
9076471	Idaho fescue	7/16/2003	17.5	3.00	Gallatin	N45 58 06. W110 57 24.	6400
9076472	Blue wildrye	8/1/2003	4.5	3.08	ID Panhandle	T45NR2W sec. 26	2800
9076473	Idaho fescue	7/25/2003	1	0.46	ID Panhandle	T48NR3W section 12	2400
9076474	Common yarrow	7/15/2003	15	0.98	Custer	T25NR46E section 19	4000
9076475	Common yarrow	9/5/2003	2.1	0.12	ID Panhandle	T19N R4E section 15	5200

Appendix 2. Seed cleaning calibrations

Blue Wildrye (*Elymus glaucus*)

1. Thrashing
    A. 3/8” screen followed by ¼” screen
2. Air screen cleaner
    A. screens
        1. top-4.350
        2. middle-3.550
        3. bottom-6 X 32
    B. valves
        1. 2.25
        2. 4.75
        3. 1.60
        4. intake-closed
    C. adjustments
        1. blower speed-4.4
        2. sieve boat-10
3. Debearder
    A. adjustments
        1. brush speed-10
        2. vacuum-on
4. Gravity table
    A. adjustments
        1. sieve boat-10
        2. blower speed-5
            i. valve-2.5
    B. table angle
        1. slope-1.0
        2. pitch-0.5

Bluebunch Wheatgrass (*Pseudoroegneria spicata*)

1. Thrashing
    A. #14 screen
    B. 3/8” screen top and ¼” screen bottom
2. Clipper
    A. screens
        1. 6-24
        2. #12
3. Air screen cleaner
    A. screens
        1. top-3.95 round
        2. middle-3.150 round
        3. bottom-6 X 24 slit
    B. valves
        1. 2.5
        2. 5.3
        3. 2.5
        4. intake-closed
    C. adjustments
        1. blower speed-6
        2. sieve boat-10
4. Indent cleaner
    A. spool-7.5
    B. adjustments
        1. catchpan-4.0
        2, sieve speed-10
5. Debearder
    A. adjustments
        1. brush speed-10
        2. gate-1.5
4. Gravity table
    A. adjustments
        1. sieve boat-10
        2. blower speed-8
            i. valve-3.0
    B. table angle
        1. slope-1.0
        2. pitch-0.5

Idaho Fescue (*Festuca idahoensis*)

1. Thrashing
    A. 3/8” screen
2. Clipper
    A. screens
        1. #12 top
3. Air screen cleaner
    A. screens
        1. top-3.750 round
        2. middle-2.350 round
        3. bottom-solid blank
    B. valves
        1. 2.1
        2. 5.25
        3. 2.5
        4. intake-closed
    C. adjustments
        1. blower speed-4.5
        2. sieve boat-10

Sandberg Bluegrass (*Poa secunda*) and Tufted Hairgrass (*Deschampsia caespitosa*)

1. Thrashing
    A. 3/8” screen
2. Air screen cleaner
    A. screens
        1. top-3.150 round
        2. middle-2.10
        3. bottom-6 X 32
    B. valves
        1. .25
        2. 2.5
        3. 3.5
        4. intake-closed
    C. adjustments
        1. blower speed-3.5
        2. sieve boat-10

FIELD PLANTING, DEMONSTRATION AND DISTRICT SEED INCREASE EVALUATION SUMMARIES

PLANT MATERIALS

2004

IDAHO EVALUATION SUMMARIES

FIELD, DSI and DEMONSTRATION PLANTINGS

IDAHO DIVISION I
PLANT MATERIALS PLANTINGS

FIELD OFFICE: BONNERS FERRY

ID99005 Paul Headings Regar meadow brome - Field Plantings (2). Materials ordered February 22, 1999. Field 1–pure stand of Regar. Field 2-mixed stand of Regar and alfalfa. Purpose – demonstration planting to document growth patterns, production, and forage quality. Site characteristics – MLRA E43b, silt loam soils, 5-10 percent slopes, north aspect, 2300 feet elevation, 24 inch precipitation zone, non-irrigated, T62N R1E NW ¼ Section 2. FY99 planted spring 1999. FY00 due to dry years 1999 and 2000 stand establishment was slow, but excellent stands in each field are establishing. Plantings average 3 tons per acre. FY01 Planting 1 - The "pure" stand of Regar Brome planting averaged 2 ton/acre. A forage analysis indicted the crude protein to be 8.75%. The forage grass for hay is fine leaves and stems. The hay feeds well to animals. In hot dry weather, the "windrows" have to be carefully harvested and cured to avoid damaging brittle leaves and stems. The crop can be "pulverized" easily. The average bale weight was 103 pounds. The owner applied 110 lbs. 40-0-0 to enhance production and will increase application rates up to 200 lbs/acre 40-0-0. There were no second cuttings since the field was planted three years ago due to poor to fair moisture conditions. Planting 2 - The Regar/Agate alfalfa mixture established well. The first cutting has grass present and makes great cattle feed. The second cutting has very little grass within the alfalfa due to slow recovery. This may be due to dry weather conditions. Also, this may be a good attribute for the producer who can sell hay with grass and no grass. FY01 Planting 1 - The "pure" stand of Regar has an excellent stand with 5 plants per square foot, good vigor, and 4000 pounds per acre production. Landowner applied 220 lbs. 40-0-0 in early spring. Planting 2 - Regar/alfalfa mixture has a good stand with 2 Regar/5 alfalfa plants per square foot, fair to good vigor, and 7000 pounds per acre production. FY02 - FY04 no evaluations.

ID99015 Merle Olsen Field Planting – Regar meadow brome/alfalfa. Materials ordered April 9, 1999. Site characteristics – Rubson silt loam soil, 5 percent slopes, south aspect, 1840 feet elevation, 24 inch precipitation zone, non-irrigated, T61N R1E Section 7. FY99 no evaluation. FY00 excellent mixed stand established. FY01 the Regar and alfalfa mixture performed well with good hay quality. This year's crop had reduced yields due to drought conditions. FY02 - FY04 no evaluations.

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 feet 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 is establishing with some species as tall as 3-4 feet by early July. In October wild oats were present throughout stand. FY01 The 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 1st 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. The 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 The 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. FY03 – FY04 no evaluations.

ID04002 Dave Wattenburger Field Planting. Delar small burnet ordered August 19, 2003. Planting planned for dormant planting in late October.

FIELD OFFICE: COUER D'ALENE

None

FIELD OFFICE: PLUMMER

None

FIELD OFFICE: SANDPOINT

ID96029 Lee Johnson wood fiber mulch, Niner sideoats grama, Alma blue grama, annual rye, Durar hard fescue, Durar hard fescue/clover, prairie junegrass, and alpine bluegrass field plantings - tree nursery ground cover trial. Site loam soil (low to mod. permeability/high erosion potential), 5-10% slopes on SE exposure. FY96 planted 5/31/96. 1. Wood mulch is doing excellent job of weed control and no rodent activity to date - mulch was about 10 inches deep when applied 2. Excellent stand of annual rye established, Durar hard fescue plants are very small and establishing beneath cover crop 3. Many young Durar hard fescue plants were establishing, but very few clover plants - soil may have been too loose when seeded and clover seed may be too deep 4. Excellent initial stand of sideoats and blue grama establishing - could not tell which species was doing the best 5. Very few prairie junegrass plants establishing - appears some germination is occurring this fall 6. A lot of alpine bluegrass seedlings - appears germination did not occur until fall. FY97 and FY98 no evaluations. FY99 Treatment 1: Control no cover and normal weed control - 0 percent desirable cover with 50-80 weeds. Treatment 2: Cedar bark mulch 6-8 inches thick – 100 percent desirable cover in rows with 5 percent weeds invading mulch and some evidence of rodents in mulch. Trees near cedar mulch are more chlorotic than other treatments. Treatment 3: Durar hard fescue and annual ryegrass – 50-70 percent desirable cover with up to 20 percent weeds. Fescue blends provide more biomass than other seedings and good cover – almost 100 percent cover if mowed. Treatment 4: Durar hard fescue and Berseem annual clover – 60-80 percent desirable cover and up to 15 percent weeds. Treatment 5: blue grama and sideoats grama – 20-50 percent desirable cover with 30-80 percent weeds. Clearly the worst treatment in trial. Treatment 6: Prairie junegrass – 60-80 percent desirable cover and 10-15 percent weeds. A good alternative since this is a low growing cover. Treatment 7: Alpine bluegrass – 50-80 percent cover with 5-10 percent weeds. Less biomass produced than fescue or prairie junegrass. The alpine bluegrass produced more of a thick sod with seedheads 6-8 inches tall. This would be a better choice for nurseries that are concerned with the shading effect of taller grasses on lower branches. It also covers the ground better once established, especially in shady areas. One potential problem is its ability to spread, including into the tree rows. FY00, FY01, FY02 - FY04 no evaluations.

ID00004 Paul Jayo Regar meadow brome field planting – irrigated/non-irrigated and hay/grazing trial. Seed ordered January 21, 2000 for delivery in early April. Site is 30-acre field with Hoodoo silt loam soil, 0-1 percent slopes, 32-inch rainfall zone, and 2485 feet elevation. FY00 planting was delayed due to dry spring weather. Cooperator plans to plant fall 2000. FY01 - FY04 no evaluations.

IDAHO DIVISION II
PLANT MATERIALS PLANTINGS

FIELD OFFICE: GRANGEVILLE

ID04004 Tony Carlson Field Planting. Sherman big bluegrass, Rosana western wheatgrass, Nezpar Indian ricegrass, Snake River Plains fourwing saltbush and Northern Cold Desert winterfat. Site characteristics: Lickskillat – Tannahill soil complex, 20 percent slopes, 1960 feet elevation, SW exposure, 14-16 inch precipitation, and non-irrigated. Seed ordered January 12, 2004. FY04 species were planted into a site that was sprayed with Roundup, raked, broadcast planted and raked again. Soil moisture was above average at planting time. During evaluation (7/9/04) Sherman big bluegrass and Nezpar Indian ricegrass were present. Site was quite weedy and it is too early to complete establishment evaluation.

ID04008 Gary Crea field planting (winter feed area trial). 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. Seed ordered March 8, 2004. Site characteristics: Ferdinand – Riggins – Flybow soil complex, west aspect, 3300 feet elevation, 22-24 inch precipitation, non-irrigated, T31N R1E SW1/4 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. Gary plans to exclude livestock until late fall and will spray for weeds next spring.

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 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.

ID04010 Marcia Heaton riparian planting. 9023733 redosier dogwood, 9023739 redosier dogwood, 9023740 redosier dogwood, Laurel willow, White willow, Coyote willow, and Golden willow. Cuttings ordered March 5, 2004. Site characteristics: Wilkems silt loam soil, 2980 feet elevation, 24 inch precipitation, non-irrigated, T31N R3E NE1/4 Section 34. FY04 – approximately 60% survival for all willow species and about 20% survival for dogwood species.

FIELD OFFICE: LEWISTON

ID82001 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.

ID86007 Hellsgate field planting - adaptation. FY92 Rush 50%, Oahe 70%, Luna 60%, Ephraim 20%, Magnar 30%, Secar 10%, Alkar 70% and P27 50% survival. FY93 in very heavy cheatgrass infested area Nordan 10% Rush 40%, Oahe 20%, Luna 24%, Rosana 30%, Magnar 15%, Secar 20% and P27 10% survival. Rush and Luna appear to be the best species. FY94 Rush int. wheatgrass is the most vigorous followed closely by Luna pubescent wheatgrass. Magnar plants are the largest. Rodents have utilized all Secar plants and a few plants of Ephraim, Nordan, P-27, Sherman, and Rosana. The accessions that have failed include Goldar, Paiute, Delar, Appar, Bandera, Nezpar and Tualatin. Cheatgrass continues to dominate site. FY95 50% survival of Rush and Rosana; 30% survival Oahe, Luna, Magnar; 20% survival Secar; 10% survival Ephraim, P27 and Sherman. Failed species include Tualatin, Nezpar, Bandera, Appar, Durar, Delar, Paiute, and T2950-Goldar. Intermediate types are doing the best. Rush and Rosana have spread the most. Alkar has extensive die-out. Cheatgrass continues to dominate site. FY96, and FY97 no evaluations. FY98 survival/comments: Oahe 50% erratic 10-12 feet spread in some areas to dead in others; Magnar 70% some seedlings and plants are very vigorous with few weeds between plants; Rush 75% spreading vegetatively 12-14 feet wide and uniform; Rosana 60% spreading vegetatively 20-30 feet wide and spotty with many weeds; Luna 70% spreading vegetatively up to 12 feet wide and a few bare areas; and Secar 10% widely scattered plants with good vigor. 1 to 3 plants of Nordan, Ephraim, and P-27 found. All other plots are dead. FY99 and FY00 pubescent and intermediate

wheatgrasses performing the best with Rush intermediate a particular standout. Rosana western wheatgrass is the most aggressive spreader. FY01 and FY02 no evaluation. **FY04 planting cancelled.**

ID95028 Dau Bannock thickspike wheatgrass and Rush intermediate wheatgrass field planting. Seed ordered 4/3/95. FY95 - FY99 no evaluations. FY00 40 plants per foot squared of Rush intermediate wheatgrass. Bannock thickspike wheatgrass failed. FY01 40 seedheads per foot squared, 4.5 feet tall, 3000 pounds per acre, estimate 500 pounds per acre seed production and stand is weed free. FY04 good stand with good vigor. This stand is suppressing yellow starthistle fairly well and also providing excellent erosion control.

ID96009 Dau Rush intermediate wheatgrass, Luna pubescent wheatgrass, and Bozoisky Russian wildrye field planting (3 individual plantings) for star thistle control. Seed ordered 12/8/95. FY96 – FY03 no evaluations. **FY04 planting cancelled.**

ID98007A Mike Miller willow planting. Aberdeen willows (Laurel, White, Streamco, Coyote, Geyer) and Meeker willows (Coyote, Yellow 3 accessions, Scouler, Whiplash 2 accessions, Booth 3 accessions, Drummond 3 accessions, Geyer 2 accessions) and Pullman shrubs (Dogwood 3 accessions). Materials ordered 2/9/98. FY98 survival Meeker willows 832 10/10, 823 10/10, 820 9/10, 826 9/10, 826 9/10, 847 7/10, 834 7/10, 827 10/10, 835 6/10, 825 10/10, 828 7/10, 822 0/10, 829 5/10, 819 ?/10. Survival of Pullman dogwoods 740 3/5, 733 5/5, 739 5/5. FY99 no evaluation. FY00 80 percent survival of 820 Pacific willow (local standard). 20 percent survival of 827 Booth willow, 828 Drummond willow, 822 Geyer willow, 829 Drummond willow and 834 Yellow willow. 10 percent survival of 832 Geyer willow. 823 Coyote willow, 826 Booth willow, 847 Drummond willow, 825 Yellow willow, 819 Yellow willow, 739 dogwood, 733 dogwood, 740 dogwood, and 835 Yellow willow failed. Competition, insects and browse damage are factors affecting survival. FY01 survival 822 Geyer 10%, 828 Drummond failed, 825 Yellow 10%, 829 Drummond 10%, 820 Pacific 80% (all died back to base – sprouting about 3 feet high this years growth), 823 Sandbar failed, 832 Geyer 20%, 826 Booth 10%, 847 Drummond failed, and 827 Booth 50%. **FY04 planting cancelled.**

ID98007B Ed and Maxine Larson willow and dogwood planting. FY99 and FY00 no evaluations. FY01 Superior accessions are Laurel willow, which is now 15-18 feet tall with good density and being utilized for cuttings to plant on other areas of the property; Sandbar willow 9024823, which is 4-5 feet tall, spreading and competing well with other vegetation. Accessions that failed include 9024825 Booth willow, 9024826 Booth willow, 9024827 Booth willow, Streambank willow, Aberdeen Geyer willow, Aberdeen Coyote willow, and 9023740 redosier dogwood. **FY04 planting cancelled.**

ID98007C Modie Park willow planting. FY99 100% survival – Booths826, Booths827, and Pacific820; 70% survival sandbar823 and Dummond829; 60% survival dogwood; 33% survival Booth825; 30% survival Geyer822 and Drummond828; 20% survival Geyer832; 14% survival Dummond847; 10% survival yellow835; 0% survival-failed yellow819 and yellow834. Site is heavily overgrown with blackberries, cattails, rush and quackgrass. West side of creek was mowed resulting in severe willow damage. Most promising willows were yellow 9024835, sandbar 9024823, Drummond 9024829 and Booth 9024826/9024827. Geyer 9024832 has glaucus stems and undersides of leaves and may be Drummond. **FY04 planting cancelled.**

ID98007E Victor Thulon willow planting. Aberdeen willows (Laurel, White, Streamco, Coyote, Geyer) and Meeker willows (Coyote, Yellow 3 accessions, Scouler, Whiplash 2 accessions, Booth 3 accessions, Drummond 3 accessions, Geyer 2 accessions) and Pullman shrubs (Dogwood 3 accessions). Materials ordered 2/9/98. FY99 no evaluation. FY00 site is heavily infested with reed canarygrass. Meeker willows: 40% survival 827 Booth willow; 30 percent survival 835 Yellow willow and 834 Yellow willow; 20% survival 825 Booth willow; and 10 percent survival 832 Geyer willow and 822 Geyer willow. Aberdeen willows: 80 percent survival Laurel willow and White willow; 40 percent survival Streamco willow; and 30 percent survival Coyote willow. All other materials failed. FY01 Aberdeen willow survival Laurel 70% (best overall), White 70%, Streamco 30%, Coyote 30%. Meeker willow survival 835 Yellow 30%, 832 Geyer 10%, 825 Booth 10%, 827 Booth 40%, 822 Geyer 10%, and 834 Yellow 30%. **FY04 planting cancelled.**

ID98016 Fred Kaufman Hycrest crested wheatgrass, Vavilov Siberian wheatgrass and Sherman big bluegrass field planting. FY98 and FY99 no evaluations. FY00 excellent stands of Hycrest and Vavilov established. FY02 excellent stand with excellent vigor for each cultivar. Hycrest crested wheatgrass suppressing cheatgrass better than Vavilov Siberian wheatgrass. FY04 excellent stand and vigor of Vavilov, Hycrest and Sherman. Stands are doing good job of suppressing weeds, providing erosion control and very good habitat for upland game birds (pheasants and quail).

ID04014 City of Lewiston – Mike Bowman Delar small burnet field planting. Seed ordered April 6, 2004. Site characteristics: MLRA B9, 4 acres, Tainey silt loam soil, 5-10 percent slope, west to north aspect, 3000 feet elevation, 26-28 inch precipitation zone, non-irrigated. FY04 no evaluation.

FIELD OFFICE: MOSCOW
None

FIELD OFFICE: NEZPERCE
None

FIELD OFFICE: OROFINO
ID99010 Ray Geidl field planting. Species include Coyote willow, Geyer 435 willow, Geyer 448 willow, Geyer 483 willow, Geyer 491 willow, Snowberry, Elderberry, Dogwood 733, Dogwood 740, and Chokecherry. FY99 and FY00 and FY01 no evaluations. FY02 Plantings are located in area with heavy reed canarygrass competition. Good survival for all willow and dogwood accessions with 4 of 5 cuttings for each still surviving, fair vigor for each, 40 inch height for all willows and 20 inches height for all dogwoods. Snowberry, Elderberry and chokecherry failed. FY03 – FY04 no evaluations.

ID04011 Clearwater County Riparian Project. 9067541 peachleaf willow, 9067546 peachleaf willow, 9067 549 peachleaf willow, 9067568 black cottonwood, 9067569 black cottonwood, 9023 733 redosier dogwood, 9023739 redosier dogwood, 9023740 redosier dogwood and Okanogan snowberry. Cuttings ordered March 5, 2004. Site characteristics: Cobbly soil, flat aspect, 1100 feet elevation, 26 inch precipitation, non-irrigated. FY04 no evaluation.

ID04012 Ray Geidl Project. 9067541 peachleaf willow, 9067546 peachleaf willow, 9067549 peachleaf willow, 9023733 redosier dogwood, 9023739 redosier dogwood, 9023740 redosier dogwood and Okanogan snowberry. Cuttings ordered March 5, 2004. Site characteristics: fine loamy soil, flat aspect, 3000 feet elevation, 35 inch precipitation, non-irrigated (naturally sub-irrigated). FY04 no evaluation.

ID04013 Paul Schroder Project. 9067541 peachleaf willow, 9067546 peachleaf willow, 9067 549 peachleaf willow, 9023733 redosier dogwood, 9023739 redosier dogwood, 9023740 redosier dogwood and Okanogan snowberry. Cuttings ordered March 5, 2004. Site characteristics: Fine loamy soil, flat aspect, 3000 feet elevation, 35 inch precipitation, non-irrigated (naturally sub-irrigated). FY04 no evaluation.

IDAHO DIVISION III
PLANT MATERIALS PLANTINGS

FIELD OFFICE: CALDWELL

ID98022 Bill Baird Rush intermediate wheatgrass and orchardgrass field planting - irrigated pasture. Seed ordered May 14, 1998. Planting scheduled for mid May through mid June. FY98 irrigated pasture planted in mid May with poor stand establishing. Bill plans to replant in spring of 1999. FY99 good stand density establishing with 5 plants per foot squared and fair vigor. Plants reached 6-8 inch height this establishment year. Nitrogen, phosphorus, potassium, and sulfur were applied. This is a very course-gravelly soil requiring irrigation every 4-5 days. FY00 and FY01 no evaluations. FY02 very course-gravelly soils that require frequent 3-4 day irrigation. Stand has good density with about 6 plants per square foot, good vigor in spite of droughty infertile soils. Individual plants are increasing in size and are competitive with weedy species. Cooperator is please with performance. FY04 – fair stand and vigor for both Rush intermediate wheatgrass and Orchardgrass on gravelly soils where frequent irrigation is required.

ID02001 CB River Springs Ranch WRP field planting. Vavilov Siberian wheatgrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Northern Cold Desert winterfat, and Snake River Plain fourwing saltbush. Seed ordered 3/26/01 for shipment in early March 2002. Site characteristics: Felthom fine sandy loam soil, 3-12 percent slopes, NE aspect, 2100 feet elevation, 11 inch rainfall, cheatgrass community to be sprayed 2-3 times (spring and fall 2001) prior to early spring (2002) interseeder planting. FY02 this year's precipitation is below average. Field was sprayed for cheatgrass control in May 2001 and March 2002. Field was planted on April 9, 2002 using a grass seeding drill and a rain of 0.3 inches occurred immediately following planting. No appreciable rain fell during the rest of the year. A field check on May 16 showed excellent seed germination. Field was sprayed for broadleaf control in June 2002. Field check on November 19, 2002 - was unable to determine success of planting. FY03 no evaluation. **FY04 planting failed – cancel.**

FIELD OFFICE: EMMETT

ID02023 Little Farms Rush intermediate wheatgrass, Vavilov Siberian wheatgrass, Covar sheep fescue, and Sodar streambank wheatgrass critical area planting. Seed ordered December 14, 1998 for delivery about August 1, 1999. FY02 seed transferred to Little Farms. FY03 and FY04 no evaluations.

FIELD OFFICE: MARSING/GRANDVIEW

ID04001 Matt and Jean Barney demonstration plots. Bannock thickspike wheatgrass, Sodar streambank wheatgrass, Magnar basin wildrye, Nezpar Indian ricegrass, Snake River Plains fourwing saltbush, Northern Cold Desert winterfat, Vavilov Siberian wheatgrass, Critana thickspike wheatgrass, Rimrock Indian ricegrass, 9019219 bottlebrush squirreltail, PI434231 plains bluegrass, 9005460 alkali bluegrass, High Plains Sandberg bluegrass, 9063520 Ruby Valley pointvetch, 9005617 strawberry clover, 9016134 Gardner saltbush, Trailhead basin wildrye, Bozoisky Russian wildrye, Secar Snake River wheatgrass, Schwendimar thickspike wheatgrass and Sherman big bluegrass ordered April 17, 2003. Seeding planned of October - November 2003. **Site Characteristics:** Owyhee County, MLRA B11, Soil Map Unit 100 fine sandy loam, weak salinity, 1-7% slope, south aspect, 3300 feet elevation, 8-10 inch precipitation zone, non-irrigated, NE 1/4 Section 29 T4S R1W. Plots were planted late fall of 2003. FY04 no evaluation.

FIELD OFFICE: MERIDIAN

ID02004 Brad Little Field Planting – BASF Plateau Herbicide Study – Seeding Trial.
Herbicide Treatment 1 – Burn + Herbicide (control – 2 ounce – 4 ounce rates). Herbicide Treatment 2 – Non-burn + Herbicide (control - 2 ounce – 4 ounce – 6 ounce – 8 ounce – 10 ounce – 12 ounce rates). Seeding Treatments – Alfalfa and Snake River Plains Germplasm fourwing saltbush will be mixed with each of the following rangeland forage grass species: Rush intermediate wheatgrass, Luna pubescent wheatgrass, Hycrest crested wheatgrass, CD-II crested wheatgrass, Vavilov Siberian wheatgrass, P27 Siberian wheatgrass, Bozoisky Select Russian wildrye, Mankota Russian wildrye, and Covar sheep fescue. Each treatment (herbicide rate – seed mix) will cover 0.12 acres in 48x110 feet plots. Seed ordered September 18, 2001 for shipment by October 12, 2001. Herbicide treatments and seeding planned for November 2001 during dormant growth period. Site characteristics – MLRA B10, silt loam to sandy loam soil, 2-6 percent slopes, east southeast aspect, 2900-3000 feet elevation, 11-12 inch precipitation zone, non-irrigated, T5N R1N SW1/4 of SW1/4 of Section 5. Site sprayed November 2, 2001. Planting conducted in December 2001. FY02 there was no plants established on August 16, 2002 due to lack of spring and summer moisture for germination. As of evaluation date only 5 inches of moisture for entire year. FY03 wet spring, but extremely hot summer (record setting).

No grass establishment. Observations on herbicide treatments: 2 ounce rate very similar to control (no herbicide treatment) with very little cheatgrass or six-weeks fescue control; 4-12 ounce rates resulted in good cheatgrass control; 8-12 ounce rates controlled Sandberg bluegrass, but it appears that there was little control of six-weeks fescue. Trial will be evaluated for at least one more year. **Droughty conditions since 2001 has caused stand failure – cancel.**

FIELD OFFICE: MOUNTAIN HOME
ID03004 Pat Bennett field planting. Topar pubescent wheatgrass, Regar meadow brome, and Garrison creeping foxtail seeding mixture. Seed ordered October 24, 2002. Seeding planned for November 2002. Site is in MLRA 10A on Houk silty clay loam soil with 0-1 percent slope, 16 inch precipitation zone, 5000 feet elevation, and non-irrigated. NW1/4 Section 33 T1S R11E. D6 caterpillar was used to scalp site, breach existing embankments, and construct earthen plugs prior to planting. Seed was broadcast planted in December 2002 onto dry seedbed. Good winter moisture (snow cover) by late December. FY03 no evaluation. **FY04 – drought since planting has caused stand failure – cancel.**

FIELD OFFICE: PAYETTE
None

FIELD OFFICE: WEISER
ID91029 Grafe Bannock and Critana thickspike wheatgrass field planting. Site is a sandy loam soil, non-irrigated, 12-14 inch ppt, 2500 feet elevation, and 4-8% slopes on west exposure. FY92 estimate 20% stand. FY93 survival is 90% for both species. The existing plants are healthy and holding their own with competition. Neither species is as vigorous as Oahe on same sites. FY94 survival is 95% for each species, good stands, and excellent vigor. This trial continues to improve, the stands are spreading and filling in open ground. Both species appear well adapted to site even considering the extended drought conditions. Total forage production is less than adjacent intermediate wheatgrass, but is more palatable. Plants are producing seed this year. The stands are starting to provide competition for annual weeds, grasses and cereal rye. I am now starting to see the value of these plants on some of our most droughty and limiting sites. FY95 Good stands for both Bannock and Critana (95% survival). Both species continue to improve over time. Cereal rye is not affecting growth. Neither thickspike wheatgrass is producing as well as Oahe intermediate wheatgrass. Both species would fit well with similar palatability grasses in mixture (suggest Goldar or Secar bluebunch wheatgrass). FY96 good stands of both with 6 plants/ft2 of each and excellent vigor. Growth of both species is still very good and weed competition is light. Total production continues to be less than adjacent intermediate wheatgrass. FY97 good stands (5 plants per foot), survival, and vigor for both Bannock and Critana. Growth and vigor for both does not reflect the excellent moisture year we had and stands are maintaining or declining slightly. FY98 no evaluation. FY99 good stands of both species with 90 percent survival and good vigor. Producing between 500 and 1000 pounds per acre in an extremely dry April through November year. Bannock is slightly taller at 18 inches than Critana at 16 inches. Heavy grasshopper damage this year. Cheatgrass invasion is slight. FY00 no evaluation. FY01 stands of both Bannock and Critana were rated poor, with 1 plant per square foot, fair vigor and 200 pounds of production per acre. Two years of drought has heavily impacted this planting and cheatgrass is invading. FY04 – plots continue to be plagued by drought conditions and severe cheatgrass infestations. They are adapted to site, but suppressed due to these factors.

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 filed 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.

ID94026 Weber Goldar bluebunch wheatgrass, Rush intermediate wheatgrass, Luna pubescent wheatgrass, Secar Snake River wheatgrass, Greenar intermediate wheatgrass, Schwendimar thickspike wheatgrass, Bozoisky Russian wildrye, Bannock thickspike wheatgrass, Delar small burnet, Firecracker and Alpine penstemon, Sherman big bluegrass, Wytana fourwing saltbush, and Rincon fourwing saltbush demo plots. Site is stony clay loam soil, non-irrigated, 16 inch ppt, 3200 feet elevation, 0-2% slopes. Seed ordered July 1994. FY94, FY95, and FY96 due to drought conditions, seeding not planted. FY97 seeded May 16, 1997 with good rains following planting. Weed competition is high. In general initial establishment was good for wheatgrasses, fair for wildryes and poor for forbs. FY98 rainfall was 150 percent of average this year resulting in a flush of weeds. All plots except forbs were sprayed for broadleaf weed control and were shredded to reduce overstory competition. The most successful plants include: GRASSES Rush is by far the superior plot from standpoint of vigor, total growth, and total production. Luna is rated second and Reliant is rated third. Other grasses are only marginally successful to non-existent due to possibly saturated soils and weed competition during the establishment year. FORBS Delar is doing very well and appears very hardy and adapted to wet soil conditions. Penstemons and Lupine did not establish. SHRUBS Rincon is taller (10-15 inches) than Wytana (4-6 inches). FY98 no evaluations. FY99 Weeds and saturated soils are a problem on this site. Most successful plants – grasses: Rush intermediate wheatgrass followed by Luna pubescent wheatgrass, and Reliant intermediate wheatgrass, with others only marginally successful; Forbs: Delar small burnet is performing very well and no other forbs established; Shrubs: Rincon fourwing saltbush is superior to Wytana fourwing saltbush on this site. FY00 no evaluation. FY01 following two years of extreme drought Greenar intermediate wheatgrass was the most productive and vigorous followed by Reliant intermediate wheatgrass and Luna pubescent wheatgrass. Rush intermediate wheatgrass, Mankota Russian wildrye, and Manska pubescent wheatgrass did not grow much this year. Magnar basin wildrye was superior to Trailhead basin wildrye in production and survivability. Thickspike wheatgrass and Russian wildrye accessions grew very slowly. Delar small burnet plants are not handling drought well and are dying. Rincon fourwing saltbush is better than Wytana fourwing saltbush with some plants to 18 inches in height. Weeds are infesting site. FY02 was a very dry growing season. Intermediate wheatgrasses - Greenar is producing more forage than any other species, Greenar is not spreading as fast as Rush or Reliant which is probably an advantage on this droughty site, Luna is the best pubescent wheatgrass, but not producing as much as Greenar. Basin wildryes - Magnar and Trailhead are nearly identical in production with Magnar slightly higher with more vigor than trailhead. Russian wildrye - Bozoisky is by far the best performer of the R. wildryes. Small burnet - Delar is no longer present. Fourwing Saltbush - Rincon is a little better than Wytana, but they lack vigor. Thickspike wheatgrass - all accessions are barely surviving. **Next evaluation scheduled for FY05**.

ID96024 Howard Sutton Rush intermediate wheatgrass, Luna pubescent wheatgrass, and Oahe intermediate wheatgrass field planting. Site is loam soil, non-irrigated, 15-17-inch ppt, 3320 feet elevation, 1-4% slope on south exposure. Seed ordered March 14, 1996. FY96 planted in May into good seedbed with good weed control. Good stand establishing with about 3 plants per foot squared, each species was planted with alfalfa in alternate rows and alternating sections. FY97 good stands with excellent vigor of each cultivar. The Oahe/alfalfa stand was cut for hay and produced 1.5 tons/acre. Because of topography the Rush/alfalfa and Luna/alfalfa were not cut for hay. The entire field was grazed; grazing was uniform across all trials so preferences could not be determined. Producer is very happy with all three from standpoint of production potential when seeded with alfalfa. FY98 good stands and vigor for each species

with about 7 plants per square foot. Yield for all species was about 5000 pounds per acre or about 3 AUMs per acre. Cattle are selecting Luna as first choice, then go to Rush before Oahe. The Rush was more mature than Luna when steers were put in pasture which may account for selection choices. FY99 good stands and vigor of all three species. Entire 84 acre seeding provided 135 AUMs or 1.6 AUMs/ac. Due to later season of use; cattle prefer Luna and Oahe to Rush. Rush initiates growth earlier and is more mature when cattle are turned into pasture, which probably accounts for this preference. FY00 similar report to last year. FY01 good stands and vigor for all species. Grazing preference continues to be for Oahe, followed by Luna, and the Rush. Production is about the same for all species although reduced this year due to two years of extreme drought. FY02 good stand, and vigor with greatly reduced production this drought year for all accessions. Produced 0.5-0.7 AUM/Acre for each accession, less than 50% of the normal precipitation year. Grazing is slowing spread of these species. FY04 – good stands with good vigor for all species. Production was approximately 0.7 AUMs per acre.

ID97023 Schwenkfelder Rush intermediate wheatgrass District Seed Increase. Site is silty clay loam soil, 14-16 inch ppt, irrigated, 2700 feet elevation, 0-2% slopes, and north exposure, T15N R2W SW1/4 NE1/4 Section 16. Seed ordered March 24, 1997. FY97 spring planted May 29, 1997 into excellent firm seedbed. By July 3, 1997 adequate rain had occurred for good germination so no irrigation was required. There were still a few seedlings emerging on this date. Cooperator plans to spray for broadleaf weeds and will fertilize this fall to prepare for seed production. FY98 excellent stand and vigor with plants averaging 60 to 72 inches in height on June 23 with seedheads up to 15 inches long. Harvested in mid August with 550 to 600 pounds per acre estimated yield. Baled forage yield was 7000 to 8000 pounds per acre. The hay is fed to range cattle early in the feeding season and utilize it readily. FY99 produced 300 lbs/ac seed this year. Producer is very happy with production and utilizes residue to feed beef cows. Hay yield was about 3 tons per acre. Producer fertilized with 43-lbs/ac nitrogen and 104-lbs/ac phosphorus in late October 1999. FY00 no evaluation. FY01 producer decided to graze this field this year due to drought and reduced seedhead production. Vigor was reduced because of drought. FY02 producer choose to irrigate (twice) this field and harvest (July 10th) for hay. Production was 7500 pounds per acre (3.76 tons/acre). Field was irrigated again and used for fall grazing. **Next evaluation scheduled for FY05**.

ID98019 Royce Schwenkfelder Bannock thickspike wheatgrass Field Planting. Seed ordered March 16, 1998 for April delivery. FY98 because of spring rains, this seeding did not go in until mid June. Seedbed preparation was excellent, but only 20 percent of plants emerged due to soil crusting. Additional seed was obtained and this seeding will be replanted. FY99 - FY04 producer has not planted due to severe drought conditions the past three years.

ID02010 Hugh Pangman - New Meadows Riparian Planting. 9067541 Peachleaf willow - Baker source and Golden willow. 50 cuttings ordered February 11, 2002 for shipment in early May 2002. To be planted with waterjet stinger. FY02 willows were planted through cobbly site using a backhoe to watertable located at 5-6 feet depth. 95 survival of each species. Peachleaf willows are 18-20 inches tall and Golden willows are 24 inches tall. Golden willows are more vigorous with more stem growth. FY03 Peachleaf willow 95 percent survival with 36-48 inch height. Golden willow local cuttings also have 95 percent survival with 48 inch plus height. Producer is please with this planting. FY04 no evaluation.

ID02011 Tom Vogel - Paddock Riparian Planting. 9067546 Peachleaf willow - Burns source and local coyote willow. 50 cuttings ordered February 11, 2002 for shipment in late March 2002. To be planted with waterjet stinger. FY02 willows were planted on April 3, 2002 using the waterjet stinger. Stream was dry for most of July and August. Peachleaf willows have about 75 percent survival with some leader growth up to 36 inches. Coyote willow has about 60% survival. FY03 and FY04 no evaluations.

ID02014 Mink Land and Livestock Riparian Planting. 9067549 Peachleaf willow - Prairie City source and local source coyote willow, 2002 for shipment in late March 2002. To be planted with waterjet stinger. FY02 Peachleaf willow survival 50% and Coyote willow survival 10%. Planting depth (soils were very dry for most of season) was probably too shallow and plant perhaps should have been completed sooner. FY03 Peachleaf willow 80 percent survival with 48 to 96 inch height. Coyote willow local cuttings have 65 percent survival with 24 to 36 inch heights. FY04 no evaluation.

ID02017 Jim Eckhardt Field Planting - Plateau Herbicide Trial (4 oz, 8 oz, 12 oz, Control 4 oz, 8 oz, 12 oz). Seed ordered March 20, 2002 for shipment in early October. Species include: Magnar basin wildrye, Trailhead basin wildrye, Bozoisky Russian wildrye, Mankota Russian, Bannock thickspike wheatgrass, Critana thickspike wheatgrass,

Goldar bluebunch wheatgrass, High Plains Sandberg bluegrass, Vavilov Siberian wheatgrass, CD-II crested wheatgrass and Hycrest crested wheatgrass. Site Characteristics: MLRA B10, Deshler-Devon silty clay loam soil, 2-5 percent slope, south aspect, 2600 feet elevation, 12 inch rainfall zone, T11N R6W NE 1/4 NW1/4 Section 1. FY02 Plateau was applied (4, 8 and 12 ounce rates) March 27, 2002 by Joe Vollmer. Did not control salsify, fiddleneck or sunflower. Planted November 4, 2002 under dry/cold conditions with a rangeland drill at 12-inch spacing. FY03 three planted species established this year: 1) Vavilov Siberian wheatgrass had the best stand and was the most vigorous. It did not grow in the untreated control plot – established well in the 4 and 8 ounce treatments – did not establish in the 12 ounce treatment; 2) CD-II crested wheatgrass was not as vigorous as Vavilov and had fewer plants established. It had no establishment in the no treatment - some establishment in the 4 ounce treatment – good establishment in the 8 ounce treatment – no establishment in the 12 ounce treatment; 3) Hycrest crested wheatgrass was the least vigorous of the establishing species with 30-35 percent fewer plants than Vavilov and CD-II. It had no establishment in the untreated plot - spotty establishment in the 4 and 8 ounce plots – no establishment in the 12 ounce plots. At this evaluation the 8 ounce treatment appears to be the best rate for Plateau herbicide. FY04 – The best stands include: Vavilov Siberian wheatgrass with good stand with good vigor; CD-II crested wheatgrass with fair stand with fair vigor; Hycrest crested wheatgrass with fair stand with fair vigor. All other planted species appear to have failed. The best cheatgrass control rate was 8 ounces/acre of Plateau herbicide. 4 ounces is not enough and 12 ounces effects perennial plant growth. The Plateau application has helped existing bottlebrush squirreltail. Conservationist would not recommend this method seedbed preparation because he does not feel the additional expense warrants the limited vegetation produced.

IDAHO DIVISION IV
PLANT MATERIALS PLANTINGS

FIELD OFFICE: BURLEY

ID94003 Bronson Bozoisky Russian wildrye, Mankota Russian wildrye, Trailhead basin wildrye, Magnar basin wildrye, Goldar bluebunch wheatgrass (firebreaks and winter grazing). Site is sandy loam soil (weakly saline), 9-10" ppt, partially irrigated, 4800 feet elevation, 0-2% slopes. Species seeded in fall of 1994 with good seedbed. FY95 good stands of Mankota, Magnar and Trailhead; fair stands of Bozoisky and Goldar. All seedings are establishing well except in weedy areas. No seed production during establishment year. FY96 good stand of Goldar, fair stand of Mankota and Magnar, and very poor stand of Trailhead and Bozoisky. All plants that are present look good and are producing seed. There are weeds present including cheatgrass, tumble mustard, Russian thistle, broom snakeweed and sagebrush. FY97 Goldar full stand, Trailhead has improved and is spreading, Magnar is very thin, and both Russian wildryes are adapted with thin stands. FY98 good stands of Bozoisky and Goldar and fair stands of Mankota, Trailhead and Magnar. Stands are grazed in winter. FY99 Good stand and vigor of all species. All species are in same pasture and the Bozoisky is grazed closer than the other species. FY00 fair to good stand of all species. Cooperator is very pleased with all species and prefers them over crested wheatgrass varieties. Site was grazed in spring. Cooperator states that livestock make good use of Bozoisky and Mankota in spring, Trailhead in winter, and Magnar in fall and winter. Magnar stays greener than Trailhead. FY01 this site is suffering from two years of drought. Mankota Russian wildrye has 36-inch height, fair to good stand and good vigor. Bozoisky has 20-inch height, fair stand with fair vigor. Magnar has 30-inch height and Trailhead has 20-inch height and both have fair to poor stands with fair to good vigor. Goldar has 24-inch height, fair to poor stand with good vigor. FY02 Survival/Plant Height - Mankota 75%/26 inch, Magnar 80%/40 inch, Trailhead 80%/36 inch, Bozoisky 75%/30 inch, Goldar 30%/26 inch. Magnar and Trailhead are only lightly grazed and are showing very little effect from grazing. Bozoisky and Mankota stands are heavily grazed and stand are beginning to decline. Goldar stand is also heavily grazed and stand has declined significantly. Producer comments indicate that Goldar is always the first species to be grazed in this pasture followed by the Russian wildrye. FY03 and FY04 no evaluations.

ID96012 Poulton Garrison field planting for plug nursery. Seed ordered 12/8/96. FY96 no evaluations. FY97 field has full stand with 2 plus plants/ft2. Plants have height of 36 inches and no weeds. Stand is gravity irrigated and was fertilized with 80 pounds of N in early June. FY98 excellent stand that has improved significantly in the last year. The stand was hayed this year. FY99 good to excellent stand. The stand was 36 inches tall when swathed for hay and had 6 inches of regrowth in early September. Cooperator is very pleased with this grass. Elk are utilizing planting. FY00 planting was cut for hay and elk are utilizing it heavily due to drought conditions. FY01 due to drought conditions, this planting was hayed earlier than normal and has been heavily grazed. Production was below normal. Stand is solid with no bare spots or invading species. FY02 same comments as last year. FY03 and FY04 no evaluations.

ID96028 East Cassia SCD Hycrest crested wheatgrass, Sodar streambank wheatgrass, Bannock thickspike wheatgrass, and Appar blue flax field planting and Hycrest II (CD-II) crested wheatgrass, Sodar, Bannock, and Appar field planting. FY96 planting planned for fall of 1996. FY97 no evaluation. FY98 fair stand of all species except Appar, which failed. FY99 poor stands of Hycrest, CDII, and Flax. Bannock and Sodar failed. Crested wheatgrass can be rowed in very heavy stands of cheatgrass. FY00 fair stand of Hycrest and CD-II, poor stand of Bannock, and Sodar and Appar failed. Both Hycrest and CD-II are thickening up and starting to crowd out cheatgrass. Some Bannock is present, but Sodar and Appar were not observed. FY01 no evaluation. FY02 planting has been mowed resulting in poor opportunity to evaluate planting. FY03 and FY04 no evaluations.

ID97005 Hawker Field planting for medusahead wildrye control. Sherman big bluegrass, Covar sheep fescue and Garnet (905308) mountain brome. Site is very stony loam soil, non-irrigated, 14 inch ppt, 5800 feet elevation, 4% slope on south exposure. Seed ordered 10/17/96. FY97 new seeding and difficult to determine establishment. FY98 good stand of Sherman and Covar establishing and fair stand of mountain brome establishing. FY99 due to severe grasshopper population, it is impossible to determine stand composition. FY00 due to drought planted species were not found – evaluate in spring 2001.FY01 site was heavily grazed early this year and no regrowth occurred. FY02 cattle have been in field most of the summer and field is overgrazed. Planting evaluation could not be performed. FY03 and FY04 no evaluations.

ID97006 Gary Jones Field planting of Garrison creeping foxtail. Site is silt loam soil, irrigated, 5000 feet elevation, and 0-3% slope on south exposure. Seed ordered 10/17/96. FY97 new seeding and very difficult to determine establishment. FY98 poor stand establishing with .5 plants per foot2. FY99 good stand with about 4 plants per square foot and 4000 pounds per acre production. Fertilizer would benefit stand and reduce weeds. FY00 good stand with excellent vigor. Planting was hayed this year. FY01 this is a good planting. It was cut earlier than usual for hay due to shortage of irrigation water. Yield was down this year, but cooperator was satisfied with yield given the droughty conditions. FY02 landowner is enthused about Garrison production/performance and plans to plant additional field to this species. FY03 and FY04 no evaluations.

ID00009A Warren Yadon willow field planting. 9067561 Lemmon willow (12), 9067548 Drummond willow (12), 9067436 Yellow willow (12), 9067375 Peachleaf willow (15), and 9067376 Peachleaf willow (14) were ordered on March 1, 2000 for shipment April 10, 2000. FY00 willow evaluations will be performed next year. FY01 this planting is overgrown with woods rose, stinging nettle and weeds. Cuttings are alive, but very difficult to evaluate this late in the year. Recommend evaluating earlier next year. FY02 12 Drummond and 6 Yellow willows were alternately planted with 2 Yellow willows 6-8 feet tall still surviving. 6 Yellow willows planted into the face of a 4-5 feet cutbank on the west side of stream, all have survived and are 2-4 feet tall with limited branching. 14 Peachleaf 376 were planted with 4 6-8 feet tall plants surviving. 15 Peachleaf 375 were planted with 12 2-10 feet tall plants surviving. 12 Lemmon willows were planted, but could not be located. FY03 and FY04 no evaluations.

FIELD OFFICE: GOODING/FAIRFIELD

ID98018A Bill Simon Farms Rush intermediate wheatgrass District Seed Increase. Seed ordered March 16, 1998 for mid April delivery. FY98 Rush seeded in April 1998 into twin rows on 30-inch centers. The 55 acre field was formerly in alfalfa (1996 and prior) and fallowed in 1997. Excellent stand established by the fall of 1998 with plants fully bunched and vigorous. Stand was sprayed with formula 40 2, 4-D in late June or early July. Producer did not fertilize stands in the fall. FY99 approximately 25 percent of production was lost to shatter due to strong winds prior to harvest. The 55-acre field produced approximately 180 lbs/acre. On droughtier hilltops and ridges producer noted that seed production was lacking and suggested that wider row spacing would be desirable. FY00 Rush stand remain strong and Bill Simon feels it is the best grass on the Prairie. The dry year took its toll on seed production, however. Harvested the third week of August 2000 and the 55-acre field produced 91 pounds/acre clean seed. The 55-acre field was in alfalfa prior to seeding to Rush, and this field has more weeds. FY01 spring frost damaged reproductive stems - no seed production. FY02 unfavorable moisture year - 50 pounds per acre seed production. FY03 good stand and vigor, however field was not harvested this year for seed due to very low seed production. The low production may have been due to spring frost (May 19 - 16^0, May 20 – 21^0, June 23 – 26^0), low precipitation, and very hot summer. Some very light seed fill on ridges – no seed fill in swales and other low spots. FY04 no seed production – producer grazed field. Stand is 6 years old and plants are spreading into the interspaces between rows. Producer does not cultivate planting between rows, so seed production would not be expected beyond 5 year old stand. Planting will be maintained for grazing. **Cancel**

ID98018B Bill Simon Farms Rush intermediate wheatgrass District Seed Increase. Seed ordered March 16, 1998 for mid April delivery. FY98 rush seeded in April 1998 into twin rows on 30-inch centers. The 85-acre field was formerly in small grain. Excellent stand was established by the fall of 1998 with plants fully bunched and vigorous. Stands were sprayed with formula 40 2, 4-D in late June or early July. Producer did not fertilize stands in the fall. FY99 approximately 25 percent of production was lost to shatter due to strong winds prior to harvest. The 85-acre field produced approximately 110 lbs/acre. On droughtier hilltops and ridges producer noted that seed production was lacking and suggested that wider row spacing would be desirable. FY00 Rush stands remain strong and Bill Simon feels it is the best grass on the Prairie. The dry year took its toll on seed production, however. Harvested the third week of August 2000, the 85-acre field produced 81 pounds/acre clean seed. Weeds in the 85-acre field are not a problem, since prior to seeding to Rush the field was in 2 years of wheat, and prior to that 5 years of Regar meadow brome, providing a clean field. FY01 unfavorable moisture year - 40 pounds per acre seed production. FY02 unfavorable moisture year - 23 pounds per acre seed production. FY03 good stand and vigor – field produced 49 pounds per acre this year probably due to spring frost (May 19 - 16^0, May 20 – 21^0, June 23 – 26^0), low precipitation, and very hot summer. FY04 – harvested approximately 70 pounds clean seed per acre. Stand is 6 years old and plants are spreading into the interspaces between rows. Producer does not cultivate planting between rows, so seed production would not be expected beyond 5 year old stand. Planting will be maintained for grazing. **Cancel**

ID98020 Bill Simon Bannock thickspike wheatgrass District Seed Increase. Seed ordered April 10, 1998 for mid April delivery. FY98 Bannock seeded on 12-inch centers. Evaluation in November 1998 indicated a slow start with weak plants at the end of the first full growing season. Weeds do not appear to be a problem, but soils are somewhat gravelly and it appears to be a difficult site to establish a stand. Field was fertilized with about 20 units of nitrogen in the fall. FY99 plants remain narrow and spindly, but fertilizer did contribute to improved plant health. Harvest of approximately 80 lbs/acre was completed early while plants were still green, but seed was mature and beginning to shatter. FY00 this is the first-to-ripen grass in Bill's portfolio, interfering with his alfalfa hay harvest on the Prairie. This year the Bannock was harvested the first week of August, and produced 110 pounds/acre clean seed, which is higher than last year's yield despite the dry year. The field was fertilized with 40 units of ammonium sulfate about May 1, 2000, and later sprayed with Formula 40 2,4-D. Cheatgrass is increasing in the field and will need to be controlled in 2001. FY01 unfavorable moisture year - 100 pounds per acre seed production. FY02 unfavorable moisture year - 65 pounds per acre seed production. FY03 good stand and vigor – field produced 43 pounds per acre probably due to spring frost (May 19 - 16^0, May 20 – 21^0, June 23 – 26^0), low precipitation, and very hot summer. FY04 – good stand and vigor with field producing 45 pounds of clean seed per acre. Planting is deteriorating and cooperator will destroy stand this fall. **Cancel**

ID00005 Camas SCD (Koonce) formerly ID86010 Koonce multiple species demo plots. FY99 field evaluation determined these plots to be contaminated and planting was destroyed, site cleaned-up and fallowed during 1999, and was replanted in the spring of 2000. Plots replanted May 1, 2000. Plots will be irrigated the first growing season. **FY00** plots were irrigated until mid June, and then discontinued. Most of the wheatgrasses sprouted in the central and northern portions of the plot, but remained small at evaluation time due to dry season. Plot remains relatively weed-free except the southernmost 15 feet of the plot (sheep fescue area) which is a solid stand of globe mallow. The fescue is sprouted underneath the large mallow leaves. This is a particularly difficult weed to control once established. Special attention needs to be directed here in spring 2001. **FY01** the plots have been subjected to two seasons of unfavorable plant growth (dry springs) and one of the lowest winter snowpacks recorded on the Camas Prairie. Still, all varieties exhibit some level of success except for the following varieties which could not be found for observation: Durar hard fescue, Nezpar Indian ricegrass, 9043501 Salina wildrye, and Thurber's needlegrass. These varieties did not establish at all or remain yet as dormant seed due to drought. Some of the absent species may have germinated but died unnoticed due to drought. Weed competition most likely is not a factor of establishment difficulties in the plot. Possible exceptions may be in the Covar sheep fescue area that had significant amounts of common mallow in 2000 but is now under control due to spot spraying. Scouringrush is invading in the Bighorn sheep fescue and Magnar basin wildrye areas and may be a factor there. The entire demo plot was spot-sprayed in 2001 twice (last of June and first of August) with 2, 4-D/Banvel. At the time of this evaluation the plot did not contain weed problems significant to grass establishment. The wheatgrasses are performing the best. The highest performing wheatgrasses include Rush and Reliant intermediate wheatgrasses, Manska and Luna pubescent wheatgrasses, CDII and Nordan crested wheatgrasses, Bannock thickspike wheatgrass, and Pryor slender wheatgrass. Weak wheatgrass performance was observed with Arriba western, Whitmar beardless wildrye, San Luis slender wheatgrass, Critana thickspike wheatgrass, Ephraim crested wheatgrass, Douglas crested wheatgrass, and P27 Siberian wheatgrass. Bozoisky and Mankota Russian wildrye performed moderately, but the other wildryes either did poorly (Volga Mammoth and Magnar) or did not establish (Salina and Trailhead). Manchar and Liso smooth bromes have done well considering the drought with moderate performances, but Garnet and Bromar mountain bromes and Regar meadow brome did not fare so well and have overall weak ratings. The fescues, needlegrasses, orchardgrasses, ricegrasses, timothy, and foxtail are currently performing weakly or did not establish. Sherman big bluegrass had low establishment density but the existing plants have good vigor with many seedheads produced. **FY02** drought continues. Excellent plots include: Rush, Greenar, Reliant, Topar, Manska, Luna, Bozoisky, CD-II, Hycrest, and Nordan. Good plots include: Rosana, Manchar, Regar, Alkar, Jose, Liso, Oahe, Tegmar, 238, Goldar, P-7, Mankota, Secar, Pryor, Bannock, Schwendimar, Sodar, Sherman, Vavilov, and Magnar. Fair plots include: Latar, Garrison, Arriba, Climax, Covar, Volga, Whitmar, San Luis, Critana, Ephraim, Douglas, P-27, Rimrock, High Plains, and Trailhead. Poor plots include: Paiute, Garnet, Bromar, Durar, 902484, and 9040137. Failed plots include: Salina and Nezpar. **FY03** plants with best density, vigor and seed production include: Rush, Reliant, Manska, Bozoisky, CD-II, Nordan, Arriba, Greenar, Topar, P7, Mankota, Hycrest, Vavilov, Alkar, Jose, Oahe, Tegmar, Luna, Ephraim, and P27. Generally, the wheatgrasses are out performing the fescues, wildryes, needlegrasses, bromes, bluegrasses, timothy and orchardgrass. Plants that have failed include: Paiute, Rimrock, 9040137 needlegrass, Nezpar, Volga, 9043501 Salina wildrye, Bighorn sheep fescue. **FY04** wheatgrasses as a group dominate as the best adapted species for this site. Intermediate (Rush and Reliant) wheatgrass, pubescent (Manska and Luna) wheatgrass, Sherman big bluegrass and Trailhead basin wildrye improved over last year despite

unfavorable conditions. All other plots remained static or declined in performance. Garnet and Bromar mountain brome and San Luis slender wheatgrasses (all short-lived perennials) died out this past year.

ID00006 Bill Simon Bannock thickspike wheatgrass District Seed Increase. Seed ordered February 10, 2000 for mid April delivery. FY00 this new Bannock seeding in spring 2000 was installed adjacent and south of existing Bannock field under file ID98020. Bannock was drilled at 3 pounds per acre PLS on 24-inch centers. The field was helicopter sprayed with 2, 4-D the third week of June. Where helicopter missed, Russian thistle prevailed this year but should diminish next year. At evaluation time on November 1, 2000, the stand was well on its way to establishment considering the dry year. FY01 unfavorable moisture year - 200 pounds per acre seed production. FY02 unfavorable moisture year - 110 pounds per acre seed production. FY03 good stand and vigor – field produced 43 pounds per acre probably due to spring frost (May 19 - 16^0, May 20 – 21^0, June 23 – 26^0), low precipitation, and very hot summer. FY04 - good stand and vigor with field producing 90 pounds of clean seed per acre. Producer feels too much vegetative growth was produced this year due to spring rains hurt seed production. Producer plans to maintain stand for seed production one more year.

ID01007 Spring Cove Ranch – Butler demonstration plantings of Magnar basin wildrye, Snake River Plain fourwing saltbush, and Northern Cold Desert winterfat. Seed 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.

ID01011 Bill Simon District Seed Increase High Plains Sandberg bluegrass test plots. Seed ordered in September 2001. FY02 and FY03 seed not planted due to drought.

ID02015 Bob Josaitis Field Planting. 905439 switchgrass (Bridger PMC) and Blackwell switchgrass (Manhattan PMC) were ordered March 15, 2002 for shipment about April 1, 2002. Purpose: portion of seed mix for wildlife nesting cover. Site Characteristics: MLRA 11a, Harsand fine sandy loam soil, 0-2 percent slope, 3700 feet elevation, 11 inches precipitation, full irrigation, T6S R15E Section 4. FY02 - FY04 seed not planted due to drought and field change. Seeding planned for spring 2005.

FIELD OFFICE: JEROME

ID99012 Tom Davis Critical Area Planting on pond embankment/dike. Hycrest crested wheatgrass and Vavilov Siberian wheatgrass seed ordered March 30, 1999. Planting planned for early April 1999. FY99 spring planting failed due to lack of rainfall. Cooperator planted (broadcast and harrowed) in November 1999 under dry conditions. FY00 good stand in areas where sprinkler semi-irrigates - poor to fair stand establishing in dry areas due to extremely droughty conditions. 2 plants per square foot, good vigor, 12-inch height. Expect stand to improve with better rainfall this fall-winter. FY01 good stand with 3 plants per foot square, and good vigor. FY02 good stand with 4 plants per square foot. FY03 no evaluation. FY04 good stand with good vigor. **Cancel**

ID99014 Tom Davis irrigation pivot corner field planting. Vavilov Siberian wheatgrass ordered March 30, 1999 with delivery about September 1, 1999. Planting planned for late October 1999. FY00 planted (broadcast and harrowed) in November under dry conditions. Good stand in areas where sprinkler semi-irrigates - poor to fair stand establishing in dry areas due to extremely droughty conditions. 2 plants per square foot, good vigor, 12-inch height. Expect stand to improve with better rainfall this fall-winter. FY01 good stand with 3 plants per foot squared and good vigor. FY02 fair stand with 2 plants per square foot. FY03 no evaluation. FY04 good stand with good vigor. **Cancel**

FIELD OFFICE: RUPERT

ID02016 Cooperator Unknown critical area planting - roadside. Seed ordered March 6, 2002 (100 pounds Topar). FY02 - FY04 no evaluations. **Cancel**

FIELD OFFICE: SHOSHONE/HAILEY

ID01003 Cooperator Unknown willow field planting. 10 cuttings each of 9067548 Drummond willow, 9067435 Geyer willow, 9067491 Geyer willow, 9067437 Booth willow, 9067469 Booth willow, and 9067478 Booth willow. FY01 no evaluation. FY02 - FY04 no evaluations. **Cancel**

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.

ID02008 Hot Creek Riparian Planting. 9067541 Peachleaf willow - Baker source, 9067549 Peachleaf willow - Prairie City source, and 9067560 Peachleaf willow - Deer Creek source. Cuttings ordered February 11, 2002 for shipment April 1, 2002. FY02 - 9067541 12 percent survival with poor vigor - 9067549 24percent survival with poor vigor - 9067560 56 percent survival with poor vigor. Survival impacted by continuously saturated soils. Success primarily related to different site conditions. FY03 planting failed - **Cancel**.

ID02009 Shoshone Creek Riparian Planting. 9067541 Peachleaf willow - Baker source, 9067549 Peachleaf willow - Prairie City source, and 9067560 Peachleaf willow - Deer Creek source. Cuttings ordered February 11, 2002 for shipment April 1, 2002. FY02 - 9067549 60 percent survival with good vigor - 9067541 76 percent survival with good to excellent vigor - 9067560 50 percent survival with fair vigor, native Planeleaf willow 100 percent survival with excellent vigor. Death loss can primarily be related to livestock damage when cattle were place in field for 5 days. FY03 no evaluation. FY04 9067549 peachleaf willow failed, 9067541 peachleaf willow 24 percent survival with fair vigor, 9067560 peachleaf willow not evaluated, native willows 100 percent survival with good vigor.

ID03001 Walt Coiner Field Planting. Purpose: Field Planting - windbreak interspace perennial cover/weed control study - irrigated-semi irrigated-dryland trials. Seed was ordered on September 17, 2002. Approximately 1 acre per species - broadcast seeding rates - Aberdeen PMC broadcast planters were used for seeding - dormant fall planting completed November 4 and 5, 2002. **Irrigated species:** Durar hard fescue; Sherman big bluegrass; Foothills Canada bluegrass, and Talon Canada bluegrass. **Semi Irrigated species**: Covar sheep fescue; Sodar streambank wheatgrass; Paiute orchardgrass; Ephraim crested wheatgrass; Sherman big bluegrass; Roadcrest crested wheatgrass; and Quatro sheep fescue. **Dryland species:** Vavilov Siberian wheatgrass; Rosana western wheatgrass and Bozoisky Russian wildrye. FY03 initial evaluation August 20, 2003. FY04 evaluation September 13, 2004.

	Stand		Vigor			
Species	2003	2004	2003	2004	Adapted	Comments
Irrigated Perennial Cover						
Sherman big bluegrass	good	fair	exc.	fair	no	over watered/leaf rust/moderate weeds
Talon Canada bluegrass	good	exc.	exc.	exc.	yes	short/best weed control
Foothills C. bluegrass	exc.	exc.	exc.	exc.	yes	taller/moderate weeds
Durar hard fescue	fair	exc.	exc.	exc.	yes	major improvement/moderate weeds
Semi-Irrigated Perennial Cover						
Covar sheep fescue	poor	fair	fair	good	yes	needs full irr. to est./moderate weeds
Quatro sheep fescue	poor	good	fair	good	yes	needs full irr. to est./moderate weeds
Newhy hybrid wheatgrass	poor	failed	fair	v. poor	no	needs full irr. to est./severe weeds

Roadcrest c. wheatgrass	good	good	good	good	yes	short/moderate weeds
Ephraim c. wheatgrass	exc.	fair	good	fair.	no	thin stand/moderate weeds
Sodar s. wheatgrass	good	poor	fair	poor	no	poor stand/severe weeds
Paiute orchardgrass	fair	fair	fair	fair	yes	needs full irr. to est./moderate weeds
Dryland Perennial Cover						
Vavilov S. wheatgrass	good	exc.	good	exc.	yes	best stand/best weed control
Bozoisky R. wildrye	poor	v. poor	fair	poor	no	severe weeds
Sherman big bluegrass	v. poor	v. poor	poor	v. poor	no	needs irr. to est./severe weeds
Rosana w. wheatgrass	fair	good	good	good	yes	short/filling in nicely/moderate weeds

Recommendations based on initial two evaluations

Irrigated – Talon Canada bluegrass, Foothills Canada bluegrass or Durar hard fescue.

Semi-irrigated – Quatro sheep fescue, Covar sheep fescue, or Roadcrest crested wheatgrass.

Dryland – Vavilov Siberian wheatgrass mixed with Rosana western wheatgrass.

ID04003 Steve Schuyler field planting – windbreak. Souixland 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.

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. Site characteristics _____. 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.

ID04007 Perinne Coulee 319 riparian woody planting. Not planted – schedule for FY05 and reorder materials.

IDAHO DIVISION V
PLANT MATERIALS PLANTINGS

FIELD OFFICE: AMERICAN FALLS/ABERDEEN
None

FIELD OFFICE: BLACKFOOT
ID02006 Paul Ricks Demonstration Planting. Seed ordered February 11, 2002 for shipment to Aberdeen PMC by March 4, 2002. FY02 Planting completed in May 2002. August 27, 2002 initial evaluation indicated at least some establishment of all seed plots. FY03 evaluated 12/9/03. FY04 evaluated and clipped 6/23/04. See attached tables at end of this section.

FIELD OFFICE: FORT HALL
ID03002 Shoshone-Bannock Tribe Demonstration Planting. Nezpar Indian ricegrass, Goldar bluebunch wheatgrass, Magnar basin wildrye, Sodar streambank wheatgrass, Bannock thickspike wheatgrass, Rimrock Indian ricegrass, Trailhead basin wildrye, Critana thickspike wheatgrass, Shoshone creeping wildrye, High Plains Sandberg bluegrass, Secar Snake River wheatgrass, Sherman big bluegrass, Schwendimar thickspike wheatgrass, Joseph Idaho fescue, Nezpurs Idaho fescue Winchester germplasm Idaho fescue, Needle and Thread grass. Seed 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). All other species were planted in the spring of 2004 and not evaluated this year.

ID03005 Shoshone-Bannock High School field planting. Common Camas bulbs. Bulbs ordered January 14, 2003. Site - MLRA B11b, 10-12 inch precipitation, sub-irrigated wet to semiwet bottomlands, non-irrigated. FY03 no evaluation. FY04 Camas bulbs were planted in the fall of 2003 and no evaluation has been completed.

FIELD OFFICE: MALAD
ID04005 Hybrid poplar study – Don Buhler field planting. Robust polar, Carolina poplar, Siouxland poplar, Simon poplar, OP367 poplar and 52-225 poplar cuttings were ordered March 5, 2004. Site Characteristics: Zukom silt loam soil, 7.4-8.4 soil pH, very wet site in early spring, 0-1% slopes, south aspect, 18-20 inch precipitation, non-irrigated, 5180 feet elevation. FY04 - Robust polar 20 percent survival with fair vigor. Carolina poplar 13 percent survival with fair vigor. Siouxland poplar failed. Simon poplar 53 percent survival with good vigor. OP367 poplar 20 percent survival with poor vigor. 52-225 poplar 13 percent survival with poor vigor.

FIELD OFFICE: MONTPELIER
None

FIELD OFFICE: POCATELLO
None

FIELD OFFICE: PRESTON
ID95036 Franklin County Bannock thickspike wheatgrass and Sodar streambank wheatgrass critical area planting. Site is landfill, Wheelon/Collonston soil, non-irrigated, 14-15 inch ppt, 5000 feet elevation, 12-20% slopes on north exposure. Seed ordered 5/5/95. FY95 seed planted 5/17/95 in good clean seedbed. Fall evaluation indicated good stand establishing for both species. FY96 good stands of both species with 3 plants/ft2 and spreading. Species are providing good erosion control. FY97 and FY98 no evaluations. FY99 good stand of each specie with 3-4 plants per square foot, good vigor, good ability to spread, and good erosion control under these conditions. Weed infestation of planting is very low. FY00 Bannock and Sodar stands are good with good vigor and 4 plants per square foot. FY01 - FY04 no evaluations.

FIELD OFFICE: SODA SPRINGS
None

BLACKFOOT FIELD OFFICE
PAUL RICKS PLOTS - FIELD PLANTING – ID02006
(Evaluated by – Scott Engle/Cameron Williams/Karie Pappani/Dan Ogle – June 22-23, 2004)

Irrigated Plots
(Approximately 28 to 32 inches of combined precipitation and irrigation)

Common Name	Cultivar	FY02 12/9/03	FY04	FY04	FY04	FY04	FY04 6/23/04	FY04 6/23/04	
		Initial Est. 2nd Year	Stand	Vigor	Spread	Weeds	Growth Stage	Lbs/Ac	
Alfalfa	Forager	good	fair	good	N/A	low	harvested	---	
Ladino clover	Jumbo	fair	good	good	N/A	moderate	harvested	---	
Alfalfa	Rampage	good	good	excellent	N/A	low	harvested	---	
Alice clover	---	good	good	good	N/A	moderate	harvested	---	
Alfalfa	Rowdy	excellent	good	good	N/A	low	harvested	---	
Cicer milkvetch	Lutana	poor	fair	fair	N/A	high	harvested	---	
Alfalfa	Ranger	fair	good	fair	N/A	low	harvested	---	
Kura clover	Endura	poor	poor	good	N/A	high	harvested	---	
Birdsfoot trefoil	Bull	fair	excellent	good	N/A	moderate	harvested	---	
Perennial ryegrass	Mara	good	excellent	poor	N/A	none	pre bloom	1550	
Tall fescue	Fawn	good	good	fair	N/A	low	bloom	1920	
Orchardgrass	Latar	good	good	fair	N/A	none	bloom	3180	
Tall fescue	Johnstone	good	good	fair	N/A	none	bloom	3480	
Orchardgrass	Potomic	good	good	good	N/A	none	bloom	3420	
Tall fescue	Teton	good	good	good	N/A	none	bloom	4620	
Orchardgrass	Baridana	excellent	excellent	good	N/A	none	bloom	2580	
Tall fescue	Dovey	excellent	good	fair	N/A	none	bloom	2100	
Orchardgrass	Paiute	good	good	good	N/A	none	bloom	2760	
Tall fescue	Barcel	good	good	fair	N/A	none	bloom	2460	
Meadow brome	Regar	good	excellent	good	low	none	bloom	2880	
Tall fescue	Barcarella	good	good	good	N/A	none	bloom	3660	
Meadow brome	Rebound	excellent	excellent	good	none	none	bloom	3480	
Tall fescue	TF33	good	good	good	N/A	low	bloom	2940	
Meadow brome	Paddock	good	excellent	good	none	none	bloom	3360	
Meadow fescue	Bartura	good	good	good	N/A	low	bloom	3060	
Timothy	Climax	fair	fair	good	N/A	moderate	bloom	2760	
Mountain brome	Hakari	excellent	excellent	good	N/A	none	bloom	3240	
Timothy	Barliza	poor	fair	good	N/A	high	bloom	2400	
Switchgrass	9005438	good	good	good	N/A	moderate	vegetative	1500	
Switchgrass	Blackwell	good	good	good	N/A	moderate	vegetative	2650	

Switchgrass	9005439	good	fair	good	N/A	high	vegetative	3500	
Sunflower	Multimedia	fair	fair	good	N/A	high	vegetative	900	
Russian wildrye	Bozoisky	good	excellent	excellent	N/A	none	bloom	6200	

Semi-Irrigated Plots
(Approximately 18 inches of combined precipitation and irrigation)

Common Name	Cultivar	FY02 12/9/03	FY04	FY04	FY04	FY04	FY04 6/23/04	FY04 6/23/04	
		Initial Est. 2nd Year	Stand	Vigor	Spread	Weeds	Growth Stage	Lbs/Ac	
Alfalfa	Forager	good	good	good	N/A	low	harvested	---	
Sainfoin	Eski	fair	good	good	N/A	moderate	harvested	---	
Alfalfa	Rampage	good	fair	good	N/A	low	harvested	---	
Sainfoin	Remont	fair	good	good	N/A	moderate	harvested	---	
Alfalfa	Rowdy	good	excellent	excellent	N/A	low	harvested	---	
Small burnet	Delar	fair	poor	fair	N/A	very high	harvested	---	
Alfalfa	Trevois	good	good	good	N/A	moderate	harvested	---	
Blue Flax	Appar	poor	fair	good	N/A	very high	harvested	---	
Alfalfa	Ladak	good	good	good	N/A	low	harvested	---	
Utah sweetvetch	Timp	poor	very poor	fair	N/A	very high	harvested	---	
Western Yarrow	9057902	poor	poor	fair	N/A	very high	harvested	---	
Ruby V. pointvetch	9063520	poor	failed	---	---	---	---	---	
Western wheatgrass	Arriba	fair	good	good	excellent	low	bloom	4020	
Western wheatgrass	Rosana	fair	excellent	fair	excellent	none	bloom	2880	
Orchardgrass	Paiute	fair	good	good	N/A	low	bloom	4140	
Mountain brome	Bromar	excellent	excellent	good	N/A	none	bloom	4900	
Pubescent wheatgrass	Luna	good	good	good	fair	none	bloom	4410	
Mountain brome	Garnet	good	good	fair	N/A	low	bloom	3080	
Thickspike wheatgrass	Bannock	poor	poor	fair	none	high	bloom	1680	
Crested wheatgrass	Douglas	very poor	poor	good	N/A	very high	bloom	3600	
Thickspike wheatgrass	Critana	poor	fair	good	fair	moderate	bloom	3540	
Smooth brome	Manchar	fair	good	excellent	fair	none	bloom	3780	
Thickspike wheatgrass	Schwendimar	fair	fair	fair	poor	high	bloom	3420	
Green needlegrass	Lodorm	fair	fair	good	N/A	high	bloom	2220	
Intermediate wheatgrass	Reliant	excellent	good	good	poor	none	bloom	5160	
Hybrid wheatgrass	Newhy	good	excellent	excellent	fair	none	bloom	4740	
Intermediate wheatgrass	Rush	good	excellent	good	fair	none	bloom	5040	
Big bluegrass	Sherman	poor	poor	good	N/A	moderate	bloom	4900	
Intermediate wheatgrass	Greenar	good	good	good	fair	none	bloom	5340	
Russian wildrye	Bozoisky	good	good	good	N/A	none	bloom	5250	

Intermediate wheatgrass	Tegmar	good	good	fair	fair	none	bloom	3720	
Canada bluegrass	Foothills	poor	poor	good	good	very high	bloom	2880	
Hybrid wheatgrass	SL	fair	poor	poor	N/A	high	bloom	2280	
Tall wheatgrass	Largo	good	excellent	poor	N/A	none	s. dough	3760	
RS Hoffman wheatgrass	---	poor	fair	good	very poor	moderate	bloom	1740	
Slender wheatgrass	San Luis	fair	good	fair	N/A	low	bloom	1800	
Slender wheatgrass	Pryor	fair	good	good	N/A	low	bloom	1560	
Tall wheatgrass	Alkar	fair	good	good	N/A	low	bloom	3120	
Canada wildrye	Mandan	fair	fair	good	N/A	moderate	pre-bloom	950	
Basin wildrye	Magnar	poor	poor	fair	N/A	very heavy	bloom	840	
Idaho fescue	Joseph	poor	very poor	poor	N/A	very heavy	bloom	600	
Basin wildrye	Trailhead	poor	fair	fair	N/A	very heavy	bloom	900	
Russian wildrye	Mankota	fair	good	fair	N/A	low	bloom	4140	
Bluebunch wheatgrass	Goldar	poor	very poor	fair	N/A	very high	bloom	---	
Russian wildrye	Syn A	fair	good	good	N/A	low	bloom	3060	

Dryland Plots (Irrigated Establishment Year – 10 to 12 inch rainfall zone)

Common Name	Cultivar	FY02 12/9/03	FY04	FY04	FY04	FY04	FY04 6/23/04	FY04 6/23/04	
		Initial Est. 2nd Year	Stand	Vigor	Spread	Weeds	Growth Stage	Lbs/Ac	
Alfalfa	Forager	fair	fair	good	N/A	high	harvested	---	
Beardless wheatgrass	Whitmar	very poor	very poor	poor	N/A	very high	harvested	---	
Alfalfa	Rampage	good	good	good	N/A	moderate	harvested	---	
Forage Kochia	Immigrant	poor	fair	good	N/A	high	harvested	---	
Alfalfa	Rowdy	good	good	good	N/A	moderate	harvested	---	
Indian ricegrass	Rimrock	poor	fair	fair	N/A	high	harvested	---	
Alfalfa	Trevois	fair	excellent	good	N/A	moderate	harvested	---	
Indian ricegrass	Nezpar	poor	fair	fair	N/A	high	harvested	---	
Alfalfa	Ladak	fair	good	fair	N/A	moderate	harvested	---	
Siberian wheatgrass	P-27	fair	fair	good	N/A	moderate	bloom	2580	
Snake R. wheatgrass	Secar	poor	poor	fair	N/A	high	s. dough	900	
Siberian wheatgrass	Vavilov	fair	excellent	excellent	N/A	very low	bloom	4500	
Western wheatgrass	Arriba	fair	good	good	excellent	moderate	bloom	2640	
Western wheatgrass	Rosana	fair	good +	good	excellent	low	bloom	3750	
Crested wheatgrass	Nordan	poor	fair	good	N/A	high	bloom	3500	
Streambank wheatgrass	Sodar	fair	good	good	good	moderate	bloom	2240	
Pubescent wheatgrass	Luna	good	excellent	good	fair	very low	s. dough	3120	
Crested wheatgrass	Ephraim	poor	fair	good	none	low	bloom	2380	

Thickspike wheatgrass	Bannock	fair	good	good	good	moderate	bloom	3080	
Crested wheatgrass	Hycrest	good	excellent	good	N/A	none	bloom	3640	
Thickspike wheatgrass	Critana	good	good	good	fair	very low	bloom	2170	
Crested wheatgrass	CD-II	good	excellent	excellent	N/A	none	bloom	3290	
Thickspike wheatgrass	Schwendimar	fair	fair	good	fair	moderate	bloom	1575	
Basin wildrye	Magnar	poor	poor	good	N/A	high	bloom	910	
Sandberg bluegrass	High Plains	very poor	very poor	fair	N/A	very high	curing	975	
Basin wildrye	Trailhead	poor	poor	good	N/A	high	bloom	1330	
Bottlebrush Squirreltail	9019219	poor	poor	good	N/A	very high	s. dough	1170	
Russian wildrye	Mankota	good	good	good	N/A	low	bloom	2240	
Bluebunch wheatgrass	Goldar	poor	very poor	good	N/A	very high	bloom	350	
Russian wildrye	Bozoisky	good	good	good	N/A	moderate	bloom	2380	
Winterfat	Open Range	very poor	very poor	good	N/A	very high	bloom	---	
Fourwing saltbush	S.R. Plains.	fair	fair	good	N/A	very high	vegetative	---	
Winterfat	N. C. D.	very poor	fair	good	N/A	very high	bloom	---	

IDAHO DIVISION VI
PLANT MATERIALS PLANTINGS

FIELD OFFICE: ARCO

ID03003 Hill-Freeman Snake River Plain 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 no evaluation.

FIELD OFFICE: DRIGGS

ID91006 Fair Grounds Multiple Species Demo Plots. FY92 planted spring 1992 excellent survival on all species except trefoil, mountain brome and cicer milkvetch which will have to be replanted. FY93 Remont, Bromar, Lutana planted spring of 1993. Remont is not tolerant of frequent irrigation. Bozoisky exhibits poor seedling vigor, Goldar has poor plant vigor, Canbar not recommended for pure stands, Magnar not adapted to shallow soils, Newhy lacks seedling vigor, Manchar exhibits poor summer regrowth, Whitmar is not tolerant of excessive moisture, and Garrison adapted to wet soils. Magnar, Bromar, Rush, and Lutana are all doing poorly. Ordered Rush, P27, Magnar, Canbar, and Bozoisky on 3/17/94 to be included in plots. FY94 all plots good to excellent stand except Lutana, Remont and Delar. These plots are all irrigated so evaluations for drought, flood, salt and acid tolerance not possible. This planting does provide excellent trials for irrigated varieties in high mountain valleys. FY95 best performers are Hycrest, Critana, Alkar, Tegmar, Luna, Greenar, Topar, Rush, Regar, Manchar, Latar, Paiute, Sodar, Newhy, Durar, Sherman, Canby and Delar. Complete evaluations are available on request. FY96 not evaluated. FY97 Durar and Delar good to excellent stands with high vigor; Regar, Amur, Manchar, Latar, Paiute good stands with excellent vigor; Rush fair stand with fair vigor; Sodar, Goldar, Cascade, Appar poor stands with fair vigor; Hycrest, Critana, Alkar, Tegmar, Luna, Greenar, Topar, Lutana, Garrison, Whitmar, Secar, P27, Bromar, Magnar, Bozoisky, Canbar, Sherman, Kalo, very poor to failed stands. All plots are subject to turfgrass encroachment. February 9, 1998 ordered Hycrest, CD-II (Hycrest II), Sherman, Newhy, Critana, Bannock, Garrison, and Bozoisky for plots. FY98 species with good to excellent stands include Amur, Rush, Manchar, Latar, Durar, Cascade, and Delar. Species with poor to fair stands include Alkar, Luna, Topar, P27, Bromar, Paiute, Magnar, Appar, and Bozoisky. Failed stands include Hycrest, Critana, Tegmar, Greenar, Secar, Whitmar, Garrison, Lutana, Regar, Sodar, Newhy, Kalo, Sherman, Canbar, and Goldar. FY99 - FY04 no evaluations.

ID99018 SCD field planting – leafy spurge competition study. Species include Rush intermediate wheatgrass, Luna pubescent wheatgrass, Regar meadow brome, Bromar mountain brome, Durar hard fescue, Bozoisky Russian wildrye, and Climax timothy. Seed ordered April 28, 1999 for shipment about May 17, 1999. FY99 Roundup was applies on June 10th to leafy spurge plots with up to 200 stems per 9.6 square foot hoop. Grass was drilled into plots on July 1, 1999 using a Brillion drill. Evaluation of germination and establishment will be performed in the spring of 2000. Replicated plots will be installed in May of 2000. FY00 - FY04 no evaluation.

ID02019 Lowel Curtis field planting. Species include Garrison creeping foxtail, Regar meadow brome and Johnstone tall fescue. Seed ordered April 8, 2002. FY02 and FY04 no evaluations.

FIELD OFFICE: IDAHO FALLS

ID94020 Winterfeld Magnar basin wildrye and Trailhead basin wildrye vegetative terraces field planting. Seed ordered 3/94. FY94 planted 5/94. Good initial stand establishment with good vigor. FY95 excellent stand establishment with over 3 plants/ft2. Plants average 24" height. Grouse are using basin wildrye for nesting cover. Working well for erosion control. FY96 excellent stands with excellent vigor Trailhead and good vigor Magnar. Excellent wildlife use by game birds, deer, owls, and coyotes. Both species are very good for snow catchment and field windbreaks. FY97 100% survival, Trailhead spreading a little faster than Magnar. Plant height about 96 inches for each. Cooperator notes that Trailhead is more drought tolerant and Magnar is more robust. FY98 100 percent survival for both species. Cut for seed this year with 140 pounds of clean seed per acre. FY99 excellent stands: Magnar 96 inches tall with little to no spread; Trailhead 84 inches tall with good spread via seed shatter. FY00 excellent stands with excellent vigor for both Magnar and Trailhead. Magnar is more robust with 96 inches height. Trailhead is spreading rapidly, is more drought tolerant, and approximately 84 inches tall. FY01 excellent stand and vigor with 96 inch height. Seed production was

approximately 100 pounds per acre. Straw yield was 1.6 tons per acre. FY02 Trailhead plowed out. Magnar excellent stand with excellent vigor, 72 inch height, and 4000 pounds per acre production. FY03 no seed crop due to insect damage.FY04 – excellent stands with excellent vigor and each accession was approximately 96 inches tall this year. Trailhead is spreading beyond original planting.

ID95046 Winterfeld Venus penstemon and Firecracker penstemon District Seed Increase. Seed sent 8/95. FY95 planted fall 1995. FY96 poor stand establishing for Alpine and no emergence for Firecracker, no seed production. FY97 Alpine slow establisher and susceptible to frost, no seed production. FY98 fair stand of both Firecracker and Alpine penstemon (1 plant per foot 2). Stands for both species are getting better each year. FY99 fair stands in unfavorable moisture year and no seed production. FY00 Firecracker penstemon died due to drought and short-lived character. Alpine penstemon has good stand with good vigor and stands 24 inches tall. Seed production was unknown at evaluation date. FY01 firecracker penstemon came back, excellent stands and vigor for both species. Seed production estimated at 600 pound per acre bulk. FY02 - Venus - fair stand with excellent vigor, 24 inch height, and 100 pounds per acre bulk production. Firecracker - fair stand with excellent vigor, but slower establishment, 24 inch height, and 100 pounds per acre bulk production. FY03 Firecracker penstemon stand is going out – no production. Venus penstemon produced 80 pounds of seed. FY04 – excellent stand and vigor for each accession. No seed production reported.

ID99016 Winterfeld Goldar bluebunch wheatgrass District Seed Increase. Seed ordered April 15, 1999. Site characteristics – Tetonia silt loam soil, 1- percent slopes, north aspect, 5400 feet elevation, 18 inch precipitation zone, non-irrigated, T2N R43E NW1/4 Section 26. FY99 planted spring 1999 with good stand establishing. FY00 excellent stand and vigor. Seed production unknown at evaluation date. Good regrowth in spite of very droughty conditions. FY01 excellent stand and vigor. 150 pounds per acre cleaned seed production (some problem with silver top). 900 pounds of straw per acre. FY02 - excellent stand with excellent vigor, 36 inch plant height and 100 pounds per acre cleaned production. Regrowth is excellent and field experiences a lot of wildlife use (elk). FY03 excellent stand produced 100 pounds per acre in unfavorable moisture year. FY04 excellent stand and vigor with approximately 250 pounds of bulk seed produced this year.

ID01012 Winterfeld Regar meadow brome – Foundation. FY01 good stand establishing with fair vigor due to drought conditions. FY02 - excellent stand with excellent vigor and 36 inch height. Drought year production 55 pounds per acre cleaned. FY03 excellent stand produced 125 pounds per acre under severe drought conditions. FY04 planting destroyed – **Cancel.**

ID01013 Winterfeld Sodar streambank wheatgrass – Foundation. FY01 excellent stand establishing with excellent vigor under severe drought conditions. FY02 - excellent stand with excellent vigor and 24 inch height. Drought year production 38 pounds per acre cleaned. FY03 excellent stand produced 35 pounds per acre under severe drought conditions. FY04 planting destroyed – **Cancel.**

ID03007 Winterfeld San Juan penstemon - Demonstration planting. Seed ordered February 10, 2003. Seed shipped February 18, 2003. FY03 planted fall of 2003. FY04 fair stand and vigor – plants are about 12 inches tall

ID04015 Winterfeld Maple Grove Lewis flax for seed increase. Seed shipped April 19, 2004. FY04 excellent stand with excellent vigor establishing. Plants are about 5 inches tall.

FIELD OFFICE: REXBURG

ID89015 Wagoner 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 ppt, 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. **Next evaluation 2008.**

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 ppt, 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 cooperator. 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/ft2 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. **Next evaluation 2008.**

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/ft2 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. **Next evaluation 2008.**

ID92013 Webster 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 ppt, 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/ft2 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. **Next evaluation 2008**.

FIELD OFFICE: RIGBY/TERRETON

ID96019a Mud Lake Willows and cottonwood demo planting Laurel, Coyote, White, Robusta poplar, Siouxland poplar, and Carolina poplar. Cuttings ordered 2/20/96. Planted May 8, 1996 using fabric mulch material and drip irrigation. FY96 Water application, started July 5th with willows receiving 7 gallons/week and poplars receiving 12 gallons/week. Flood irrigation by Park officials resulted in over-irrigation and drip system was cut back. 100% survival of all species except coyote which had 70% survival. Good vigor for all species except Carolina poplar which had fair vigor. Growth: Carolina 3.2 feet; Siouxland 5.7 feet; Robust 5.5 feet; Laurel 2.7 feet; White 3.7 feet; Coyote 4.0 feet. FY97 Irrigation: 3 gallons/tree from May through September. Survival/Vigor/Height: Carolina poplar 75%/good/10.5 feet; Siouxland poplar 100%/excellent/14 feet; Robust poplar 100%/fair/7 feet; Laurel willow 100%/excellent/7.5 feet; White willow 100%/excellent/9 feet; Coyote willow 67%/fair/ 4.5 feet. FY98 Survival/ Vigor/Height: Carolina poplar 75%/good/15 feet; Siouxland poplar 100%/excellent/ 20 feet; Robust poplar 100%/fair/12 feet; Laurel willow

100%/excellent/10.5 feet; White willow 100%/good/14 feet; Coyote willow 70%/good/6.5 feet. FY99 Carolina poplar 75% survival with good vigor and 21.2 feet height. Siouxland poplar 100% survival with excellent vigor and 26.4 feet height. Robust poplar 100% survival with poor vigor (yellow leaves) and 16.6 feet height – seedlings are vigorous with good color and suspect Aberdeen stock may have disease. Laurel willow 100% survival with good vigor and 12.4 feet height. White willow 100% survival with good vigor and 18.5 feet height. Coyote willow 70% survival with fair vigor and 6.9 feet height. FY00 Flood irrigated every two weeks with drip irrigation 6-10 gal/week. Carolina poplar 75 percent survival with excellent vigor and 320 inch height. Siouxland poplar 100 percent survival with excellent vigor and 354 inch height. Robust poplar 100 percent survival with poor vigor (disease) and 216 inch height. Laurel willow 100 percent survival with excellent vigor and 180 inch height. White willow 100 percent survival with fair vigor and 240 inch height. Coyote willow 66 percent survival with fair vigor and 90 inch height. FY01 6-year-old planting was flood irrigated every two week this year. Carolina poplar (10-15 feet spacing recommended) - 75% survival, excellent vigor, 36 feet height, 16 feet crown width, and 5.5 inch DBH. Siouxland poplar (10-15 feet spacing recommended) – 100% survival, excellent vigor, 38 feet height, 15 feet crown width, and 5 inch DBH. Robust poplar (10-15 feet spacing recommended) – 100% survival, poor vigor, 25 feet height, 9 feet crown width, and 3.5 inch DBH. Laurel willow (8-10 feet spacing recommended) – 100% survival, good vigor, 17 feet height, 12.5 feet crown width, and 2 inch DBH. White willow (10-12 feet spacing recommended) – 100% survival, fair vigor, 20 feet height, 12 feet crown width, and 2 inch DBH. Coyote willow (3-5 feet spacing recommended) – 70% survival, fair vigor, 8 feet height, and 3 feet crown width. FY02 Carolina poplar 75% survival, excellent vigor, 439 inch height, and 5.75 dbh. Siouxland poplar 100% survival, excellent vigor, 455 inch height, and 17.5 inch dbh. Robusta poplar 100% survival, fair vigor, 319 inch height, and 4 inch dbh. Laurel willow 100% survival, good vigor, 211 inch height, and 2.25 dbh. White willow 100% survival, good vigor, 235 inch height, and 2.25 inch dbh. Coyote willow 66% survival fair vigor, and 139 inch height. FY03 100 percent survival of Carolina poplar (good vigor – 40 feet height), Souixland poplar (good vigor – 44 feet height), Robust poplar (fair-good vigor – 25-25 feet height), Laurel willow (good vigor – 22 feet height – lower limbs dieing), and White willow (excellent vigor – 16 feet height – good density). 50 percent survival of Coyote willow (fair-good vigor – 21 feet height). Souixland best choice of poplars – White willow best choice of willows. **Next evaluation 2007.**

ID96019b Rigby Cottonwood demo planting - Carolina, Siouxland, Robusta. Planted April 29th using fabric mulch and drip irrigation. FY96 Water application 10-14 gallons per week. Growth Carolina 2.0 feet; Siouxland 3.2 feet; Robust 4.0 feet. FY97 100% survival for all poplars. Good vigor for Carolina and Siouxland / poor vigor for Robust. Height 8-9 feet Carolina and Siouxland / 3 feet Robust. FY98 Survival/Vigor/Height: Carolina poplar 100%/good/15 feet; Siouxland poplar 100%/ excellent/18 feet; and Robust poplar 100%/poor/5.5 feet. FY99 Carolina poplar 100% survival with fair vigor and 21 feet height. Siouxland poplar 100% survival with fair vigor and 21 feet height. Robust poplar 100% survival with very poor vigor and 7 feet height. Note – Robust poplars from Lawyers Nursery are thriving, so suspect Aberdeen cuttings may be carrying a disease. FY00 Drip irrigated (14 gal/week) – Carolina poplar 100 percent survival with fair vigor and 240 inch height; Siouxland poplar 100 percent survival with fair vigor and 252 inch height; Robust poplar 100 percent survival with poor vigor and 84 inch height. FY01 6-year-old planting is irrigated with drip irrigation system at 7 gallons per week. Carolina poplar – 100% survival, poor vigor 22 feet height, 7 feet crown width, and 2.5 inch DBH. Siouxland poplar – 100% survival, poor vigor, 24 feet height, 6 feet crown width, and 3 inch DBH. Robust poplar – 100% survival, very poor vigor, 7 feet height, 4 feet crown width, and 1 inch DBH. Drought stress is evident and drip irrigation system is probably not fully functioning with plugged emitters, need for additional emitters, and need for longer watering sets. FY02 Carolina poplar 100% survival, very poor vigor, 300 inch height, and 2.5 inch dbh. Siouxland polar 100% survival, fair vigor, 330 inch height, and 2.75 dbh. Robusta poplar 100% survival, very poor vigor, 92 inch height, and 1 inch dbh. Irrigation system problems were repaired and irrigation sets have been extended - expect improvement next year. FY03 100 percent survival of Carolina poplar (fair to good vigor – 10 feet height – some winter die back), Souixland poplar (good vigor – 28 feet height) and Robusta poplar (very poor vigor – 8 feet height). Best choice Souixland poplar. **Next evaluation 2007.**

ID98013 Jefferson County Landfill Field planting 1) Ephraim crested wheatgrass, Sodar streambank wheatgrass, and Bannock thickspike wheatgrass; 2) Covar sheep fescue, Schwendimar thickspike wheatgrass, and Secar Snake River wheatgrass. Seed ordered Feb 9, 1998. Site is silty clay loam soil, 0-1 % slope, east aspect, 4785 feet elevation, 10-12 inch ppt, non-irrigated, T6N R33E SEl/4 Section 14. FY98 initial evaluation showed very poor to no establishment of Covar, Schwendimar, Secar, Sodar, and poor to very poor establishment of Ephraim and Bannock. The clay soil portions of the seeding crusted and the sandy soil portion of the seeding may have been too dry. Site should be evaluated one more season before a decision to reseed is made. FY99 Covar – fair stand with poor vigor and .2 plants per square foot. Schwendimar – very poor stand with poor vigor and .1 plants per square foot. Secar – very poor stand with poor vigor and .1 plant per square foot. Bannock fair stand with poor vigor and 1 plant per square foot. Sodar –

poor stand with poor vigor and .1 plants per square foot. Ephraim – fair stand with fair vigor and 1 plant per square foot. FY00 Planting Mix 1 – fair stand of Ephraim/Sodar/Bannock is establishing with fair vigor and stand is limiting weed growth. Planting Mix 2 – poor stand of Covar/Schwendimar/Secar is establishing with fair vigor. Secar and Schwendimar failed in planting for the most part, but Covar is establishing slowly. Stand is dominated by kochia weed. Planting 3 – Bannock has good stand with fair vigor. Windbreak planting (drip irrigated) is irrigated once per week for 12-16 hours, is doing very well, and trees are uniform – Russian Olive 5-8 feet height with 5 feet crown width; Rocky Mountain Juniper 3-5 feet height with 3 feet crown width; Siberian Peashrub 4-7 feet height with 4 feet crown width. FY01 the Ephraim-Bannock-Sodar mix and Bannock only plantings are increasing and spreading. Covar in the Covar-Schwendimar-Secar mix is also increasing. Grass densities of 2+ plants per foot squared occur on more favorable sandy soils. The hard packed clayey areas have few grass seedlings established. The windbreak planting is doing very well with 100% survival and very good maintenance for water (drip irrigation system) and weed control. Russian olive is averaging 9 feet tall and 7 feet crowns on sandier soils and 5-6 feet tall with 5 feet crowns on clayey hard packed soils. Junipers and Siberian peashrub are not affected as much by varied soil conditions with Junipers averaging 5 feet tall with 4 feet crowns on sandy soils and 4.5 feet tall with 4 feet crowns on clayey soils. The Siberian peashrub is averaging 6 feet tall with 5 feet crowns on sandy soils and 5.5 feet tall with 5 feet crowns on clayey soils. FY02 grass planting are doing very well and spreading with over 3 plants per square foot. FY03 planting is doing well. **Next evaluation 2006**.

ID98014 Calvin Moser Rush intermediate wheatgrass pasture trial. Seed ordered 2/9/98. Site is sandy loam soil, 0-2 % slope, west aspect, 4795 feet elevation, 10-12 inch ppt, irrigated, T4N R38E SEl/4 Section 29. FY98 two acres of Rush were seeded at the end of March with oats as a cover crop (15 lbs/acre oats). The oats were harvested in mid-September and the Rush is responding with average of one foot tall and 2 plants/ft2 at the end of October. FY99 Rush - excellent stand with excellent vigor, 9000 pounds per acre production, 4 to 6 feet height, and 3+ plants per square foot. Regar – not planted. FY00 good stand with fair vigor and 5400 pounds production. Production lower due to heat and severe drought conditions. FY01 good stand with 3 plants per square feet and good vigor. Stand produced about 4000 pounds per acre this year with two flood irrigation applications. Stand probably would have produced more if cooperator had fertilized planting. FY02 good stand with good vigor - planting produced about 2 tons per acre. **Next evaluation 2006.**

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, and 9/99. FY03 evaluated May 21, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY06**.

Accession	Stand	Plants/ft2	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, and 9/99. FY03 evaluated May 21, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY06**.

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

ID82101 BLM Hole In Rock Multiple Adaptation Evaluation. Planted late October 1982. Evaluations 8/7/84, 7/28/86, 7/13/89, 7/7/92, 9/95 and 9/99. **Access to site is very difficult and future evaluations will be cancelled - maintain file for reference.**

ID83100 FS Nip & Tuck Multiple Adaptation Evaluation. Evaluations 7/6/92. 9/95 and 7/02. Site has deteriorated to point future evaluations would provide little future value. **Cancel future evaluations, but maintain file for reference.**

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. FY03 evaluated May 21, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY06**.

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 and 9/99. FY03 evaluated May 20, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY06**.

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. 1995 no evaluation, and 9/99. FY03 evaluated May 19, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY06**.

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 and 9/99. FY03 evaluated May 19, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY06**.

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. Evaluations 7/7/92.
FY03 evaluated May 19, 2003 by Dan Ogle and Mark Olson - **Next evaluation FY06**.

Accession	Stand	Plants/ft2	Vigor	Comments
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.

FIELD OFFICE: ST. ANTHONY

ID02020 Mae Lake Trust field planting. Species include Rush intermediate wheatgrass, Bannock thickspike wheatgrass, Nezpar Indian ricegrass, and Maybell antelope bitterbrush. Seed ordered April 8, 2002. FY03 no evaluation. FY04 planting failed – **Cancel.**

PLANT MATERIALS

2004

UTAH EVALUATION SUMMARIES

FIELD, DSI and DEMONSTRATION PLANTINGS

UTAH AREA 1
PLANT MATERIALS PLANTINGS

UT89011 Johnson - Tooele FO Secar Snake River wheatgrass and Hycrest crested wheatgrass field planting for jointed goatgrass control. FY90 seeded in March and stand is establishing. FY91 - FY93 no evaluations. FY94 fair stand of both species. Secar has better vigor and forage production. Secar does not establish as easily as Hycrest. Cattle prefer Secar. FY95 cooperator was disappointed in slow establishment and vigor of Secar in prior years. Secar plants are now well established and very vigorous. Secar is spreading outside of planted rows. During this favorable moisture year Secar remained green and continued to grow throughout the summer. Native bluebunch wheatgrass also remained green the entire growing season. FY96 good stand and vigor for both species. Secar is spreading outside of planted rows, but does not compete well with weeds (goatgrass and morning glory). Cooperator prefers Hycrest for early spring use. Secar is better species for use in later periods. FY97- FY99 no evaluations. FY00 Secar fair stand with good vigor. Hycrest good stand with good vigor. Grazing use is higher on Hycrest (45%) than Secar (10%) in spring grazing period. FY01 and FY02 no evaluation. FY03 Secar fair to good stand – Hycrest good stand. Weed infestation (bindweed) is still a problem with more bindweed in Secar stand than the Hycrest stand. Both species have good vigor. Hycrest is moving into Secar stand. Secar is spreading some from drill rows. Hycrest is spreading into interspaces between rows. Cooperator prefers Hycrest for spring grazing and uniform grazing was observed in both stands in fall. FY04 no evaluation

UT99008 Bryner - Logan FO Laurel willow field planting – nursery. Site is Airport loam soil, 7.7 pH, heavy clay sub-soils, 0 slope, 16-inch rainfall zone, high watertable, and 4430 feet elevation. FY99 cuttings planted April 17, 1999 into 12 inch scalped circles, T12N R1E SW quarter of Section 31. Trees are drip-irrigated. June 4, 1999 cuttings have sprouted and appear to be establishing well. FY00 - FY04 no evaluations.

UT00001 Don Peterson - Logan FO spring field planting of Rush intermediate wheatgrass (medusahead wildrye control). Leatham silt loam soil, 30 percent slopes, southwest aspect, 5400 feet elevation, 14-17 inch precipitation, non-irrigated, T9N R1E North ½ Section 5. FY00 site burned in fall 1999 and sprayed with Roundup-Escort mix in spring 2000 for medusahead control. Chemical kill of medusahead was excellent. 14 pounds per acre were drilled in 8 inch spacing on May 20, 2000 with good initial germination and establishment. Planted May 2000 with poor initial establishment. Field was reseeded in the fall of 2000. FY01 no evaluation. FY02 stand good with survival estimated at 70 percent, 3-4 plants per square foot, and good vigor. FY03 stand is about 70 percent with fair vigor and good spread. FY04 no evaluation

UT01005 Scott Hansen – Tremonton FO field planting. Tarweed control. P27 Siberian wheatgrass, Vavilov Siberian wheatgrass, Ephraim crested wheatgrass, Goldar bluebunch wheatgrass, Nezpar Indian ricegrass, Rimrock Indian ricegrass, Arriba western wheatgrass, Bozoisky Russian wildrye, Mankota Russian wildrye, and Richfield Selection firecracker penstemon. Seed ordered April 16, 2001. FY01 not planted in 2001 or 2002 due to drought. FY03 planted in 4 plots in late March 2003.

*** Plot 1:** Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, and Goldar bluebunch wheatgrass – broadcast planted.

*** Plot 2:** Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, and Goldar bluebunch wheatgrass – broadcast planted.

*** Plot 3:** Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, and Goldar bluebunch wheatgrass – broadcast planted.

*** Plot 4:** Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, Goldar bluebunch wheatgrass, Nezpar Indian ricegrass, Arriba western wheatgrass, P27 Siberian wheatgrass, Ephraim crested wheatgrass, Bozoisky Russian wildrye, Rincon fourwing saltbush, Mankota Russian wildrye, and Rimrock Indian ricegrass – broadcast planted.

FY03 initial evaluation during severe drought - Vavilov, P27 and Ephraim fair stands FY04 no evaluation.

UT03005 Jon White – Logan FO field planting. Rush intermediate wheatgrass, Topar pubescent wheatgrass, and Tegmar dwarf intermediate wheatgrass were ordered April 18, 2003. Luna pubescent wheatgrass, Oahe intermediate wheatgrass and Regar meadow brome will be provided by cooperator. Purpose: Critical Area Planting - medusahead rye competition. Site Characteristics: Cache County, MLRA E47, 16 acres, Barfuss-Leatham silt loam soil complex, 35 percent slopes, northwest aspect, 5300 feet elevation, 14-17 inch precipitation, non-irrigated, SE1/4 Section 31

T10N R1E. Spring 2003 planting. Planting of 15 pounds per acre was completed on April 29, 2003 using a drill with 6 inch spacing into very good weed free seedbed. FY04 no evaluation.

UT04002 Bryce Clayton – Provo FO woody riparian buffer planting. Coyote willow, 9023733 redosier dogwood, 9023739 redosier dogwood, and 9023740 redosier dogwood cuttings were ordered March 5, 2004. Site characteristics – Birdow very fine sandy loam soil, 6-15 percent slopes, 5770 feet elevation, 18 inch precipitation zone, non-irrigated, T11S R3E NE1/4 Section 13. FY04 estimated survival 20 percent coyote willow and 60 percent dogwood.

UT04003 Charles and Karen Sigler– Provo FO riparian woody planting. Sodar streambank wheatgrass, 9067560 peachleaf willow, coyote willow, golden willow and Laurel willow cuttings were ordered March 5, 2004. Site characteristics – mixed alluvial sandy to clayey soil, 0-2 percent slopes, 4520 feet elevation, 14-16 inch precipitation zone, non-irrigated, T8S R2E NW1/4 Section 33. FY04 survival golden willow 40%, Laurel willow 10%, Coyote willow 10% and Peachleaf willow failed. Cuttings were planted too high on streambank and did not have adequate access to perennial soil moisture. Golden willow survival was better do to nearby lawn irrigation. Sodar streambank wheatgrass was dormant fall seeded and will be evaluated next year.

UT04004 Benson Project – Tremonton FO riparian woody planting. 9023733, 9023739, and 9023740 redosier dogwood accessions cuttings and silver buffaloberry plants were ordered March 5, 2004. Site characteristics _____? FY04 no evaluation.

UT04012 Charles and Karen Sigler – Provo FO dryland pasture field planting. Hycrest crested wheatgrass, Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, and Bozoisky Russian wildrye. Seed ordered March 8th for delivery in late March to early April. Site characteristics – Vineyard fine sandy loam soil, moderately saline conditions, 0-2 percent slopes, 4520 feet elevation, 14-16 inch precipitation zone, non-irrigated, T8S R2E NW1/4 Section 33. FY04 not planted.

UT04013 Charles and Karen Sigler – Provo FO irrigated pasture field planting. Paiute orchardgrass, Regar meadow brome and Rush intermediate wheatgrass. Seed ordered March 8th for delivery in late March to early April. Site characteristics – Vineyard fine sandy loam soil, moderately saline conditions, 0-2 percent slopes, 4520 feet elevation, 14-16 inch precipitation zone, irrigated, T8S R2E NW1/4 Section 33. FY04 not planted.

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. **Next evaluation planned for 2005.**

UT00003 Cooperator Unknown - Beaver FO willow field planting. 50 cuttings each of 9067435 Geyer willow, 9067437 Booth willow, 5730101 Drummond willow, 9067466 Yellow willow, 9067452 Yellow willow, 9067549 Peachleaf willow. Cuttings ordered March 1, 2000 with shipment April 10, 2000. FY00 very poor establishment year due to extreme drought. FY01 grazing has been removed, but deer use is heavy in some locations. Survival-Height-Vigor: 435 Geyer 40% survival, 15 inch height and fair vigor; 437 Booth 46% survival 12 inch height and fair vigor; 101 Drummond 40% survival, 15 inch height and fair vigor; 466 Yellow 20% survival due to poor planting location, 24 inch height and fair vigor; 452 Yellow 80% survival, 26 inch height and excellent vigor; 549 Peachleaf 62% survival, 24 inch height and good vigor. FY02 - FY04 no evaluations.

UT02002 Rasmussen - Fillmore FO demonstration planting of Snake River Plains fourwing saltbush. Seed purchased through Utah Crop Improvement Association. Seed shipped from Aberdeen PMC April 12, 2002. FY03 due to poor climatic conditions, seed has not been planted. FY04 no evaluation.

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 was completed. 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.

UT03004 Bob Bliss - Fillmore FO field planting - Durar hard fescue and western wheatgrass. Seed ordered March 20, 2003. FY03 – FY04 no evaluations.

UT04001 Blake Walbeck project – Richfield FO demonstration plots. P27 Siberian wheatgrass, Vavilov Siberian wheatgrass, Douglas crested wheatgrass and Ephraim crested wheatgrass. Seed packets ordered November 2003. Site characteristics:_____. FY04 no evaluation.

UT04005 Arlan Mayer – Beaver FO field planting. P27 Siberian wheatgrass, Hycrest crested wheatgrass, Douglas crested wheatgrass, and Bozoisky Russian wildrye. Seed ordered March 8, 2004. Site characteristics: BEK silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T28S R10W NE ¼ Section 31 (NE corner of NE pivot). FY04 no evaluation.

UT04006 Joey Leko – Beaver FO field planting. P27 Siberian wheatgrass, Hycrest crested wheatgrass, Roadcrest crested wheatgrass, Syn A Russian wildrye. Seed ordered March 8, 2004. Site characteristics: REK silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T28S R11W NE ¼ Section 25 (field 5). FY04 no evaluation.

UT04007 Mark Whitney – Beaver FO field planting. Vavilov Siberian wheatgrass, Ephraim crested wheatgrass, Douglas crested wheatgrass, and Bozoisky Russian wildrye. Seed ordered March 8, 2004. Site characteristics: REA silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T28S R10W Section 8. FY04 no evaluation.

UT04008 Kent Marshall – Beaver FO field planting. Vavilov Siberian wheatgrass, Ephraim crested wheatgrass, Roadcrest crested wheatgrass, Syn A Russian wildrye. Seed ordered March 8, 2004. Site characteristics: REA silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T29S R10W SW ¼ Section 17. FY04 no evaluation.

UT04009 Scott Wiseman – Beaver FO field planting. Nezpar Indian ricegrass and Northern Cold Desert winterfat. Seed ordered March 8, 2004. Site characteristics: REA silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T28S R10W SE ¼ Section 29. FY04 no evaluation.

UT04010 Arlan Mayer – Beaver FO field planting. Richfield Selection firecracker penstemon and Bandera Rocky Mountain penstemon. Seed ordered March 8, 2004. Site characteristics: REA silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T28S R10W NW ¼ Section 32. FY04 no evaluation.

UT04011 Kent Marshall – Beaver FO field planting. Richfield Selection firecracker penstemon and Bandera Rocky Mountain penstemon. Seed ordered March 8, 2004. Site characteristics: REA silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T30S R10W Section 12. FY04 no evaluation.

UT04014 Kent Marshall – Beaver FO field planting. Magnar basin wildrye, Trailhead basin wildrye, Nezpar Indian ricegrass, Open Range winterfat, Northern Cold Desert winterfat, and Snake River Plain fourwing saltbush. Site characteristics: REA silty clay loam soil, 0-2 percent slope, 5000 feet elevation, 10 inch precipitation, non-irrigated, T28S R10W SE ¼ Section 29. FY04 no evaluation.

UT04015 Soren Nielsen project – Manti FO. Riparian woody field planting – 9067538 black cottonwood. Cuttings ordered March 5, 2004. FY04 no evaluation.

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 poorer 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. Fairs 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.

UT88009 Skyline Mine - Price FO Multiple Grass on critical area planting – slopes. FY90 and FY92 planting summaries available. FY93 portion of seeding destroyed for new beltline. Rest of seeding doing very well. FY95 Appar flax is spreading, both intermediate and pubescent wheatgrass have spread, thickspike wheatgrass is doing very well, Sherman big bluegrass is doing great, mountain rye is not producing well, Paiute is doing well in plots but has not spread, Aster is improving, Covar sheep fescue is not performing well. **FY96** seeding about the same as last year, erosion from slope covered some of the seeding and it will be interesting to see how the plants can withstand this sedimentation. Rush, Sherman and Mountain ryegrass are doing the best overall.
FY99 10 Year Evaluation. Mixture 1: Luna pubescent wheatgrass is very good on steep slopes and fair on gentle slopes. Hycrest crested wheatgrass failed. Manchar smooth brome is not present on steep slopes, but doing very well on gentle slopes. Appar blue flax is fair on steep slopes and excellent on gentle slopes. Kalo birdsfoot trefoil failed on steep slopes and fair on gentle slopes. Delar small burnet and roses are present on both steep and gentle slopes. **Mixture 2:** Topar pubescent wheatgrass is very good on steep slopes and good on gentle slopes. Ephraim crested wheatgrass and Sodar streambank wheatgrass failed. Delar small burnet is fair on steep slopes and very good on gentle slopes. Roses are present on both slopes. **Mixture 3:** Rush intermediate wheatgrass is good on both steep and gentle slopes. P27 Siberian wheatgrass failed. Critana thickspike wheatgrass is fair on both slopes. Cedar Palmer penstemon is poor on steep slopes and fair on gentle slopes. Summit Louisiana sagewort and roses are present on both slopes. **Mixture 4:** Arriba western wheatgrass is fair to good on both slopes. Mountain rye is very good on gentle slopes. Sherman big bluegrass is good steep slopes and excellent on gentle slopes. Summit Louisiana sagewort is fair on both slopes. Roses are present on both slopes. **Mixture 5:** Rosana western wheatgrass is fair on both slopes. Paiute orchardgrass is very good on both slopes. Covar sheep fescue is good on steep slopes and fair on gentle slopes. Bandera Rocky Mountain penstemon is fair on both slopes. Roses are present on both slopes. **Mixture 6:** Tegmar intermediate wheatgrass is fair on both slopes. Durar hard fescue is fair on steep slopes and high fair on gentle slopes. Bannock thickspike wheatgrass is high fair to good on both slopes. Lutana cicer milkvetch is good on both slopes. Roses are present on both slopes. **Mixture 7:** San Luis slender wheatgrass is good on both slopes. Newhy hybrid wheatgrass failed. Cascade birdsfoot trefoil is poor on steep slopes and good on gentle slope. Blueleaf aster is good to very good on both slopes. Western yarrow is good on both slopes. Roses are present on both slopes.
FY02 very difficult to evaluate following 2 years of severe drought. All grasses have very little production.
FY03 15 Year Evaluation: The last several years of drought has damaged these stands. Rain in August 2003 has helped plant survival and vigor. **Mixture 1 – steep slopes:** Luna fair, Manchar failed, Appar failed, Delar failed, Roses are present; **gentle slopes:** Paiute has moved in, Manchar fair, Appar fair, Lutana good. **Mixture 2 – steep slopes:** Topar good, Delar fair, Appar and Roses are present; **gentle slopes:** Delar good, Topar good, Appar good. **Mixture 3 –**

steep slopes: Rush good, Critana failed, Cedar failed, Summit good, Roses are present; **gentle slopes:** Rush good, Critana fair, Cedar failed, Lutana good. **Mixture 4 – steep slopes:** Arriba good, Mountain rye fair, Sherman failed, Summit fair, Roses and Goldenrod present; **gentle slopes:** Arriba good, Mountain rye good, Sherman fair, Lutana good, Summit fair, Roses and Goldenrod present. **Mixture 5 – steep slopes:** Rosana good, Paiute fair, Covar fair, Bandera failed, Current and Roses present; **gentle slopes:** Rosana fair, Paiute good, Covar good, Bandera fair, Appar fair, Lutana good. **Mixture 6 – steep slopes:** Tegmar good, Durar failed, Bannock failed, Lutana good, Roses and Current present; **gentle slopes:** Tegmar good, Durar poor, Bannock fair, Lutana good, Paiute fair. **Mixture 7 – steep slopes:** San Luis fair, Cascade failed, Blueleaf aster good, Western yarrow fair, Roses present; **gentle slopes:** San Luis good, Blueleaf aster good, Western Yarrow fair, Lutana fair. FY04 no evaluation.

UT90017 Snowball - Price FO Multiple species irrigated demo plots for saline soils. FY92 and FY94 detailed reports available. Irrigation has pushed salinity down below root zone to a large degree. FY95 and FY96 Cicer milkvetch best producer (5279 lbs/ac) followed by San Luis (2587), Revenue (2326), Alsike (1986), Newhy (1673), Hoffman (1646), Festorina/Forager/Tall wheatgrass (1460), Shoshone/Fawn/Altai (1350), Magnar (1125), Garrison (1050), and Kura/Matua/ Trefoil 850) FY99 No yield data gathered. Excellent stands include Shoshone beardless wildrye, Fawn tall fescue, Newhy hybrid wheatgrass, Festorina tall fescue, Forager tall fescue, RS Hoffman, Kura clover, and SP90 Kura clover. Good stands include: Prairieland altai wildrye, Revenue slender wheatgrass, San Luis slender wheatgrass, Jose tall wheatgrass, Garrison creeping foxtail, Johnstone tall fescue X perennial rye, Lutana/Monarch cicer milkvetch, Regar meadow brome, and orchardgrass. Poor stands include Magnar basin wildrye, some plots of cicer milkvetch, Cascade birdsfoot trefoil, and Dakota/Forestburg switchgrass. Mowing significantly reduces vigor of basin wildrye and switchgrass. Festorina and Forager are preferred over Fawn by sheep. Alsike clover and Matua brome failed/died. The fescue x perennial ryegrass appears to show some signs of winterkill. FY03 No water was applied to plots in 2003. Prairieland Altai wildrye good stand with fair vigor and poor production. Magnar basin wildrye very poor stand with fair vigor and very poor production. Shoshone beardless wildrye fair stand with fair vigor and poor production. Revenue slender wheatgrass failed (short-lived species). San Luis slender wheatgrass failed (short-lived species. Jose tall wheatgrass fair stand with poor vigor and poor production. Monarch cicer milkvetch fair to very poor stand with fair vigor and very poor production. Garrison creeping foxtail fair stand with poor vigor and poor production. Fawn tall fescue good stand with poor vigor and poor production. Newhy hybrid wheatgrass good stand with fair vigor and fair production. Cascade Birdsfoot trefoil failed. Festorina tall fescue good stand with poor vigor and poor production. Forager tall fescue good stand with poor vigor and poor production. Tall fescue – perennial rye cross fair stand with poor vigor and poor production. Orchardgrass poor stand with very poor vigor and very poor production. RS Hoffman grass good stand with fair to good vigor and fair production. Kura clover poor stand with very poor vigor and very poor production. 18SP90 Kura clover poor stand with very poor vigor and very poor production. The few remaining Magnar basin wildrye plant and Altai wildrye plants produced seedheads. RS Hoffman appears to be doing better under drought conditions than Newhy. FY04 no evaluation.

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 fail stand and vigor for both Magnar and trailhead due to no summer thunder storms this year.

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.

UT99007 Curtis Rozmon - Price FO field planting on irrigated pasture. Trial includes 905438 switchgrass, 905439 switchgrass, Cave-In-Rock switchgrass, Blackwell switchgrass, Kanlow switchgrass, Latar orchardgrass, perennial ryegrass, and white clover. Site is MLRA D35, loamy fine sand soil, 0-1 percent slope, southwest exposure, 4000 feet elevation, 6-8 inch precipitation, irrigated, T23S R16E SE1/4 Section 25. Seed ordered March 22, 1999. FY99 not planted this year. FY00-FY03 didn't plant due to extreme drought. FY04 no evaluation.

UT00007 George Carter – Monticello FO. Tegmar intermediate wheatgrass - Topar pubescent wheatgrass – Paiute orchardgrass critical area planting. Seed ordered July 5, 2000. Site characteristics: Herm-Lles clay loam to stony loam, 8 percent slopes, west aspect, 8500 feet elevation, 14-16 inch rainfall zone, irrigated for establishment, T26S R23E Section 24. Planting planned for October 2000. FY01 no evaluation. FY02 planting was irrigated for establishment. Good stand of all three species establishing with good vigor. FY03 excellent stand of all three species with excellent vigor and production. Stand continues to be irrigated. FY04 no evaluation.

UT02001 Pete Pickup – Roosevelt FO. Field planting. Rush intermediate wheatgrass (3 acres) - Topar pubescent wheatgrass (5 acres) – Paiute orchardgrass (2 acres). Site information: MLRA D34, Turzo silt loam soil, 8 inch precipitation zone, irrigated, 4800 feet elevation, 2% slope, south exposure, T7S R2E Section 16. Seed ordered April 19, 2002. FY03 fair stand of Rush producing about 1 AUM/ac with fair vigor. Fair stand of Topar producing about .75 AUM/ac with fair vigor. Weeds are a problem in both stands of grass. FY04 good stands and vigor for both species. The plantings were hayed this year – Rush = 1.25 tons/acre and Topar = 1.0 ton/acre. Regrowth was grazed – estimate 0.25 AUMs/acre.

UT03002 David James – Monticello FO demonstration planting. Northern Cold Desert winterfat seed ordered February 18, 2003. Site information: MLRA D35; Limeridge shallow sandy loam soil series; 4 percent slope; south aspect; 4800 feet elevation; 6-8 inch precipitation zone; non-irrigated; T40S R20E Sections 6 and 36. FY04 no evaluation.

UT03003 Mike Wilcox - Monticello FO field planting. UT98004 planted fall (seeding germinated) 1998, but failed due to drought with little to no winter-spring precipitation. This is a dormant fall replanting of Rush intermediate wheatgrass. Luna pubescent wheatgrass is the standard of comparison. Barnam loam soil, 3 percent slopes, south aspect, 6000 feet elevation, 14 inch precipitation, non-irrigated, T31N R26E Section 8. FY00 very little germination this spring (<10%) due to very dry spring. FY01 no evaluation. UT00002 FY02 planting failed due to drought. Seed (Topar pubescent wheatgrass) for UT03003 ordered 2-21-03. FY03 not planted due to drought. FY04 no evaluation.