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FOREST SERVICE, ROCKY MOUNTAIN RESEARCH STATION
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UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
BOISE, 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. Love 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. Love 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 'Anatone Germplasm' 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° 9.57' W 117° 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 (*Ribes* 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 °C**. Maximum daily temperatures may equal or exceed **27 °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. Love ssp. *inermis* [Scribner & J.G. Smith] A. Love), 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 habit. 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. ssp. *wyomingensis* 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.

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References

Anonymous. 1847. Beardless wheatgrass for conservation use in dryland areas. Technical Supplement #25. Nursery Division, Soil Conservation Service, U.S. Dept. Agr., Pullman, Washington. (Mimeo.)

Anonymous. 1964. 'Whitmar' – A new drought tolerant grass for summer, fall, and winter use. U.S. Department of Agriculture, Soil Conservation Service, Pullman, WA. 3 p.

Anonymous. 1981. Land resource regions and major land resource areas of the United States. USDA-SCS Agric. Handb. 296. U.S. Government Printing Office, Washington, DC.

Bailey, R.G. 1995. Description of the ecoregions of the United States. 2nd ed. Misc. Publ 1391 (rev.). U.S. Department of Agriculture, Forest Service, Washington, DC. 108 p.

Carlson, J.R. and M.E. Barkworth. 1997. *Elymus wawawaiensis*: A species hitherto confused with *Pseudoroegneria spicata* (Triticeae, Poaceae). Phytologia 83:3 12-330.

- Gibbs, J. and G. Young. **1989**. 'Goldar' bluebunch wheatgrass public release documentation. U.S. Department of Agriculture, Soil Conservation Service, Boise, ID. **73** p.
- Hein, M.A. **1958**. Registration of varieties and strains of grasses. Wheatgrasses (*Agropyron* spp.) 111. Whitmar beardless wheatgrass (Reg. No. **4**). *Agron. J.* **59:685-686**.
- Jones, T.A., S.R. Larson, D.C. Nielson, S.A. Young, N.J. Chatterton, and A.J. Palazzo. **2002**. Registration of **P-7** bluebunch wheatgrass germplasm. *Crop Sci.* **42:1754-55**.
- Jones, T.A., D.C. Nielson, and J.R. Carlson. **1991**. Developing a grazing-tolerant native grass for bluebunch wheatgrass sites. *Rangelands* **13:147-150**.
- Kelley, Clarence A. [n.d.a]. Notice of release of 'Secar' bluebunch wheatgrass. U.S. Department of Agriculture, Soil Conservation Service, Pullman, WA. **52** p.
- Kelley, C. [n.d.b]. Recommendation for the release of a variety of bluebunch wheatgrass. U.S. Department of Agriculture, Soil Conservation Service, Pullman, WA. **3** p.
- Kitchen, S.G. and S.B. Monsen. **1994**. Germination rate and emergence success in bluebunch wheatgrass. *J. Range Manage.* **47:145-150**.
- Kitchen, Stanley G. **1995**. Return of the native: A look at select accessions of North American Lewis ~~flax~~, p. **321-326**. In: Bruce A. Roundy, E. Durant McArthur, Jennifer S. Haley, and David 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: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.
- Kitchen, S.G. and S.B. Monsen. **1999**. Selection for seedling vigor in bluebunch wheatgrass, p. **14-21**. In: Cooperative research studies: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Shrub Sciences Laboratory, Provo, Utah, 1989-1998.
- Larson, S.R., T.A. Jones, Z-M. Hu, C.L. McCracken, and A. Palazzo. **2000**. Genetic diversity of bluebunch wheatgrass cultivars and a multiple-origin polycross. *Crop Sci.* **40:1142-1147**.
- Mann, David H. **1954**. Whitmar beardless –New Range Promise. *Idaho Farmer*: **72(16): 641**.
- Monsen, S.B., D.G. Naillon, and S.G. Kitchen. **1999**. Comparing **53** native collections of bluebunch wheatgrass and Snake River wheatgrass in two garden experiments at Nephi, Utah and Orchard, Idaho, p. **3-13**. In: Cooperative research studies: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Shrub Sciences Laboratory, Provo, UT **1989-1998**.

Morrison, K.J. 1981. Secar bluebunch wheatgrass. Extension Bull. Washington State University, Cooperative Extension Service, Pullman.

National Oceanic and Atmospheric Administration (NOAA). 1997. Climatological Data Annual Summary, Washington 1997. 10:1-21.

Ogle, D., L. St. John, M. Stannard, and L. Holzworth. 2003. Grass, grass-like, forb, legume, and woody species for the Intermountain West. TN plant materials **24**. USDA Natural Resources Conservation Service, Boise, ID. **42** p.

U.S. Department of Agriculture, Natural Resources Conservation Service, Soil Survey Division (USDA NRCS SSD). 2003. Official Soil Series Descriptions [Online WWW]. Available URL: "<http://ortho.ftw.nrcs.usda.gov/osd/> [Accessed 25 September 2003].

U.S. Environmental Protection Agency. 2000. Level III Ecoregions of the Continental United States. U.S. Environmental Protection Agency, Washington, DC.

Vogel, K.P. and R.A. Masters. 2001. Frequency grid - a simple tool for measuring grassland establishment. J. Range Manage. **54**:653-655.

Wolfe, H. H. and Morrison, K. J. 1957. Whitmar Beardless Wheatgrass, State College of Wash. Ext. Cir. 273.

SIGNATURES FOR RELEASE OF:

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

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