

# **PLANT MATERIALS PROGRESS REPORT**

**AUGUST 1, 1997**

**USDA-NATURAL RESOURCES  
CONSERVATION SERVICE, IDAHO**

**PREPARED BY:**

**LOREN ST. JOHN  
J. CHRIS HOAG  
PLANT MATERIALS CENTER  
P.O. BOX 296  
ABERDEEN, ID 83210**

**DANIEL G. OGLE  
NRCS  
3244 ELDER STREET  
BOISE, ID 83705**

## **INTRODUCTION**

This report summarizes plant science work conducted within the Aberdeen Plant Materials Center service area during 1996 and 1997. The Focus of the Aberdeen PMC is riparian and wetland plant and technology development; plants and establishment techniques for low precipitation rangeland; and promotion and demonstration of windbreaks and other agroforestry practices.

## **COMPLETED WORK**

### Craters of the Moon National Monument

The PMC entered into a reimbursable agreement with Craters of the Moon National Monument to produce containerized plants of antelope bitterbrush, rubber rabbitbrush, sulphur flower buckwheat and Wyoming big sagebrush which were transplanted to sites disturbed by road reconstruction. Approximately 7000 plants were delivered to the Monument in October, 1996. The PMC also provided guidance in transplanting and after planting care of the plants.

### Lava Beds National Monument

The PMC entered into a reimbursable agreement with Lava Beds National Monument to produce seed from sulphur flower buckwheat. The PMC transplanted greenhouse grown plants into weed barrier fabric to reduce weed competition. The weed barrier material has proven to be successful in controlling weeds and conserving soil moisture. 55.5 pounds of seed were produced in 1996.

### Mountain Home Air Force Base Woody Inter-center Strain Trial

This trial was established in 1991 to test woody plants for use in windbreaks in southwestern Idaho. There are 111 accessions representing 63 species. Semi-annual evaluations were conducted through 1996 to identify both released and potential plant material for adaptation. The PMC will continue to evaluate the site on a 5-10 year interval to observe long term survival and performance. The site is a valuable demonstration of woody plant material.

### Released Plant Materials - Selected Class of certified plant material (natural track)

#### *Salix pentandra*

Aberdeen Selection of Laurel Willow (*Salix pentandra*), Accession Number 9005049, for Land Resource Regions B, D, and E. Intended use is for erosion and wind control in windbreaks and for landscaping.

#### *Carex nebrascensis*

Sterling Selection of Nebraska Sedge (*Carex nebrascensis*), Accession Number 9067420, for Land Resource Region B East from the Sterling Wildlife Management Area, just north of the town of Aberdeen, Bingham County, Idaho. Intended use is for erosion control, constructed wetland systems, wetland

enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Centennial Selection of Nebraska Sedge (*Carex nebrascensis*), Accession Number 9057599, for Land Resource Region B West from Centennial Marsh Wildlife Management Area, just south of the town of Hill City, Camas County, Idaho. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Modoc Selection of Nebraska Sedge (*Carex nebrascensis*), Accession Number 9057612, for Land Resource Region (LRR) D North from Modoc National Wildlife Refuge, near the town of Alturas, Modoc County, California. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Ruby Lake Selection of Nebraska Sedge (*Carex nebrascensis*), Accession Number 9057639, for Land Resource Region (LRR) D South from Ruby Lake National Wildlife Refuge, near the town of Ruby Lake, Elko County, Nevada. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

#### *Juncus Balticus*

Sterling Selection of Baltic Rush (*Juncus balticus*), Accession Number 9067411, for Land Resource Region (LRR) B East from Sterling Wildlife Management Area, just north of the town of Aberdeen, Bingham County, Idaho. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Roswell Selection of Baltic Rush (*Juncus balticus*), Accession Number 9057580, for Land Resource Region (LRR) B West from Roswell Wildlife Management Area, just west of the town of Roswell, Canyon County, Idaho. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Stillwater Selection of Baltic Rush (*Juncus balticus*), Accession Number 9057632, for Land Resource Region (LRR) D North from Stillwater National Wildlife Refuge, northwest of the town of Fallon, Churchill County, Nevada. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

#### *Eleocharis palustris*

Mud Lake Selection of Creeping Spikerush (*Eleocharis palustris*), Accession Number 9067389, for Land Resource Region (LRR) B East from Mud Lake Wildlife Management Area, just north of the town of Terreton, Jefferson County, Idaho. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

C J Strike Selection of Creeping Spikerush (*Eleocharis palustris*), Accession Number 9057585, for Land Resource Region (LRR) B West from C J Strike Wildlife Management Area, near the town of Bruneau, Owyhee County, Idaho. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Malheur Selection of Creeping Spikerush (*Eleocharis palustris*), Accession Number 9057607, for Land Resource Region (LRR) D North from Malheur National Wildlife Refuge, south of the town of Burns, Harney County, Oregon. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Ruby Lake Selection of Creeping Spikerush (*Eleocharis palustris*), Accession Number 9067387, for Land Resource Region (LRR) D South from Ruby Lake National Wildlife Refuge, near the town of Ruby Lake, Elko County, Nevada. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

#### *Scirpus acutus*

Camas Selection of Hardstem Bulrush (*Scirpus acutus*), Accession Number 9057643, for Land Resource Region (LRR) B East from Camas National Wildlife Refuge (NWR), just west of the town of Hamer, Jefferson County, Idaho. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Hagerman Selection of Hardstem Bulrush (*Scirpus acutus*), Accession Number 9057597, for Land Resource Region (LRR) B West from Hagerman Wildlife Management Area, just west of the town of Hagerman, Gooding County, Idaho. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Ogden Bay Selection of Hardstem Bulrush (*Scirpus acutus*), Accession Number 9067393, for Land Resource Region (LRR) D South from Ogden Bay Wildlife Management Area, west of the city of Ogden, Weber County, Utah. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Stillwater Selection of Hardstem Bulrush (*Scirpus acutus*), Accession Number 9057634, for Land Resource Region (LRR) D North from Stillwater National Wildlife Refuge, northwest of the town of Fallon, Churchill County, Nevada. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

#### *Scirpus pungens*

Market Lake Selection of Common Threesquare (*Scirpus pungens*), Accession Number 9057648, for Land Resource Region (LRR) B East from Market Lake Wildlife Management Area, just north of the town of Roberts, Jefferson County, Idaho. Intended use is for erosion control, constructed wetland systems, wetland

enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Fort Boise Selection of Common Threesquare (*Scirpus pungens*), Accession Number 9057578, for Land Resource Region (LRR) B West from Fort Boise Wildlife Management Area, west of the town of Apple Valley, Canyon County, Idaho. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Malheur Selection of Common Threesquare (*Scirpus pungens*), Accession Number 9057610, for Land Resource Region (LRR) D North from Malheur National Wildlife Refuge, south of the town of Burns, Harney County, Oregon. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

### *Scirpus maritimus*

Bear Lake Selection of Alkali Bulrush (*Scirpus maritimus*), Accession Number 9067380, for Land Resource Region (LRR) B East from Bear Lake National Wildlife Refuge (NWR), just south of the town of Montpelier, Bear Lake County, Idaho. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Fort Boise Selection of Alkali Bulrush (*Scirpus maritimus*), Accession Number 9057579, for Land Resource Region (LRR) B West from Fort Boise Wildlife Management Area, west of the town of Apple Valley, Canyon County, Idaho. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Stillwater Selection of Alkali Bulrush (*Scirpus maritimus*), Accession Number 9067428, for Land Resource Region (LRR) D North from Stillwater National Wildlife Refuge, northwest of the town of Fallon, Churchill County, Nevada. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

Bear River Selection of Alkali Bulrush (*Scirpus maritimus*), Accession Number 9067374, for Land Resource Region (LRR) D South from Bear River Migratory Bird Refuge, west of Brigham City, Box Elder County, Utah. Intended use is for erosion control, constructed wetland systems, wetland enhancement, wetland creation, wildlife food and cover, and increased plant diversity in wetland and riparian communities.

## **ONGOING ACTIVITIES**

### Native Bluegrass Evaluation Planting

Seed collections from Caliente, NV were planted in replicated plots in May, 1996. 'Sherman' big bluegrass and 'Canbar' Canby bluegrass are standards of comparison.

### BLM/USFS Native Grass Seed Production Study

This is a cooperative reimbursable project with the Bureau of Land Management and the Forest Service Shrub Lab to study the effects of fertilization and irrigation on Thurbers needlegrass and bottlebrush squirreltail. The study began in 1995. During 1996 plants were evaluated and seed harvests were made.

#### Chinese Inter-center Strain Trial

The trial is an evaluation of grasses, forbs and shrubs native to northern China and inner Mongolia and was seeded in 1994. Production, plant height, cover and vigor data are being collected. Identical trials are located at Bridger, MT and Pullman, WA PMCs.

#### Coffee Point Inter-center Strain Trial

Coffee Point is located approximately 25 miles northwest of Aberdeen in an 8-12 annual precipitation zone. The trial was seeded in November, 1994 to evaluate grasses for adaptation and performance. Production, plant height, cover and vigor data are being collected.

#### Curlew Inter-center Strain Trial

This trial is located on the Curlew National Grasslands southwest of Pocatello, ID in a 12-16 inch annual precipitation zone and was seeded in November, 1992. Intermediate and thickspike wheatgrasses are being evaluated. There is also an extensive display nursery for landusers to observe differences between varieties.

#### Grantsville Inter-center Strain Trial

Grantsville is located approximately 30 miles southwest of Salt Lake City, UT in an 8-12 annual precipitation zone and a region heavily infested with cheatgrass. The trial was seeded in November, 1994 to evaluate grasses for adaptation, performance and ability to compete with cheatgrass. Production, plant height, cover and vigor data are being collected.

#### Mountain Home Air Force Base Windbreak Demonstration

This project is a cooperative, reimbursable project with the United States Air Force to install and demonstrate the value of windbreaks. In 1996, the PMC installed approximately 15,000 linear feet of windbreak and in 1997 about 12,000 linear feet of windbreak. The five row windbreaks are comprised of Siberian peashrub, Rocky Mountain Juniper, Robust poplar, Austrian Pine and 'Shuberts' chokecherry. This project is planned to extend over a 4 year period.

#### Idaho Army National Guard

The PMC and the South Bingham Soil Conservation District have begun working on a reimbursable project with the Idaho Army National Guard to research propagation of tapertip hawkbeard and sharp-leaf penstemon which are native to the Tank Training Range located south of Boise. Also planned are the establishment of 3 plant testing sites to test native plant materials; test and demonstrate seedbed preparation and seeding techniques; and to assist the

National Guard in developing commercial seed production avenues for species they would like to establish at the training range on a large scale basis.

#### Fourwing saltbush

The PMC has been evaluating fourwing saltbush for future release. Four accessions from the northern range of its adaptation have been bulked to develop material that is more winter hardy than existing releases. Currently in advanced testing and seed increase.

#### Winterfat

The PMC has been evaluating winterfat for future release. Four accessions from the northern range of its adaptation have been bulked to develop material that is more winter hardy than existing releases. It was discovered that native winterfat appears to hybridize with Pamirian winterfat which is native to central Eurasia. The PMC is in the process of removing Pamirian type plants from testing and seed increase plots.

#### Breeder and Foundation Seed Production

The Aberdeen PMC is responsible for Breeder and Foundation seed production of 17 plant releases. During 1996 and 1997 the PMC produced Foundation seed of 'Regar' meadow brome, 'Magnar' basin wildrye, 'Goldar' bluebunch wheatgrass, 'Rush' intermediate wheatgrass, 'Bannock' thickspike wheatgrass, 'Vavilov' Siberian wheatgrass, 'Richfield Selection' firecracker penstemon and 'Clearwater Selection' alpine penstemon.

#### Constructed Wetland Systems

\* Nature Conservancy CWS - Located near Hagerman, ID. This site was built to treat tailwater from the Northside Canal Co. main canal before it enters Springs owned by NC and eventually the Snake River in 1994. The site was planted in 1995 and 1996. This project is also a response to a court order to clean up irrigation return flows before they enter the middle Snake River area. This system is being used for research and demonstration.

\* Cedar Draw CWS - This site is situated on property owned by Idaho Fish & Game Dept. The site was constructed and planted in 1996. This is a cooperative project between the Twin Falls Canal Co., University of Idaho, Idaho Fish & Game Dept., USDA - NRCS Aberdeen Plant Materials Center, Idaho Power Co., and Coors Brewing Co. The site is designed and installed around an old fish hatchery, and will be used to test wetland plant species, CWS design, and management practices. This CWS is being used as a research and demonstration site.

\* H-Drain CWS - Located near Paul, ID and situated on property owned by USDA - Bureau of Reclamation. The site was built and planted in 1995. This project was constructed to treat wastewater from irrigated farms in the A & B Irrigation District. The area originally fed an injection

well which injected the irrigation wastewater into the Snake River Aquifer. This project is currently functioning.

\* CSI CWS - This CWS is situated on College of Southern Idaho Campus in Twin Falls, ID. This system is treating geothermal water that heats the campus buildings, stormwater runoff from the city of Twin Falls, and agricultural wastewater that enters Perrine Coulee above the city. The site was built in 1995 and planted in 1996. Water entering the CWS is about 85° F. It will be used as a research and demonstration site.

\* Scarrow Dairy CWS - Located on a private 900 cow dairy located near Wendell, ID. This CWS will be used to treat milkhouse wastewater, corral cleanout water, and irrigation return flows. The system will recirculate treated water, and is designed to treat water with high ammonia concentrations. The treated water will be used for irrigation of adjacent fields and to raise large mouth bass and channel catfish in one of the ponds.

\* City of Pocatello Stormwater CWS - We are assisting the City of Pocatello in the design, construction, and planting of a Constructed Wetland System to treat stormwater that flows through the city from the surrounding farmland. The CWS is being constructed at this time and will encompass about 4 acres. We will advise the City in the purchase of plants, plant scheduling, and actual planting. We are cooperating with the USGS to set up a water monitoring plan. This project will be planted in Spring, 1998.

\* Fairview CWS - Located near American Falls, ID on the Neil Poulson farm. This CWS will treat furrow irrigation wastewater from a 160 acre farm that raises grain, grass seed, and cattle. The wastewater is treated before it enters American Falls Reservoir on the Snake River. We are helping with design, data collection, plant selection, plant procurement, and planting.

### Riparian Projects

\* Arimo Ranch Riparian Grazing Demonstration Project - Includes 4.1 mile of Marsh Cr. Located on private property. One half of the stream is excluded from cattle grazing, and one half is under a managed planned grazing system. One half of the enclosure, and one half of the grazed portions have been or are being planted and or having bioengineering structures installed. This site is being used as a research and demonstration site. This is a cooperative project between NRCS PMC and ID F&G. EPA funds have been used to construct the enclosure.

\* Portneuf River Bioengineering and Demonstration Site - This site was originally a demonstration site for a Riparian Ecology, Management, and Restoration Workshop where students installed various bioengineering structures on a very large stream curve that is owned by the Idaho Fish and Game Department. We have since redesigned the treatments and installed



several new bioengineering structures to protect the meander during the 1996-1997 floods.

\* Stocking Ranch on the Blackfoot River - This is a large ranch owned by the Idaho Fish and Game Department that has recently removed cattle from its pastures. The Upper Blackfoot River runs through the ranch and the streambanks are just starting to recover. We have installed several bioengineering structures along some of the more heavily eroding bank sections. This site is providing additional test areas for improvement of the bioengineering techniques used in the arid and semi-arid West.

\* Trout Creek Off-Center Advanced Test Site - The Trout Creek O.A.T. site is the oldest riparian testing site for Aberdeen PMC. It was originally excluded from grazing in 1988. We have been testing various willow, cottonwood, and dogwood species in addition to planting methods since that time. We have also installed several bioengineering structures during a Riparian Workshop in 1995. This site has some of the best long term data available.

### Field and Demonstration Plantings

Within Idaho and Utah there are currently 180 field or demonstration plantings. These plantings are installed primarily on private lands in cooperation with the landowner, local soil conservation district and NRCS field office. These plantings enable us to field test materials under development, promote materials that have been recently released and to demonstrate to local planners, land users and landowners the value of the plant(s) to solve resource problems and needs. Each of these plantings are evaluated annually to determine the performance of the plant(s) under the specific soil, climate and management conditions present at the test location.

### **CURRENT PUBLICATIONS AND PAPERS**

Aberdeen Plant Materials Center, 1996 Annual Technical Report, March, 1997. Summary of new plant releases, project progress reports and public information activities.

Plant Guide Handbook, Compiled by: Daniel G. Ogle, Plant Materials Specialist, Boise, Idaho, February 1997. Summary of approximately 350 plant guides including forbs, grasses, riparian/ wetland plants, shrubs/trees, and weedy species common to the intermountain west.

Hoag, J.C. 1991. Planting Techniques from the Aberdeen, ID, Plant Materials Center for vegetating shorelines and riparian areas. In: Proceedings--Symposium on Ecology and Management of Riparian Shrub Communities. USDA Forest Service Gen. Tech. Rep. RM-65. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. pp 163-166.

Hoag, J. C. and M. Zierke. 1996. Wetland and Riparian Plant Descriptions for the Ft Hall Indian Reservation. Interagency Riparian/Wetland Plant Development Project, USDA-Natural Resources Conservation Service, Plant Materials Center, Aberdeen, ID. 15 pp.

Hoag, J. Chris. 1996. Establishment techniques for woody vegetation in riparian zones of the arid and semi-arid West. In Proceedings of the 4th North American Agroforestry Conference, Boise, Idaho, July 24-26, 1995. p. 135-137.

Zierke, M. and J. C. Hoag. 1996. A reference guide for the collections and use of ten common wetland plants of the Great Basin and Intermountain West. Interagency Riparian/Wetland Plant Development Project, USDA-Natural Resources Conservation Service, Plant Materials Center, Aberdeen, ID. 13 pp.

### Technical Notes

1. Seed Collection. March 1993.
3. Cover Crops. June 1993.
5. List of Improved Conservation Plant Materials Released by NRCS and Cooperators Through December 1996. April 1997.
6. The Stinger - A Tool to Plant Unrooted Hardwood Cuttings of Willow and Cottonwood Species for Riparian or Shoreline Erosion Control or Rehabilitation. June 1994.
8. Alfalfa Management Guide. June 1997.
9. Salt Tolerance of Plants. October 1994.
10. Planning a Seeding. October 1994.
18. Basic Biology, Distribution and Vegetative Suppression of Four Knapweed Species. December 1993.
23. How to Plant Willows and Cottonwoods for Riparian Rehabilitation. September 1993.
24. Improved Grass, Forb, Legume and Woody Seed Species for the Intermountain West. January 1997.
25. Function and Operation of a Machine to Lay Weed Barrier Material. October 1995.
26. PVP Plant Variety Protection Program for Conservation Plants. October 1995.
27. Plant Release Procedures, Cultivar-Tested-Selected-Source Identified. January 1996.
28. Glossary of Terms for use on Native Species Issues. October 1995.
29. Test Results - Woody Plant Materials for Windbreaks. January 1996.
30. Perennial Ryegrass for Irrigated Pasture. October 1996.

31. Two-Year Results from Switchgrass Seeding Trial. October 1996.

33. Plant and Seed Vendors for Colorado-Idaho-Kansas-Montana-Nebraska-New Mexico-North Dakota-South Dakota-Utah-Wyoming. April 1997.

#### Progress Reports

Hoag, J. C. and Sellers, M. 1996. Interagency Riparian/Wetland Plant Development Project January-June 1996 Progress Report. June, 1996.

Hoag, J. C. and Sellers, M. 1996. Interagency Riparian/Wetland Plant Development Project June-Dec 1996 Progress Report. Dec., 1996.

Sellers, M. 1996. Ft. Hall Indian Reservation Native Wetland Seed Collections. Progress report. Produced for Ft. Hall Indian Reservation tribes and used in their report to the BOR. October 1996. 2 pp.

Sellers, M. 1996. Evaluation of wetland community at Nature Conservancy CWS. Progress report. August 1996. 8 pp.

Hoag, J. and M. Sellers. 1996. Watering schedule report. Completed for Twin Falls Canal Co. 2 pp.

Sellers, M. 1996. Evaluation of wetland plantings at Cedar Draw CWS. Progress report. 5 pp.

#### Unpublished Regional & National Posters

Hoag, J. Chris. 1996. Using Dormant Pole Cuttings To Revegetate Riparian Areas. Interagency Riparian/Wetland Plant Development Project, USDA-Natural Resources Conservation Service, Plant Materials Center, Aberdeen, ID. Poster Paper.

Hoag, J. Chris, M. E. Sellers, and Mike Zierke. 1996. Constructed Wetland Systems for Water Quality Improvement of Irrigation Wastewater in the Arid and Semi-Arid West. Interagency Riparian/ Wetland Plant Development Project, USDA-Soil Conservation Service, Plant Materials Center, Aberdeen, Idaho. Poster Paper.

#### **WORKSHOPS AND TRAINING SESSIONS**

\* Multiple - State Plant Materials Training - Primarily for NRCS employees, but also provided to other federal, state, local and private individuals. A three day course with one and a half days in the classroom and one and a half days in the field. The course introduces the student to plant materials as an alternative to solve resource management problems, PMC functions, classes of seed, seed tags, fundamentals of seed production, planning a seeding, seed quality, seeding rates, seed mixtures, drill calibration, planting evaluations, use of rice hulls, seedbed preparation, and the integration of plant materials into field office activities. The PMC farms, ongoing projects and studies, and one off center test site are used to give the students a more practical training opportunity.

\* Bioengineering Workshops - For NRCS employees, other federal, state and local agencies, and private landowners. A two day course with one day in the classroom discussing riparian zone ecology, management, and restoration principles. The second day is in the field installing a variety of bioengineering structures as alternatives to hard structures.

\* Wetland Creation and Enhancement Workshops - For NRCS employees, other federal, state and local agencies, and private landowners who are interested in Constructed Wetland Systems or enhancement of existing wetlands. A two day workshop with one day in the classroom reviewing wetland functions, hydrology, plants, plant establishment principles, and plant community maintenance. A second day is in the field planting wetland plants and looking at existing designs.

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