

Bridger PMC Field Guide 2012



USDA-NRCS 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 (now NRCS) 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.

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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 may be 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.

This field brochure provides basic information on BPMC activities, projects, production, and program direction for the user. A table and map at the back of the guide accompanies the narrative so the reader can locate specific studies and production fields. The BPMC Long-

Range Plan is a priority list of plant materials conservation issues in Montana and Wyoming. For additional or more specific information, reference the current Bridger Plant Materials Center Annual Technical Report, visit the Montana NRCS or Plant Materials websites, or call the BPMC staff.

Bridger Plant Materials Center 2012-2017 Long-Range Plan

Needs	Actions	Status		MT & WY
		New	Ongoing	Priority
Cropland				
-Saline/Sodic species	Assemble and evaluate salt tolerant herbaceous plants		X	H
	Increase seed of selected species		X	
	Evaluate mixture compatibility		X	
	Assemble and evaluate salt tolerances of woody species	X		
	Develop methods of establishment		X	
-Windbreaks	Select adapted trees & shrubs to increase species diversity		X	
	Develop and test techniques to improve plant survival		X	H
	Assemble and evaluate low elevation Douglas fir	X		
-Soil Health	Investigate/demonstrate cover crops/crop rotation at PMC	X		H
Pasture & Hayland				
-Saline/Sodic species	Screen additional species for saline/sodic tolerance		X	H
	Develop and test minimum till techniques of establishment		X	
-Invasive species competition	Partner to evaluate forages for biological weed control	X		
	Test techniques of establishment	X		
-Season-long forage & quality	Evaluate warm season species and mixtures		X	
	Evaluate forb & grass establishment & mixture compatibility		X	
	Evaluate shrub species that retain high winter protein	X		
-Stand establishment	Test reduced-till/alternate row/ cross-seeding establishment techniques	X		H
Rangeland				
-Restore native habitats	Assemble and evaluate native grasses, forbs & shrubs with emphasize forbs		X	H
	Assemble and evaluate salinity tolerances of native plants		X	
-Stand establishment	Test reduced-till/alternate row/ cross-seeding establishment techniques	X		H
-Invasive species competition	Partner to evaluate native plants for biological weed control	X		
	Test techniques of establishment	X		
-Culturally significant species	Cooperate with tribes on identification & propagation		X	
	Evaluate propagation and establishment techniques		X	
-Threatened & endangered	Evaluate PM for sage grouse habitat		X	
Disturbed Lands				
-Increase cover & diversity	Evaluate native grass, forb, shrub & tree species		X	H
	Evaluate species and techniques for revegetation after natural resource extraction/energy development		X	H
	Develop establishment and management techniques		X	H
Woodlands				
-Control erosion and noxious weeds	Identify and test adapted species to control erosion and out-compete weed infestations		X	
	Develop and test techniques for successful establishment		X	
Riparian/Wetlands				
-Species for stabilization				H
	Identify/test species/techniques for riparian stabilization		X	
	Identify/test species/techniques for shoreline stabilization	X		
-Water pollution abatement: air quality/waste management	Partner to identify & select species to utilize, fix, and filter contaminants	X		
	Identify & select saline/sodic tolerant shrubs & trees	X		H
-Regeneration of cottonwoods	Evaluate methods of cottonwood regeneration		X	H
-Invasive species competition	Partner to evaluate Russian olive control and revegetation techniques and invasive species biological controls	X		H
	Evaluate techniques of establishment	X		
Wildlife				
-Food, cover & water	Test/evaluate techniques for pollinator enhancement		X	H
	Species, habitat, establishment & management techniques		X	H
Other Lands				
-Backyard conservation	Assemble & select low maintenance grass, forbs & shrubs		X	
	Promote and demonstrate		X	
-Energy conservation	Investigate bio-fuel/biomass energy alternatives, energy conservation practices in agriculture	X		H
	Continue Xeriscape demonstration plots		X	
	Develop rain water conservation gardens	X		
Technology Transfer				
	Provide PM and topic-specific training to FOs and CDs		X	H
	Emphasize technology delivery related to current issues		X	H

Active and Anticipated Studies

Initial Evaluation Planting (IEP) of Native Forbs to Revegetate Disturbances (see Field 2 on map)

In November 2008, seed collections received from 2005-2008 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 19 accessions were received and planted in 2009-2011.

Xeriscape Demonstration (see Field 19 on map)

There is presently a great interest in utilizing low maintenance/low water requirement grasses, both native and introduced, for landscaping. Plots were established in 1998 of nine grasses under dryland conditions (Introduced—'Ephraim' crested wheatgrass *Agropyron cristatum*, 'Bozoisky-Select' Russian wildrye *Psathyrostachys juncea*, 'Covar' sheep fescue *Festuca ovina*, and Foothills Canada bluegrass *Poa compressa*; Native—'Critana' thickspike wheatgrass *Elymus lanceolatus* ssp. *lanceolatus*, 'Sodar' streambank wheatgrass *Elymus lanceolatus* ssp. *lanceolatus*, 'Rosana' western wheatgrass *Pascopyrum smithii*, Bismarck buffalograss *Buchloe dactyloides*, and Bad River blue grama *Bouteloua gracilis*. In the spring of 2001, 'Roadcrest' crested wheatgrass *Agropyron cristatum* was added to the demonstration plots. Half of each plot is periodically mowed, while the other half is allowed to reach full growth.

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 were (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.

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, 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 2011, Meriwether Germplasm blanketflower *Gaillardia aristata* was released. In addition, several top-performing accessions in the DATR Project are also candidates for release and presently are being field-increased at the Center.

Culturally Significant Plants (see Field 4 on map)

Sweetgrass tends to reproduce vegetatively, and traditional, large-scale seed production techniques are rarely successful. In July 2001, transplants of 9063351 sweetgrass *Hierochloa 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 indicated the Montana entry as the top performer and the Michigan entry rated second. In 2004, Spirit Germplasm sweetgrass was released as a Selected Class of vegetative material.

In March 2011, dormant cuttings were taken from plains cottonwood trees *Populus deltoides* originally planted by Chief Plenty Coup on the Crow Indian Reservation. The clonal cuttings

were established in the PMC's greenhouse mist bench, transplanted to larger containers, and held over until out-planting at Chief Plenty Coups State Park in June 2012. The majority of the cottonwoods were planted on a 180-acre island in the Big Horn River following removal of Russian olive.

In May 2012, sprigs of Spirit sweetgrass were distributed to the Little Big Horn College at Crow Agency, Montana, for cultural use by members of the Crow Tribe-Apsaalooke Nation. Sweetgrass is traditionally burned as purifying incense in spiritual and religious ceremonies.

Tree and Shrub Sub-Irrigation Tube Study (see Fields 3 and 14 on map)

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. Five-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 (see Field 26 on map)

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 (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, Siberian elm, caragana, and skunkbush sumac.

Performance of New Conservation Grasses, Legumes, and Forbs in Montana & Wyoming (see Fields 5 & 10 on map)

The two plots established in the spring of 2006 at the PMC were rejuvenated in May 2012. Many of the original entries were maintained, while those identified as poor performers were replaced. 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 (see Field 26 on map)

Four released varieties of alfalfa were planted in 2011 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 down-slope. Three of the alfalfas were privately released as having salt tolerance and a public Montana State University release, Shaw, was 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 AC 'Saltlander' green wheatgrass, were added to the site in 2011.

Cool- and Warm-Season Cover Crop Trial (see Field 22 on map)

A replicated cool- and warm-season cover crop study is being established on a common sandy loam, row-irrigated site at the BPMC. The main treatment of the study will be 30 cover crop species and 12 mixes. Cover crop species include radishes, turnips, clovers, peas, vetches, beans, canola, flax, lentils, corn, safflower, sunflower, millets, and cereal grains. The replicated trial will be used to evaluate the adaptability, forage yield and

quality, stand establishment, and soil moisture utilization of different cover crop species and mixes. Also each agronomic operation, i.e., site preparation, planting, irrigation, herbicide use, forage harvest, etc., will be recorded for economic analysis. This project is a spinoff of a Montana NRCS state cooperative cover crop agreement established at Montana State University's Northern Agricultural Research Center near Havre and Eastern Agricultural Research Center near Sydney. These two locations are dryland locations while the BPMC will give additional information under irrigated conditions.

Scarlet Globemallow Comparative Evaluation Planting (CEP) (see Field 2 on map)

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 assess adaptation and performance of nearly 400 entries of native grasses, legumes, and forbs, including 36 individual sources of scarlet globemallow that 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 important 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.

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 such as biomass production at three growth stages, and measuring light intensity with a ceptometer in Foundation fields of Antelope white prairie clover, Meriwether blanketflower, and Stillwater upright prairie coneflower. Plots are evaluated throughout the growing season and new entries may be added in the future.

ARS Forage Kochia Study (see Field 8 on map)

The BPMC is partnering with the ARS station at Logan, Utah, to test multiple lines of tall stature forage kochia *Bassia prostrata* for use in range reseeding plantings. The tall lines are compared to 'Immigrant' forage kochia for a number of plant growth factors. The goal is to provide late season forage for cattle that can be accessed even when a snow cover is present.

Bur Oak Depth of Rooting Study (behind greenhouse on map)

Growing plants in tall, narrow containers has been used in the past to successfully establish plants in desert and other droughty environments. The BPMC is testing this technology for use with bur oak, a strongly tap-rooted species with slow initial height growth. The theory is that by culturing bur oak in deep pots, we can overcome the slow initial growth stage and improve out-planting survival. Seedlings are currently growing in 10-, 24-, and 36-inch deep pots and will be planted in the field in early 2012.

Off-Center Trials

Although the following projects cannot be seen on the Center, they represent an important part of our program and are worth noting.

Shell Exploration — Pinedale, WY

The purpose of this planting was 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 included 72 different entries of 32 grasses, 24 forbs, and 16 shrubs installed as replicated plots on a ½-acre area with a precision cone-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. Evaluations concluded in 2010 and the site will be periodically monitored for wildlife and livestock impacts on plant establishment.

Hay and Pasture Grass Performance Trials near Havre and Moccasin, MT

In 2009, four forage studies were established at MSU's Northern Agricultural Experiment Center (NARC) and Central Agricultural Research Center (CARC). The irrigated trial at NARC includes 17 grass accessions and two grass/legume mixes. Both sites had a 32 accession dryland grass trial established that year. The other trial at CARC was an alternate-row grass/alfalfa trial composed of 13 grasses in combination with Shaw alfalfa.

Hay and Pasture Grass Performance Trial near Sheridan, WY

In the late fall of 2011, a 21 accession dryland grass trial was dormant planted east of Sheridan at the University of Wyoming's Sheridan Research and Extension Center. In addition, an alternate-row grass/alfalfa trial composed of 13 grasses in combination with Shaw alfalfa was established.

ARS Fort Keogh Russian Olive Revegetation Study – Miles City, MT

The Bridger PMC is partnering with the Agricultural Research Service (ARS), the Miles City Area Office, and the Custer County Conservation District to develop revegetation techniques after Russian olive *Elaeagnus angustifolia* has been removed. The goal of the study is to examine weed and plant invasion after Russian olive removal, to determine the effects of seeded and planted species on secondary invasion, and to identify the best establishment techniques for the establishment of desirable communities. Four test plots consisting of nearly 5 acres were cleared of Russian olive, sprayed, and then revegetated with desirable species. Additionally, plains cottonwood *Populus deltoides* ssp. *monolifera* seedlings grown in three different sizes of containers (10-, 24- and 36-inch deep) were installed in a separate study at Fort Keogh to determine if rooting depth influences survival and growth of this important riparian species. After only one growing season, seedling survival in the 24- and 36-inch deep pots was nearly 100%, whereas seedling survival in conventional 10-inch pots was only 67%.

Releases

The BPMC 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 BPMC was established more than 50 years ago, there have been 31 releases of 17 grasses, 8 trees/shrubs, and 6 forbs. The 28 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. The most recent Selected Class release is Meriwether Germplasm blanketflower *Gaillardia aristata*. Meriwether Germplasm is a composite of 15 accessions from counties in Montana and Wyoming. It was selected primarily for conservation use in native seed mixtures to revegetate a variety of disturbances, low maintenance and naturalized landscapes, and as a food and cover source for pollinators, livestock, and wildlife. The anticipated area of adaptation is the mountains and foothills of the Northern Rockies and east to North Dakota.

Bridger Plant Materials Center Releases

creeping foxtail	Garrison	Cultivar	1959
thickspike wheatgrass	Critana	Cultivar	1971
cicer milkvetch	Lutana	Cultivar	1971
western wheatgrass	Rosana	Cultivar	1972
prairie sandreed	Goshen	Cultivar	1976
four-wing saltbush	Wytana	Cultivar	1976
manystem wildrye	Shoshone	Cultivar	1980
Russian wildrye	Bozoisky-Select	Cultivar	1984
slender wheatgrass	Pryor	Cultivar	1988
basin wildrye	Trailhead	Cultivar	1991
Indian ricegrass	Rimrock	Cultivar	1996
Rocky Mtn juniper	Bridger-Select	Selected	1998
slender white prairieclover	Antelope	Tested	2000
Sandberg bluegrass	High Plains	Selected	2000
silverberry	Dupuyer	Source Identified	2000
silverberry	Pondera	Source Identified	2000
Canada bluegrass	Foothills	Selected	2001
winterfat	Open Range	Tested	2002
ponderosa pine	Hunter	Selected	2002
basin wildrye	Washoe	Selected	2002
fuzzytongue penstemon	Old Works	Source Identified	2002
common snowberry	Prospector	Selected	2002
western yarrow	Great Northern	Selected	2004
prairie coneflower	Stillwater	Selected	2004
western snowberry	Trapper	Selected	2004
sweetgrass	Spirit	Selected	2004
slender wheatgrass	Copperhead	Selected	2006
Nevada bluegrass	Opportunity	Selected	2007
bur oak	Ekalaka	Selected	2008
silver buffaloberry	Mill Creek	Selected	2010
blanketflower	Meriwether	Selected	2011

Cooperative 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 Yellowstone, Glacier, Devils Tower, Craters of the Moon, and Grand Teton 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 5.5 acres of seed production for the two national parks. For Glacier there are 4 species of grasses and 2 forb species in production. Yellowstone has nearly 3 acres of 7 grass species (9 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 propagation facilities under highly controlled conditions.

Yellowstone National Park (see various "YNP" fields on map)

Numerous projects funded through the Federal Highway Administration are currently underway at the BPMC for YNP including seed increase fields of mountain brome *Bromus marginatus*, bluebunch wheatgrass *Pseudoroegneria spicata* ssp. *spicata*, needle and thread *Hesperostipa comata*, Idaho fescue *Festuca idahoensis*, blue wildrye *Elymus glaucus*, basin wildrye *Leymus cinereus*, 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 has participated in seed collection activities and increase seed of native collections, and will establish research plots. Presently, the BPMC is increasing seed of bluebunch wheatgrass *Pseudoroegneria spicata* ssp. *spicata*, and needle and thread *Hesperostipa comata*. In the fall of 2011, an off-center trial was planted on two sites to evaluate the effect of seed treatments on establishment of eight indigenous grasses.

Glacier National Park (see various "GNP" fields on map)

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 such as alpine bluegrass *Poa alpina*, alpine timothy, *Phleum alpinum*, and blue aster *Symphotrichum laeve*.
- seed increase fields of blue wildrye *Elymus glaucus*, and slender wheatgrass *Elymus trachycaulus*.

Craters of the Moon

A cooperative agreement was established between the BPMC and Craters in 2009. Wildland seed processing, plant propagation, and establishment techniques will be developed for several species of grasses, forbs, and shrubs. The BPMC propagated containerized stock of mountain big sagebrush *Artemisia tridentata* sub. *vaseyana*, rubber rabbitbrush *Ericameria nauseosa*, antelope bitterbrush *Purshia tridentata*, and limber pine *Pinus flexilis* for Craters, and delivered nearly 1,400 plants to the park this May.

Grand Teton (see Fields 11, 12, 13, and 20 on map)

A new cooperative agreement was established between the BPMC and Grand Teton National Park in 2010. Seed production began mid-summer 2011 with new production fields of mountain brome *Bromus marginatus*, Idaho fescue *Festuca idahoensis*, Sandberg bluegrass *Poa secunda*, and bluebunch wheatgrass *Pseudoroegneria spicata* ssp. *spicata* planted at the BPMC. An additional field of the first *Poa secunda* was planted in the fall 2011, and a second seed source of *Poa secunda* planted in spring 2012.

DEVELOPMENT OF ACID/HEAVY-METAL TOLERANT RELEASES (DATR) PROJECT (see "DATR" fields on map)

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.

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 "non-local" nursery stock of the same species from other areas of Montana, Colorado, Utah, and Wyoming. Results support 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 golden currant were the hardiest species tested. The superior performance of the local ecotype of silver buffaloberry resulted in the release of Mill Creek Germplasm in 2010.

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 materials originating from contaminated minelands to cultivars presently on the market. Superior performing experimental plant materials will subsequently be developed for the commercial market.

Data collected from these studies has resulted in five 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 slender wheatgrass and Opportunity Germplasm Nevada bluegrass. Potential future releases include ecotypes of Wood's rose *Rosa woodsii*, Baltic rush *Juncus balticus*, wooly cinquefoil *Potentilla hippiana*, bluebunch wheatgrass *Pseudoroegneria spicata*, chokecherry *Prunus virginiana*, and horizontal juniper *Juniperus horizontalis*.

The Bridger PMC will continue to establish, maintain, and increase superior accessions, while focusing attention on establishment issues in the Upper Clark Fork River Basin (UCFRB). The next 4 years of the DATR effort will focus on publication, developing establishment techniques, integrating new plant selections into standards and specifications, and coordination of production efforts among restoration professionals, the BPMC, and commercial growers.

WYOMING BUREAU OF LAND MANAGEMENT (BLM) (see Field 2 on map)

In 2008, a 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 continues to make seed collections from a variety of sites of target species that were dormant- and/or spring-seeded at the BPMC as part of a larger Initial Evaluation Planting. Plant growth and phenological development will be evaluated over a 4-year period. Species of interest include 23 collections of prairie thermopsis *Thermopsis rhombifolia*, pale agoseris *Agoseris glauca*, two-grooved milkvetch *Astragalus bisulcatus*, Geyer's milkvetch *Astragalus geyeri*, narrowleaf milkvetch *Astragalus pectinatus*, sulphur-flower buckwheat *Eriogonum umbellatum*, low beardstongue *Penstemon humilis*, larchleaf penstemon *Penstemon laricifolius*, waxleaf penstemon *Penstemon nitidus*, textile onion *Allium textile*, hoary aster *Machaeranthera canescens*, basindaisy *Platyschkuhrnia integrifolius*, and leafy wildplarsley *Musineon divaricatum*.

**FIELDS LAYOUT 2012
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
Roundup-ready®	alfalfa	commercial	3.70	4/26/12
FIELD 2				
Saline Cover	tall wheatgrass	commercial	0.25	4/23/00
<u>Development of Acid-Tolerant Releases</u>				
Washoe	basin wildrye	Deer Lodge County, MT	0.25	4/14/09
Hayes	hay barley	commercial	1.0	4/02/12
<u>Comparative Evaluation Planting</u>				
44 acc.	scarlet globemallow	Montana and Wyoming	0.14	11/18/09
<u>Initial Evaluation Planting</u>				
104 acc.	Field Off./BLM Collec.	Montana and Wyoming	0.41	2008-2011
<u>Breeder Blocks</u>				
Rosana	western wheatgrass	Rosebud County, MT	0.15	4/30/97
Garrison	creeping foxtail	Bismarck, ND PMC	0.15	4/30/97
FIELD 3				
Trapper	western snowberry	composite (5 acc.)	0.47	1997, 2000
Pondera	silverberry	Pondera County, MT	0.16	2009
4 acc.	Irrigation Tube (fallow)	commercial	0.48	5/05/05
Propagation Stock	Rocky Mountain Juniper			1996
FIELD 4—north end, west to east				
<u>National Park Service</u>				
Great Northern	western yarrow	Flathead County	0.01	5/31/12
<u>National Park Service Seed Increase</u>				
9081447	blue aster	Glacier National Park	0.01	1998
FIELD 4—south end, west to east				
Spirit	sweetgrass	Toole County, MT	0.06	7/18/01 & 3/23/06
<u>Development of Acid-Tolerant Releases</u>				
9087653	Baltic rush	Deer Lodge County, MT	0.03	6/05/06
9076274	woolly cinquefoil	Deer Lodge County, MT	0.09	6/05/06
<u>National Park Service Seed Increase</u>				
9087799	smallwing sedge	Glacier National Park	0.01	6/7 /11
9087433	showy aster	Glacier National Park	0.05	6/21/05
FIELD 4--full length				
Cover crop	seed increase	2 species	0.66	5/23/12
FIELD 5/6W				
Open Range	winterfat	composite	0.46	8/18/10
<u>National Park Service Seed Increase</u>				
9081882	Idaho fescue	Yellowstone National Park	0.33	8/18/10
9088025	mountain brome	Yellowstone National Park	0.14	8/18/10
9081537	Idaho fescue	Yellowstone National Park	0.33	8/18/10
<u>PMC Seed Increase</u>				
9019219	bottlebrush squirreltail	Washakie County, WY	0.33	8/18/10
<u>National Park Service Seed Increase</u>				
9081759	bluebunch wheatgrass	Yellowstone National Park	0.14	8/17/10
9081887	basin wildrye	Yellowstone National Park	0.33	8/17/10
9076227	tufted hairgrass	Yellowstone National Park	0.20	8/17/10
9088030	blue wildrye	Yellowstone National Park	0.20	8/17/10
9088099	slender wheatgrass	Glacier National Park	0.07	8/17/10
Meriwether	blanketflower	bulk composite	1.36	2009-10

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

Accession	Common Name	Origin or Source	Acres	Date
FIELD 5/6E				
Hayes	hay barley	commercial	2.00	4/17/12
Cover crop mixes		cool- / -warm-season spp.	3.00	4/20/12
Hayes	hay barley	commercial	2.00	4/17/12
FIELD 7E				
Bozoisky-Sel.	Russian wildrye	Kazakhstan/ARS Logan, UT	2.25	4/27/04
FIELD 7W				
Hayes	hay barley	commercial	0.50	4/02/12
<u>Cultural & Establishment Trial</u>				
29 entries	Forb Demonstration		0.06	5/16/12
<u>Breeder Block</u>				
Open Range	winterfat	composite	0.05	4/21/89
FIELD 8				
Five lines	forage kochia	ARS, Logan, Utah	0.01	3/25/11
Woody Species			4.78	
23 species	Woody Demonstration		0.50	2006
<u>Development of Acid-Tolerant Releases</u>				
9081639	western snowberry	Deer Lodge County, MT	0.17	5&6/07
FIELD 9				
Plant Materials Orchard Demonstration-greenhouse transplants			0.14	6/16/93
<u>Orchard Understory Trial</u> (East to West)			0.40	5/17/84
Parkway	crested wheatgrass			
Covar	sheep fescue			
Paiute	orchardgrass			
Ephraim	crested wheatgrass			
Durar	hard fescue			
<u>Rain/Pollinator Garden</u> sedge/grass/forbs			0.006	5/15/12
FIELD 10W				
<u>Cultural & Establishment Trial</u>				
45 entries	Cool- and warm-season Grass Demonstration		0.10	5/09/12
FIELD 10E				
5 species	Pollinator Study		0.04	5/09/12
FIELD 11				
Hayes	hay barley	commercial	-	4/02/12
<u>National Park Service Seed Increase</u>				
9088212	Sandberg bluegrass	Grand Teton National Park	0.50	11/17/11
<u>Development Acid-Tolerant Releases</u>				
Old Works	fuzzytongue penstemon	Deer Lodge County, MT	0.22	11/17/11
9081632	silverleaf phacelia	Deer Lodge County, MT	0.22	11/17/11
Rimrock	Indian ricegrass	Yellowstone County, MT	1.00	11/17/09
FIELD 12				
Open Range	winterfat	composite	0.10	4/15/03
<u>National Park Service Seed Increase</u>				
9088212	Sandberg bluegrass	Grand Teton National Park	0.70	8/11/11
Goshen	prairie sandreed	Goshen County, WY	0.75	4/16/03
<u>National Park Service Seed Increase</u>				
9088212	Sandberg bluegrass	Grand Teton National Park	0.60	8/11/11
9088209	bluebunch wheatgrass	Grand Teton National Park	0.65	8/11/11
9088206	Idaho fescue	Grand Teton National Park	1.00	8/11/11
9088217	mountain brome	Grand Teton National Park	1.00	8/11/11
FIELD 13				
<u>National Park Service Seed Increase</u>				
9087790	slender wheatgrass	Glacier National Park	0.50	8/17/10
Foothills	Canada bluegrass	composite	0.50	8/17/10

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

Accession	Common Name	Origin or Source	Acres	Date
Antelope	white prairie clover	Dickenson, ND	0.50	8/17/10
	(Plantings listed for each field in order, beginning on the north.)			
Stillwater	prairie coneflower	composite	1.00	8/18/10
FIELD 14				
<u>Rocky Mountain Juniper Seed Orchard</u>				
Bridger-Select	Rocky Mt. juniper	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
FIELD 15/16				
Consistency	Roundup-ready® alfalfa	commercial	7.40	4/26/12
FIELD 17				
Trailhead	basin wildrye	Musselshell County, MT	3.80	4/06/95
FIELD 18				
Delaney	sainfoin	University of Wyoming	1.40	5/15/07
Hayes	hay barley	commercial	2.60	4/02/12
FIELD 19				
<u>Ponderosa pine seed orchard</u>				
Hunter	Germplasm	Great Plains states	1.71	5/30/89
Covar	sheep fescue	orchard cover		
15 plots	Xeriscape demonstration		0.18	4/10/98
<u>Development Acid-Tolerant Releases</u>				
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 20N				
Shoshone	manystem wildrye	Fremont County, WY	0.96	11/02/05
<u>Living Snow Fence</u>				
Bighorn (E)	skunkbush sumac	Los Lunas, NM PMC		5/77
Jemez (W)	New Mexico forestiera	Los Lunas, NM PMC		
FIELD 20S				
Delaney	sainfoin	University of Wyoming	1.40	5/23/09
<u>National Park Service Seed Increase</u>				
9090925	Sandberg bluegrass	Grand Teton National Park	1.00	4/24/12
Shoshone	manystem wildrye	Fremont County, WY	0.80	11/08/04
FIELD 21				
<u>Breeders Block</u>				
Rosana	western wheatgrass	Rosebud County, MT	0.08	5/08/06
Hayes	hay barley	commercial	-	4/17/12
<u>National Park Service Seed Increase</u>				
9087860	bluebunch wheatgrass	Yellowstone National Park	0.45	8/21/09
9081502	needle and thread	Yellowstone National Park	0.39	8/21/09
Hayes	hay barley	commercial	-	4/17/12
FIELD 22				
<u>Cool-season Cover Crop Trial</u>				
30 single entries and 12 mixes		commercial	0.12	4/26/12
<u>Warm-season Cover Crop Trial</u>				
14 single entries and 6 mixes		commercial	0.10	6/7/12
Cover Crop Seed Increase	flex pea	commercial	0.20	5/03/12
<u>Breeders Block</u>				
Critana	thickspike wheatgrass	Hill County, MT	0.10	5/08/06
Hayes	hay barley	commercial		pending

& 5/20/03

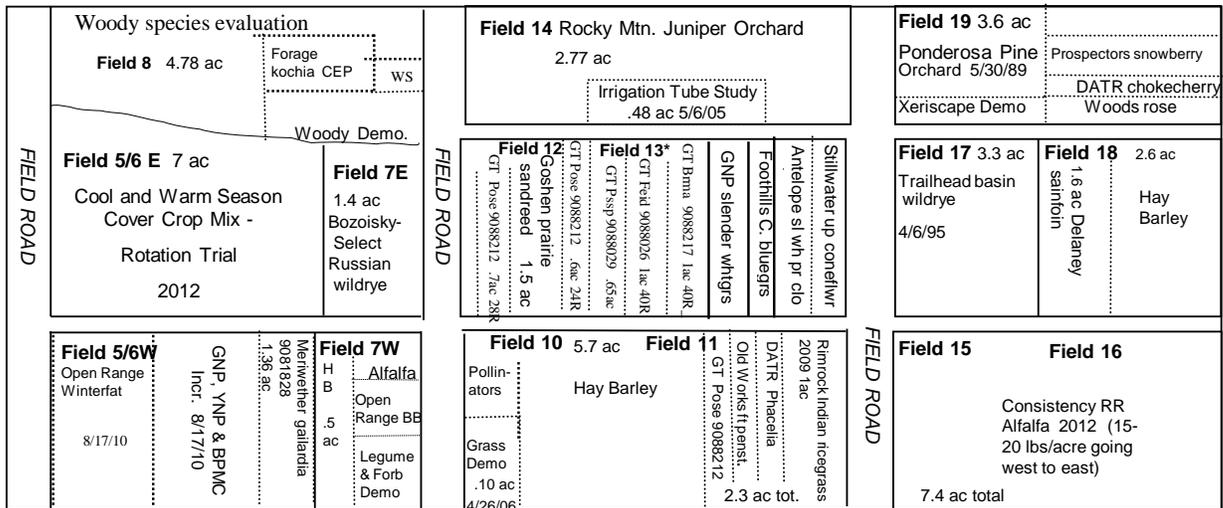
(Plantings listed for each field in order, beginning on the north.)

Accession	Common Name	Origin or Source	Acres	Date
FIELD 23				
Ekalaka	bur oak	Great Plains States	3.20	6/17/94
<u>Development Acid-Tolerant Releases</u>				
9081623	horizontal juniper	Deer Lodge County, MT	0.60	5/29/02
FIELD 24				
Rosana	western wheatgrass	Rosebud	3.00	3/30/12 & 11/28/11
FIELD 25				
Hayes	hay barley	commercial	5.25	3/30/12
FIELD 26				
<u>Saline Seep Woody Evaluation Area</u>				
18 entries	Woody Salinity Tolerance Study		0.68	5/01/06
7 entries	Alfalfa & Grass Salinity Study		0.01	8/2010
FIELD 27				
Hayes	hay barley	commercial	-	3/30/12
Rosana	western wheatgrass	Rosebud County, MT	0.41	4/13/07
Hayes	hay barley	commercial	2.75	3/30/12
FIELD 28				
Hayes	hay barley	commercial	2.25	3/30/12
FIELD 29				
Hayes	hay barley	commercial	5.25	3/30/12
FIELD 30				
<u>Development Acid-Tolerant Releases</u>				
9081334	silver buffaloberry	Deer Lodge County, MT	0.60	5/22/00
<u>Woody Initial Seed Increase</u>				
1 acc.	Amur maple			5/17/76
FIELD 31				
Lavina	hay barley	Montana State University	2.00	3/30/12
<u>Development Acid-Tolerant Releases</u>				
9081334	silver buffaloberry	Deer Lodge County, MT	0.60	3/29/10

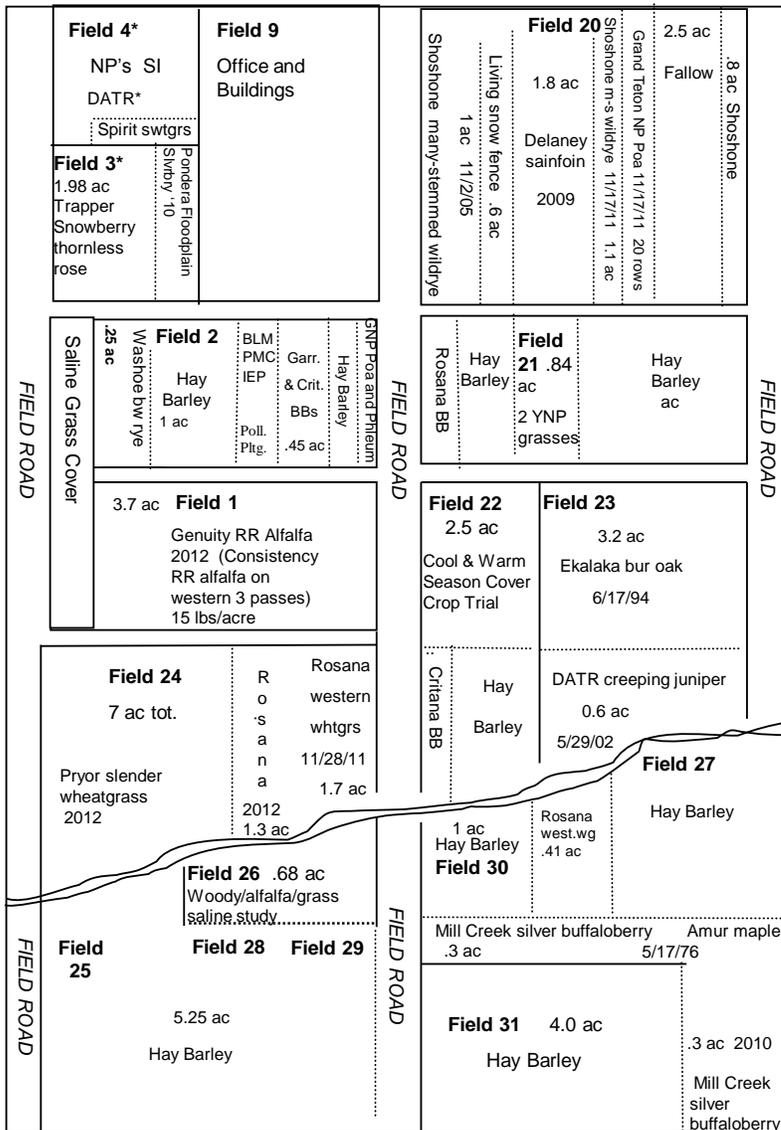
USDA-NRCS
June 2012

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SOUTH RIVER ROAD



Bridger, Montana
 Plant Materials Center
 2012
 Not to Scale
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Legend:
 BB = Breeder's Block
 CC = Cover Crop
 HB = Hay Barley
 R = Rows
 SI = Seed Increase
 WG = wheatgrass
 WS = Weather Station