Bridger PMC 2010

Proposed Release

Mill Creek Germplasm Silver Buffaloberry

PLANT MATERIALS CENTER
BRIDGER, MONTANA

History

The Bridger Plant Materials Center (PMC) opened its doors in 1959 for evaluation, selection, and development of plant materials for Montana and Wyoming. From 1959 to 1970, the PMC operated on 80 acres of a 140-acre farm leased by the Carbon County (Montana) Conservation District. In 1970, the 104 Conservation Districts in Montana and Wyoming purchased the entire 140-acre farm. The USDA Soil Conservation Service leased 110 acres of this farm from 1970 to 1984. Due to an ever-expanding program, the Natural Resources Conservation Service now leases 130 acres from the Conservation Districts.

Staffing

PMC Acting Manager	Ron Nadwornick	Ronald.Nadwornick@mt.usda.gov
Asst. Manager/Horticulturist	Joe Scianna	Joseph.Scianna@mt.usda.gov
Agronomist	Susan Winslow	Susan.Winslow@mt.usda.gov
Agronomist	Roger Hybner	Roger.Hybner@mt.usda.gov
Farm Foreman	Darren Zentner	Darren.Zentner@mt.usda.gov
Biological Technician	Ross Oyler	Ross.Oyler@mt.usda.gov
Biological Technician, YNP	Andi Pierson	Andi.Pierson@mt.usda.gov
Biological Technician, BLM	Bob Fisher	Bob.Fisher@mt.usda.gov
DATR Project Leader	Beth Graham	Elizabeth.Graham@mt.usda.gov
SWCDMI Secretary	Jean Hodges	Jean.Hodges@mt.usda.gov

Telephone: (406) 662-3579
Fax: (406) 662-3428

Mail & Delivery:
USDA-NRCS
Plant Materials Center
98 South River Road
Bridger, MT 59014

For additional information on plant materials, visit our website:
http://www.mt.nrcs.usda.gov/technical/ecs/plants/
http://www.Plant-Materials.nrcs.usda.gov
For specific details on plants, visit the Plants Database:
http://plants.usda.gov

Facilities

The 140 acres are irrigated primarily by furrow irrigation; however, hand-moved sprinklers are used for establishment-year irrigation. Major buildings include:

40’ x 80’ metal seed cleaning building,
30’ x 50’ seed storage building,
50’ x 80’ metal building for shop and machinery storage,
26’ x 52’ office building,
19’ x 31’ greenhouse with 19’ x 31’ headhouse,
20’ x 48’ coldframe/lath house, and
30’ x 40’ laboratory.

Reimbursable Projects

National Park Service Cooperative Agreements
Since 1986, the Bridger PMC has maintained cooperative agreements with the National Park Service for native plant restoration relating to highway reconstruction. Supported by the Federal Highway Administration, the National Park Service is upgrading and realigning the major roads within national

parks' boundaries nationwide. The Bridger PMC has assisted both Yellowstone and Glacier National Parks with numerous aspects of this work, including:

- identifying early successional or colonizing species that can be used to restore roadside disturbances,
- identifying species that lend themselves to be increased using traditional cultural practices,
- determining the method and timing of seed collection,
- determining seed cleaning methods,
- collecting, cleaning, inventorying, and storage of seed collections,
- developing germination and dormancy-breaking techniques for hard-to-propagate species,
- developing asexual propagation techniques for woody plants, and
- developing cultural techniques for seed, container plant, and bare-root production.

Seed production plots (varying from 0.03 to 0.45 acres) are established at the Bridger PMC and harvested using hand harvesting, a seed stripper, diapered swather, or a plot combine. Presently there are approximately 6 acres of seed production for the two national parks. For Glacier there are 6 species of grasses and 2 forb species in production**.** Yellowstone has 2 acres of 7 grass species (8 collections) in production.

Not all Park Service collections are increased at the Bridger PMC. Although most collections made in the parks are sent to the Bridger PMC for cleaning, accessioning, and storage, some seed is returned directly to the respective parks for direct seeding or sent to commercial growers for seed or plant increase. Yellowstone and Glacier are making approximately 350 to 400 individual collections per year. To date, Yellowstone has made collections from 148 different sites from within Yellowstone National Park. Glacier National Park has made collections from 126 different sites, both from within the park and from adjacent National Forest Land.

Woody plant projects involve the collection, processing, storage, production, planting, and inventorying of native woody seed and plants. Most of this work involves the container production of species such as Wood's rose, snowberry, serviceberry, chokecherry, currant, Oregongrape, silverberry, and other species with conservation and revegetation applications. In some cases, the clonal propagation of plants is necessary through the use of stem cuttings. This research is being conducted in the PMC greenhouse under highly controlled conditions.

Yellowstone National Park Cooperative Agreements

Numerous projects funded through the Federal Highway Administration are currently underway at the BPMC for YNP that include seed increase fields of rough bentgrass *Agrostis scabra*, bottlebrush squirreltail *Elymus elymoides*, mountain brome *Bromus marginatus*, slender wheatgrass *Elymus trachycaulus*, bluebunch wheatgrass *Pseudoroegneria spicata* ssp. *spicata*, needle and thread *Hesperostipa comata*, nodding brome *Bromus anomalus*, and tufted hairgrass *Deschampsia cespitosa*.

In 2009, a new YNP cooperative agreement was initiated to assist in revegetation efforts along the northern boundary in the Gardiner Basin. The BPMC will participate in seed collection activities, increase seed of native collection, and establish research plots. Presently, the BPMC is increasing seed of bluebunch wheatgrass *Pseudoroegneria spicata* ssp. *spicata*, and needle and thread *Hesperostipa comata*.

Glacier National Park Cooperative Agreement

The PMC currently has several projects in support of our cooperative agreement with Glacier National Park, including:

- using container production of grasses and forbs to reduce seed production intervals and increase product quality of species like Columbia needlegrass *Achnatherum nelsonii*, bluebunch wheatgrass *Pseudoroegneria spicata*, eastern showy aster *Eurybia conspicua*, yarrow *Achillea millefolium*, largeleaf avens *Geum macrophyllum,* and western fescue *Festuca occidentalis*.
- a germination study involving several alpine species to determine the effect of light or darkness on the ability of these species to germinate,
- seed increase fields of several sedge *Carex* species, blue aster *Symphyotrichum laeve*, alpine timothy *Phleum alpinum*, and blue wildrye *Elymus glaucus*, and

- container production of Oregongrape *Mahonia repens, woods rose Rosa woodsii, and* thimbleberry *Rubus parviflorus* for roadside restoration.

Craters of the Moon

A new cooperative agreement was established between the BPMC and CROM in 2009. Wildland seed processing, plant propagation, and establishment techniques will be developed for several species of grasses, forbs, and shrubs.

Development of Acid/Heavy-Metal Tolerant Releases (DATR) Project

The DATR project is funded by a State of Montana Natural Resource Damage program with in-kind contributions from NRCS, SWCDMI, and the Deer Lodge Valley Conservation District. The project is sponsored by the Deer Lodge Valley CD and headquartered at the NRCS Plant Materials Center in Bridger, Montana. The DATR project's mission is to release plant materials that exhibit tolerances to mineland soils characterized by elevated heavy-metal concentrations and low pH.

The scope of the project has included (1) greenhouse testing of experimental acid/heavy-metal tolerant accessions growing in low pH and heavy-metal contaminated soil media; (2) comparative field testing of selected herbaceous seed mixtures; (3) comparative field testing of promising woody species; (4) establishment, production, and maintenance of seed increase blocks of superior performing plant materials; (5) release of superior plant materials; and (6) technology transfer of research results, best management practices, and products.

Results from a Greenhouse Comparative Evaluation Planting (CEP) study identified several superior plant ecotypes. Subsequently, four seed mixtures containing various blends of ten grass and four forb species were field tested in 2001 at two affected sites near Anaconda (upland site and lowland site). A control planting was established at the Bridger PMC. The Seed Mixture Treatment Study compared four "local" seed mixtures (originating from seed collected within the Anaconda Smelter Superfund Site) to four "non-local" seed mixtures containing cultivars currently on the market. Limited data resulted from this study due to poor stand establishment at both the upland and lowland sites.

In the fall of 2000, a Woody CEP was installed near Anaconda on soils affected by acidity and heavy-metal contamination. This study tested 19 accessions of seven woody species. "Local" stock, originating at the Anaconda Smelter Superfund Site, was compared to "nonlocal" nursery stock of the same species from other areas of Montana, Colorado, Utah, and Wyoming. Both first and second growing season (2001 and 2002) results supported the use of "local" stock, which exhibited superior growth, vigor, and survival in six of the seven species tested. Overall, silver buffaloberry, common snowberry, and currant were the hardiest species.

In the spring of 2003, three new trials were installed north of Anaconda within the 2002 Stucky Ridge Uplands Remedial Action area. This lime-amended area was chosen for the new study site, as past plantings on untreated soils did not produce adequate stands. The purpose of the study is to compare the performance of experimental plant material originated from contaminated minelands to cultivars presently on the market. Superior performing experimental plant material will subsequently be developed for the commercial market.

Data collected from these studies resulted in three initial plant releases. In 2002, Washoe Germplasm basin wildrye, Prospectors Germplasm common snowberry, and Old Works Germplasm fuzzytongue penstemon were released through the Montana Seed Stock Program and distributed to commercial seed growers through the Montana Seed Growers Association. In 2006 and 2007, two additional species were released—Copperhead Germplasm Selected Class slender wheatgrass and Opportunity Germplasm Nevada bluegrass. Potential future releases include ecotypes of silver buffaloberry, Wood's rose, western snowberry, Baltic rush, potentilla, western wheatgrass, bluebunch wheatgrass, and horizontal juniper.

The Bridger PMC will continue to establish, maintain, and increase superior accessions, while focusing attention towards establishment concerns at the Upper Clark Fork River Basin (UCFRB). Site factors, nursery practices and materials, available plant materials, transplant practices and field placement were

discussed as they all relate to the success of revegetating areas that present difficult site/environmental conditions.

Wyoming Bureau of Land Management (BLM)
In 2008, a new cooperative agreement was developed with Wyoming BLM to evaluate the performance of native forbs for their potential in revegetating disturbance in desert shrub and sagebrush plant communities. The BLM made seed collections from a variety of sites of target species that were dormant-seeded at the BPMC in a new Initial Evaluation Planting. Plant growth and development will be evaluated over a 4-year period. Species included are prairie thermopsis *Thermopsis rhombifolia*, pale agoseris *Agoseris glauca*, and beardstongue *Penstemon*.

Foundation Seed Research Assistantships
All Foundation seed from the Bridger PMC is given to the Foundation Seed Programs at Montana State University and the University of Wyoming. Revenue generated by the sale of Foundation seed is used to fund research projects, particularly graduate research, related to the seed production, forages, and reclamation industries. The Director of the Montana State University Agricultural Experiment Stations and the NRCS State Conservationist mutually agree upon all funded projects.

Jessie Wiese, a former MSU graduate assistant working with Dr. Fabian Menalled, was evaluating the effect of pre- and post-emergence herbicides in wildflower seed production fields at two sites. The following is the abstract from her thesis, Establishment and Seed Production of Native Forbs Used in Restoration.

"The importance of incorporating native wildflowers into seed mixtures for disturbed land revegetation projects is widely known and accepted. However, wildflower seed producers need to gain scientific, technical, and practical knowledge for the successful production of native seeds. In particular, assessing weed management approaches represents a necessary step to facilitate the successful establishment and seed production of native wildflowers in production settings. To fill this knowledge gap, we examined the impact of pre and post-emergence herbicides alone and in combination with hand weeding on 5 wildflower species [slender white prairie clover (*Dalea candida*(Michx). ex Willd), blanketflower (*Gaillardia aristata* Pursh), fuzzy tongue penstemon (*Penstemon eriantherus* Pursh var. *eriantherus*), silverleaf phacelia (*Phacelia hastata* Douglas ex Lehm.), and prairie coneflower (*Ratibida columnifera* (Nutt.) Woot. & Standl)] under greenhouse and field conditions. Herbicides evaluated included Treflan (trifluralin) 189 l/ha, Lorox (linuron) 1.121 kg/ha., Permit (halsulfuron) 91 g/ha., Plateau (imazapic) 560 g/ha, and Prowl (pendimethalin) 4.2 l/ha. The objectives of this study were to 1.) Determine wildflower seedling tolerance to post-emergence herbicides, 2) Evaluate the effect of pre- and post-emergence herbicides on native wildflower seedling establishment, weed control, and wildflower seed production.

"Objective 1 was carried out in a greenhouse setting. A randomized block design was used and repeated twice. A Monte Carlo simulation was used to assess herbicide damage and a randomized block design analysis of variance (ANOVA) was used to assess herbicide impact on fresh and dry biomass. Results indicated that the *D. candida* and *R. columnifera* were minimally affected by herbicide treatments, while *G. aristata* and *P. hastata* were frequently affected, the first by linuron and halosulfuron and the last by halosulfuron and imazapic.

"Objective 2 was conducted at two sites (the Post Research Farm near Bozeman, MT and at the Bridger Plant Materials Center in Bridger, MT) to assess hand weeding and pre and postemergence herbicide effects on native wildflowers. A randomized block design was used to assess wildflower establishment, percentage cover, yield, and seed germinability and viability, along with weed community composition and cover as function of weed management approach. Data were analyzed with a randomized block design analysis of variance (ANOVA) to test for significant differences in wildflowers seedling emergence, percent cover of wildflowers, and seed yield. Results indicated site to site variation was important and that wildflower species responded uniquely to weed management. This indicates that caution should be used when applying herbicides to the tested species. Specifically, emergence of *P.eriantherus, D. candida* and *P.hastata* were negatively affected by trifluralin, indicating caution should be used if this herbicide is used on wildflowers. While incorporating herbicides as a component of weed

management systems is a common, effective method to control weeds, caution should be used in wildflower seed production, as wildflower species were not tolerant to the same herbicides."

Major Projects

Plant Materials Project for Development of Trees and Shrubs

Woody plant research at the Bridger Plant Materials Center is becoming an increasingly significant aspect of our program. The demand for trees and shrubs that can tolerate the severe conditions characteristic of the Northern Great Plains and the variety of applications for their use continues to grow. Woody plant research, like most plant studies, requires evaluation over the anticipated life or usefulness of the planting. This makes for slow progress. Many projects initiated 10, 20, or even 30 years ago are just now nearing fruition. As data is tabulated and summarized, selections of superior trees and shrubs will be identified and targeted for release. New pre-varietal release procedures allow the PMC to quickly provide superior selections to the market. To the land owner, this means plants that can better tolerate the severe environmental conditions in Montana and Wyoming, while performing such conservation functions as reducing soil erosion, providing wind and sun protection, preventing snow drifts, providing food and shelter for wildlife, riparian restoration, and more.

Plant Materials For Saline Soils

The Bridger PMC has been working on the development of salt-tolerant plant materials since 1975. Originally the Soil and Water Conservation Districts of Montana, Inc. (SWCDMI) accepted a grant from the Old West Regional Commission (Department of Commerce) to collect and evaluate salt-tolerant plants both from native and foreign origins.

Native collections were made throughout Montana and Wyoming and evaluated on a saline site at the Bridger PMC. Eventually field evaluation sites were established near Conrad, Fort Benton, Hardin, Malta, and Rapelje, Montana; and Powell, Wyoming. Trials were established to compare direct seeding with sprigging, and compare the establishment success and intra-specific competition within several seed mixtures. Tech Note—Plant Materials No.26 was written as a guide for species and establishment techniques that are best utilized on saline-alkaline soils.

Active and Anticipated Studies

Initial Evaluation Planting (IEP) of Native Grasses and Forbs

In November 2008, seed collections received from 2005-2008, along with some of the aforementioned performers, were planted in a new IEP. Included are 44 accessions of 11 native legume species and 40 accessions of 24 native wildflowers. The BPMC conducts these high-priority trials to ultimately recommend diversity in native seed mixes for revegetating disturbed areas, enhancing wildlife habitat, promoting collimator-friendly plant communities, and alternatives in low maintenance landscapes. An additional nine accessions were received and planted in 2009 and 2010.

Xeriscape Demonstration

There is presently a great interest in utilizing low maintenance/low water requirement grasses, both native and introduced, for landscaping. Plots of nine different grasses have been established under dryland conditions (Introduced—crested wheatgrass, Russian wildrye, sheep fescue, and Canada bluegrass; Native—thickspike wheatgrass, streambank wheatgrass, western wheatgrass, buffalograss, and blue grama). In the spring of 2001, 'Roadcrest' crested wheatgrass was added to the demonstration plots. Half of each plot is periodically mowed, while the other half is allowed to reach full growth. A vehicle is driven across the plots ten times every 3 weeks to evaluate trampling resistance.

In early May 2005, five grass mixture plots of two species each were broadcast-seeded at the south end of the existing demonstration area. The objective is to evaluate the performance of seven species that may be appropriate in a turf grass mix for very dry, drought-prone conditions. The simple mixes are (seeded north to south): 'Critana' thickspike and 'Rosana' western wheatgrass, 'Foothills' Canada bluegrass and 'Covar' sheep fescue, 'Bad River' blue grama and Covar sheep fescue, Foothills Canada bluegrass and Roadcrest crested wheatgrass, and Bad River blue grama and 'Cody' buffalograss.

Additional plans are to biannually take out a section of the Kentucky bluegrass lawn and establish native plantings for reduced water use and mowing.

Bur Oak Seed Source Study—*Quercus macrocarpa*

Bur oak is a native species widely distributed across much of the United States. Although found only in the far southeastern corner of Montana in uncultivated, natural stands, it is found in numerous small communities across the state as a street tree or landscape plant. Adapted to a wide variety of soil conditions, this species tolerates relatively high soil pH, is drought tolerant, and has few insect or disease problems. Capable of reaching heights over 100 feet on good sites, it normally attains a maximum height of about 50 feet in Montana. Like all oaks, bur oak is a strong-wooded species capable of surviving in environments that seem to support only weak-wooded, deciduous trees.

A 24-accession, replicated study was established at Bridger in June of 1994. The goal of the project was to identify well adapted accessions with better than average rates of growth and superior form for use in windbreaks. Annual evaluations have been taken each year since 1994. Performance data has already identified superior seed sources; final selections were made, and non-selected trees removed in April 2004. The final selection has been named Ekalaka Germplasm bur oak and was formally released in October 2009. Sixty-seven trees are currently maintained as an orchard for seed production. Data on seed production germination is collected periodically and used in developing long-term orchard management plans.

Initial Seed Increase of Plant Materials for Biological Diversity in Rangeland and Restoration Seedings

Initial Evaluation Plantings were established at the PMC beginning in 1994. To date, the performance has been evaluated of more than 400 collections of native grasses, legumes, and wildflowers. In 2004, Great Northern Germplasm western yarrow *Achillea millefolium* var. *occidentalis* and Stillwater Germplasm upright prairie coneflower *Ratibida columnifera* were released. In 2008, a seed increase field was established of blanketflower *Gaillardia aristata*. In addition, several top performing accessions in the previously mentioned DATR Project (see page 2) are also candidates for release and presently are being field-increased at the Center.

Culturally Significant Plants

Sweetgrass tends to reproduce vegetatively, and traditional, large-scale seed production techniques are rarely successful. In July 2001, transplants of 9063351 sweetgrass *Hierochloe odorata* were relocated in Field 4 to establish a vegetative increase block. Plant growth and development are being monitored, and various cultural techniques are utilized to optimize stand production. In May 2002, an Inter-Center Initial Evaluation Planting of six sweetgrass entries was established to compare the performance of regional sources. The 2002 and 2003 evaluation results indicate that the Montana entry is the top performer and the Michigan entry rates second. In 2004, Spirit Germplasm sweetgrass was released as a selected class of vegetative material.

Tree and Shrub Sub-Irrigation Tube Study

A major investigation into the potential benefits of sub-surface applications of supplemental water on tree and shrub survival and growth was initiated at the Bridger PMC in 2005. This study is being conducted in conjunction field trials established by Miles City, Montana, Area Staff and funded through a Grazing Lands Conservation Initiative (GLCI) grant. A total of 480 trees, representing four species (bur oak *Quercus macrocarpa*, green ash *Fraxinus pennsylvanica*, ponderosa pine *Pinus ponderosa*, and Rocky Mountain juniper *Juniperus scopulorum*) are being tested with and without tubes, under fallow and vegetated conditions. In addition to improving seedling survival and growth, the study aims to improve water conservation, seedling drought tolerance, and efficiency of water delivery. Four-year results demonstrate a dramatic difference in seedling survival and growth depending on the presence or absence of vegetative cover, with fallow conditions resulting in vastly superior plant performance. In addition, green ash with tubes grew taller and had better vigor ratings than surface-watered green ash on the fallow site.

Tree and Shrub Salinity Tolerance Study

A woody plant salinity tolerance study was initiated in late 2005 to determine the effects of soil salinity on plant survival and growth. Eighteen species of trees and shrubs were installed across a salinity gradient

in Field 26 at the PMC in May 2006. Data collected in 2006 through 2009 (with preliminary results) suggest tree and shrub salinity tolerance is significantly lower than reported in the literature, at least on moderate to heavy-textured soils. Superior performing species include silver buffaloberry, silverberry, blueleaf honeysuckle, golden currant, green ash, caragana, and skunkbush sumac.

Performance of New Conservation Grasses, Legumes, and Forbs in Montana & Wyoming

The performance and adaptation of 78 entries will be monitored in two plots that were established at the PMC on April 26 and May 3, 2006. The new plant materials, originating from areas in the Northern Great Plains, Inter-mountain West, and the Great Basin, are being compared against long-time commercial standards.

Alfalfa Salinity-Tolerance Demonstration

Three released varieties of alfalfa will be planted in 2008 on a saline seep area of the Bridger PMC. As a result of seepage over many decades from an irrigation canal, the area ranges from 2 EC near the canal to 24 EC approximately 150 feet downslope. Two of the alfalfas were privately released as having salt tolerance and a public Montana State University release, Shaw, will be used as a check. Many producers are interested in salt-tolerant alfalfas to reclaim their saline seeps and recharge areas. In addition, future CRP and CSP plantings in eastern Montana may also benefit from information gleaned from the study. Two grasses, 'NewHy' hybrid wheatgrass and AG 'Saltlander' green wheatgrass, will be added to the site in 2010.

Scarlet Globemallow Comparative Evaluation Planting (CEP

The BPMC identified several high priority environmental needs associated with improving native species diversity in seed mixes to revegetate rangeland and disturbed areas, and to enhance wildlife habitat and residential landscapes. The PMC installed Initial Evaluation Plantings (IEP) in 1994, 1997, 2004, and 2008 to access adaptation and performance of nearly 400 entries of native grasses, legumes, and forbs, including 36 individual sources of scarlet globemallow have been processed at the PMC since 1981. The Plant Materials program does not presently have a release of scarlet globemallow available to the commercial seed industry, so a study plan was developed and approved to continue evaluation and potential selection of this import native species.

In November 2008, scarlet globemallow seed was assembled and planted from 30 of the best performing entries as identified in the two previous IEPs, along with seed of 14 new collections received from 2005-2008. The study will evaluate performance over a 4-year time period. Establishment was very poor, so the plots were reseeded in November 2009.

Irrigated Cool-Season Grass and Alternate Row Grass/Alfalfa Forage Trials

In the spring of 2010, 17 cool-season grass cultivars and two grass/legume mixes were planted in three replications at the BPMC under irrigated growing conditions. The alternate-row grass/alfalfa forage trial had 14 cultivars planted on alternate rows with Shaw alfalfa. These trials were also planted in the spring of 2009 at the MSU Agricultural Experiment Stations in Moccasin and Havre, Montana. Moccasin established the 32 cool-season cultivar, dryland trial as well as the alternate row grass/alfalfa trial. Havre established both the irrigated and dryland cool-season trials. Interest from producers in both Montana and Wyoming remains very high for this type of information.

Almanac-CEAP Pilot Project

The BPMC is participating in a joint ARS-NRCS pilot project to collect plant attribute data to support the Agricultural Land Management Alternative with Numeric Assessment Criteria (Almanac) model and the Conservation Effects Assessment Project (CEAP). The objective is to provide data to the ARS for use in conservation planning tools or models to improve the accuracy and predictability of conservation effects of practices applied by NRCS through Farm Bill programs. The BPMC is sampling a variety of growth factors, including light intensity measured with a ceptometer, in foundation fields of 'Critana' thickspike wheatgrass, 'Trailhead' basin wildrye, 'Rosana' western wheatgrass, and 'Rimrock' Indian ricegrass. Plots are evaluated throughout the growing season and new entries may be added in the future.

Off-Center Trials

Shell Exploration—Pinedale, WY

The purpose of this planting is to evaluate the performance of native species and seeding techniques in the revegetation of disturbances caused by the exploration and extraction of oil and gas reserves. Secondly, species' diversity to enhance wildlife habitat for sage grouse, mule deer, antelope, and other species will be determined. The planting includes 72 different entries of 32 grasses, 24 forbs, and 16 shrubs that were installed as replicated plots on a ½-acre area with a precision core-seeder. A broadcast seeder planted the same two mixes, each 1 acre. The site will also be used as an educational tool for public and private land managers, as well as other interested individuals.

Questar Exploration—Pinedale, WY

The purpose of this planting is to evaluate the performance of native species and seeding techniques in the revegetation of disturbances caused by the exploration and extraction of oil and gas reserves. Secondly, species' diversity to enhance wildlife habitat for sage grouse, mule deer, antelope, and other species will be determined. The planting includes 29 shrub entries of 25 species that were installed as replicated plots on a 0.43-acre area with single-row belt seeders. Five different bluebunch wheatgrass varieties were broadcast-seeded in an adjacent 0.23-acre plot to evaluate performance and adaptation.

Irrigated Forage Trial—Powell, WY

This study was established to compare the productivity of 40 native and introduced forage grasses under irrigation, as well as to examine relative production of seeding forage grasses in aftermath rows with a legume. In 2007, the best-performing grasses in solid stands were entries of pubescent, slender, and intermediate wheatgrasses. In the alternate-row plots, pubescent wheatgrass and alfalfa yielded the most hay forage. Plots were harvested and data is being analyzed for 2009.

Releases

The PMC cooperatively tests, with numerous partners, a variety of plant materials under a broad range at environmental conditions. The top performers are made available to commercial growers through the foundation seed programs at Montana State University-Bozeman and the University of Wyoming-Laramie. Since the PMC was established more than 50 years ago, there have been 30 releases of 17 grasses, 8 trees/shrubs, and 5 forbs. The 27 species, which are maintained at the Bridger PMC, have utility in a variety of conservation applications, such as forage production, range renovation, mineland revegetation, salinity tolerance, windbreaks and shelterbelts, wildlife habitat, and energy-efficient landscapes.

Garrison Creeping Foxtail—*Alopecurus arundinaceus*

'Garrison' creeping foxtail was released by the Bismarck PMC and the University of Wyoming in 1959. The Bridger PMC has responsibility for Breeder and Foundation seed production. It is an excellent grass for irrigated or subirrigated hay or pasture. Garrison produces a light fluffy seed that is difficult to plant. Rice hulls have been used as a carrier, and pelletizing the seed reduces seeding difficulty. In some instances, wet meadows are too wet to prepare a clean seedbed and, consequently, producers have resorted to feeding Garrison hay to livestock on areas where they would like to establish Garrison. Sprigging is also an excellent way of establishing Garrison.

Critana Thickspike Wheatgrass—*Elymus lanceolatus* ssp*. lanceolatus*

'Critana' thickspike wheatgrass was originally collected by Montana State University in 1960 near Havre, Montana, and was released by Bridger PMC and the Montana Agricultural Experiment Station in 1971. This grass has been used mostly for mine reclamation, road- sides, recreation areas, and range reseedings. Critana has excellent seedling vigor and forms a dense sod. Critana is noted for its variable genetic expression. For example, a Critana plant may produce rhizomes that have characteristics of Montana wheatgrass or slender wheatgrass. Genetic expression has created problems in producing certified seed and, in the past, has allowed standards for allowable slender wheatgrass included in Critana seed to approach 30 percent. However, for its intended use in mine reclamation or range reseeding, genetic expression has not posed a problem.

Lutana Cicer Milkvetch—*Astragalus cicer*

'Lutana' cicer milkvetch was the first release in the United States of this species (1971). The original germplasm was introduced from Sweden in 1926. Cicer milkvetch is a nonbloating legume adapted for use as hay and pasture in irrigated meadows or in dryland areas receiving at least 15 inches of annual precipitation. Cicer milkvetch will tolerate a high water table or standing water better than alfalfa. This legume has coarser stems and higher moisture content than alfalfa, making cicer less desirable as a hay crop. It will, however, withstand heavy grazing pressure and is compatible with most irrigated forage grasses.

Rosana Western Wheatgrass—*Pascopyrum smithii*

'Rosana' western wheatgrass is a native perennial grass selected for reseeding depleted rangelands, mined lands, and abandoned cropland. It was collected in Rosebud County, Montana, and cooperatively released by the Bridger PMC and Montana Agricultural Experiment Station in 1972. Rosana is adapted to medium- to fine-textured soils, neutral to strongly saline, and 12 or more inches of precipitation, run-in, or overflow range sites. Rosana is usually seeded in mixtures with other plant species such as green needlegrass *Nassella viridula*.

Goshen Prairie Sandreed—*Calamovilfa longifolia*

'Goshen' prairie sandreed was released to stabilize and revegetate sandy range sites in eastern Montana and Wyoming receiving more than 12 inches of annual precipitation. Goshen was cooperatively released in 1976 by the Bridger PMC and the Montana and Wyoming Agricultural Experiment Stations. Good stands of Goshen are usually established using standard rangeland seeding methods when planted between April and mid-May. Goshen does well when seeded in a grass mixture including Critana thickspike wheatgrass, Rosana western wheatgrass, green needlegrass, or Indian ricegrass. At Bridger, Montana, Goshen grows to about 34 inches high on dryland and to 70 inches with irrigation. Vigorous spring growth begins by the end of April, full bloom usually occurs by August, and the seed ripens by October.

Wytana Fourwing Saltbush—*Atriplex* X *aptera*

'Wytana' was cooperatively released in 1976 by the Bridger PMC and the Montana and Wyoming Agricultural Experiment Stations. Wytana was released primarily for mine reclamation and range revegetation. Plantings should be in mixtures with native grasses. In mixtures, adequate plant populations have been obtained by using a seeding rate of 1/2 to 1 pound of bulk seed-per-acre. Protein content is good (15%) and remains so throughout the winter. Wytana is the first released cultivar of a shrub species to be successfully harvested for seed with standard farm equipment.

Shoshone Beardless Wildrye—*Leymus triticoides*

'Shoshone' was released in 1980 by the Bridger PMC and Montana and Wyoming Agricultural Experiment Stations after extensive testing on saline soils throughout Montana and Wyoming. Prior to release, this grass was tested in over 100 field plantings. Shoshone is one of the most salt-tolerant grasses on the commercial market. Once established in strongly saline soil, Shoshone is capable of spreading by rhizomes into soils with electrical conductivity in excess of 30 dS/m.

Bozoisky-Select Russian Wildrye—*Psathyrostachys juncea*

'Bozoisky-Select' Russian wildrye was released by ARS, NRCS, and Montana, Utah, and Idaho Agricultural Experiment Stations in 1984. Russian wildrye is native to the steppe and desert regions of Russia and China. It has not been used much in the past because of poor seedling vigor. Through recurrent selection, Bozoisky-Select was developed with improved seedling and vegetative vigor, leafiness, and seed yield. Bozoisky-Select can add substantial flexibility to a grazing management program. Much like crested wheatgrass, it provides for early spring grazing, but retains greenness and nutritive value over the entire summer. It cures well and provides good winter roughage for grazing animals.

Pryor Slender Wheatgrass—*Elymus trachycaulus* ssp. *trachycaulus*

'Pryor' originated from a collection from a saline intermittent drainage-way in a saline upland range site approximately 15 miles south of Bridger, near the Wyoming border. Pryor was released in 1988 by the Bridger PMC and Montana and Wyoming Agricultural Experiment Stations. Pryor has been found to have better seedling vigor, salt tolerance, and longevity than the other released cultivars of slender wheatgrass

('Primar', 'Revenue', and 'San Luis'). Pryor has a larger seed than other cultivars of slender wheatgrass (97,000 seeds-per-pound compared to 147,000 seeds-per-pound). Pryor is a self-fertile, short-lived, forage grass that is used in a variety of seeding mixtures to provide quick cover and soil stabilization without competing with the slower developing, long-lived species.

Trailhead Basin Wildrye—*Leymus cinereus*

'Trailhead' basin wildrye was cooperatively released in 1991 by the Bridger PMC and the Montana and Wyoming Agricultural Experiment Stations. Trailhead is a native, collected near Roundup, Montana, and is noted for its production and longevity under droughty conditions—exceeding 'Magnar', the only other released cultivar. Due to its large size and ability to remain standing over winter, basin wildrye provides excellent cover for upland game birds and good forage for wildlife such as elk, deer, and bighorn sheep.

Rimrock Indian Ricegrass—*Achnatherum hymenoides*

'Rimrock' was cooperatively released in 1996 by the Bridger PMC, the Montana and Wyoming Agricultural Experiment Stations, and the USDA Agricultural Research Service, Logan, Utah. Rimrock is a native perennial grass that can be used in seed mixtures for range revegetation and reclamation of disturbed sandy soils. This species produces an abundance of high protein, plump seed that makes excellent food for upland game birds and songbirds. Rimrock was released primarily because of its ability to retain mature seed better than the cultivars 'Paloma' (origin Pueblo, Colorado) or 'Nezpar' (origin Idaho). The more acute angle of the glumes of Rimrock helps retain seed longer and protects from catastrophic shattering events such as high winds and heavy rain.

Bridger-Select Rocky Mountain Juniper—*Juniperus scopulorum*

Bridger-Select Rocky Mountain juniper was released in 1998, and represents the first Bridger PMC selection to utilize the new prevarietal release mechanism. This release is a bulk of 181 trees from 26 superior seed sources collected from across the northern Great Plains. Final selections were made based primarily on height growth, uniformity of shape, vigor, and crown density. It also exhibits excellent seedling survival (97%). Bridger-Select performs best in areas of Montana and Wyoming with 12 inches or more of annual precipitation and in USDA Hardiness Zone 3b (-30° to -35°F) or warmer. It is recommended as a medium component in windbreaks and shelterbelts offering low maintenance, year-round protection, and numerous wildlife applications.

Antelope White Prairie Clover—*Dalea candida*

'Antelope' was released in the spring of 2000 in cooperation with the Bismarck PMC and the Agricultural Experiment Stations of Montana, Wyoming, and North Dakota. The original collection was made in Stark County, near Dickinson, North Dakota. This collection has been evaluated in North Dakota, Montana, and Wyoming since its collection in 1947. Although it performed well in comparison with other collections of white prairie clover and purple prairie clover, there was never a significant demand for seed of this species until just recently. Several of the Farm Assistance programs are requiring the seeding of native grasses and forbs. There is one release of purple prairie clover ('Kaneb') and no previous releases of white prairie clover.

Garnet Mountain Brome—*Bromus marginatus*

'Garnet' mountain brome was released in the spring of 2000 by the Meeker, Colorado Environmental Plant Center in cooperation with the Bridger PMC. The ecotype of mountain brome originated in Powell County, Montana, near the ghost town of Garnet. This mountain brome has done well in Montana, Wyoming, and Colorado, outperforming the only other release of this species, 'Bromar'. Garnet is longer lived and has a much higher level of head-smut resistance. Mountain brome is a short-lived, pioneer/colonizing species that is used for critically disturbed sites. It is adapted for use in forest and meadow habitat types throughout the northern Rocky Mountain region.

High Plains Sandberg Bluegrass—*Poa sandbergii*

Numerous collections of Sandberg bluegrass were collected from arid sites in Wyoming, particularly the Bighorn Basin and the Red Desert. 'High Plains', released in 2000, is a composite of three superior ecotypes from Uinta County (Granger, WY), Natrona County (Casper, WY), and Campbell County (Gillette, WY). Sandberg bluegrass is a short-lived, short-stature, native grass that can be included in seeding mixtures for reclamation of disturbed sites and rangeland reseeding.

Dupuyer and Pondera Silverberry—*Elaeagnus commutata*

Silverberry is a native, small to moderate stature, multi-stemmed, deciduous shrub useful in riparian channel stabilization projects. Two Source-Identified silverberries were released in 2000 for this purpose in Montana. Joe Carleton of the former Montana Interagency Wetland Team identified these seed sources. Although these sources have not been field-tested, a critical need for additional species for riparian stabilization warranted their identification and release to the commercial market. Dupuyer Streambank is recommended for overbank and transitional zones, whereas Pondera Floodplain can be used in transitional and upland sites.

Foothills Canada Bluegrass—*Poa compressa*

Canada bluegrass was introduced into Canada (circa 1792) and has naturalized throughout much of the northern United States and southern Canada. This short-growing, rhizomatous grass was released in 2001. It is considered a pioneer species--readily colonizing on disturbed soils--that thrives on moderately acidic, droughty, and low nutrient soils.

Hunter Germplasm Ponderosa Pine—*Pinus ponderosa*

A Selected Class of Rocky Mountain ponderosa pine was released in 2002. Ponderosa pine is a native conifer in Montana and Wyoming that provides a tall, evergreen component to windbreaks and shelterbelts, as well as year-round protection. This new 200-tree selection, named Hunter Germplasm ponderosa pine, consists of eastside seed sources selected for improved rate of height growth and increased seedling survival. Height growth rates at Bridger of ~2 feet per year without supplemental irrigation were measured at 10 years of age—nearly double the rate of growth reported for the species on similar sites. Hunter Germplasm ponderosa pine is currently in production at the Montana Conservation Seedling Nursery at Missoula and is available to commercial nurseries.

Open Range Winterfat—*Krascheninnikovia lanata*

A Tested Class germplasm release of winterfat was released in 2002. This release is a composite of three superior accessions: one from Prairie County, Montana (Terry), one from Carbon County, Montana (Bridger), and one from Carbon County, Wyoming (Rawlins). This is the first commercial release of this shrub species. Open Range is adapted for use throughout the Northern Great Plains region, including north-central United States, and south-central Canada. Winterfat retains its leaves throughout the winter, providing quality year-round browse.

Washoe Germplasm Basin Wildrye—*Leymus cinereus*

Washoe Germplasm basin wildrye was released in 2002. This selection of basin wildrye was collected in Deer Lodge County near the defunct Washoe smelter stack south of Anaconda, Montana. Fallout from past copper smelting emissions has elevated heavy-metal levels and decreased soil pH in the area. At the collection site, arsenic, cadmium, copper, lead, and zinc ranged from moderately to highly phytotoxic. Soil pH ranged from 4.6 to 5.6. Washoe Germplasm had better overall height, vigor, and survival compared to 'Trailhead' and 'Magnar' when tested in low pH and heavy-metal contaminated soil. Basin wildrye has an extensive fibrous root system making it an excellent soil stabilizer. Its tall, robust stature also makes it a good wind barrier.

Old Works Germplasm Fuzzytongue Penstemon—*Penstemon eriantherus*

Old Works Germplasm fuzzytongue penstemon was released in 2002. It is a native blue-flowering perennial forb adapted to loamy and sandy soils. It is commonly found in dry, open terrain from prairies into mountains. This selection was collected near the historic Old Works smelter in Deer Lodge County, Montana. It has excellent potential for restoration of dry, open lands and in xeriscape and rock gardens.

Prospectors Germplasm Common Snowberry—*Symphoricarpos albus*

Prospectors Germplasm common snowberry was released in 2002. It is an important food, nesting, and cover species for many game and songbirds in the western United States. Bighorn sheep, pronghorn antelope, and deer also browse the foliage and twigs. This selection was collected near the Anaconda Smelter Site near the defunct Washoe Smelter. Prospectors Germplasm was selected for its superior adaptation to moderately acidic and heavy-metal laden soils. This species is an excellent soil stabilizer with its densely branched and rhizomatous root system that often forms dense plant colonies.

Great Northern Germplasm Western Yarrow—*Achillea millefolium* var. *occidentalis*

Great Northern Germplasm western yarrow was released in 2004. It is a native, white-flowering, perennial forb adapted to droughty conditions on gravelly loam and thin or sandy soils. Common yarrow is one of the most widely recognized and adaptable wildflowers in North America. This selection will be utilized primarily in seed mixtures to add species' diversity on rangeland, mineland, and roadside revegetation projects.

Spirit Germplasm Sweetgrass—*Hierochloe odorata*

Spirit Germplasm sweetgrass was also released in 2004. It is the Bridger PMC's first release of vegetative plant material. Sweetgrass is a culturally significant, native, cool-season grass that inhabits moist environments of riparian and wetland areas. The leaves have a sweet vanilla fragrance and they are used as a purifying cleanser in Native American religious and spiritual ceremonies. The vegetative propagules may also have utility in the stabilization and restoration of riparian and wetland ecosystems.

Stillwater Germplasm Prairie Coneflower—*Ratibida columnifera*

Stillwater Germplasm prairie coneflower is pending release in 2004. This release is comprised of five superior performing accessions bulked from seed originally collected in Carbon and Stillwater Counties, Montana. It is a native, perennial forb of the Aster Family adapted to dry, open spaces with loam, sandy loam, or clayey loam soils. This drought-tolerant native wildflower selection will be utilized primarily in seed mixtures to add species' diversity on a multitude of revegetation projects and for enhancing wildlife habitat. It will also function well in residential and larger-scale landscape applications.

Trapper Germplasm Western Snowberry—*Symphoricarpos occidentalis*

Western snowberry is a native shrub broadly adapted to eastern Montana and Wyoming. Trapper Germplasm western snowberry is a Selected Class, prevarietal release based primarily on seedling survival and plant condition (vigor rating) for use in conservation plantings such as living snow fences, wildlife habitat plantings, and land reclamation projects. Released in 2004, this selection is a bulk of 14 parent plants from Montana (8 plants) and Wyoming (6) consisting of five individual seed sources. Two clonal seed production orchards have already been established at Bridger and the Montana Conservation Seedling Nursery at Missoula, Montana.

Copperhead Germplasm Slender Wheatgrass—*Elymus trachycaulus*

Copperhead Germplasm was released in 2006. Slender wheatgrass is a short-lived perennial bunchgrass that often acts as a pioneer species on disturbed sites. This species is a native wildland collection from an area east of the former copper smelter in Anaconda, Montana. Copperhead Germplasm has exhibited superior emergence, survival, and biomass production on amended acid/heavy-metal impacted soils under the ambient climatic conditions of the Upper Clark Fork River Basin in Deer Lodge County, Montana. The collection site was severely impacted by smelter fallout, surface wind, and water transported contaminants, as well as historic overflow from the canal transporting waste material to the Opportunity Sediment ponds. The original collection site, with a soil surface pH of 4.3, has an average annual precipitation of 13.93 inches and an elevation of 5,000 feet. Copperhead Germplasm, as with any slender wheatgrass, is best used in native reclamation mixtures for its quick establishment and site stabilization.

Opportunity Germplasm Nevada Bluegrass—*Poa secunda*

Opportunity Germplasm was released in 2007, and its origin is also from wildland collections near Anaconda, Montana. This selection was compared to two other *Poa secunda* seed sources collected from acid/heavy-metal impacted mining sites in Montana and with two *Poa secunda* cultivars from nearby states. All five collections were field tested for 4 years at one upland site near Anaconda that was deep plowed and amended with lime. Opportunity Germplasm Nevada bluegrass exhibits superior seedling emergence, percentage stand cover, vigor rating, mean plant height, biomass production, and seedling and stand survival.

To file a complaint of discrimination, write USDA , Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, DC 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal employment opportunity provider and employer.

FIELDS LAYOUT 2010
Bridger PMC

(Plantings listed for each field in order, beginning on the north.)

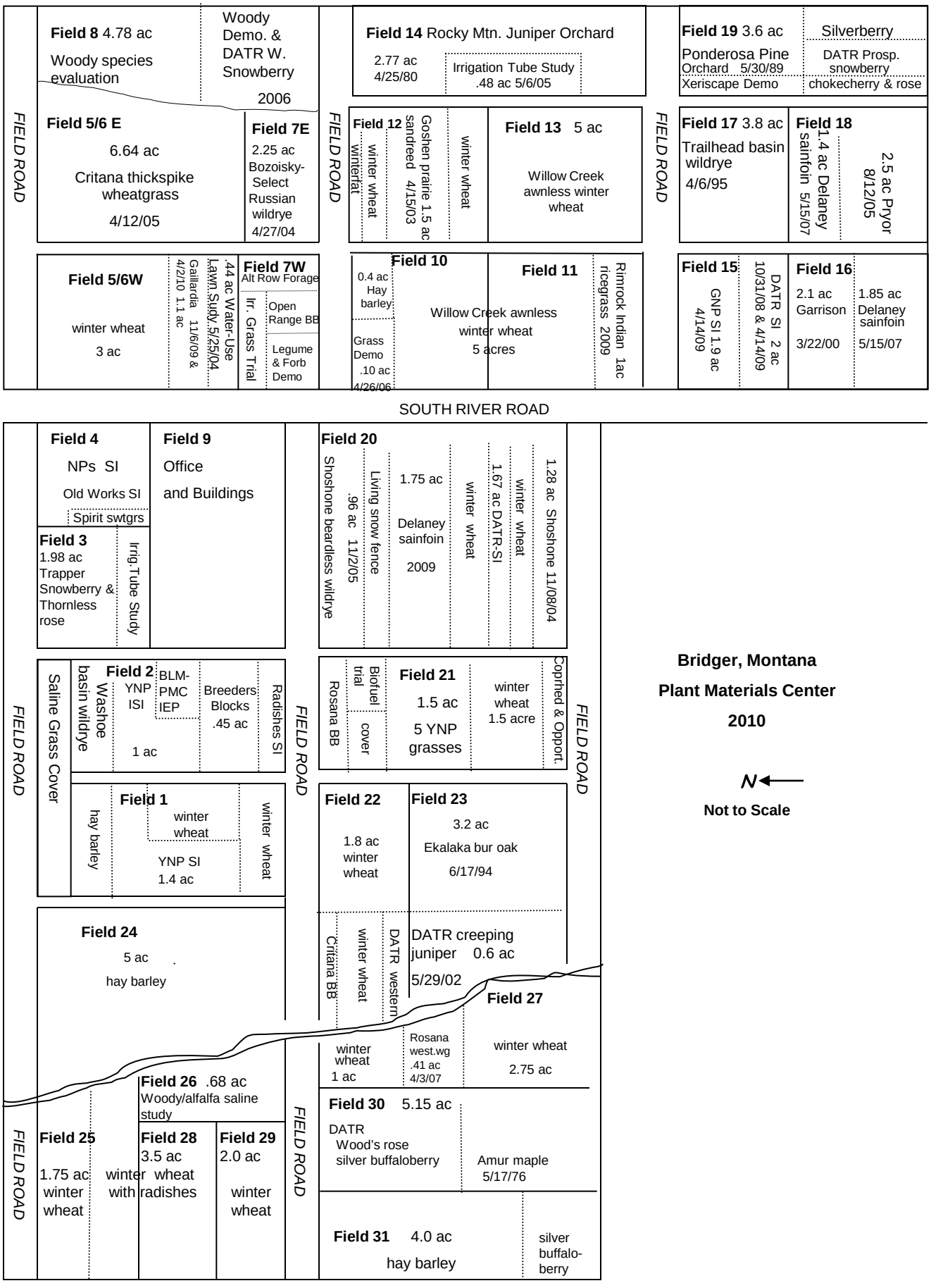
Accession	Common Name	Origin or Source	Acres	Date
FIELD 1				
Saline Cover	tall wheatgrass	commercial	0.25	4/23/00
Hayes	hay barley	commercial	1.00	3/29/10
National Park Service				
9063432	bluebunch wheatgrass	Yellowstone National Park	0.36	3/28/07
9076211	slender wheatgrass	Yellowstone National Park	0.29	4/13/07
9076165	mountain brome	Yellowstone National Park	0.32	4/17/07
9054405	bottlebrush squirreltail	Yellowstone National Park	0.21	3/26/08
9081502	needle and thread	Yellowstone National Park	0.25	3/25/08
Willow Creek	awnless winter wheat	commercial	2.00	9/17/09
FIELD 2				
Saline Cover	tall wheatgrass	commercial	0.25	4/23/00
Development of Acid-Tolerant Releases				
Washoe	basin wildrye	Deer Lodge County, MT	0.25	4/14/09
National Park Service Seed Increase				
9087860	bluebunch wheatgrass	Yellowstone National Park	0.51	4/13/09
9081729	slender wheatgrass	Yellowstone National Park	0.13	4/13/09
Comparative Evaluation Planting				
44 acc.	scarlet globemallow	Montana and Wyoming	0.14	11/18/09
Initial Evaluation Planting				
84 acc.	Field Offices/BLM Collections (MT & WY)		0.41	11/17/08 & 4/22/09
Breeder Blocks				
Rosana	western wheatgrass	Rosebud County, MT	0.15	4/30/97
Garrison	creeping foxtail	Bismarck, ND PMC	0.15	4/30/97
Crop rotation radish		commercial	1.50	5/20/10
FIELD 3				
Trapper	western snowberry	composite (5 acc.)	0.25	1997, 2000
Initial Evaluation Planting				
9063260	Wood's Rose Thorniness Evaluation		0.01	8/20/02
National Park Service				
9087348	blue wildrye	Glacier National Park	0.12	4/27/08
4 acc.	Irrigation Tube Study (fallow)	commercial	0.48	5/05/05
Propagation Stock Rocky Mountain Juniper				1996
FIELD 4—north end, west to east				
National Park Service				
9081447	blue aster	Glacier National Park	0.03	1998
9081993	bluebunch wheatgrass	Glacier National Park	0.02	6/21/05
Cultural Trials				
U of WY Prairie Coneflower Row-spacing Study			0.03	2002
Warren USAF Base Seed Increase				
14 species	native grasses & forbs		0.02	2003
National Park Service Seed Increase				
9081443	slenderbeak sedge	Glacier National Park	0.02	1998
9076127	bluebunch wheatgrass	Glacier National Park	0.17	6/21/05
FIELD 4—south end, west to east				
Spirit	sweetgrass	Toole County, MT	0.06	7/18/01 & 3/23/06
Development of Acid-Tolerant Releases				
9087653	Baltic rush	Deer Lodge County, MT	0.03	6/05/06
9076274	woolly cinquefoil	Deer Lodge County, MT	0.09	6/05/06
Old Works	fuzzytongue penstemon	Deer Lodge County, MT	0.10	10/31/08
9081632	silverleaf phacelia	Deer Lodge County, MT	0.12	10/31/08

Accession	Common Name	Origin or Source	Acres	Date
FIELD 4—south end, west to east (Continued)				
National Park Service Seed Increase				
9076144	largeleaf avens	Glacier National Park	0.06	6/09/06
9078645	chamisso sedge	Glacier National Park	0.02	1998
9087433	showy aster	Glacier National Park	0.014	6/21/05
FIELD 5/6 East				
Critana	thickspike wheatgrass	Hill County, MT	6.64	4/12/05
FIELD 5/6 West				
Willow Creek	awnless winter wheat	Montana State University	4.04	9/23/09
9081828	gaillardia	14 counties	{1.10}	11/6/09
9081828	gaillardia	bulk composite	{total}	4/26/10
FIELD 7 East				
Bozoisky-Sel.	Russian wildrye	Kazakhstan/ARS Logan, UT	2.25	4/27/04
FIELD 7 West				
25 acc.	Water Use Efficiency Study (MSU)		0.44	5/26/04
Breeder Block				
Open Range	winterfat	composite	0.05	4/21/89
Cultural & Establishment Trial				
33 entries	Legume & Forb Demonstration		0.06	5/03/06
Alternate Row Alfalfa/Grass Forage Trial				
12 acc.	grasses/Shaw alfalfa	Bridger PMC	0.15	5/07/10
Irrigated Grass Forage Trial				
17 acc.	cool-season grasses	Bridger PMC	0.15	3/18/10
FIELD 8				
Woody Species			4.78	
23 species	Woody Demonstration		0.50	2006
Development of Acid-Tolerant Releases				
9081639	western snowberry	Deer Lodge County, MT	0.17	5&6/07
FIELD 9				
Plant Materials Demonstration Rows		greenhouse transplants	0.14	6/16/93
Orchard Understory Trial (East to West)			0.40	5/17/84
Parkway	crested wheatgrass			
Covar	sheep fescue			
Paiute	orchardgrass			
Ephraim	crested wheatgrass			
Durar	hard fescue			
FIELD 10				
Willow Creek	awnless winter wheat	Montana State Univeristy	0.40	9/18/09
Cultural & Establishment Trial				
45 entries	Warm- & Cool-season Grass Demonstration		0.10	4/26/06
Willow Creek	awnless winter wheat	Montana State University	2.50	9/18/09
FIELD 11				
Willow Creek	awnless winter wheat	Montana State University	2.50	9/18/09
Rimrock	Indian ricegrass	Bridger PMC	1.00	11/17/09
FIELD 12				
Open Range	winterfat	composite	0.10	4/15/03
Willow Creek	awnless winter wheat	Montana State University	1.00	9/18/09
Goshen	prairie sandreed	Goshen County, WY	1.50	4/16/03
Willow Creek	awnless winter wheat	Montana State University		
FIELD 13				
Willow Creek	awnless winter wheat	commercial	6.50	9/18/09
FIELD 14				
Rocky Mountain Juniper Seed Orchard				
Bridger-Select	Great Plains states		2.77	4/25/80
Critana thickspike wheatgrass orchard cover				
4 acc.	Irrigation Tube Study (vegetative cover)		0.48	5/06/05

Accession	Common Name	Origin or Source	Acres	Date
FIELD 15				
National Park Service Seed Increase				
9087348	blue wildrye (2007)	Glacier National Park	0.75	4/14/09
9087348	blue wildrye (2008)	Glacier National Park	0.52	4/14/09
9058298	Idaho fescue	Glacier National Park	0.63	4/14/09
Development Acid-Tolerant Releases				
Old Works	fuzzytongue penstemon	Deer Lodge County, MT	0.22	10/31/08
9081632	silverleaf phacelia	Deer Lodge County, MT	0.22	10/31/08
Opportunity	Nevada bluegrass	Deer Lodge County, MT	0.78	4/13/09
Copperhead	slender wheatgrass	Deer Lodge County, MT	0.78	4/13/09
FIELD 16				
Garrison	creeping foxtail	Bismarck PMC, ND	2.10	3/22/00
Delaney	sainfoin	Wyoming	1.85`	5/15/07
FIELD 17				
Trailhead	basin wildrye	Musselshell County, MT	3.80	4/06/95
FIELD 18				
Delaney	sainfoin	Wyoming	1.40	5/15/07
Pryor	slender wheatgrass	Carbon County, MT	2.50	8/12/05
FIELD 19				
Ponderosa pine seed orchard				
Hunter Germplasm		Great Plains states	1.71	5/30/89
Covar sheep fescue orchard cover				
14 plots	Xeriscape demonstration		0.18	4/10/98 & 5/05/05
PMC source	silverberry	Wheatland County, MT	29 ea.	11/04/99
Development Acid-Tolerant Releases				
9081638	Wood's rose	Deer Lodge County, MT	0.50	6/05/07
Prospectors	common snowberry	Deer Lodge County, MT	0.44	5/22/00
9081326	chokecherry	Deer Lodge County, MT	0.50	5/29/07
FIELD 20				
Shoshone	manystem wildrye	Fremont County, WY	0.96	11/02/05
Living Snow Fence				5/77
Bighorn (E)	skunkbush sumac	Los Lunas, NM PMC		
Jemez (W)	New Mexico forestiera	Los Lunas, NM PMC		
Delaney	sainfoin	Montana State University	1.40	5/23/09
Willow Creek	awnless winter wheat	Montana State University		9/17/09
Development of Acid-Tolerant Releases				
9081636	bluebunch wheatgrass	Deer Lodge County, MT	0.30	4/07/05
Copperhead	slender wheatgrass	Deer Lodge County, MT	0.35	4/07/05
Opportunity	Nevada bluegrass	Deer Lodge County, MT	0.24	4/07/05
Willow Creek	awnless winter wheat	Montana State University	1.50	9/17/09
Shoshone	manystem wildrye	Fremont County, WY	1.28	11/08/04
FIELD 21				
Breeders Block				
Rosana	western wheatgrass	Rosebud County, MT	0.08	5/08/06
4 acc.	Tall Wheatgrass Study	biofuel research	0.10	3/13/08
National Park Service Seed Increase				
9087860	bluebunch wheatgrass	Yellowstone National Park	0.45	8/21/09
9081502	needle and thread	Yellowstone National Park	0.39	8/21/09
9078470	nodding brome	Yellowstone National Park	0.13	8/21/09
9076223	tufted hairgrass	Yellowstone National Park	0.13	8/21/09
9081342	rough bentgrass	Yellowstone National Park	0.19	8/21/09
Willow Creek	awnless winter wheat	Montana State University	1.50	9/18/09
Development Acid-Tolerant Releases				
Opportunity	bluegrass	Deer Lodge County, MT	0.50	6/04/07
FIELD 22				
Willow Creek	awnless winter wheat	Montana State University	1.8	9/18/09

Accession	Common Name	Origin or Source	Acres	Date
FIELD 22 (Continued)				
Breeders Block				
Critana	thickspike wheatgrass	Hill County, MT	0.10	5/08/06
Willow Creek	awnless winter wheat	Montana State University	2.00	9/18/09
Development Acid-Tolerant Releases				
9081968	western wheatgrass	Deer Lodge County, MT	0.10	6/01/05
FIELD 23				
Ekalaka	bur oak	Great Plains States	3.20	6/17/94
Development Acid-Tolerant Releases				
9081623	creeping juniper	Deer Lodge County, MT	0.60	5/29/02 & 5/20/03
FIELD 24				
Hayes	hay barley	commercial	5.00	3/16/10
FIELD 25				
Willow Creek	winter wheat w/radishes	MSU & commercial	1.75	9/23/09
FIELD 26				
Saline Seep Woody Evaluation Area				
18 entries	Woody Salinity Tolerance Study		0.68	5/01/06
3 entries	Alfalfa Salinity Study		0.01	6/2008
FIELD 27				
Willow Creek	awnless winter wheat	Montana State University	1.00	9/18/09
Rosana	western wheatgrass	Rosebud County, MT	0.41	4/13/07
Willow Creek	awnless winter wheat	Montana State University	2.75	9/18/09
FIELD 28				
Willow Creek	winter wheat w/radishes	MSU & commercial	3.50	9/23/09
FIELD 29				
Willow Creek	awnless winter wheat	Montana State University	2.00	9/23/09
FIELD 30				
Development Acid-Tolerant Releases				
9081638	Wood's rose	Deer Lodge County, MT	0.40	7/22/99
9081334	silver buffaloberry	Deer Lodge County, MT	0.60	5/22/00
Woody Initial Seed Increase			0.40	
1 acc.	Amur maple			5/17/76
FIELD 31				
Hayes	hay barley	commercial	3.00	3/16/10
Development Acid-Tolerant Releases				
9081334	silver buffaloberry	Deer Lodge County, MT	0.60	3/29/10

USDA-NRCS
June 2010


FIELD ROAD
Field 8 4.78 ac
Woody species evaluation
Woody Demo. & DATR W. Snowberry
2006
Field 5/6 E
6.64 ac
Critana thickspike wheatgrass
4/12/05
Field 7E
2.25 ac
Bozoisky-Select Russian wildrye
4/27/04
Field 14 Rocky Mtn. Juniper Orchard
2.77 ac
4/25/80
Irrigation Tube Study
.48 ac 5/6/05
Field 19 3.6 ac
Ponderosa Pine Orchard 5/30/89
Xeriscape Demo
Silverberry
DATR Prosp. snowberry
chokecherry & rose
Field 12
winter wheat winterfat
Goshen prairie 1.5 ac sandreed 4/15/03
winter wheat
Field 13 5 ac
Willow Creek awnless winter wheat
Field 17 3.8 ac
Trailhead basin wildrye
4/6/95
Field 18
1.4 ac Delaney sainfoin 5/15/07
2.5 ac Pryor 8/12/05
Field 5/6W
winter wheat
3 ac
.44 ac Water-Use Lawn Study 5/25/04
Gaillardia 11/6/09 & 4/2/10 1.1 ac
Field 7W
Alt Row Forage
Irr. Grass Trial
Open Range BB
Legume & Forb Demo
Field 10
0.4 ac Hay barley
Grass Demo .10 ac 4/26/06
Field 11
Willow Creek awnless winter wheat
5 acres
Rimrock Indian 1ac ricegrass 2009
Field 15
GNP SI 1.9 ac 4/14/09
DATR SI 2 ac 10/31/08 & 4/14/09
Field 16
2.1 ac Garrison 3/22/00
1.85 ac Delaney sainfoin 5/15/07
SOUTH RIVER ROAD
Field 4
NPs SI
Old Works SI
Spirit swtgrs
Field 9
Office and Buildings
Field 3
1.98 ac
Trapper Snowberry & Thornless rose
Irrig.Tube Study
Field 20
Shoshone beardless wildrye
.96 ac 11/2/05 Living snow fence
1.75 ac Delaney sainfoin 2009
winter wheat
1.67 ac DATR-SI
winter wheat
1.28 ac Shoshone 11/08/04
Saline Grass Cover
Field 2
Washoe basin wildrye
YNP ISI
BLM-PMC IEP
1 ac
Breeders Blocks .45 ac
Radishes SI
Rosana BB
Biofuel trial
cover
Field 21
1.5 ac
5 YNP grasses
winter wheat 1.5 acre
Copr'ed & Opport.
Field 1
hay barley
winter wheat
YNP SI 1.4 ac
winter wheat
Field 22
1.8 ac winter wheat
Field 23
3.2 ac
Ekalaka bur oak
6/17/94
Field 24
5 ac
hay barley
Critana BB
winter wheat
DATR western
DATR creeping juniper 0.6 ac
5/29/02
Field 27
winter wheat
2.75 ac
winter wheat
1 ac
Rosana west.wg .41 ac 4/3/07
Field 26 .68 ac
Woody/alfalfa saline study
Field 30 5.15 ac
DATR
Wood's rose
silver buffaloberry
Amur maple
5/17/76
Field 25
1.75 ac winter wheat
winter with radishes
Field 28
3.5 ac
Field 29
2.0 ac
winter wheat
Field 31 4.0 ac
hay barley
silver buffalo-berry
Bridger, Montana
Plant Materials Center
2010
N
Not to Scale