USDA NRCS
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Aberdeen Plant Materials Center

2011 Annual Technical Report

United States
Department of
Agriculture

Natural Resources
Conservation Service

Aberdeen, Idaho

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Plant Materials Publications

The following documents were developed and reported in FY 2011. In order to condense the Annual Technical Report, these documents are not included but are available online:

Technical Notes http://www.id.nrcs.usda.gov/programs/tech_ref.html#TechNotes

Plant Guides http://www.id.nrcs.usda.gov/programs/tech_ref.html#PlantGuides

Release Brochures http://www.id.nrcs.usda.gov/programs/tech_ref.html#Brochures

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Propagation Protocols - *Carex aquatilis, Carex rostrata, Calamagrostis canadensis, Deschampsia caespitosa, Chaenactis douglasii, Machaeranthera canescens, Senecio multilobatus, Carex nebrascensis, Juncus ensifolius*

Native Plants Journal Published Articles - Using historic bushel weights to estimate seed quality. The Jet Harvester: a shop-built tool for harvesting forb and shrub seeds.

INTRODUCTION

The Plant Materials Center at Aberdeen is part of a national plant materials program operated by the United States Department of Agriculture, Natural Resources Conservation Service. The purpose of the Plant Materials Center is to develop and communicate new technology for the use and management of plants. We also assemble, evaluate and release plant materials for conservation use and develop new techniques for establishment of conservation plants. The Aberdeen Plant Materials Center was established in 1939 and currently maintains 14 cultivars and 31 pre-variety (Selected Class) releases. The Aberdeen Plant Materials Center serves portions of Nevada, Utah, Oregon, Wyoming and Idaho. This document is a compilation of progress reports for activities by the Aberdeen Plant Materials Center during FY 2011.

The following documents and presentations were developed during FY 2011 and may be obtained by contacting the Aberdeen Plant Materials Center:

DOCUMENTS

Tilley, D., St. John, L., Ogle, D., Shaw, N., and J. Cane 2011. Plant Guide for fernleaf biscuitroot (*Lomatium dissectum*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 1/28/2011. 7p.

Tilley, D., St. John, L., Ogle, D., and N. Shaw 2011. Plant Guide for Gray's biscuitroot (*Lomatium grayi*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 25 Feb 2011. 4p.

Tilley, D., St. John, L., Ogle, D., and N. Shaw 2011. Plant Guide for nineleaf biscuitroot (*Lomatium triternatum*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 1/28/2011. 4p.

Tilley, D., St. John, L., Ogle, D., and C. Burns 2011. Technical Note No. 52. Threatened, Endangered, Candidate, and Proposed Plant Species of Utah. Aberdeen Plant Materials Center, Boise, Idaho. 2/25/2011. 60p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for water sedge (*Carex aquatilis*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 2/28/2011. 4p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant guide for Atwood's phacelia (*Phacelia argillacea*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 1/4/2011. 2p.

Tilley, D., St. John, L., and D. Ogle 2010. Plant Guide for Autumn Buttercup. IDPMC, Boise, Idaho. 11/15/10. 3p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Barneby reed-mustard (*Schoenocrambe barnebyi*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 1/14/2011. 2p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for clay reed-mustard (*Schoenocrambe argillacea*). Aberdeen Plant Materials Center, Aberdeen, ID. 1/14/2011. 2p.

Tilley, D., St. John, L., and D. Ogle 2010. Plant Guide for Dwarf Bear Poppy. IDPMC, Boise, Idaho. 11/15/10. 2p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Gierisch Mallow (*Sphaeralcea gierischii*). Aberdeen Plant Materials Center, Aberdeen Idaho. 1/21/11. 2p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Goose Creek Milkvetch (*Astragalus anserinus*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 2/3/2011. 2p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for hardstem bulrush (*Schoenoplectus acutus*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 3/18/2011. 4p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Heliotrope milkvetch (*Astragalus limnocharis* var. *montii*). Aberdeen Plant Materials Center, Aberdeen, ID. 1/3/2011. 2p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Holmgren milkvetch (*Astragalus holmgreniorum*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 1/14/2011. 3p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Jones' waxy dogbane (*Cycladenia humilis* var. *jonesii*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 1/3/2011. 2p.

Tilley, D., St. John, L., and D. Ogle 2010. Plant Guide for Kodachrome Bladderpod. IDPMC, Boise, ID. 11/15/10. 3p.

Tilley, D., St. John, L., and D. Ogle 2010. Plant Guide for Last Chance Townsendia. IDPMC, Boise, Idaho. 11/15/10. 3p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Maguire Daisy (*Erigeron maguirei*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 1/3/2011. 2p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Packard's milkvetch (*Astragalus cusickii* var. *packardiae).* Aberdeen Plant Materials Center, Aberdeen, Idaho. 2/3/2011. 2p.

Tilley, D., St. John, L., and D. Ogle 2010. Plant Guide For San Rafael Cactus. IDPMC, Boise, ID. 11/15/10. 2p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Shivwits milkvetch (*Astragalus ampullarioides*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 1/12/2011. 2p.

Tilley, D., St. John, L., and D. Ogle 2010. Plant Guide for Siler's Pincushion. IDPMC, Boise, Idaho. 11/15/10. 2p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Uinta Basin hookless cactus (*Sclerocactus glaucus*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 1/5/2011. 3p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Uinta Basin Waxfruit (*Glaucocarpum suffrutescens*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 1/14/2011. 3p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Welsh's milkweed (*Asclepias welshii*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 1/3/2011. 2p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for White River penstemon (*Penstemon scariosus* var. *albifluvis*). Aberdeen Plant Materials Center, Aberdeen, ID. 1/14/2011. 2p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Winkler's pincushion cactus (*Pediocactus winkleri*). Aberdeen Plant Materials Center, Aberdeen, ID. 1/14/2011. 2p.

Tilley, D., St. John, L., and D. Ogle 2011. Plant Guide for Wright fishhook cactus (*Sclerocactus wrightiae*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 1/14/2011. 2p.

Tilley, D., St. John, L. and D. Ogle. 2011. Plant Guide for Maguire Primrose (*Primula cusickiana* var. *maguirei*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 1/3/2011. 2p.

Tilley, D., St. John, L. and D. Ogle 2010. 2010 Aberdeen Plant Materials Center Progress Report of Activities. IDPMC, Aberdeen, ID. 11/19/10. 4p.

Tilley, D., St. John, L. and D. Ogle 2011. Plant Guide for Barneby ridge-cress. Aberdeen Plant Materials Center, Aberdeen, ID. 1/7/2011. 2p.

Tilley, D., St. John, L. and D. Ogle 2011. Plant Guide for Deseret milkvetch (*Astragalus desereticus*). Aberdeen Plant Materials Center, Aberdeen Idaho. 1/3/2011. 2p.

Tilley, D., St. John, L. and D. Ogle 2011. Plant Guide for Navajo sedge (*Carex specuicola*). Aberdeen Plant Materials Center, Aberdeen, ID. 1/7/2011. 2p.

Tilley, D., Ogle, D., Blaker, P. and St. John, L. 2011. 2010 Annual Technical Report. Aberdeen Plant Materials Center, Aberdeen, Idaho. March 1, 2011. 147p.

Tilley, D., Ogle, D., and St. John, L. 2011. Plant Guide for slender wheatgrass (*Elymus trachycaulus*). Aberdeen Plant Materials Center, Aberdeen, Idaho. 2/18/2011. 5p.

Tilley, D., Ogle, D., and L. St. John 2010. Plant Guide for Hoary Tansyaster. IDPMC, Boise, Idaho. 11/15/10. 4p.

Tilley, D., Ogle, D., and B. Cornforth 2010. Technical Note No. 35. Quick Methods to Estimate Seed Quality. IPDMC, Boise, Idaho. 11/16/10. 10p.

Tilley, D., Ogle, D. and L. St. John 2010. Plant Guide for Douglas' Dustymaiden. IDPMC, Boise, Idaho. 11/15/10. 4p.

Tilley, D., Ogle, D. and L. St. John 2011. Plant Guide for Sweet Clover. Aberdeen Plant Materials Center, Aberdeen, ID. revised May, 2011. 6p.

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Tilley, D. 2010. Propagation protocol for production of container *Calamagrostis canadensis*. IDPMC, Aberdeen, ID. 10/7/2010. 2p.

Tilley, D. 2010. Propagation protocol for production of container *Carex aquatilis*. IDPMC, Aberdeen, ID. 10/7/2010. 2p.

Tilley, D. 2010. Propagation protocol for production of container *Carex nebrascensis nebrascensis*. IDPMC, Aberdeen, ID. 10/7/2010. 2p.

Tilley, D. 2010. Propagation protocol for production of container *Carex rostrata*. IDPMC, Aberdeen, ID. 10/7/2010. 2p.

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Tilley, D. 2010. Propagation protocol for seed production of *Chaenactis douglasii*. Aberdeen PMC, Aberdeen, ID. 11/10/10. 3p.

Tilley, D. 2011. Propagation protocol for seed production of hoary tansyaster (*Machaeranthera canescens*). Aberdeen PMC, Aberdeen, Idaho. 6/3/2011. 2p.

Tilley, D. 2011. Propagation protocol for seed production of multilobed groundsel (*Packera multilobata*). Aberdeen Plant materials center, Madison, WI. 8/1/11. 2p.

Tilley, D. 2011. Seed collection request for dune scurfpea (*Psoralidium lanceolatum*). Aberdeen Plant Materials Center, Aberdeen, ID. 1/4/2011. 2p.

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Tilley, D. 2011. Seed collection request for tapertip hawksbeard (*Crepis acuminata*). Aberdeen Plant Materials Center, Aberdeen, ID. 1/4/2011. 2p.

St. John, L., Tilley, D., Ogle, D., Johnson, D. 2011. Plant Guide for Searls' Prairie Clover. Aberdeen Plant Materials Center, Aberdeen, Idaho. June 22, 2011. 4p.

St. John, L., Tilley, D. and D. Ogle 2011. Yellowstone National Park Wetland Plant Propagation - 2010 Progress Report. Aberdeen Plant Materials Center, Aberdeen, Idaho. January 11, 2011. 2p.

St. John, L., Ogle, D.G., Parr, S., Darris, D. 2011. Plant Guide for Tufted Hairgrass. Aberdeen Plant Materials Center, Aberdeen, Idaho. January 14, 2011. 7p.

St. John, L., Ogle, D., Stannard, M., and P. Pavek 2011. Plant Guide for Mammoth wildrye. Aberdeen Plant Materials Center, Aberdeen, Idaho. November 16, 2010. 4p.

St. John, L., Ogle, D. and Tilley, D. 2011. Cooperative Work between The Great Basin Native Plant Selection and Increase Project and the Aberdeen Plant Materials Center. Aberdeen Plant Materials Center, Aberdeen, Idaho. December 16, 2010. 10p.

St. John, L., Ogle, D. and D. Tilley 2011. Plant guide for Strawberry Clover. Aberdeen Plant Materials Center, Aberdeen, Idaho. October 1, 2010. 4p.

St. John, L., D. Ogle, W. Duckwitz, D. Tober 2011. Plant Guide for Altai Wildrye. Aberdeen, Idaho and Bismarck, North Dakota Plant Materials Centers, Aberdeen, Idaho. January 5, 2011. 4p.

St. John, L. and D. Ogle 2011. Plant Guide for White Clover. Aberdeen Plant Materials Center, Aberdeen, ID. revised May, 2011. 3p.

St. John, L. and D. Ogle 2011. Plants for Solving Resource Problems - 'Recovery' Western Wheatgrass. Aberdeen Plant Materials Center, Aberdeen, Idaho. January 5, 2011. 4p.

St. John, L. 2011. Grand Teton National Park FY 2010 Seed Increase. Aberdeen Plant Materials Center, Aberdeen, Idaho. March 21, 2011. 3p.

St. John, L. 2011. Seed Production of Native Plants in the Intermountain West. Society for Range Management, 2011 Annual Meeting, February 10, 2011. 1p.

St. John, L. 2011. Yellowstone National Park Grass Seed Production FY 2010. Aberdeen Plant Materials Center, Aberdeen, Idaho. March 28, 2011. 4p.

Ogle, D., Tilley, D., Cane, J., St. John, L., Fullen, K., Stannard, M. and P. Pavek 2011. Technical Note No. 2a. Plants for Pollinators in the Intermountain West. Aberdeen Plant Materials Center, Boise, Idaho. 1/3/2011. 40p.

Ogle, D., St. John, L., Tilley, D., and K. Fullen 2011. Technical Note No. 51. Threatened, Endangered, Candidate and Proposed Plant Species of Idaho. Aberdeen Plant Materials Center, Boise, Idaho. 2/25/2011. 27p.

Ogle, D., St. John, L., and T. Jones 2011. Plant Guide for bluebunch wheatgrass (*Pseudoroegneria spicata*). Idaho plant materials program, Boise, Idaho. 1/20/11. 5p.

Majerus, M., Holzworth, L., Tilley, D., Ogle, D., and M. Stannard 2011. Plant Guide for Sandberg's bluegrass complex (*Poa secunda*) and others. Idaho Plant Materials Program, Boise, Idaho. 4/4/11. 7p.

compiled by L. St. John 2011. News articles for South Bingham Soil Conservation District Newsletter. Aberdeen Plant Materials Center, Aberdeen, Idaho. April 6, 2011. 2p.

Bair, C. and D. Tilley 2010. Technical Note No. 55. The Jet Harvester: A Shop Built Tool for Harvesting Forb and Shrub Seed. IDPMC, Boise, ID. 10/7/2010. 6p.

Winger, Marlon, Dan Ogle, Loren St John and Mark Stannard 2010. Cover Crops. USDA NRCS, Boise, Idaho. TN56, October 2010. 9p.

Scheinost, Pamela L., David M. Skinner and Mark E. Stannard 2010. Evaluation of Planting Time and Survivability of 16 Forbs and 2 Grass Species Native to the NW. USDA NRCS, Boise, Idaho. TN54; October 2010. 20p.

Ogle, Dan, Pamela Pavek, Richard Fleenor, Mark Stannard, Tim Dring, Jim Cane, Karen Fullen, Loren St John, Derek Tilley 2011. Plants for Pollinators in the Inland Northwest. USDA NRCS, Boise, Idaho. TN2B - January 2011. 66p.

Ogle, Dan, Loren St John, Derek Tilley 2010. Plant and Seed Vendors for Idaho-Montana-Nevada-E. Oregon-Utah-E. Washington-Wyoming. USDA NRCS, Boise, Idaho. Technical Note 33, January 2011 revision. 18p.

Ogle, Dan, Loren St John, Dwight Tober 2011. Intermediate Wheatgrass Plant Guide. USDA NRCS, Boise, Idaho. April 2011. 5p.

Ogle, Dan, Loren St John and Mark Stannard 2010. Grass, Grass-Like, Forb, Legume and Woody Species for the Intermountain West. USDA NRCS, Boise, Idaho. TN 24; October 2010 Revision. 48p.

Ogle, Dan and Loren St John 2010. Aberdeen Plant Materials Center Long Range Plan 2011-2020. USDA NRCS, Boise, Idaho. October 2010. 17p.

Ogle, D.G., L. St. John and K. Jensen 2010. Chapter 2: Species Selection and Grazing Management Guidelines. In G.E. Shewmaker and M.G. Bohle (eds.) Pasture and Grazing Management in the Northwest. University of Idaho Extension, Moscow, Idaho. PNW 614, 2010. 208p.

Miller, Ron, Jerry Kaiser, and Dan Ogle 2010. Legume Inoculation. USDA NRCS, Boise, Idaho. TN26; October 2010. 5p.

Hoag, J. Chris and Dan Ogle 2010. Willow Clump Plantings. USDA NRCS, Boise, Idaho. TN42; October 2010 revision. 10p.

PRESENTATIONS

Title: PMC Overview for Assistant State Conservationist
Presenter: PMC Staff **Location:** Aberdeen Plant Materials Center
Date presented: 10/13/2010

Title: PMC Overview for Purchasing Officer
Presenter: St. John, Blaker **Location:** Aberdeen Plant Materials Center
Date presented: 10/28/2010

Title: PMC overview for South Bingham Soil Conservation District
Presenter: L. St. John **Location:** South Bingham Soil Conservation District
Date presented: 12/7/2010

Title: Developing range seeding mixes
Presenter: D. Tilley **Location:** Idaho Falls, ID
Date presented: 1/6/2011

Title: PMC 2010 Activity Report to Idaho Plant Materials Committee
Presenter: D. Tilley, L. St. John **Location:** Boise, Idaho
Date presented: 1/19/2011

Title: PMC Program Overview to West Region Plant Materials Consortium
Presenter: L. St. John **Location:** Teleconference
Date presented: 1/20/2011

Title: Fiscal Year 2010 Cooperative Work with Yellowstone National Park
Presenter: L. St. John **Location:** Billings, MT
Date presented: 2/9/2011

Title: Seed Production of Native Plants in the Intermountain West
Presenter: L. St. John **Location:** Billings, MT
Date presented: 2/10/2011

Title: IDPMC activities with GBNPSIP in 2010
Presenter: D. Tilley **Location:** Salt Lake City, Utah
Date presented: 2/23/2011

Title: PMC 2010 Activity Report to Utah Plant Materials Committee
Presenter: D. Tilley , L. St. John **Location:** Salt Lake City, UT
Date presented: 2/24/2011

Title: CRP Seeding Training
Presenter: PMC Staff **Location:** Aberdeen Plant Materials Center
Date presented: 3/22/2011

Title: CP42 Pollinators and Developing CRP Mixtures
Presenter: D. Tilley **Location:** Aberdeen, Idaho CRP training
Date presented: 3/22/2011

Title: Native Plant Seed Production in the Intermountain West
Presenter: L. St. John **Location:** Boise, Idaho
Date presented: 3/30/2011

Title: Investigations of wetland plant establishment
Presenter: D. Tilley **Location:** Boise State University, Boise, ID
Date presented: 3/30/2011

Title: Plant Materials T&E activities
Presenter: D. Tilley **Location:** Boise, Idaho
Date presented: 4/5/2011

Title: Sage Grouse - Great Basin - PMC Connection
Presenter: L. St. John **Location:** Video Teleconference
Date presented: 4/5/2011

Title: Overview of Idaho Plant Materials Center
Presenter: Derek Tilley **Location:** Jackson, Wyoming
Date presented: 4/26/2011

Title: Cover Crop Demonstration Field Evaluation
Presenter: St. John, Winger **Location:** Aberdeen Plant Materials Center
Date presented: 5/2/2011

Title: Joint Fire Science Seeding at Wildcat Hills, UT
Presenter: L. St. John and N. Shaw **Location:** Wildcat Hills, UT
Date presented: 6/2/2011

Title: Multi-State Plant Materials Training (3 day course)
Presenter: PMC Staff **Location:** Aberdeen Plant Materials Center
Date presented: 6/14/2011

Title: Pollinator Conservation Planning Short Course
Presenter: Xeres Society/PMC staff **Location:** Aberdeen Plant Materials Center
Date presented: 6/22/2011

Title: Orchard Experimental Restoration Site Field Day: Two Decades of Studies
Presenter: Pellent, M., Shaw, N., St. John **Location:** Orchard, ID Experimental Exclosure
Date presented: 6/28/2011

Title: Overview of work and tour of PMC for University of Idaho Rangeland Principles Course
Presenter: L. St. John **Location:** Aberdeen Plant Materials Center
Date presented: 7/6/2011

Title: Aberdeen Plant Materials Center Open House
Presenter: St. John, Blaker **Location:** Aberdeen Plant Materials Center
Date presented: 7/21/2011

Title: Plant Materials Center Tour for Ethiopian Scientists
Presenter: L. St. John **Location:** Aberdeen Plant Materials Center
Date presented: 8/18/2011

Title: Stream Planning and Assessment
Presenter: D. Tilley **Location:** Cascade, ID
Date presented: 8/22/2011

Title: Plant Materials Comm. Meeting – Idaho
Presenter: Dan Ogle **Location:** Boise, Idaho
Date presented: 2/1/2011

Title: Fuel Breaks
Presenter: Ogle, Dan **Location:** Boise, ID
Date presented: 2/24/2011

Title: Plant Materials Committee Meeting - Utah
Presenter: Dan Ogle **Location:** Salt Lake City, Utah
Date presented: 3/22/2011

Title: CRP Seeding Training
Presenter: Dan Ogle **Location:** Aberdeen PMC
Date presented: 4/5/2011

Title: Tri-State PMC STC Advisory Meeting - Training Presentation
Presenter: Ogle, Dan **Location:**Boise, ID; Portland, OR; Spokane, WA
Date presented: 4/26/2011

Title: North Idaho CRP Training
Presenter: Dan Ogle **Location:** Pullman, WA
Date presented: 6/14/2011

Title: 2011 Plant Materials to Solve Resource Problems
Presenter: Dan Ogle **Location:** Aberdeen PMC
Date presented: 6/14/2011

Title: 2011 Planning a Seeding
Presenter: Dan Ogle **Location:** Aberdeen PMC
Date presented: 6/14/2011

Title: Demonstration Plots - Plant Identification
Presenter: Dan Ogle **Location:** Aberdeen PMC
Date presented: 6/16/2011

Title: Integrating Plant Materials into Field Office Activities - Field and Demo Plantings
Presenter: Dan Ogle **Location:** Aberdeen PMC
Date presented: 6/16/2011

Note: *Trade names are used solely to provide specific information and should not be considered a recommendation or endorsement by the Natural Resources Conservation Service.*

USDA NRCS
Natural Resources Conservation Service

United States
Department of
Agriculture

**Natural Resources
Conservation Service**

Aberdeen, Idaho

October 2010

Aberdeen
Plant Materials Center

Long Range Plan
2011-2020

Aberdeen Plant Materials Center
Home Farm

Long Range Plan
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I. Preface and Signatures

The mission of the NRCS Plant Materials Program is to develop and transfer effective state-of-the-art plant science technology to met customer and resource needs. NRCS established the Aberdeen Plant Materials Center (PMC) in 1939 to supply seed, plants, technical data and guidance to the grassland program of the Western United States. The program has evolved significantly since those early days as described in this Long Range Plan.

Permanent PMC staff includes the team leader (manager), plant scientist (agronomist/rangeland specialist), farm manager, biological science technician and an administrative assistant. A NRCS plant materials specialist serves Idaho and Utah and is headquartered at the NRCS Idaho State Office in Boise. The South Bingham Soil Conservation Districts plays a key role in the operation of the PMC by providing land (two farms), farm buildings and support for summer workers. The University of Idaho also plays a supportive role in the operation of the PMC by providing services to the PMC office and greenhouse and administrative support for summer workers.

This Long Range Plan identifies actions the PMC will take to help solve high-priority resource problems identified within the Service Area. It is consistent with the goals and objectives identified in the NRCS Strategic Plan.

The plant material needs of the Aberdeen PMC Service Area fall into ten major priorities. The highest priorities include: rangeland and forestland; wildlife habitat; riparian-wetland; plant releases and seed and plant production; and equipment, facilities and personnel. Based on current funding and personnel levels, the PMC is not able to assign specific actions to medium and low priority needs categories. Medium priority needs may be addressed as actions are taken to meet the needs of the high priority categories and as additional funds become available. Occasional written materials may also be developed to assist with the identified medium priority needs.

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Aberdeen Plant Materials Center
Long Range Plan
2011 – 2020

II. Introduction

The mission of the Plant Materials Program is to develop and transfer effective state-of-the-art plant science technology to meet customer and resource needs. The purpose of the Plant Materials Program is to carry out specialized activities in resource conservation, as part of the overall program of the Natural Resources Conservation Service (NRCS).

The responsibility of the Aberdeen Plant Materials Center (PMC) is to: 1) assemble, test, and release plant materials for conservation use, 2) determine techniques for the successful use and management of conservation plant species, 3) facilitate the commercial increase of conservation plants, and 4) provide for the development and transfer of state-of-the-art applied plant science technology.

This Long Range Plan will guide and direct the PMC operations toward solving high-priority resource problems identified within the Service Area. It is consistent with the goals and objectives identified in the NRCS Strategic Plan.

III. Long Range Plan Development

This Long Range Plan has been developed in accordance with the National Plant Materials Manual, Part 540.11– 540.13. It is a guide for directing plant materials center activities within the states served. The PMC Technical Advisory Committee and State Plant Materials Committees are responsible for identifying customers, resources, and program needs.

NRCS Goals and Objectives as listed in the National Plant Materials Manual, Exhibit 539-1, categorize program needs.

The Technical Advisory Committee and State Plant Materials Committees recommend studies needed at the PMC to meet identified concerns. Specific study areas and special concerns are defined by these committees and reviewed by the State Conservationist Advisory Committee. Projects are incorporated into the PMC's Annual Business Plan based on annual funding levels.

IV. Technology Transfer and Education

The continuous transfer of new technology from PMCs, universities, agricultural research and others to NRCS field personnel and land users is essential to meet customer expectations. The format of the technology must be user friendly, timely, and have technical support to insure understanding and appropriate use.

The Aberdeen PMC staff and plant materials specialist will provide an aggressive technology transfer program through new plant releases and planting techniques, demonstrations, formal and informal training, and in written form. Written materials may include technical notes, fact sheets, plant guides, scientific papers, and news articles.

V. National Action Plans, Projects and Studies

In an effort to coordinate and unify PMC activities, the Plant Materials Program initiated multiple PMC action plans and cooperative studies and projects. These coordinated projects and studies are designed to address larger scale issues that require the input of two or more PMCs. The national network of 27 Plant Materials Centers are uniquely suited to undertake national action plans, projects and studies of this nature. They represent an effort to utilize the network of PMCs to directly contribute to improving NRCS technical vegetative recommendations and support the effects of conservation activities throughout the nation. These projects and studies will require some time each year for Aberdeen PMC staff and will be directly addressed in the Annual Business Plan.

VI. General Description of the Service Area

Size: 83,870,000 acres

Climate: USDA Plant Hardiness Zones 4, 5, 6 are within the area served. The climate is continental, changes rapidly with elevation, and is characterized by wet winters and dry summers. Summers have cool nights and warm days. Precipitation occurs mostly as winter snow or rain and spring rain, varying from less than 5 inches to over 30 inches annually. In southern and central areas of Nevada and Utah rain may also occur in mid-summer with monsoonal thunder storms.

Land Resource Regions: Portions of three Land Resource Regions (B, D and E) are included within the boundaries of the Aberdeen PMC Service Area.

Major Land Resource Areas: All or portions of 13 Major Land Resource Areas (MLRAs) and five states (Idaho, Nevada, Oregon, Utah, and Wyoming) are included in the Aberdeen PMC Service Area as follows:

B Northwestern Wheat and Range Region

- B9 Palouse and Nez Perce Prairies (Idaho and Oregon)*
- B10 Central Rocky and Blue Mountain Foothills (Idaho and Oregon)*
- B11 Snake River Plains (Idaho and Oregon)*
- B12 Lost River Valleys and Mountains (Idaho)
- B13 Eastern Idaho Plateaus (Idaho and Utah)

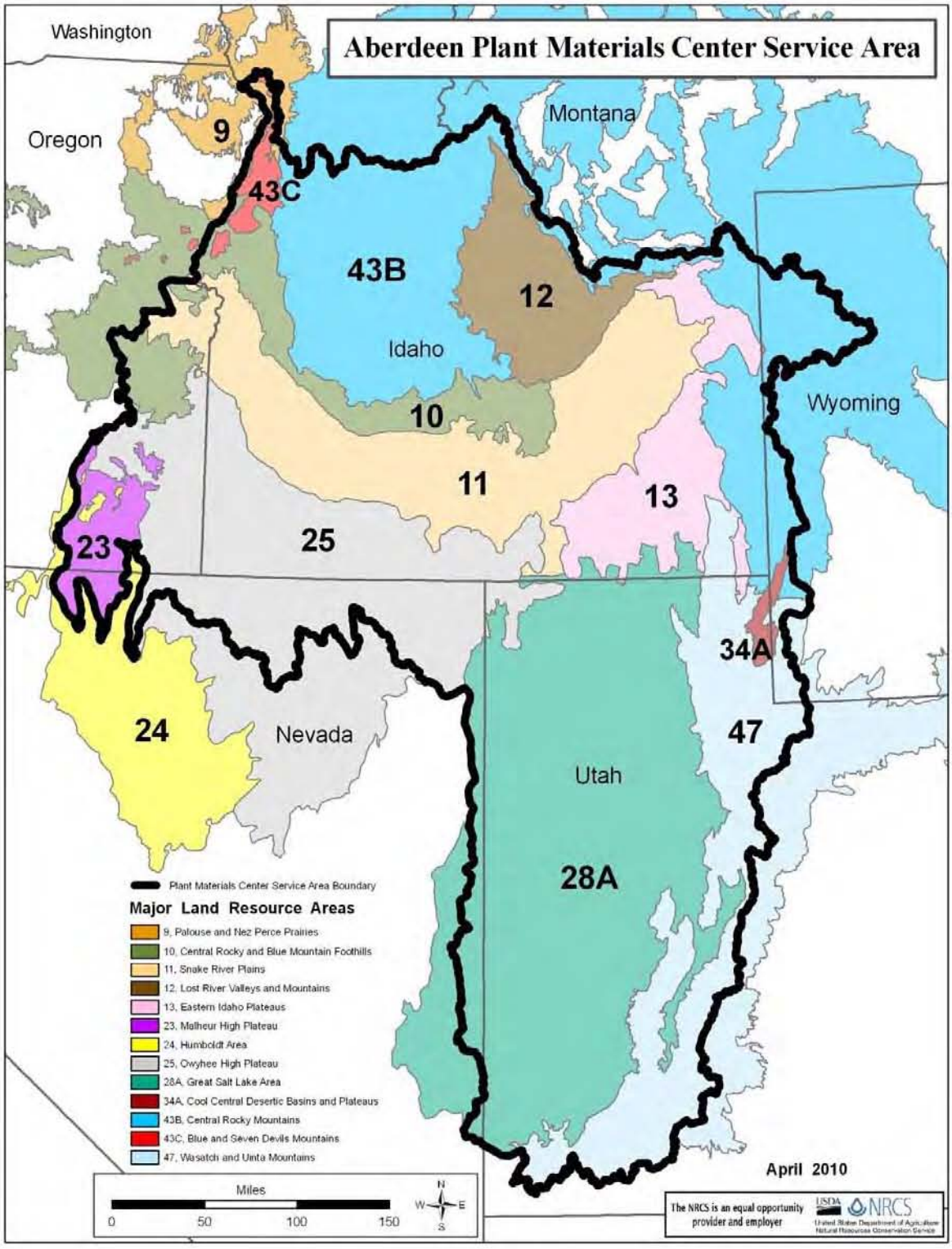
D Western Range and Irrigated Region

- D23 Malheur High Plateau (Oregon and Nevada)*
- D24 Humboldt Area (Oregon and Nevada)*
- D25 Owyhee High Plateau (Nevada, Idaho, Oregon and Utah)*
- D28A Great Salt Lake Area (Idaho, Utah and Nevada)*
- D34A Cool Central Desertic Basins and Plateaus (Utah and Wyoming)*

E Rocky Mountain Range and Forest Region

- E43B Central Rocky Mountains (Idaho, Utah and Wyoming)*
- E43C Blue and Seven Devils Mountains (Idaho and Oregon)*
- E47 Wasatch and Uinta Mountains (Idaho, Utah and Wyoming)*

* Indicates overlap with other PMCs' area of responsibility



A detailed description of Land Resource Regions, MLRAs, land use, and climate may be found in the reference " Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean and the Pacific Basin," Agricultural Handbook 296. 2006.

VII. NRCS Objectives, Needs, Recommended Actions

The priority plant material needs of the Aberdeen PMC fall into 5 major categories according to the National Plant Materials Manual, Exhibit 539-1; Goal 2:

1. Healthy and productive cropland sustaining U.S agriculture and the environment.

2. Healthy watersheds providing clean and abundant water supplies for people and the environment.

3. Healthy and productive grazing lands sustaining U.S. agriculture and the environment.

4. Healthy and productive wetlands sustaining watersheds and wildlife.

5. High quality habitat on private lands supporting the nation's wildlife heritage.

The plant material needs of the Aberdeen PMC Service Area fall into 10 major priorities and are in accordance with the national program objectives. The highest priorities include: rangeland and forestland; wildlife habitat; riparian-wetland; plant releases and seed and plant production; and equipment, facilities and personnel. Based upon current funding and personnel levels, the PMC is not able to assign specific actions to categories identified as medium priority needs. These needs are listed with the intention that they may be addressed as actions are taken to meet the needs of the high priority categories and as additional funds become available. Occasional written materials may be developed to assist with the medium priority needs identified.

A. Categories Identified as High Priority Needs

1. Rangeland and Forestland

Large areas of rangeland and forestland are in unsatisfactory ecological condition and are producing forage and associated habitat well below potential. Many sites are infested with cheatgrass, medusahead, knapweed species and other invasive weeds. These areas provide poor diversity of vegetation for wildlife, generally have poor cover, and may have excessive rates of soil erosion. Wildfire consumes large acreages of poor ecological condition land each year. Reseeding large areas is costly with current methods and available plant materials. Threatened, endangered and sensitive species are destroyed, weeds are allowed to invade, water quality is degraded due to soil erosion, and watershed values are adversely affected. Critical wildlife habitat is affected.

Needs

- Plant and seed establishment techniques
- Establishment of woody shrubs from seed
- Development of native forbs to improve plant community diversity
- Facilitate commercial seed production of native and appropriate introduced plants
- Greenstrips or vegetative fuel breaks, often introduced species, to reduce wildfire hazard
- Information and management of threatened, endangered and sensitive plants
- Strategies for invasive weed management including chemical and mechanical control, integrated pest management, and revegetation strategies

Actions

a. Develop native, performance-tested rangeland/forestland grasses, forbs, and shrubs
b. Cooperate with other researchers to develop integrated pest management strategies for invasive plants such as cheatgrass, medusahead, knapweed species, starthistle, rush skeletonweed, etc.
c. Continue cooperative relationships with plant development/land management agencies
d. Equipment/technology development for improved plant establishment on rangelands
e. Develop information on threatened, endangered and sensitive plants

2. Wildlife Habitat

Food and cover habitat for wildlife have been seriously reduced or eliminated in many areas by intensive farming practices, poor rangeland and forestland ecological condition, wildfire, reduced winter forage, overgrazing, extensive development of housing and transportation corridors, and more intensive management of forests.

Needs

- Information on adapted species and cultural methods for establishment
- Native forbs for rangeland and forestland areas
- Enhance areas with inter-seeding technology and prescribed burning
- Enhance existing habitat to reduce loss of critical habitat to urbanization
- Establishment of woody shrubs from seed and by plants when appropriate
- Information on buffer strips, including windbreaks and greenstrips/fuel breaks
- Information on pest management
- Information and plant releases to enhance pollinators
- Information and plant releases to enhance sage-grouse habitat

Actions

a. Develop performance-tested grasses, forbs, and shrubs with specific wildlife values
b. Develop equipment and technology for improved plant establishment
c. Develop information and plant releases to enhance native pollinators
d. Develop information and plant releases to enhance sage-grouse habitat

3. Riparian - Wetlands

Concentrated runoff water causes gully, perennial and intermittent stream erosion. Floods cause streambank and gully erosion on cropland, rangeland, forestland, pastureland, and meadows. Desirable streamside vegetation is degraded, and it is difficult to prepare planting sites and protect such sites during establishment.

Needs

- Riparian species information and restoration techniques
- Streambank stabilization with trees and shrubs
- Techniques to establish wetland species with seed
- Urban development of storm-water collection and treatment facilities
- Low growing, aggressive, stiff, sod-forming species for concentrated flow erosion
- Filter and buffer strips

Actions

a. Identify native riparian-wetland plants for use in restoring plant communities
b. Technology transfer of bioengineering techniques for establishment and management of plants for degraded and intermittent riparian zones
c. Studies to determine techniques to establish wetland species with seed
d. Studies to determine best species for herbaceous buffers – water quality practices
e. Technology transfer of design criteria and adapted plant and management techniques

f. Continue cooperative relationships with plant development and land management agencies

4. Plant Releases, Seed and Plant Production

A major responsibility of the PMC is the maintenance of Breeder seed and production of Foundation or early Generation quality seed of the plant releases from the center. Foundation and early Generation seed is made available to the commercial seed industry through the University of Idaho Agricultural Experiment Station, Idaho Crop Improvement Association, Utah Crop Improvement Association, other plant materials centers and cooperating agencies. Allocation and exchange through written agreements are used to distribute seed. Foundation and early Generation seed of recent releases may be provided to soil conservation districts for Registered, Certified or next Generation seed production under the District Seed Increase Program. Seed for field and demonstration plantings is made available to cooperators through soil and water conservation districts in order to determine proper uses, adaptation, new technology, and to promote and demonstrate the values of new plant releases.

Actions

a. Maintain Breeder, Foundation and early Generation seed of released materials
b. Maintain genetic superiority and characteristics of released materials
c. Release new plant materials
d. Develop techniques for facilitation of commercial production

5. Equipment, Facilities and Personnel

For the PMC to function effectively and efficiently, equipment and facilities must be maintained and upgraded as new technology becomes available. Buildings, farm machinery, greenhouse and research equipment, as well as computer hardware and software, must be maintained and upgraded. Funding for improvements can be difficult to obtain. Because of rapidly changing technology, PMC personnel must continually learn new skills to be effective in developing and transferring new plant science technology.

Needs

- Continue equipment and facility upgrades
- Training opportunities for PMC personnel

Actions

a. Continue cooperative working relationship with South Bingham Soil Conservation District, University of Idaho, and Idaho Department of Fish and Game
b. Maintain facilities and equipment
c. Review needs and make purchases as funds allow
d. Obtain training to keep employees informed and educated in new technology

B. Categories Identified as Medium Priority Needs

Based on current funding and personnel levels, the PMC is not able to assign specific actions to needs categories identified as medium priority. They are listed with the intention that they may be addressed as actions are undertaken to meet high priority needs. While intensive PMC plant development work will not generally be performed for medium priority needs, occasional written materials may be developed to assist with these needs.

1. Pastureland

Pastureland is producing below potential on sites with both good and poor soils and soil situations including low fertility, poor drainage, high sodic or saline conditions, and stony or excessively drained conditions. Improper grazing management, species selection, irrigation, and fertility practices commonly result in lower productivity and loss of more desirable species.

Needs

- Plant materials best suited to intensive grazing on irrigated pastures
- Plant materials for saline soils
- Pasture renovation including no-till
- Pasture and hayland management practices (grazing, fertilization, irrigation)

2. Agroforestry

Many woody species have been tested and their effectiveness is known for agroforestry applications. Design criteria and management for windbreaks is known. Researchers know the beneficial effects of windbreaks on crop quality, and quantity and water use efficiency. The beneficial effects of windbreaks to reduce windborne soils and snow are also well understood. However, there is a continuing need to transfer this knowledge and promote agroforestry practices to land users.

Needs

- Communicate benefits of agroforestry to landowners
- Demonstration/installation of agroforestry practices
- Information on plantation species
- Information on buffer strips including windbreaks and field borders
- Maintain PMC windbreak plots for display and training purposes

3. Sheet and Rill Erosion on Cropland

High intensity rains, rain-on-snow, spring thaw, and runoff cause soil erosion of open cropland fields. The season of greatest erosion is during spring and with summer thunderstorms. Low residue crops, down slope farming, and highly erodible soils contribute to the erosion problem. There is a lack of available information on the application of some practices. Information is needed on the affects of practices on water quality.

Needs

- Economically viable alternative crops to improve rotations
- Information on cover and green manure crops
- Information on buffer practices including windbreaks, field borders, filter strips, riparian buffers, and grassed waterways

4. Wind Erosion on Cropland

Strong winds cause soil erosion of open fields, usually in the spring. Low residue crops and highly erodible soils contribute to the problem. There may be a lack of user-friendly information for landowners on the value of windbreaks and cover crops.

Needs

- Information on cover and green manure crops
- Information on buffer strips including windbreaks and field borders

5. Critical Area Treatment

Large areas of land are disturbed or damaged each year. Many acres are disturbed by practices such as highway, dam, dike, or pond construction and by urban development and mining. Other land is affected by natural events such as landslips, floods, etc. The soils are commonly a composite of rock and mixed soil material or denuded by wind and water erosion. These areas may be very droughty with low water holding capacities, are generally infertile, and may have high levels of calcium, sodium, or other minerals that make establishing vegetation difficult. Seedbed preparation may be very difficult.

Needs

- Information on critical area planting and seeding techniques and species
- Information on bioengineering practices for disturbed land
- Information on chemical and fertilizer soil amendments
- Information on special stabilization techniques to allow establishment of vegetation such as fiber mats, mulches, etc.

VIII. PLANTS RELEASED BY ABERDEEN PLANT MATERIALS CENTER - 2010

Aberdeen Selection Laurel willow, a long-lived, naturalized, tall shrub used primarily in windbreak and ornamental plantings. Released in 1997.

Alkali bulrush - Bear Lake, Bear River, Fort Boise, and Stillwater Selections, a long-lived, native, perennial, aggressively sod-forming grass-like plant that often forms large colonies in wet marshy or shoreline areas. Released in 1997 for MLRAs B and D.

Anatone Selection bluebunch wheatgrass, a long-lived, native, drought tolerant, bunchgrass used in rangeland and other natural area plantings. Released in 2004.

'Appar' blue flax, a short-lived, naturalized, perennial, naturally reseeding forb used on rangeland, mine spoil, highway right-of-way, and ornamental plantings. Released in 1980.

Baltic rush - Railroad Valley, Roswell, Sterling and Stillwater Selections, a long-lived, native, perennial, wiry, aggressively sod-forming grass-like plant that often forms large colonies in semi-wet meadow and saturated areas. Released in 1997 and 1998 for MLRAs B and D.

'Bannock' thickspike wheatgrass, a long-lived, native, very drought tolerant, weakly sod-forming grass used in rangeland and other natural area plantings. Released in 1995.

Clearwater Selection Venus penstemon, a long-lived, native, showy, perennial forb used in rangeland, mine spoil, highway-right-of-way, and ornamental plantings. Released in 1994.

Common threesquare - Fort Boise, Malheur, Market Lake, and Wayne Kirch Selections, a long-lived, native, perennial, aggressively sod-forming grass-like plant that often forms large colonies in semi-wet meadow and saturated areas. Released in 1997 and 1998 for MLRAs B and D.

Creeping spikerush - CJ Strike, Malheur, Mud Lake, and Ruby Lake Selections, a long-lived, native, sod-forming grass-like plant that can be singular or in large colonies in very wet meadows to shallow water areas. Released in 1997 for MLRAs B and D.

'Delar' small burnet; a long-lived, evergreen, perennial forb used primarily in rangeland, disturbed areas, and wildlife plantings. Released in 1981.

'Ephraim' crested wheatgrass, a long-lived, introduced, somewhat drought tolerant, bunchgrass used in critical area plantings for stabilization and erosion control. Released in 1983.

'Goldar' bluebunch wheatgrass, a long-lived, native, somewhat drought tolerant, bunchgrass used in rangeland and other natural area plantings. Released in 1989.

Hardstem bulrush - Camas, Hagerman, Ogden Bay, and Stillwater Selections, a long-lived, native, very tall, aggressively sod-forming grass-like plant that often forms large colonies in very wet shallow water areas. Released in 1997 for MLRAs B and D.

'Magnar' basin wildrye, a long-lived, native, drought tolerant, very large bunchgrass used in herbaceous windbreak, rangeland, and other natural area plantings. Released in 1979.

Maple Grove Selection Lewis flax, a short-lived, native, perennial, naturally reseeding forb used on rangeland, mine spoil, highway right-of-way, and ornamental plantings. Released in 2004.

Nebraska sedge - Centennial, Modoc, Ruby Lake, and Sterling Selections, a long-lived, native, perennial, highly palatable, densely sod-forming grass-like plant found in wet to semi-wet areas. Released in 1997 for MLRAs B and D.

'Nezpar' Indian ricegrass, a long-lived, native, very drought tolerant bunchgrass used for sandy soil stabilization and as winter forage for livestock and wildlife. Released in 1978.

Northern Cold Desert Selection winterfat, a long-lived, low growing, drought and cold tolerant native shrub used in rangeland and other natural area plantings in northern climates. Released in 2001.

'Paiute' orchardgrass, a long-lived, introduced, high producing, highly palatable bunchgrass used primarily in non-irrigated or irrigated pasture plantings above 16 inches rainfall. Released in 1983.

'Recovery' western wheatgrass, a long lived, native, drought tolerant rhizomatous grass used primarily on rangeland and for critical area plantings. Released in 2009.

'Regar' meadow bromegrass, a long-lived, introduced, high vigor, rapid regrowth, highly palatable, mildly sod-forming grass use primarily in non-irrigated or irrigated pasture plantings above 14 inches rainfall. Released in 1966.

Richfield Selection firecracker penstemon, a long-lived, native, drought tolerant, very showy, perennial forb used in rangeland, mine spoil, highway-right-of-way, and ornamental plantings. Released in 1994.

'Rush' intermediate wheatgrass, a long-lived, introduced, high seedling vigor, rapidly growing, high producing, highly palatable, mildly sod-forming grass use in rangeland, non-irrigated, and irrigated plantings above 11 inches rainfall. Released in 1994.

Snake River Plains Selection fourwing saltbush, a long-lived, mid-sized, drought and cold tolerant native shrub used in rangeland and other natural area plantings in northern climates. Released in 2001.

'Sodar' streambank wheatgrass, a long-lived, native, very drought tolerant, sod-forming grass used in critical area, erosion control, rangeland and other natural area plantings. Released in 1954.

'Tegmar' dwarf intermediate wheatgrass, a long-lived, introduced, late maturing, sod-forming grass used in critical area and erosion control plantings. Released in 1968.

'Vavilov II' Siberian wheatgrass, a long-lived introduced, very drought tolerant bunchgrass used primarily on rangeland seedings. Released in 2008.

Discontinued Aberdeen PMC Releases

'P27' Siberian wheatgrass – released in 1953 and discontinued in 2009.

'Pomar' dwarf orchardgrass – released in 1966 and discontinued in 1994.

'Topar' pubescent wheatgrass – released in 1953 and discontinued in 2001.

IX. PMC Business Plan

FOUNDATION SEED PRODUCTION AT ABERDEEN PLANT MATERIALS CENTER

A major responsibility of the Aberdeen Plant Materials Center is the production of Foundation quality seed of the plant releases from the Center. Foundation seed is made available to the University of Idaho Agricultural Experiment Station, Idaho Crop Improvement Association, Utah Crop Improvement Association, other plant materials centers and cooperating agencies. Seed is distributed as provided for by allocation and exchange or other written agreements. Foundation seed of recent releases may also be provided to soil conservation districts for registered or certified seed production under the District Seed Increase (DSI) program.

The following table illustrates seed shipments from the Aberdeen Plant Materials Center for Fiscal year 2003 through 2011:

Cultivar	2003	2004	2005	2006	2007	2008	2009	2010	2011	TOTAL POUNDS
					POUNDS PLS					
Anatone bluebunch wheatgrass	-	20	250	350	400	775	450	155	125	2525
Appar blue flax	65	0	848	955	150	150	200	120	175	2663
Bannock thickspike wheatgrass	25	0	1110	900	240	150	0	0	100	2525
Delar small burnet	0	1250	945	490	100	1225	0	0	300	4310
Ephraim crested wheatgrass	0	200	0	1300	300	500	605	0	0	2905
Goldar bluebunch wheatgrass	250	200	200	170	250	450	300	250	100	2170
Magnar basin wildrye	150	245	0	0	490	50	0	50	0	985
Maple Grove lewis flax	-	240	280	70	-	-	-	0	0	590
Nezpar Indian ricegrass	340	0	300	500	700	150	100	0	0	2090
P-27 Siberian wheatgrass [1/]	0	0	0	0	200	200	0	-	-	400
Clearwater selection penstemon	10	4	8	0	0	0	1	4	20	47
Richfield selection penstemon	6	3	11	25	6	4	11	9	5	80
Paiute orchardgrass	0	0	0	75	200	50	300	0	0	625
Recovery western wheatgrass	-						400	0	450	850
Regar meadow brome	50	50	0	650	50	400	0	50	100	1350
Rush intermediate wheatgrass	0	0	800	300	500	0	0	0	0	1600
S.R.P. fourwing saltbush	5	2	16	0	0	0	0	0	0	23
Sodar streambank wheatgrass	200	0	625	775	250	400	50	0	0	2300
Tegmar dwarf intermediate wheatgrass	0	200	0	0	0	0	250	250	150	850
Northern Cold Desert winterfat	3	8	20	5	4	0	0	2	0	42
Vavilov II Siberian wheatgrass	-	-	-	-	-	600	300	635	320	1855
TOTAL POUNDS	1,104	2,422	5,413	6,565	3,840	5,104	2,967	1,525	1,845	30,785

[1/] Release discontinued in 2009.

March 24, 2011

Aberdeen Plant Materials Center

2011 FIELD ANNUAL PLAN OF OPERATION
HOME FARM

Field	Acres	Crop	Operation
1	1.7	Display Nursery (2007)	Manage for display. Plant data to be collected for CEAP/ALMANAC.
2E	1.3	Sandberg Bluegrass (2009) (Yellowstone NP)	Manage for seed production.
2W	1.0	Dusty Maiden (2010) Tansy Aster (2010)	Manage for Certified seed production and release.
3	1.8	Anatone Bluebunch (2005)	Manage for Certified seed production.
4	1.4	Constructed Wetland Ponds	Establish test plots according to study plan.
5	2.4	Potatoes	U of I will plant potatoes.
6	2.4	Green Manure	Establish Austrian pea for plow down.
7	3.2	Anatone (2009)	Manage for Certified seed production.
8	3.2	Green Manure	Establish late summer cover crop for plow down.
9	3.2	Green Manure	Establish wheat cover crop for plow down.
10	3.2	Recovery (2010)	Manage for Certified seed production.
11N	1.1	Maple Grove (2008)	Manage for Certified seed production.
11S	0.2	Prairie Clover (2009)	Managed for Certified seed production and release.
12	1.4	Buckwheat IEP (2007)	Evaluate and manage according to study plan.
		Fallow	fallow as needed for weed control.
13N	0.1	Penstemon (2003)	Maintain for pollinator habitat.
13S	0.25	Fallow	fallow as needed for weed control.
14	1.2	Woody Display Nursery (1995)	Maintain display of woody conservation plants. Manage Durar/Covar cover crop.
14S	0.3	Nevada Bluegrass IEP (2010)	Evaluate and manage according to study plan.

Aberdeen Plant Materials Center

2010 FIELD ANNUAL PLAN OF OPERATION

HOME FARM (Continued)

Field	Acres	Crop	Operation
15	1.4	Field windbreak (2000)	Maintain Simon poplar field windbreak.
16	1.0	Squirreltail ICST (2009)	Evaluate according to study plan.
17	0.5	Hybrid Poplars (1998)	Manage for long term survival evaluation.
18-19	0.9	Fourwing and winterfat (1999)	Manage for Certified seed production.
20	1.5	Fallow	Fallow for new grass display nursery in 2012.

Aberdeen Plant Materials Center

2011 FIELD ANNUAL PLAN OF OPERATION

FISH AND GAME FARM

Field	Acres	Crop	Operation
21W	0.2	Fallow	Fallow as needed for weed control.
21W	0.3	Idaho Fescue (Grand Teton NP – 2008)	Manage for seed production.
21M	1.3	Maple Grove (2010)	Manage for Certified seed production.
21E	1.4	Pipe yard (2004)	Maintain permanent yard for pipe storage.
21N	1.3	Bozoisky Cover crop (1985)	Maintain as needed for permanent cover.
22W	4.1	Alfalfa (2008)	Manage for hay production and wildlife benefits.
22E	1.3	Willow IEP (1984)	Maintain for wildlife cover.
23W	2.4	Bozoisky Cover crop (2007)	Maintain as needed for permanent cover.
23M	--	Windbreak	Maintain and irrigate as needed.
23E	2.2	Green Manure	Establish late summer cover crop for plow down.
24W	1.1	Windbreaks	Maintain and irrigate as needed.
24 M	2.2	Wildlife Food Plot	Establish and maintain sorghum for wildlife use.
24E	1.5	Wildlife Food Plot	Establish and maintain millet for wildlife use.
25W	1.5	Wildlife Food Plot	Establish and maintain millet for wildlife use.
25E	3.5	Goldar (2009)	Establish and manage for Foundation seed production.
26W	1.0	Bozoisky Cover crop (2005)	Maintain as needed for permanent cover.
26E	2.7	Willow Cutting Nursery (1994)	Maintain as needed.
27W	2.2	Bozoisky Cover crop (2005)	Maintain as needed for permanent cover.
27M	1.2	Bozoisky Cover crop (2007)	Maintain as needed for permanent cover.
27E	1.0	Wildlife Food Plot	Establish and maintain wheat for wildlife use.
28W	1.0	Wildlife Food Plot	Establish and maintain wheat for wildlife use.
28E	2.5	Pollinator Plot	Establish pollinator display planting.
29W	1.3	Willows (1994)	Manage for cuttings.
29E	3.7	Alfalfa (2008)	Manage for hay production and wildlife benefits.

Aberdeen Plant Materials Center

2011 FIELD ANNUAL PLAN OF OPERATION
FISH AND GAME FARM (continued)

Field	Acres	Crop	Operation
30W	0.7	Windbreak	Maintain and irrigate as needed.
30E	4.8	Alfalfa (2010)	Establish and manage for hay and wildlife benefits.
31W	1.5	Alfalfa (2010)	Establish and manage for hay and wildlife benefits.
31E	3.75	Western w.g. (2005)	Maintain for wildlife cover.
32	6.2	Windbreak IEP (1982)	Maintain as needed.

Any hay grown will not be cut prior to June 15 and not after September 1. Hay will be irrigated after last cut to first fall frost to achieve regrowth prior to winter dormancy.

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

BREWINGTON FARM (U of I)

Field	Acres	Crop	Operation
410M	1.0	Bluebunch Wheatgrass (2009) (Yellowstone NP)	Manage for seed production.
410E	1.0	Needleandthread (2009) (Yellowstone NP)	Manage for seed production.

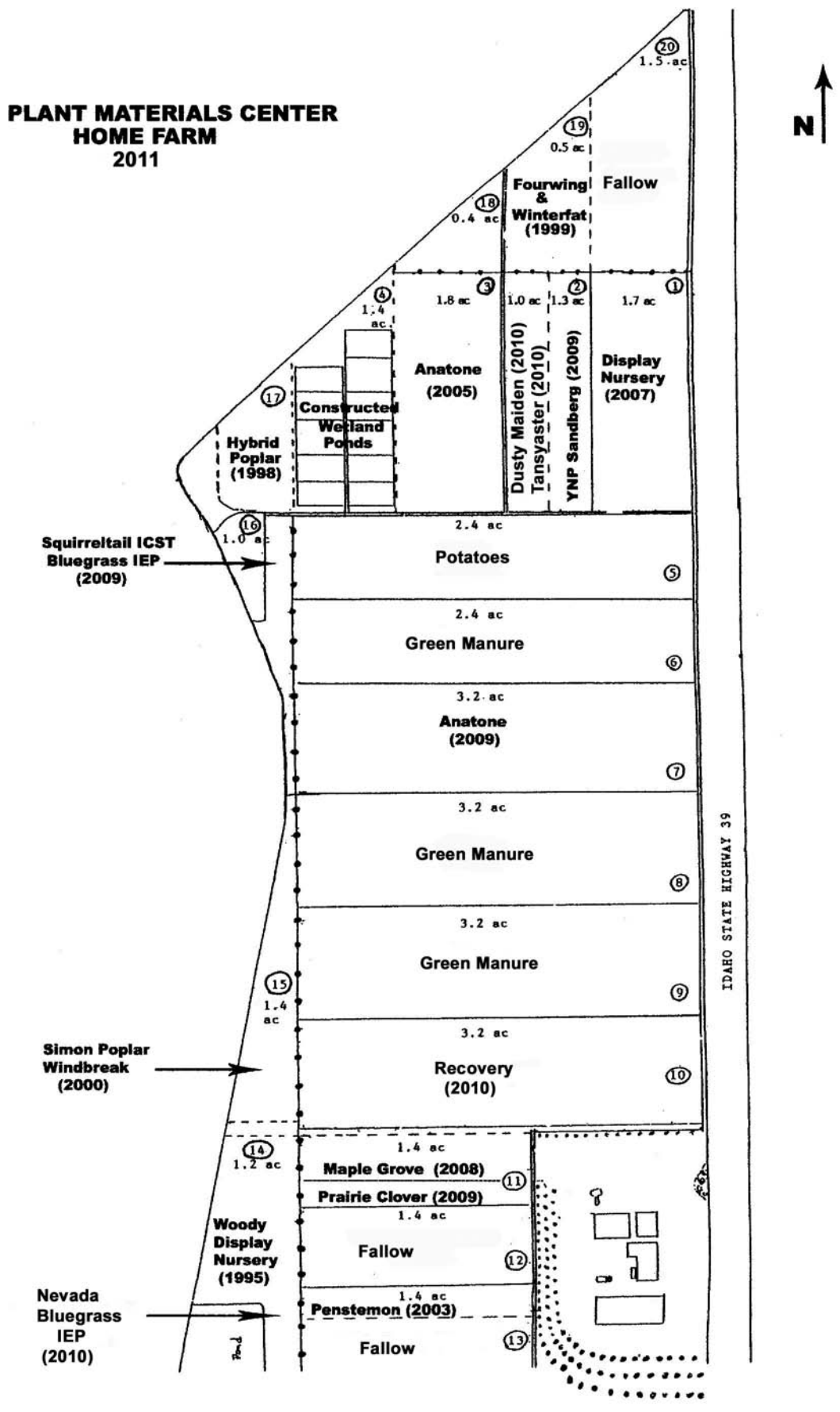
Aberdeen Plant Materials Center

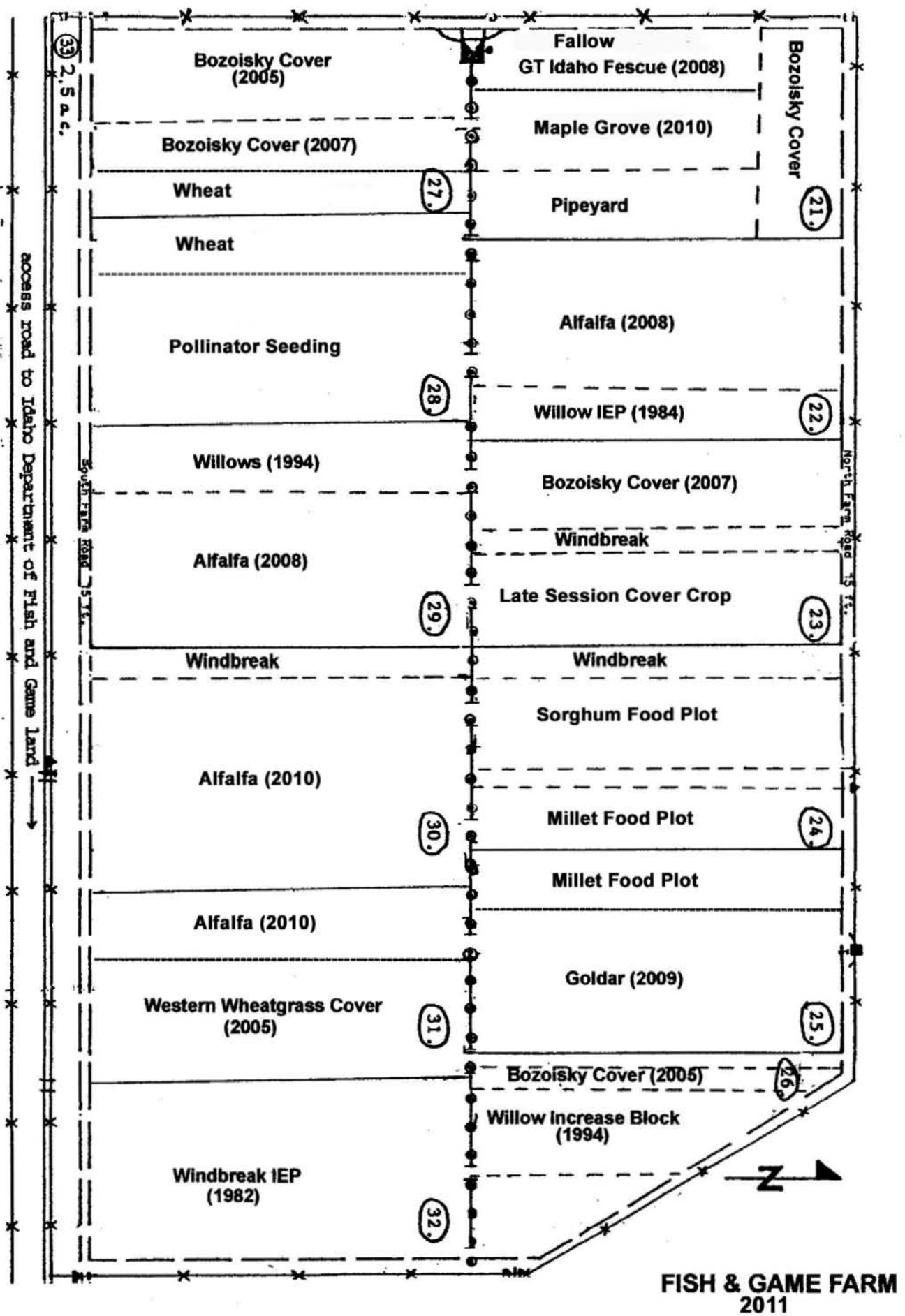
2011 FIELD ANNUAL PLAN OF OPERATION (continued)

PEARL FARM

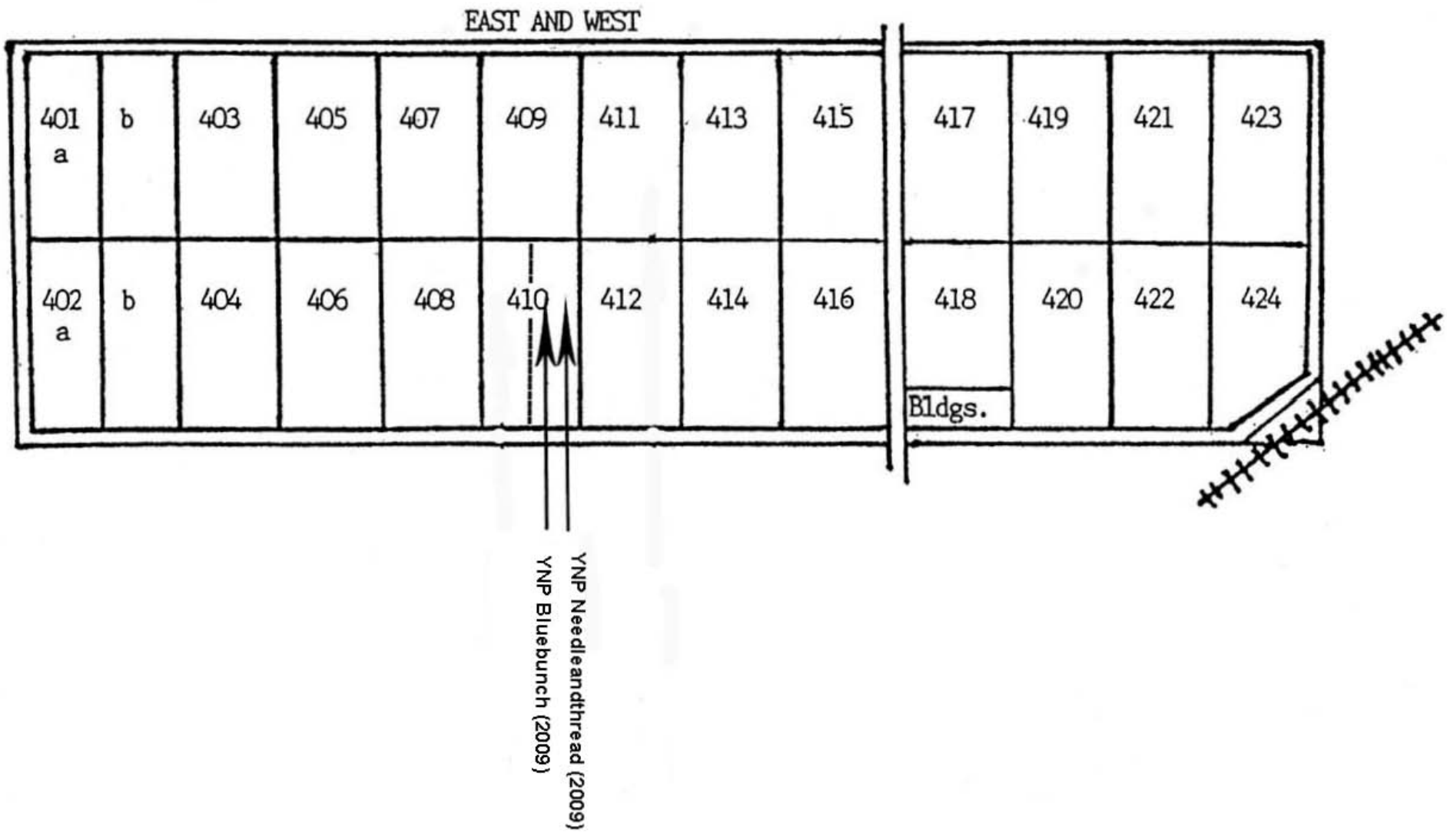
Field	Acres	Crop	Operation
P1	5.0	Alfalfa (2006)	Maintain for hay production and to improve soil quality.
P2	5.0	Alfalfa (2006)	Maintain for hay production and to improve soil quality.
P3	5.0	Alfalfa (2006)	Maintain for hay production and to improve soil quality.
P4	2.0	Green Manure	Establish wheat cover crop for plow down.
P5W	2.5	Alfalfa (2007)	Maintain for hay production and to improve soil quality.
P5E	2.5	Fallow	Fallow for weed control.
P6W	2.5	Green Manure	Establish wheat cover crop for plow down.
P6E	2.5	Fallow	Fallow for weed control.
P7W	2.5	Mountain Brome (2010) (Grand Teton NP)	Manage for seed production.
P7E	2.5	Green Manure	Establish wheat cover crop for plow down.
P8	2.2	Green Manure	Establish wheat cover crop for plow down.

Maintain two-row windbreak (Rocky Mountain Juniper and Simon Poplar established on south and west farm borders.

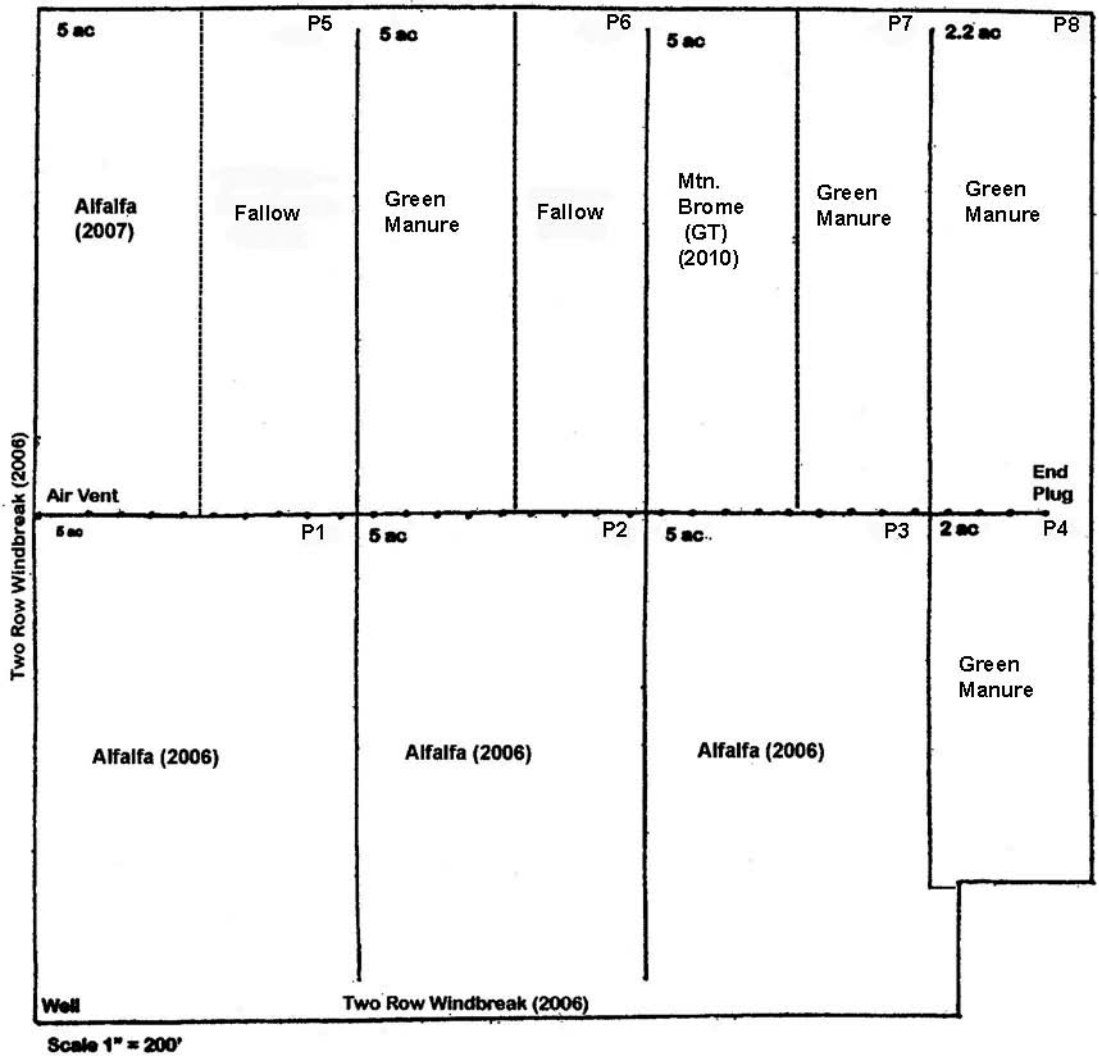

PLANT MATERIALS CENTER
HOME FARM
2011
N
20
1.5 ac
19
0.5 ac
Fallow
Fourwing & Winterfat (1999)
18
0.4 ac
4
1.4 ac
3
1.8 ac
1.0 ac
2
1.3 ac
1
1.7 ac
Anatone (2005)
Dusty Maiden (2010) Tansyaster (2010)
YNP Sandberg (2009)
Display Nursery (2007)
17
Constructed Wetland Ponds
Hybrid Poplar (1998)
16
1.0 ac
2.4 ac
Potatoes
5
Squirreltail ICST Bluegrass IEP (2009)
2.4 ac
Green Manure
6
3.2 ac
Anatone (2009)
7
3.2 ac
Green Manure
8
3.2 ac
Green Manure
9
15
1.4 ac
3.2 ac
Recovery (2010)
10
Simon Poplar Windbreak (2000)
14
1.2 ac
1.4 ac
Maple Grove (2008)
11
Prairie Clover (2009)
1.4 ac
Fallow
12
Woody Display Nursery (1995)
1.4 ac
Penstemon (2003)
Fallow
13
Nevada Bluegrass IEP (2010)
Pond
IDAHO STATE HIGHWAY 39


33
2.5 a.c.
Bozoisky Cover (2005)
Fallow
GT Idaho Fescue (2008)
Bozoisky Cover
Maple Grove (2010)
Bozoisky Cover (2007)
Wheat
27.
Pipeyard
21.
Wheat
Alfalfa (2008)
Pollinator Seeding
28.
Willow IEP (1984)
22.
Willows (1994)
Bozoisky Cover (2007)
South Farm Road 15 ft.
North Farm Road 15 ft.
Windbreak
Alfalfa (2008)
Late Session Cover Crop
29.
23.
Windbreak
Windbreak
Sorghum Food Plot
Alfalfa (2010)
Millet Food Plot
30.
24.
Millet Food Plot
Alfalfa (2010)
Goldar (2009)
Western Wheatgrass Cover (2005)
31.
25.
Bozoisky Cover (2005)
26.
Willow Increase Block (1994)
Windbreak IEP (1982)
32.
access road to Idaho Department of Fish and Game land
N
FISH & GAME FARM
2011

UNIVERSITY OF IDAHO
BREWINGTON FARM (2011)



PLANT MATERIALS CENTER
PEARL FARM
2011



Project Title: Cooperative Work between the Great Basin Native Plant Selection and Increase Project and the Aberdeen Plant Materials Center

Project: USDA-NRCS Plant Materials Center Aberdeen, ID

Principal Investigators and Contact Information:

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Project Description:

1. Production of Certified Generation 1 (G1) seed of Anatone Germplasm bluebunch wheatgrass to facilitate commercial seed production.
2. Assist in re-establishment of native plant diversity in crested wheatgrass monocultures of the Great Basin and equipment and strategies to enhance the post-wildfire establishment and persistence of Great Basin native plants.
3. Propagation of native forbs for evaluation and seed increase.

Seed Production

Due to the high demand for Anatone bluebunch wheatgrass Certified stock seed, the Aberdeen Plant Materials Center (PMC) increased acreage of seed production from 1.0 acre to 5.2 acres in 2007. The following table shows acres of seed production, production yields and Certified seed shipped to commercial growers from 2007 to 2010.

Year	Acres in seed production	Seed Yield (pounds)	Seed Shipped(pounds)
2007	5.2	1384	400
2008	4.2	478	775
2009	7.4	280	450
2010	5.0	896	155

Re-establish native plant diversity in crested wheatgrass monocultures of the Great Basin and equipment and strategies to enhance the post-wildfire establishment and persistence of Great Basin native plants

In 2008, seeding trials were planted near Elko, Nevada in cooperation with the University of Nevada Extension Service and near Aberdeen, Idaho in cooperation with the USDA-ARS Sheep Experiment Station. Modifications were made to a Truax Rough Rider range drill and a Kemmerer range drill to broadcast and drill seed in the same pass with alternate rows of broadcast and drill seeding. The PMC prepared the seed mixes and planted the sites in late October and early November, 2008. The following tables list the mixes for each site:

South Fork, NV 2008
Broadcast Mix
12.5 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Mtn. Home Sandberg bluegrass	0.75	0.92
Appar blue flax	0.75	0.83
Eagle western yarrow	0.20	0.45
Wyoming big sagebrush	0.20	1.31
Spiny hopsage	0.50	1.37
Rice Hulls		8.88

South Fork, NV 2008
Drill Mix
12.5 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Nezpar Indian ricegrass	2.00	2.03
Toe Jam Cr. B. squirreltail	2.00	2.26
Needleandthread	2.00	3.21
Magnar basin wildrye	2.00	2.10
Secar Snake River wheatgrass	1.00	1.08
Munro globemallow	0.50	0.76
Rice Hulls		2.32

Grandview, ID 2008
Broadcast Mix
12.90 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Maple Grove Lewis flax	0.40	0.43
Mtn. Home Sandberg bluegrass	0.20	0.24
Royal Penstemon	0.40	0.56
Wyoming big sagebrush	0.05	0.29
Rubber rabbitbrush	0.15	1.01
Rice Hulls		7.29

Grandview, ID 2008
Drill Mix
12.90 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Anatone bluebunch wheatgrass	3.20	3.60
Magnar basin wildrye	0.80	1.04
Bannock thickspike wheatgrass	0.60	0.74
Thurber's needlegrass	0.60	0.99
Rice Hulls		7.29

The second year of seeding trials was completed at the Grandview site in cooperation with the USDA-ARS Sheep Experiment Station in 2009. The following seed mixes were prepared and the plots were planted November 2-3.

Grandview, ID 2009
Broadcast Mix
12.90 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Maple Grove Lewis flax	0.40	0.44
Mtn. Home Sandberg bluegrass	0.20	0.22
Royal Penstemon	0.40	0.50
Wyoming big sagebrush	0.05	0.25
Rubber rabbitbrush	0.15	1.20
Rice Hulls		7.11

Grandview, ID 2009
Drill Mix
12.90 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Anatone bluebunch wheatgrass	3.20	3.60
Magnar basin wildrye	0.80	0.85
Bannock thickspike wheatgrass	0.60	0.67
Thurber's needlegrass	0.60	0.94
Rice Hulls		6.40

Seed was mixed and seedings were completed October 25-29, 2010 at Black Butte, Idaho and at Southfork, Nevada.

Black Butte, ID 2010
Cover Crop Mix
20.00 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Rimrock Indian ricegrass	3.69	4.03
Anatone bluebunch wheatgrass	4.01	5.17
Rice Hulls		6.06

Drill Mix
44.2 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Anatone bluebunch wheatgrass	1.97	2.46
Bottlebrush squirreltail	0.99	1.02
Rimrock Indian ricegrass	1.82	1.88
Needleandthread	1.01	1.30
Thurbers needlegrass	0.82	1.48
Basalt milkvetch	0.45	0.50
Munro globemallow	0.61	1.00
Rice Hulls		0.26

10X Broadcast Mix
5.20 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	0.94	3.30
Rubber rabbitbrush	0.40	0.98
Sandberg bluegrass	0.39	0.47
Eagle yarrow	0.15	0.16
Royal penstemon	0.12	0.21
Rice Hulls		6.44

5X Broadcast Mix
33.8 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	0.46	1.62
Rubber rabbitbrush	0.40	0.98
Sandberg bluegrass	0.39	0.47
Eagle yarrow	0.15	0.16
Royal penstemon	0.12	0.21
Rice Hulls		8.67

Standard Broadcast Mix

5 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Wyoming big sagebrush	0.09	0.33
Rubber rabbitbrush	0.39	0.96
Sandberg bluegrass	0.38	0.46
Eagle yarrow	0.14	0.15
Royal penstemon	0.12	0.21
Rice Hulls		5.60

South Fork, NV 2010
Broadcast Mix

12.5 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Mtn. Home Sandberg bluegrass	0.75	0.85
Appar blue flax	0.75	0.93
Eagle yarrow	0.20	0.22
Wyoming big sagebrush	0.20	1.20
Spiny hopsage	0.50	1.30
Rice Hulls		9.26

Drill Mix

12.5 acres

Species	Pounds PLS/ac	Pounds Bulk Seed/ac
Nezpar Indian ricegrass	2.00	2.15
Toe Jam Cr. b. squirreltail	2.00	2.17
Needleandthread	2.00	2.53
Magnar basin wildrye	2.00	2.07
Secar Snake River wheatgrass	1.00	1.32
Munro globemallow	0.50	0.69
Rice Hulls		2.83

Maintenance of forb seed increase plots

The original project plan in 2005 was to propagate 8,000 plants total of *Lomatium dissectum* (LODI) fernleaf biscuitroot, *Lomatium grayii* (LOGR) Grays biscuitroot, *Lomatium triternatum* (LOTR) nineleaf biscuitroot, *Eriogonum umbellatum* (ERUM) sulphurflower buckwheat, *Penstemon deustus* (PEDE) hotrock penstemon, *Penstemon acuminatus* (PEAC) sharpleaf penstemon, and *Penstemon speciousus* (PESP) sagebrush penstemon in the greenhouse. Approximately 1000 plants each of ERUM and LOTR were to be transplanted at the PMC and remaining plants were to be made available to cooperators for transplanting at field locations.

Due to no plant establishment of *Lomatium* species and minimal success with greenhouse propagation of *Penstemon* species, no plants were made available to cooperators. All plants that were successfully propagated in the PMC greenhouse were transplanted at the PMC during the 2005 growing season and direct dormant seeding of *Eriogonum*, *Lomatium* and *Penstemon* accessions were completed at the PMC in November 2005. Weed barrier fabric was installed to control weeds.

2007 Activities

On May 8, 2007 the biscuitroot and sulphurflower buckwheat plots were treated with a wick application of 100 percent Roundup to control weeds and on June 18 the plots were hand weeded. On June 20, 2007 survival counts were made and seed was harvested at seed ripeness and the results are shown in the following table:

Species	Survival (percent)	Clean seed (pounds)
ERUM	40	4.0
LODI	25	NA
LOGR	70	NA
LOTR	71	NA
PEAC	68	8.0
PEDE	58	19.0
PESP	60	0.7

By early July, the *Lomatium* species were completely dormant. None of the *Lomatium* plants had yet developed flowers. It is thought that most of their energy was going into the development of the tap root. In early November 2007 the dormant *Lomatium* plots were treated with a spray application of Roundup to control weeds that were still green. PEAC (a short-lived species) was beginning to die out.

2008 Activities

On May 15, 2008 the sulphurflower buckwheat plots were treated with a wick application of 100 percent Roundup to control weeds and on June 10-11 all plots were hand weeded. The following table shows harvest date and seed yield for the accessions that were harvested:

Species	Harvest Date	Clean seed (pounds)
ERUM	8/13	12.6
LODI	NA	NA
LOGR	NA	NA
LOTR	7/3	2.6
PEAC	NA	NA
PEDE	NA	NA
PESP	8/8	1.5

By early July, the *Lomatium* species were completely dormant. The only *Lomatium* to flower and set seed was LOTR. LODI and LOGR have yet to flower after 3 years of establishment. It was thought that most of their energy was still going into the development of the tap root. In early November 2008 the dormant *Lomatium* plots were treated with a spray application of Roundup to control weeds that were still green. PEAC and PEDE (short-lived species) had died out to the point that no seed was harvested in 2008.

The USDA-FS Rocky Mountain Research Station in Boise, Idaho cleaned the seed that was harvested from the plots. Some of the seed was utilized for the seeding trial conducted at Snowville, Utah for the Equipment and Strategies to Enhance the Post-wildfire Establishment and Persistence of Great Basin Native Plants study.

2009 Activities

Weeds were controlled by hand during 2009. ERUM was harvested mostly by combine but was followed by hand harvesting. The plots of the other species were harvested by hand. LODI and LOGR finally produced seed in 2009, the fourth year of establishment. PESP was the only penstemon accession still surviving, the others being short-lived. The following table shows harvest date and seed yield for the accessions that were harvested in 2009:

Species	Harvest Date	Clean seed (pounds)
ERUM	8/4	11.3
LODI	7/1	1.3
LOGR	7/1	0.9
LOTR	7/1	4.5
PEAC	NA	NA
PEDE	NA	NA
PESP	8/8	0.4

By early July, the *Lomatium* species were completely dormant. In early October 2009 the dormant *Lomatium* plots were treated with a spray application of Roundup to control weeds that were still green.

The USDA-FS Rocky Mountain Research Station in Boise, Idaho cleaned the ERUM seed that was harvested from the plots. Some of the seed was utilized for the seeding trial planted near Aberdeen, Idaho ID in November, 2009 for the study to improve the diversity of introduced grass stands.

2010 Activities

Weeds were controlled by hand during 2010. The penstemon plots had all died out by 2010. The remaining plots were harvested with the PMC jet harvester. The following table shows harvest date and seed yield for the accessions that were harvested in 2010:

Species	Harvest Date	Clean seed (pounds)
ERUM	8/5	5.0 (estimated)
LODI	7/13	2.0 (estimated)
LOGR	7/13	1.5 (estimated)
LOTR	7/13	1.5 (estimated)

Harvested seed was sent to the USDA-FS Rocky Mountain Research Station in Boise, Idaho in September, 2010. The plots were removed after the end of the 2010 growing season.

Relevant Publications

(Available online at http://plant-materials.nrcs.usda.gov/idpmc/publications.html)

St. John, L, Cornforth, B., Simonson, B., Ogle, D. and D. Tilley. 2008. Technical Note 20: Calibrating the Truax Rough Rider Drill for Restoration Plantings. Aberdeen Plant Materials Center, Aberdeen, ID. Revised April, 2008. 14p.

St. John, L., D. Ogle, and N. Shaw. 2009. Hotrock Penstemon Plant Guide. Aberdeen Plant Materials Center, Aberdeen, ID. January 8, 2009. 3p.

St. John, L., D. Ogle, and N. Shaw. 2009. Sharpleaf Penstemon Plant Guide. Aberdeen Plant Materials Center, Aberdeen, ID. January 20, 2009. 3p.

St. John, L. 2008. Equipment Strategies to Enhance the Post-Wildfire Establishment and Persistence of Great Basin Native Plants. Aberdeen Plant Materials Center, Aberdeen, ID. October 2, 2008. 4p.

St. John, L., and D. Ogle. 2009. Great Basin Native Plant Selection and Increase Project - 2008 Annual Report. Aberdeen Plant Materials Center, Aberdeen, Idaho. February 27, 2009. 15p.

St. John, L. and D.G. Ogle 2009. Technical Note No. 16 Green Strips or Vegetative Fuel Breaks. Aberdeen Plant Materials Center, Aberdeen, Idaho. March 5, 2009. 16p.

Tilley, D.J. and L. St. John 2006. Orchard Display Nursery Evaluation Summary (2005-2008) Final Report. Aberdeen Plant Materials Center, Aberdeen, ID. October 15, 2008. 9p.

Tilley, D.J., Ogle, D., St. John, L. and N. Shaw. 2008. Royal Penstemon Plant Guide. Aberdeen Plant Materials Center, Aberdeen, ID. October 6, 2008. 3p.

Presentations

Date: 1/26/2010

Title: Aberdeen PMC report of Activities 2009: Great Basin Native Plant Selection and Increase project

Presenter: Loren St. John

Location: Salt Lake City, UT

Management Applications

1. Certified seed stock of Anatone bluebunch wheatgrass, produced by the PMC is available though the University of Idaho Foundation Seed Program and Utah Crop Improvement Association.

2. Based on propagation studies at the PMC, sulphurflower buckwheat, hotrock penstemon, sagebrush penstemon and sharpleaf penstemon can be commercially grown, at least with the use of weed barrier fabric. Lomatium species appear to require a number of years (3 - 4) to mature to reproductive stage under the climatic conditions at Aberdeen, Idaho and may not be conducive to commercial production because of the long period to reach reproductive capability.

3. The Truax Rough Rider drill performs well in seeding studies and should be used for large scale seedings.

Products

1. Certified seed stock of Anatone bluebunch wheatgrass produced by the PMC is available though the University of Idaho Foundation Seed Program and Utah Crop Improvement Association

2. Seed of sulphurflower buckwheat that were produced from the propagation studies were used in the seed mixtures for the study to improve the diversity of introduced grass stands. Seed of the *Lomatium* species and *Penstemon speciousus* was made available to cooperators for seeding trials.

3. Plant Guides are available for Royal penstemon, Hotrock penstemon and Sharpleaf penstemon.

GRAND TETON NATIONAL PARK

FY2010 Annual Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION - The Aberdeen Plant Materials Center (PMC) entered into an interagency agreement with Grand Teton National Park (GTNP) in 2006 to produce seed of four native grasses for use in revegetation of disturbed areas following road construction. Seed fields of slender wheatgrass (*Elymus trachycaulus*), Sandberg bluegrass (*Poa secunda*), blue wildrye (*Elymus glaucus*) and mountain brome (*Bromus marginatus*) were planted in 2006, and seed was harvested in 2007 and 2008. New fields of Idaho fescue (*Festuca idahonensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) were planted in May, 2008. Seed from these fields were harvested in 2009 and 2010. In 2010, a new field of mountain brome was planted for seed production in 2011 and 2012.

ACCOMPLISHMENTS – Mountain brome (2.5 acres) was planted June 10, 2010 in field P7W, Pearl Farm. Soil at the Pearl Farm is Kimama silt loam with a pH of 7.4 to 9.0. Average annual precipitation is 9.39 inches and seed fields are sprinkler irrigated to supplement natural precipitation to approximate 18 to 20 inches of total annual moisture. Weeds were controlled during the growing season. The following table lists all species grown for GTNP, field acreage, current seed inventory and seed shipped during 2010.

Species	Harvest year	Field size (ac)	Inventory PLS pounds	Lbs. shipped 2010	Seed Test date
Idaho fescue	2010	0.3	82.8		3/21/11
Idaho fescue	2009	0.3	0	8.76	3/20/09
Bluebunch wht.g.	2010	0.17	1.57		3/21/11
Bluebunch wht.g.	2009	0.17	0	0.4	5/27/10
Slender wht.g.	2009	1.0	489.8		5/17/10
Slender wht.g.	2008	1.0	415.2		4/14/09
Slender wht.g.	2007	1.0	567.9	300	3/20/08
Sandberg b.g.	2009	0.25	4.1		6/4/10
Sandberg b.g.	2007	0.25	2.98		3/19/09
Blue wildrye	2008	2.7	389.2		4/22/09
Blue wildrye	2007	2.7	699.3		3/10/08

DIGITAL PHOTOS

Grand Teton National Park bluebunch wheatgrass seed increase field at Aberdeen PMC. June, 2010.

Grand Teton National Park Idaho fescue seed increase field at Aberdeen PMC. June 2010.

Grand Teton National Park mountain brome seed increase field at Aberdeen PMC. September, 2010.

YELLOWSTONE NATIONAL PARK - WETLAND PLANT PROPAGATION

FY2010 Annual Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION - In 2008, the Natural Resources Conservation Service (NRCS), Aberdeen, Idaho Plant Materials Center (PMC) entered into an interagency agreement with the National Park Service (NPS), Yellowstone National Park (YNP) to propagate and deliver approximately 35,000 wetland plants in 10 cubic inch conetainers. Delivery will take place over a three year period (targeting approximately 12,000 plants per year) beginning in the fall of 2009. Species to be grown include *Carex aquatilis*, *C. microptera*, *C. rostrata*, *C. utriculata*, *Juncus ensifolius*, and *Deschampsia caespitosa*. Seed for propagation is provided from YNP collections stored at the Bridger, Montana PMC.

ACCOMPLISHMENTS – The following table outlines the number of plants requested, greenhouse planting date, survival and number of plants delivered to YNP:

Species	Requested #	# Planted	Planting Date	# Delivered	% Survival
Deschampsia caeaspitosa	3,038	3,430	3/30/10	3,360	98
Calamagrostis canadensis	1,960	2,156	3/30/10	2,054	95
Carex rostrata	2,058	2,744	4/1/10	2,733	99
Carex aquatilis	4,998	5,880	4/14/10	5,880	100
Juncus ensifolious (2009 planting)	2,000	2352	5/26/09	1,274	54
Total	14,054	16,562		15,301	92

TECHNOLOGY DEVELOPMENT – *Deschampsia caeaspitosa, Calamgrostis canadensis, and Carex aquatilis* were direct seeded into conetainers with no pre-treatment of the seed. The *Juncus* and *Carex rostrata* seed was stratified in a "sphagnum moss tea" at 5º C for 14 days and 40 days respectively prior to planting. All seed was surface planted, and pressed into soil surface to maximize seed-to-soil contact. Irrigation was by overhead spray with water applied 2 minutes every hour from 9 am to 6 pm daily. Supplemental lighting was provided from 8 pm to 8 am each day until May 18. Plants were fertilized with liquid Miracle Grow® once weekly from May 6 – June 24. Greenhouse temperature were kept at 90 -100º F. The plants were delivered to planting site at YNP on July 22. A new planting of *Juncus ensifolious* (3,038 conetainers) was started in greenhouse wetland tanks on August 23 for delivery in 2011.

DIGITAL PHOTOS

Calamgrostis canadensis for Yellowstone National Park.
July 19, 2010

Wetland planting along Gibbon River, Yellowstone National Park
September 15, 2010.

YELLOWSTONE NATIONAL PARK – GRASS SEED PRODUCTION

FY2010 Annual Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
PLANT MATERIALS CENTER
ABERDEEN, IDAHO

INTRODUCTION - In 2008, the Natural Resources Conservation Service (NRCS), Plant Materials Center (PMC), Aberdeen, Idaho entered into an interagency agreement with the National Park Service (NPS), Yellowstone National Park (YNP) to produce seed of Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and needleandthread (*Hesperostipa comata* ssp. *comata*) for use on restoration sites at YNP. Seed will be harvested from these fields in 2010 and 2011 with possible extension to 2012.

ACCOMPLISHMENTS - The seed fields were planted in spring 2009. Sandberg bluegrass was planted in field 2E at the PMC Home Farm and the bluebunch wheatgrass and needleandthread were planted in field 410E at the University of Idaho Brewington Farm. Each seed increase block is approximately 1 acre. Soils at the PMC Home Farm are Declo silt loam with pH of 7.4 to 8.4. Soils at the Brewington Farm are also classified as Declo loam but these soils have a high percentage of sand. Average annual precipitation is 9.39 inches and seed fields are sprinkler irrigated to supplement natural precipitation to approximate 18 to 20 inches total annual precipitation. Establishment of the seed production fields were rated fair to good.

In early to mid-April, 2010 broadleaf weeds started emerging in the needleandthread and bluebunch wheatgrass fields. These fields were sprayed on April 19 with 2, 4-D at a rate of 32 oz./ac (standard rate used on all fields). The weather cooled to below normal temperatures in the latter half of April so no irrigation water was applied. The weather finally warmed to normal temperatures in early May and irrigation was started on the fields May 13. On May 27 signs of chemical damage were observed in the fields. The University of Idaho Extension Weed Specialist was asked to evaluate the fields and determine cause of the chemical damage. Her conclusions were that there might have been several factors that occurred separately or in combination. 1) We might have used a bad batch of spray tank cleaner the previous fall that did not neutralize the herbicides used the previous fall. 2) The cool, dry weather following herbicide application may have caused the herbicide to sit on the plants without the plants metabolizing the herbicide. When irrigation started and temperatures warmed up, the plants took up the herbicide more rapidly than usual

As a result of the herbicide damage, no seed harvest was made from the bluebunch wheatgrass. A bale of needleandthread hay containing seed and weighing 195 pounds was harvested and delivered to YNP in September, 2010. The Sandberg bluegrass (which was not sprayed in April) produced 58.76 PLS pounds of seed. The bluebunch wheatgrass and needleandthread fields recovered from the herbicide damage by late summer and should produce seed in 2011.

DIGITAL PHOTOS

Herbicide damage on bluebunch wheatgrass. May 27, 2010.

Herbicide damage on needleandthread. May 27, 2010.

Bluebunch wheatgrass recovering from herbicide damage. July 22, 2010.

Needleandthread recovering from herbicide damage. July 22, 2010.

Bluebunch wheatgrass. September 30, 2010

Needleandthread. September 30, 2010.

Sandberg bluegrass. September 30, 2010.

Native Buckwheat Initial Evaluation Planting

2011 Progress Report

Study Number: IDPMC-P-0815-RA
Derek J. Tilley, PMC Agronomist
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Sulphurflower buckwheat (*Eriogonum umbellatum*) (left) and whorled or Wyeth buckwheat (*E. heracleoides*) (right). Photos by Derek Tilley.

Introduction

Buckwheat species have been identified as top priority half-shrub species with high potential for use in range and wildlife plantings. Buckwheat species attract a rich variety of pollinators and other insects, which are also valuable to sage grouse recovery efforts. Buckwheat species are utilized in the xeriscaping market and have potential for roadside beautification and diversification projects. The goal of this study is to identify one or more superior sulphurflower (*Eriogonum umbellatum*) and/or whorled or Wyeth (*E. heracleoides*) buckwheat accession(s) adapted for use in the Aberdeen PMC service area.

Materials and Methods

The Aberdeen, Idaho Plant Materials Center (IDPMC) assembled 39 collections of buckwheat, *Eriogonum* spp. from Idaho, California, Oregon and Wyoming (appendix 1). Collections were made primarily by NRCS employees from Idaho, but collections were also received from the Lockeford, California NRCS Plant Materials Center, Oregon NRCS, Craters of the Moon National Monument and Preserve (USDI - NPS), Bridger Teton National Forest (USDA - FS), Rocky Mountain Research Station (USDA - FS), Western Regional Plant Introduction Station and one private seed company (Comstock Seed, Gardnerville, Nevada). Of the 39 accessions, 21 were included in the 2007 initial evaluation planting (IEP) based on the quality and quantity of

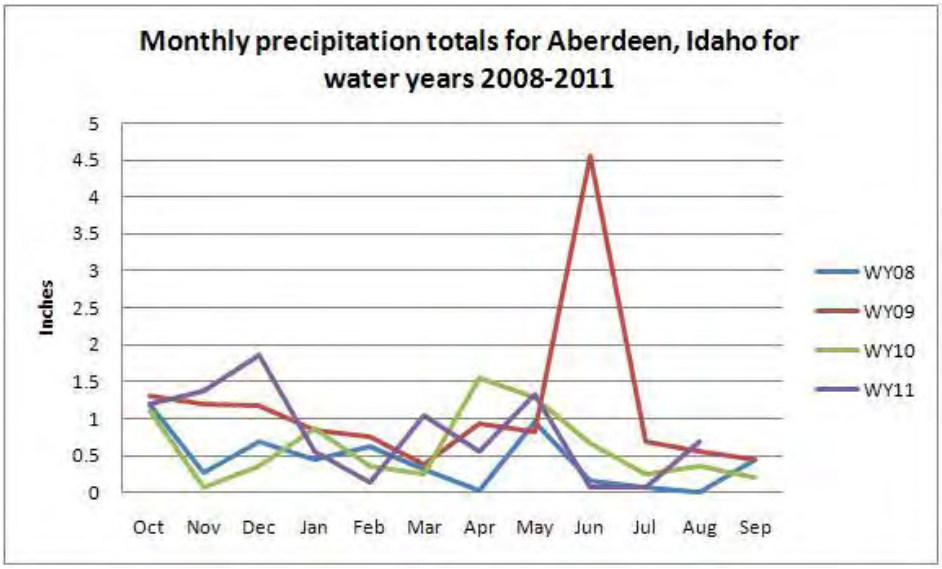
the seed provided. These included 16 accessions of whorled buckwheat and five accessions of sulphurflower buckwheat. All collections were cleaned with an air screen cleaner to approximately 90% purity. No laboratory purity and viability tests were performed prior to planting.

Average seed per pound values for each species were obtained by weighing 500 seeds from 32 accessions (appendix 2). Sulphurflower buckwheat ranged from 0.98 to 1.94g per 500 seeds or 117,000 to 231,000 seeds per pound with an average of 170,000 seeds per pound. Whorled buckwheat seed weights ranged from 1.06 to 1.98g per 500 seeds or 114,000 to 214,000 seeds per pound with an average of 171,000 seeds per pound.

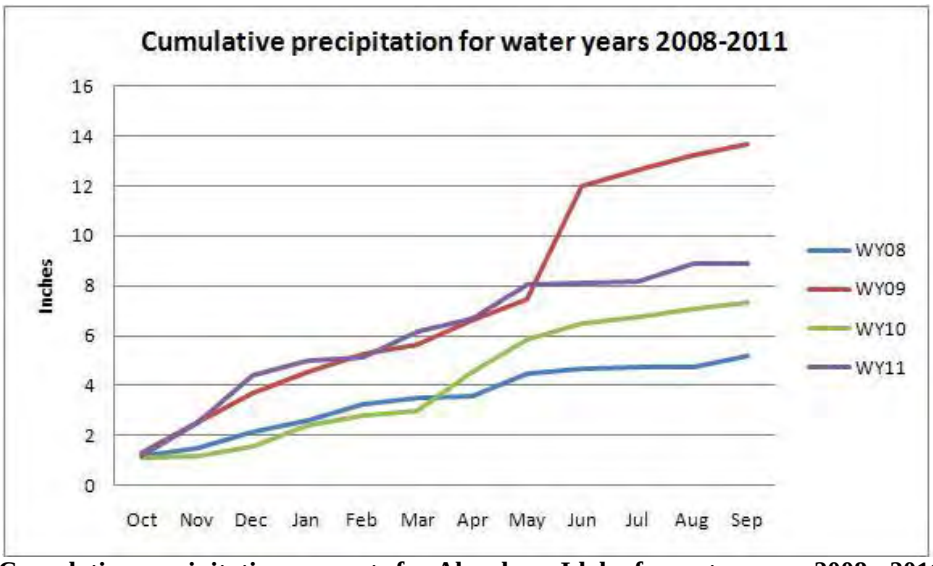
The field study was designed as a randomized complete block in a single row of six foot wide weed barrier fabric in field 12 at the PMC Home Farm. The study included four replications beginning with the first replication on the west end of the field. Holes were burned into the fabric using an oxy-propane torch and a spacing jig designed for 18 inch hole spacing. Each plot contained six holes and measured 54 x 36 inches. Soil at the site is a Declo silt loam with pH of 7.4 to 8.4. Average annual precipitation in Aberdeen is 9.4 inches.

The study was seeded on November 1, 2007. Soil in each hole was roughened lightly and then hand-seeded with 12 to 25 seeds followed by a light packing by foot. Seed was placed at the soil surface to 1/8 inch depth. The trial was watered minimally in 2008 to reduce soil crusting and allow plants to break the soil surface. No additional water was applied following emergence.

Precipitation for water year 2008 was significantly lower than average, with Aberdeen receiving only 5.18 inches for the year. Little moisture was received during the establishment phase from April to June, followed by an extremely dry summer. 2009 had higher than average precipitation thanks to an abnormal 4.55 inches of rain during the month of June for a total of 13.67 inches during the water year. 2010 was again lower than average with 7.30 inches of precipitation received during the water year. In 2011, Aberdeen received a cumulative 8.86 inches of precipitation through August 31.



Monthly precipitation totals for Aberdeen, Idaho for water years 2008 - 2011



Cumulative precipitation amounts for Aberdeen, Idaho for water years 2008 - 2011

The plots were initially evaluated for percent stand on August 4, 2008. Stand establishment was recorded as the number of holes per plot containing plants divided by 6 holes. The diameter of all living plants from each accession were measured and averaged to provide a mean diameter per accession. On July 7, 2009 the plots were evaluated for percent stand, average plant height, plant vigor and flower production. Vigor and flower production for each plot were assigned a visual rating of 1-9 with 1 being best and 9 being worst or dead. In 2010 the plots were evaluated on June 15 for percent stand, and again on June 23 for vigor, height, and width. Seed harvests were made by hand from June 15 through August 16. Seed was cleaned with an air screen cleaner, and then weighed to extrapolate lb/acre values. By 2010, plots of several accessions had zero plants. Data were not analyzed in those cases where plants were absent in 3 or more replications, and those accessions were removed from the evaluation. In 2010, none of the accessions identified as sulphurflower buckwheat had persisted with enough plants to merit evaluation, so only evaluations of whorled buckwheat accessions are reported. In 2011, the plots were evaluated for percent stand and seed production. Seed harvests were made on July 26, August 2 and August 7 as the plants ripened.

Data were analyzed with Statistix 8.2 software using an Analysis of Variance to determine significance (α=0.05), and a Tukey's test or LSD test was used to separate means when significance was detected. Plant diameters were not tested for significance in 2008.

Results

At the time of the first evaluation in 2008, no significant differences were detected between stand means for either species (tables 1 and 2). Stand percentages were generally low with the best initial establishment of the sulphurflower buckwheat accessions being accession 9076549 with 20.8%. The largest average diameter recorded among the sulphurflower buckwheat accessions was 18.6 cm from accession 9076550. In 2009 there were no significant differences detected in any of the measured characters in the sulphurflower buckwheat trial. All stand percentages were lower in 2009 than 2008. Accession 9076549 continued to have the best stand with 16.5%. The tallest accession was 9076550 with 16.5 cm. Vigor and flower production ratings were poor in 2009 for all sulphurflower buckwheat accessions. The best vigor rating belonged to accession 9076549 (6.0), and the top average flower producer was accession 9076550 with 6.3.

Table 1. Sulphurflower buckwheat evaluations for 2008 and 2009.

	Aug. 4, 2008		Jul. 7, 2009			
Accession No.	Stand	Plant diameter	Stand	Height	Vigor	Flr. Prod.
	----%----	----cm----	----%----	----cm----	-------(1-9)-------	
9076549	20.8[1]	13.5[2]	16.5[1]	14.3[1]	6.0[1]	6.8[1]
9076550	16.7	18.6	12.3	16.5	6.8	6.3
9076554	16.7	17.3	12.5	6.5	8.0	8.3
9076560	8.3	10.9	4.0	7.0	7.3	7.3
9076514	4.2	3.3	0.0	8.3	7.8	8.3
P=			0.62	0.84	0.85	0.75

[1] No significant difference
[2] Not tested for significance

In 2008, whorled buckwheat stands ranged from 4.2% (9076555) to 50.0% (9076543). Stands varied enough between plots that no significant difference was detected. Accession 9076543 had the largest average plant diameter of 17.4 cm.

In 2009, accessions 9076543 and 9076540 had the best stands, both with 45.3%; however no significant difference was found for percent stand among the accessions. The tallest average plants in 2009 were those of accession 9076542 with an average of 53.3 cm. The best vigor ratings of the whorled buckwheat trial were from accessions 9076543 (2.3) and 9076542 (2.5). These two accessions also had the highest rating for flower production (both with 2.3).

Table 2.Whorled buckwheat for 2008 and 2009.

	Aug. 4, 2008		Jul. 7, 2009			
Accession No.	Stand	Plant diameter	Stand	Height	Vigor	Flr. Prod
	----%----	----cm----	----%----	----cm----	-------(1-9)-------	
9076543	50.0[1]	17.4[2]	45.3[1]	40.8 ab	2.3[3]	2.3 a
9076540	41.7	8.6	45.3	27.0 ab	4.8	7.0 a-c
9076538	37.5	9.0	33.3	33.0 ab	5.5	6.0 a-c
9076536	37.5	11.1	20.8	20.8 ab	6.3	6.8 a-c
9076561	33.3	13.0	20.8	15.5 ab	6.0	6.8 a-c
9076546	33.3	10.8	32.8	45.0 ab	2.8	3.0 a-b
9076553	29.2	12.5	33.0	34.3 ab	2.8	5.0 a-c
9076548	25.0	8.3	20.5	28.8 ab	4.3	5.5 a-c
9076533	25.0	9.5	24.5	24.3 ab	5.0	6.3 a-c
9076542	25.0	15.2	28.8	53.3 a	2.5	2.3 a
9076532	16.7	14.9	20.8	22.3 ab	5.8	5.8 a-c
9076558	12.5	10.0	20.5	27.0 ab	5.0	5.5 a-c
9076529	8.3	9.1	8.3	8.3 b	7.5	8.0 b-c
9076547	8.3	9.1	12.3	15.8 ab	6.5	7.3 a-c
9076539	8.3	7.4	8.0	13.3 b	7.0	8.8 c
9076555	4.2	3.2	8.0	12.0 b	6.5	8.3 c
Critical value (0.05)=			NA	38.6	5.9	5.0

[1] No significant difference
[2] Not tested for significance
[3] Significance was detected but means could not be separated

In 2010, stands were near the same level as 2009, but those accessions missing plants in 3 or more replications were discontinued from evaluation (accessions 9076532, 9076558, 9076529, 9076547, 9076539, and 9076555). Percent stand rankings in 2010 were the same as those from 2009. The best stand being achieved by accession 9076543 with 46% (table 3). Accession 9076543 also tied with accession 9076546 for the best vigor rating (2.25). Accession 9076543 had the largest plants in the evaluation with an average height of 46.36 cm and average plant width of 49.53 cm. However, accession 9076543 had poor seed yields averaging only 36 lbs/acre. Best seed yields came from accessions 9076546 and 9076553 with averages of 113 and 110 lbs/acre. Seed yields varied greatly between replications, however, and no significant differences could be detected between accessions.

Table 3. 2010 Evaluation data

	Jun 15, 2010		Jun 23, 2010		
Accession No.	Stand	Vigor	Height	Width	Seed yield[1]
	%	(1-9)	cm	cm	Lb/ac
9076543	46 a	2.25 a	46.36 a	49.53 a	36
9076540	38 a-b	5.00 b-d	29.21 b-c	32.39 b	17
9076538	29 a-d	5.00 b-d	39.28 a-b	37.71 a-b	59
9076536	25 a-e	4.22 a-d	36.45 a-c	40.24 a-b	34
9076561	33 a-c	6.00 c-d	25.40 c	32.39 b	6
9076546	34 a-c	2.25 a	42.55 a	38.10 a-b	113
9076553	29 a-d	3.25 a-b	42.55 a	40.01 a-b	110
9076548	21 b-f	2.67 a	41.82 a	39.40 a-b	15
9076533	21 b-f	7.00 d	28.58 b-c	28.58 b	3
9076542	29 a-d	3.00 a-b	44.77 a	46.36 a	65
Critical value (0.05)=	Varies	Varies	Varies	Varies	NA

[1] No significant difference

Stands remained essentially constant going from 2010 to 2011 (table 4). The best stand again was from accession 9076543 at 54%. The slight increase from the prior year could be due to volunteer plants, but is more likely the result of mature plants spreading over the fabric holes and being counted as multiple plants. Seed yields were significantly higher in 2011 than 2010. The top yield was from accession 9076542 with 257 lbs/ac followed closely by accession 9076546 with 240 lbs/ac. Other good seed producers were accessions 9076553, 9076536, 9076543, and 9076549 with 175, 150, 117, and 102 lbs/ac respectively.

Table 4. 2011 Evaluation data

Accession No.	Stand	Seed yield
	%	Lb/ac
9076543	54 a	117 b-d
9076540	30 a-c	49 c-d
9076538	29 a-c	62 b-d
9076536	21 b-c	150 a-c
9076561	29 a-c	19 d
9076546	34 a-b	240 a
9076553	29 a-c	175 a-b
9076548	21 b-c	22 d
9076533	25 b-c	32 c-d
9076542	34 a-b	257 a
9076532	21 b-c	8 d
9076558	13 b-c	2 d
9076529	4 c	23 d
9076547	8 b-c	1 d
9076539	9 b-c	6 d
LSD (0.05)=	25	121

Discussion

None of the accessions of either species had very good establishment, yet mortality from established plants from one season to the next is low. Four accessions stand out as having relatively high establishment and persistence as well as high seed production through the evaluated years; 9076543, 9076546, 9076553 and 9076542. All four come from eastern Idaho in the Caribou Range.

One, accession 9076543, was identified after establishment as a subspecies of sulphurflower buckwheat, *Eriogonum umbellatum* var. *majus*. This subspecies has the typical globose inflorescences of sulphurflower buckwheat, but the flowers are cream colored instead of yellow resembling whorled buckwheat. This subspecies which differs visibly from traditional sulphurflower and whorled buckwheat may not be as accepted by native seed users as the more common subspecies. Additionally, accession 9076543 was collected in an area receiving approximately 25 to 30 inches of annual precipitation. This could make it less adapted to the more arid sites commonly seeded in the IDPMC service area.

Accession 9076542 was also collected in a higher rainfall area than the remaining two accessions. Stand and seed yield of 9076542 are comparable or less than those from accession 9076546.

Accessions 9076546 and 9076553 were both collected in Caribou County, Idaho northeast of Soda Springs. The two accessions are separated by approximately 10 miles and are both in an 18 to 20 inch precipitation area occurring with mountain big sagebrush, three-tip sagebrush, bluebunch wheatgrass and basin wildrye. The stand for accession 9076546 is located on National Forest land in a meadow and on a south facing hillside above the meadow. There is a gravel quarry in the hillside adjacent to the collection site, which if expanded could impact the stand. Accession 9076553 was collected near the Blackfoot River on private land in a strip between a

road and railroad tracks. There is little potential for development or cattle grazing. Both locations at present appear healthy and relatively stable.

Accession 9076646 rated slightly better than 9076553 in a majority of the evaluations, but there were no statistically significant differences between the accessions. Due to the similar performance and proximity of the original collection sites, there seems to be little value in separating the accessions. IDPMC will move forward with release procedures to create a selected class, pre-varietal release of whorled buckwheat considering the location from accession 9076646 as the primary site for generation zero (G0) seed, and the 9076553 population as a secondary G0 site if needed.

Appendix 1. Assemblage of collections

Acc. No.	Species	County, State	Date coll.	Collector, Affiliation	Wt. clean (g)
9076479	*E.* sp.	ID	2004	CMNM	29.47
9076514	ERUM	ID	2004	CMNM	28.01
9076560 [a]	ERUM	ID	2006	Shaw, USFS	31.79
9076561	ERHE2	ID	2005	CMNM	24.44
'Sierra'	ERUM ssp. *polyanthum*	El Dorado, CA	2003	Lockeford PMC, NRCS	1.8 lb
9076559	ERUM	Mono, CA	10 July 05	Comstock Seed	25.74
9076528	ERHE2	Washington, ID	27 July 06	Tilley, NRCS	6.68
9076529	ERHE2	Washington, ID	27 July 06	Tilley, NRCS	35.34
9076530	ERHE2	Washington, ID	27 July 06	Tilley, NRCS	9.30
9076531 [bc]	*E. thymoides*	Adams, ID	27 July 06	Tilley, NRCS	Trace
9076532	ERHE2	Adams, ID	28 July 06	Tilley, NRCS	81.25
9076533	ERHE2	Valley, ID	28 July 06	Tilley, NRCS	116.92
9076534	ERHE2	Elmore, ID	28 July 06	Tilley, NRCS	9.75
9076535 [b]	ERUM	Elmore, ID	28 July 06	Tilley, NRCS	2.72
9076536	ERHE2	Elmore, ID	28 July 06	Tilley, NRCS	34.34
9076537	ERUM	Elmore, ID	28 July 06	Tilley, NRCS	9.69
9076538	ERHE2	Elmore, ID	28 July 06	Tilley, NRCS	122.30
9076539	ERHE2	Elmore, ID	28 July 06	Tilley, NRCS	21.58
9076540	ERHE2	Blaine, ID	29 July 06	Tilley, NRCS	21.22
9076541	ERUM	Butte, ID	29 July 06	Tilley, NRCS	13.28
9076542	ERHE2	Bonneville, ID	1 Aug 06	Tilley, NRCS	42.19
9076543	ERHE2	Bonneville, ID	1 Aug 06	Tilley, NRCS	53.55
9076544	ERHE2	Caribou, ID	1 Aug 06	Tilley, NRCS	16.60
9076545	ERHE2	Caribou, ID	1 Aug 06	Tilley, NRCS	12.55
9076546	ERHE2	Caribou, ID	1 Aug 06	Tilley, NRCS	36.92
9076547	ERHE2	Cassia, ID	1 Aug 06	Tilley, NRCS	45.90
9076548	ERHE2	Twin Falls, ID	1 Aug 06	Tilley, NRCS	56.30
9076549	ERUM	Teton, WY	25 July 06	Yegorova, USFS	1.8 lb
9076550	ERUM	Elmore, ID	14 Aug 06	Ogle, NRCS	37.10
9076551 [b]	ERUM	Clark, ID	28 July 06	Edgerton, NRCS	2.08
9076552 [b]	ERUM	Fremont, ID	27 July 06	Edgerton, NRCS	No seed
9076553	ERHE2	Caribou, ID	5 Aug 06	Mickelson, NRCS	1.7 lb
9076554	ERUM	Franklin, ID	23 Aug 06	Jones, NRCS	26.19
9076555	ERHE2	Franklin, ID	23 Aug 06	Jones, NRCS	33.84
9076556 [d]	ERHE2	Franklin, ID	23 Aug 06	Jones, NRCS	--
9076557 [d]	ERUM	Franklin, ID	23 Aug 06	Jones, NRCS	--
9076558	ERHE2	Franklin, ID	23 Aug 06	Jones, NRCS	15.25
9076562	ERUM	Lake, OR	14 Aug 06	Corning, NRCS	6.16
9076563	ERHE2	Washington, ID	2002	WRPIS	10.0

[a] Increase field at IDPMC. Original collection from Slate Creek, ID.
[b] Not enough seed to include in trial.
[c] Seed given to Steve Love, U.I., for use in xeriscaping ornamental trial.
[d] 9076556 and 9076557 inadvertently combined at time of cleaning; left out of IEP.

Appendix 2. Seeds/lb

ERHE2	500 wt (g)	Seed/lb	ERUM	500 wt (g)	Seed/lb
9076528	1.06	214,150	9076537	0.98	231,633
9076529	1.38	164,493	9076541	1.29	175,969
9076530	1.12	202,679	9076549	1.08	210,185
9076532	1.65	137,576	9076550	1.16	195,690
9076533	1.09	208,257	9076514	1.10	206,364
9076534	1.28	177,344	9076559	1.94	117,010
9076536	1.17	194,017	'Sierra'	1.55	146,452
9076538	1.16	195,690	9076479	1.92	118,229
9076539	1.20	189,167	9076554	1.43	158,741
9076540	1.19	190,756	9076560	1.53	148,366
9076542	1.20	189,167			
9076543	1.23	184,553			
9076544	1.30	174,625			
9076545	1.30	174,625			
9076546	1.32	171,970			
9076547	1.37	165,693			
9076548	1.31	173,282			
9076553	1.32	171,970			
9076561	1.71	132,749			
9076555	1.36	166,912			
9076558	1.98	114.646			
9076563	1.18	192,372			

Buckwheat trial field map

R1 (west)	R2	R3	R4
548	532	555	543
533	514	549	540
553	553	532	554
538	533	538	558
529	538	536	560
542	536	542	538
539	546	540	548
560	558	558	546
514	550	543	514
549	542	548	536
558	549	547	550
554	561	560	549
547	548	550	542
561	560	553	529
536	555	554	533
540	540	529	555
546	543	533	539
543	547	561	561
532	539	546	553
555	529	539	532
550	554	514	547

*yellow =ERUM

(east)

Nevada Bluegrass Initial Evaluation Planting

2011 Progress Report
Study Number: IDPMC-P-0816-RA
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Introduction

Nevada bluegrass (*Poa secunda* ssp. *nevadensis*) is a large statured subspecies of the Sandberg bluegrass complex (Majerus et al., 2011). It can be found in the foothills and mountains of southern Idaho, northern Utah and Nevada, eastern Oregon and Washington and western Montana and Wyoming. Nevada bluegrass is similar to Sandberg bluegrass, but is considerably larger in stature, approximating the size of big bluegrass (*Poa secunda* ssp. *ampla*). This subspecies is a perennial bunchgrass with culms as much as 100 cm (40 in) tall. Basal leaves typically reach a length of 25 cm (10 in) with a width of 1 to 3 mm (1/16 to 3/32 in). Nevada bluegrass has distinctive long acuminate ligules from 1.5 to 6 mm (1/16 to ¼ in) long. The narrow panicles are 10 to 18 cm (4 to 7 in) long with yellowish-green to purplish-tinged spikelets. Nevada bluegrass can be distinguished from Sandberg bluegrass by its glabrous (hairless) to scabrous (rough) lemma, long decurrent ligules and large stature. The species can be wind pollinated, self-fertile, or apomictic (Monsen et al., 2004).

Nevada bluegrass is found in 10 inch and greater rainfall areas in sagebrush steppe plant communities including mountain foothills and mountains from Alaska to southern California, through Nevada to Arizona and Colorado. In the Intermountain Region plants are commonly found in the lower foothills into the mountains of southern Idaho, northern Nevada and Utah, eastern Oregon and Washington and western Montana and Wyoming.

There are no releases of Nevada bluegrass selected specifically for use in the Aberdeen PMC service area. Bridger PMC has recently released Opportunity Germplasm Nevada bluegrass for use in mine spoil contaminated soils in Wyoming and Montana (Majerus and Majerus, 2008).

Because of the small stature and early maturity, most species of Sandberg bluegrass complex do not provide much usable forage; however, Nevada bluegrass can be an important forage producer for larger animals. Sandberg bluegrass and its subspecies are usually minor components of many grassland communities, but are considered among the six most important rangeland grasses of the Intermountain and Pacific Northwest regions (USDA Forest Service 1937).

The anticipated use of commercially available Nevada bluegrass seed is for inclusion in native mixtures for wildlife habitat, reclamation of disturbed sites, restoration of native rangeland, and conservation plantings. Nevada bluegrass is a good forage producer and has value in native species rehabilitation and site recapture.

Materials and Methods

Seed was collected from native sites during the summer of 2008. Seed was air dried and then cleaned to approximately 97% purity. Cleaned seed was placed in cold-dry storage (ca 50º F, 20% RH) until planting. Viability was estimated in January 2010 using the kerosene heater "popping" method outlined in Tilley et al., (2010) and in-house germination tests.

Greenhouse Trial

On January 14, 2010 Aberdeen PMC initiated a greenhouse trial to evaluate seedling emergence. Seed was sown into 12 x 18 inch greenhouse trays filled with a soil mix containing 1 part coconut fiber peat, 1 part compost and 1 part perlite. The seed was sown into rows at 50 seeds/linear foot. Seeding depth was 0 to ¼ inches. The trays were watered with overhead irrigation. Temperatures in the greenhouse averaged between 50 and 75 degrees with a 17 hour photoperiod.

Three germination indices were calculated in this trial. A germination rate was determined by using the method described by Maguire (1962). The number of seedlings obtained at each counting was divided by the number of days after planting, and the values obtained at each count were summed at the end of the test as follows:

$$\text{Germination rate} = \left(\frac{\text{Number of seedlings}}{\text{Days after planting}}\right) + \ldots + \left(\frac{\text{Number of seedlings}}{\text{Days after planting}}\right)$$

Days to 50% germination (D_{50}) and days between attainment of 10% and 90% germination ($D_{10\text{-}90}$) were obtained by plotting percent germination versus days after planting, in a quadratic regression. Germinants were counted upon visual detection of the cotyledon. Values obtained were then subjected to an analysis of variance with an alpha of 0.05 to determine significance. Means were separated using a LSD (least significant difference) test. Average total germination percentages are also reported but were not analyzed for significance.

Field Trial

Experimental design of the field trial was a randomized complete block with four replications. Individual plots were 20 feet long and contained a single row with rows planted on three foot centers. The trial contains primarily Nevada bluegrass, but also includes several collections of Sandberg bluegrass and big bluegrass. The experimental design also included plots of known industry standards (Mountain Home, Opportunity, Hanford Source, Sherman, and High Plains) for comparison.

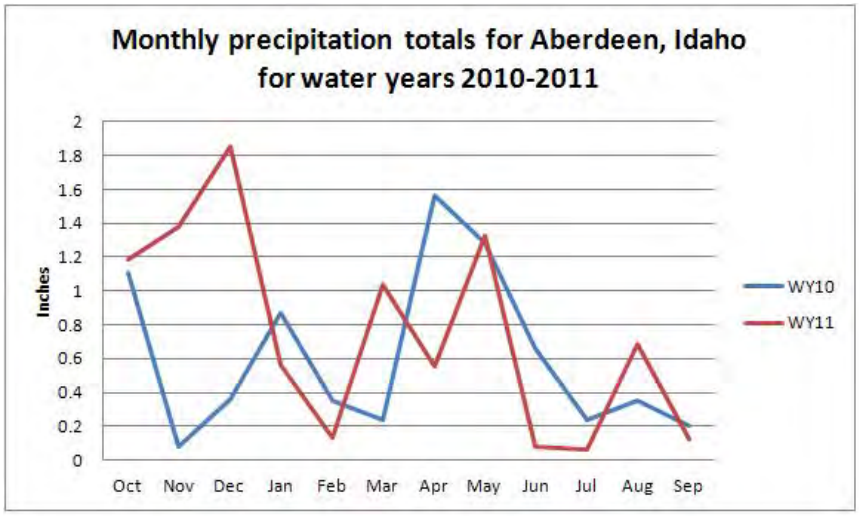
Soil at the site is a Declo silt loam with pH of 7.4 to 8.4. Average annual precipitation is 9 inches. The planting site was prepared in the fall of 2009 and spring of 2010 with herbicide and tillage applications. Plots were planted with a belt-seeder on June 14, 2010 at a depth of 0-1/4 inch. The plots were planted at a target seed rate of 50 seeds/linear foot using an estimated 1 million seeds per pound based on Ogle et al. (2009), which lists an estimated 925,000 seeds/pound and USDA (2009) which lists 1,049,000.

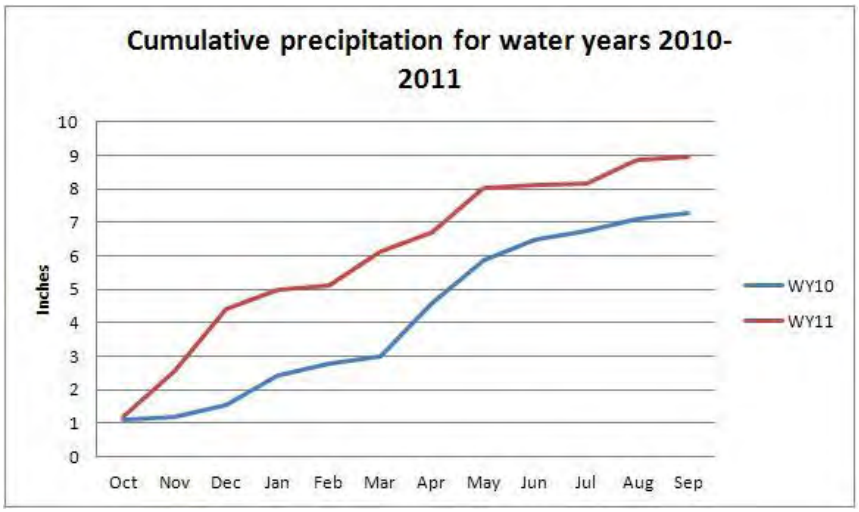
On September 12, the plots were evaluated for percent stand, plant density and seedling vigor. Percent stand was measured using a twenty foot rope marked with one foot increments stretched the length of the plot and anchored at either end. Plants intercepting the one foot increments were summed and recorded as a percentage. Plant density was measured by counting seedlings found in the middle two feet of row and converted to average number of plants per foot of row. Representative plants in each plot were measured for plant height. Plant heights were not analyzed for significance.

In 2011, percent stand, plant density and height were evaluated on May 2. Seed and forage harvests were timed to maximize the yield in each individual plot. This occurred between July 12 and 18. For biomass and seed yield, all plants in a plot (including seed) were hand harvested using a scythe. The material was then air dried for 2 weeks. Dried weights were then obtained from the total material before the seed was cleaned off and weighed.

All data were analyzed using an Analysis of variance. Means of statistically different data were separated using a least significant difference (LSD) test. Accessions are listed in the table from best percent establishment to worst. Only accessions with measureable plants are reported for 2010.

The plots were watered to provide approximately 14 to 16 inches of total accumulated water for the year; the typical moisture requirement for seed production of the species. Cumulative natural precipitation totaled 7.3 inches in water year 2010 and8.98 inches in water year 2011.





Results

Greenhouse Trial

There was a wide range of germination percentages and rates of germination detected between accessions (table 2). Accession 9076611 had the best recorded germination, the shortest D_{10-90} and the second shortest D_{50} rating in the trial. Accession 9076622 had the shortest D_{50} rating and the fourth highest germination.

Table 2. Germination characteristics

Accession	Germination	Germination rate[1]	D_{50}[2]	D_{10-90}[3]
	---%---		--days--	--days--
9076611	91	22.89 a	8.32 a-b	4.08 a
9076592	100	21.89 a-b	9.17 b-e	5.15 a-f
9076586	92	20.34 a-c	9.02 a-d	5.00 a-e
9076622	76	19.84 a-d	8.04 a	6.08 d-j
9076584	87	18.87 b-e	9.12 b-e	5.09 a-e
9076638	68	17.46 c-f	8.43 a-b	4.80 a-c
9076646	81	17.28 c-f	9.19 b-e	5.17 a-f
9076593	75	17.10 d-f	8.87 a-c	4.44 a
9076616	73	17.10 d-f	9.14 b-e	5.33 a-g
9076639	79	17.10 d-f	9.05 b-e	4.70 a-b
9076655	84	15.86 e-g	9.77 c-i	6.23 e-k
9076642	74	15.25 f-h	9.28 b-f	4.97 a-d
9076608	67	15.04 f-h	8.89 a-c	4.96 a-d
9076596	62	13.34 g-i	9.10 b-e	4.99 a-e
9076653	67	12.78 g-i	9.70 c-h	5.83 b-h
9076606	61	12.27 h-j	9.28 b-f	5.02 a-e
9076618	51	11.31 i-j	9.01 a-d	4.88 a-d
9076587	52	11.05 i-k	9.19 b-e	5.29 a-g
9076605	45	9.12 j-l	9.56 c-g	5.93 b-h
9076624	48	7.90 k-l	10.54 g-i	5.94c-h
9076602	40	6.39 l-m	10.55 g-i	6.64 h-k

9076650	29	6.35 l-m	9.05 b-e	5.94 b-h
9076594	36	6.07 l-n	10.23 f-i	6.33 f-k
9076609	28	4.54 m-o	10.66 h-i	7.29 j-k
9076623	22	4.40 m-o	9.62 c-g	5.30 a-g
9076604	23	4.24 m-o	9.89 d-i	5.72 b-h
9076615	19	3.67 m-o	9.77 c-i	6.00 c-i
9076628	22	3.58 m-o	10.72 i	7.43 k
9076649	21	3.25 m-o	10.70 i	7.23 i-k
9076654	15	3.11 n-o	9.90 d-i	5.72 b-h
9076610	17	2.85 n-o	10.03 e-i	6.52 g-k
9076621	12	2.15 o	9.71 c-h	5.78 b-h
LSD (0.05)		3.22	0.99	1.24

[1] Germination rate is a comparative value with no associated unit of measure; larger # means faster germ.
[2] Days to 50% germination.
[3] Days between 10% and 90% germination

Field Trial

Opportunity germplasm had significantly better initial year establishment in the field trial than any other accession (table 3). Opportunity also had the highest plant density with 19 plants/ft², which was significantly better than any other accession. The best performer of the non-released accessions was 9076622 with 57% establishment and 8 plants/ft².

Table 3. Field establishment evaluation Sept. 12, 2010

Accession	Establishment	Density	Height[1]
	----%----	Plants/ft²	cm
Opportunity	88 a	19 a	4.0
9076622	57 b	8 b	2.75
Sherman	37 bc	5 bcd	6.0
9076615	36 c	4 bcd	5.5
9076610	33 c	9 b	1.75
9076618	33 c	5 bcd	2.0
9076609	29 c	6 bc	2.3
9076649	21 cd	4 bcd	2.0
9076623	17 cde	2 cd	4.0
9076605	1 de	1 cd	4.0
LSD (0.05)=	varies	varies	

[1]Height not analyzed for significance.

In 2011 Opportunity continued to have the highest rated stand and plant density (table 4). Opportunity also had the greatest seed yield at 25 lbs/ac and the third greatest forage yield with 324 lb/ac. Accession 9076622 performed comparably to Opportunity in most aspects; however accession 9076622 had significantly lower forage and seed production.

Table 4. Field trial evaluations

Accession	% stand	Density	Height	Seed Yield	Forage Yield
	----%----	Plants/ft²	cm	Lb/ac	Lb/ac
Opportunity	86.9 a	8.4 a	4.5 b-c	25 a	324 a
9076622	76.3 a-b	7.5 a-b	4.5 b-c	15 b	216 b
9076615*	65.8 a-c	6.1 a-e	8.8 a	15 b	328 a
9076609	64.5 a-c	6.9 a-d	5.3 b	13 b-c	216 b
9076610	63.2 a-c	7.1 a-c	4.3 b-d	8 c-d	204 b-c
9076618	63.2 a-c	6.5 a-d	4.3 b-d	7 c-e	192 b-c
9076623	63.2 a-c	5.5 a-g	3.0 d-f	5 d-f	90 d-e
Sherman*	60.5 b-d	3.5 d-i	9.3 a	13 b-c	394 a
9076649	56.6 b-e	6.6 a-d	3.5 c-e	8 c-d	124 c-d
High Plains	55.3 b-f	3.6 d-i	2.8 e-g	0 f	0 f
9076602	46.1 c-g	6.4 a-d	1.8 f-g	0 f	0 f
9076654	46.1 c-g	3.6 d-i	2.5 e-g	0 f	0 f
9076605	43.4 c-h	4.5 b-h	3.0 d-f	1 e-f	60 d-f
9076586	42.1 c-i	5.6 a-f	2.3 e-g	0 f	0 f
9076606	38.2 d-j	2.1 g-i	2.0 f-g	0 f	0 f
9076584	35.5 e-j	4.5 b-h	2.3 e-g	0 f	0 f
9076650	34.2 e-j	5.0 a-h	1.8 f-g	0 f	0 f
Mt. Home	34.2 e-j	4.1 b-i	2.0 f-g	0 f	0 f
9076593	34.2 e-j	5.1 a-h	2.5 e-g	0 f	0 f
9076616	31.6 f-j	4.1 b-i	2.5 e-g	0 f	0 f
9076653	31.6 f-j	3.8 c-i	2.3 e-g	0 f	0 f
9076631	30.3 g-j	4.6 b-h	2.8 e-g	0 f	0 f
9076611	29.0 g-j	3.5 d-i	2.5 e-g	0 f	0 f
9076638	28.9 g-j	5.0 a-h	1.5 g	0 f	0 f
9076608	27.6 g-j	4.4 b-i	3.0 d-f	1 f	30 e-f
Hanford Source	26.3 g-j	2.8 e-i	1.8 f-g	0 f	0 f
9076642	25.0 g-j	1.8 h-i	2.3 e-g	0 f	0 f
9076604	25.0 g-j	2.5 f-i	2.3 e-g	0 f	0 f
9076587	21.1 h-j	2.1 g-i	2.1 e-g	0 f	0 f
9076596	18.4 i-j	1.0 i	2.0 f-g	0 f	0 f
9076592	17.1 j	1.9 h-i	2.3 e-g	0 f	0 f
9076646	17.1 j	2.6 f-i	2.0 e-g	0 f	0 f
9076639	15.8 j	1.9 h-i	2.5 e-g	0 f	0 f
9076655	15.8 j	1.9 h-i	2.3 e-g	0 f	0 f
LSD (0.05)=	24.2	3.5	varies	7	84

* *Poa ampla*

Discussion

First year seedling establishment was low for all accessions with the exception of Opportunity. Only 10 of forty accessions had visible germination. In 2011 stands were detected in more plots. Several accessions increased significantly in establishment and density and compared favorably with Opportunity during 2011. The top two performing accessions were 9076622 and 9076615. Both had high second year plant densities, vigorous growth and fair seed and forage yields. Accession 9076622 also scored well in the greenhouse establishment trials with the shortest D_{50} rating and the fourth highest germination rate.

Accession 9076622 was collected in Windfall Canyon, Eureka County, Nevada approximately 4 miles south of the town of Eureka. The plants are growing on the roadsides in association with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), needleandthread (*Heterostipa comata*), thickspike wheatgrass (*Elymus lanceolatus*), and basin wildrye (*Leymus cinereus*). The site is at 6900' elevation and receives an estimated 10 inches of annual precipitation. Additional seed of 9076622 was collected in 2011 by Clint Anderson, Rangeland Management Specialist, NRCS Ely, NV field office on July 26 for further evaluation of the accession.

Accession 9076615 was collected in Box Elder County in extreme northwestern Utah in a basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and pinyon-juniper (*Pinus edulis* and *Juniperus scopulorum*) community at 5860' in elevation. The site receives approximately 12 to 14 inches mean annual precipitation. Accession 9076615 was identified in the trial as being big bluegrass, and can be directly compared to Sherman, a release from a population near Moro, Sherman County, Oregon in 1932. Sherman was released in 1945 by the Washington, Idaho and Oregon Agricultural Experiment Stations and the Pullman Washington Plant Materials Center.

The field trial plots will be evaluated one more year (2012). An advanced evaluation planting will be established in 2012 to compare the top two accessions (9076622 and 9076615) with Opportunity Germplasm and Sherman. Since the species is apomictic, these plots can also be used as seed increase plots if one or more accessions is chosen for official release or for additional studies.

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Accession	Species	State	County	Lat. / Long.	El. (ft)	Location	Plant community
9076584	POSE	ID	Bingham	43 6' 41", -112 50' 54"	4560	Powerline rd, N of Aberdeen	Basin big sage, rabbitbrush
9076586	POSE/PONE	ID	Bingham	43 6' 41", -112 50' 54"	4560	Powerline rd, N of Aberdeen	Basin big sage, rabbitbrush
9076587	POSE	ID	Power	42 15' 40", -112 45' 44"	5000	Curlew Ntl Grassland, S of Twin Springs in rocky roadside post burn	ARTR, PUTR, PSSP, POSE
9076592	POSE	NV	Elko	41 4' 4", -114 31' 31"	6400	Road to Pequop summit ca 1 mi W of Oasis	ARTR, POSE
9076593	POSE	NV	Elko	41 6' 57", -114, 47' 33"	6200	N side of I-80 at Moor exit (360) near train tracks	PJ
9076594	POSE	NV	Elko	41 2' 27", -115 1' 49"	6600	Road to Angel Lake, exit 351 from Wells, NV	ARTRV, black sage, Juniper, LECI
9076596	POSE	NV	Elko	40 18' 56", -115 29' 36"	6700	FR 113 from Ruby Lake, top of low hill opposite large granite batholith	ARTRv, PUTR
9076602	POSE	UT	Juab	39 24' 43", -111 53' 23"	5900	Off UT hwy 28, E of Yuba state park near small cabin	PJ
9076604	PONE	UT	Box Elder	41 56' 15", -112 28' 34"	6000	N of Valley, UT off hwy 84 exit 20, E of crop field on rocky knob	ARTR, Stipa commata
9076605	PONE	ID	Bingham	43 7' 1", -112 48' 40"	4400	Coffee Point Rd, ca 600 m N of 600 S	ARTRtr, STCO, ELEL
9076606	POSE	ID	Bingham	43 7' 1", -112 48' 40"	4400	Coffee Point Rd, ca 600 m N of 600 S	ARTRtr, STCO, ELEL
9076608	POSE	ID	Power	42 11' 17", -112 45' 6"	4990	Meadowbrook Rd in post burn	PSSP, STCO, POSE, CHVI
9076609	PONE	ID	Power	42 11' 17", -112 45' 6"	4990	Meadowbrook Rd in post burn	PSSP, STCO, POSE, CHVI
9076610	PONE	ID	Power	42 9' 34", -112 49' 36"	5670	Cow Canyon Rd jct w/ Meadowbrook rd	PONE, AGCR, PSSP
9076611	POSE	ID	Power	42 5' 39", -112 50' 15"	5100	Cow Canyon in burned PJ	PJ, STCO, POSE
9076615	POAM	UT	Box Elder	41 48' 41", -113 35' 12"	5860	Dove Creek, W of Rosette	ARTRtr, CHNA, CHVI, PJ
9076616	POSE	NV	White Pine	41 3' 57", -114 31' 23"	6400	Pequop (east exit) N of I-80 on rd to summit	PJ, ARTR
9076618	POSE	NV	White Pine	41 2' 27", -115 1' 49"	6600	Angel Lake Rd, SW of Wells	ARTRV, black sage, Juniper, LECI
9076621	POSE	NV	White Pine	39 32' 3", -115 47' 17"	6250	Diamond Mts, W of Newark Valley, S of Goicochea ranches	one needle pinyon, cliffrose, ARTRtr
9076622	PONE	NV	Eureka	39 29' 8", -115 56' 54"	6900	Windfall Cyn off hwy 50	ARTR, CHNA, LECI
9076623	PONE/POAM	NV	White Pine	39 11' 49", -114 41' 42"	7300	Cave Lake Loop, S of Ely in disturbed area	PJ, ARTR, LECI
9076624	POSE	UT	Millard	38 55' 11", -112 12' 22"	7000	FR100, E of Fillmore on road cut	Cercocarpus, Acer, Juniper, Quercus
9076628	POSE	UT	San Pete	39 30' 36", -111 44' 5"	6000	Chicken Creek Cyn, E of Levan on red rocky slopes	Acer, Quercus
9076631	POSE	UT	Duchesne	40 25' 15", -110 22' 54"	7160	21000 W (road to Moon Lake) N of Mountain Home, UT in rocky soil	Juniper, black sage, PSSP, needlegrass
9076638	POSE	ID	Lincoln	42 54' 52", -113 45' 53"	4300	Kamima to Carey Rd N of Kamima in rocky knoll	ARTR, AGCR, POSE
9076639	PONE	ID	Lincoln	43 8' 12", -113 46' 5"	4300	Kamima to Carey Rd, N of Kamima above Laidlaw Corrals	ARTR, AGCR, POSE
9076642	PONE	ID	Blaine	43 25' 29", -114 0' 57"	5200	Little Wood River, 0.5 mi SE of dam	ARTR, PONE
9076646	POSE	ID	Lincoln	43 6' 22", -114 4' 49"	4460	N of Richfield	ARTR
9076649	POAM	ID	Camas	43 20' 32", -114 35' 19"	5000	Roadside on Hwy 20. Possible seeding of Sherman	ARTR
9076650	PONE	ID	Ada	43 36' 30", -115 57' 0"	3070	Lucky Peak Res on FR 268 (Side Gulch Rd)	PUTR, chokecherry
9076653	PONE	ID	Elmore	43 37' 9", -115 42 48"	4400	Arrow Rock Res. Side Gulch Rd.	ARTR, PUTR
9076654	PONE	ID	Elmore	43 33' 30", -115 36' 53"	4700	Long Gulch Rd. (FR 113)	
9076655	POSE	ID	Owyhee	42 59' 2", -116 28' 28"	3720	Triangle Rd from Oreana	ARTRwy, POSE, BRTE

Idaho Fescue Initial Evaluation Planting

2011 Progress Report
Study Number: IDPMC-P-1002-RA
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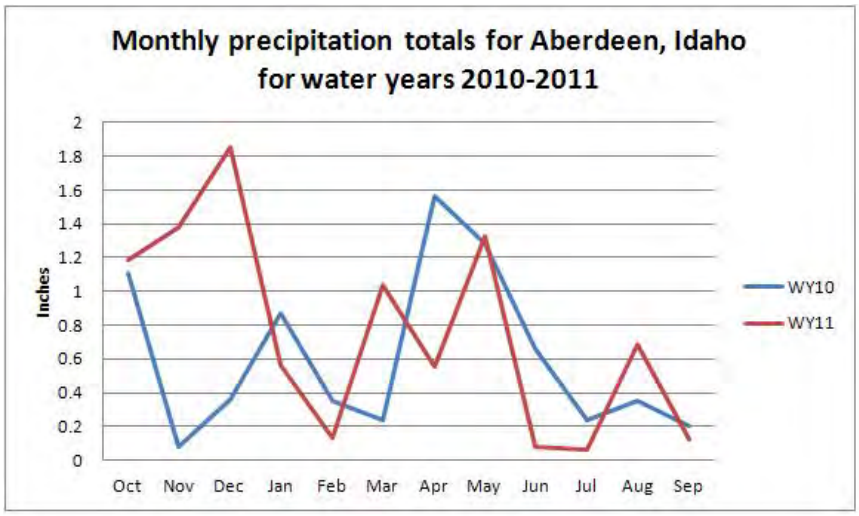
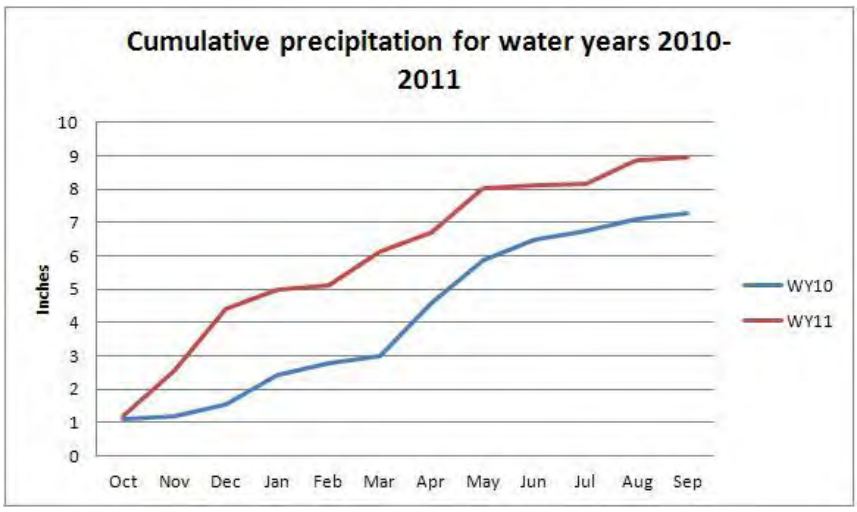
Introduction

Seed of two Idaho Fescue accessions, 9076620 and 9076648, were collected from native sites in Nevada and Idaho during the summer of 2008. Seed was allowed to air dry and was then cleaned to approximately 97% purity. Cleaned seed was placed in cold-dry storage (ca 50º F, 20% RH) until planting. Viability was estimated in January 2010 using the kerosene heater "popping" method outlined in Tilley et al., (2010) and in-house germination tests.The new accessions were tested against three released Idaho Fescue varieties, Winchester, Joseph and Nezpurs and one previously tested accession 9076469 from a site near Bozeman, Montana. Experimental design was a randomized complete block with four replications. Individual plots were 20 feet long and contained a single row with rows planted on three foot centers.

Soil at the site is a Declo silt loam with pH of 7.4 to 8.4. Average annual precipitation is 9 inches. The planting site was prepared in the fall of 2009 and spring of 2010 with herbicide and tillage applications. Plots were planted with a belt-seeder on June 14, 2010 at a depth of 0-1/4 inch. The plots were planted at a target seed rate of 50 seeds/linear foot (Ogle et al.2009).

The plots were irrigated to provide approximately 14 to 16 inches of total accumulated water for the year; the typical minimum moisture requirement for this species. Cumulative natural precipitation totaled 7.3 inches in water year 2010 and 9.0 inches in water year 2011.





On September 12, 2010 the plots were evaluated for percent stand, plant density and seedling vigor. Percent stand was measured using a twenty foot rope marked with one foot increments stretched the length of the plot and anchored at either end. Plants intercepting the one foot increments were summed and recorded as a percentage. Plant density was measured by counting seedlings found in the middle two feet of row and converted to average number of plants per foot of row. Representative plants in each plot were measured for plant height. In 2011, percent stand, plant density and height were evaluated on May 2.

All data were analyzed using an Analysis of variance. Means of statistically different data were separated using a least significant difference (LSD) test. Accessions are listed in the table from best percent establishment to worst. Only accessions with measureable plants are reported for 2010.

Results

Establishment was spotty for most accessions (table 2). Joseph had the best percent establishment, plant density and the tallest plants evaluated, and was significantly better than the other accessions in density and height.

Table 2. field establishment

	September 12, 2010			May 2, 2011		
Accession	Establishment	Density	Height	% Stand	Density	Height
	----%----	Plants/ft²	cm	----%----	Plants/ft²	cm
Joseph	28 a	6 a	1.7 a	34[1]	2.5[1]	4.0 bc
9076469	18 ab	2 b	0.5 b	38	2.8	5.5 ab
9076620	12 ab	1 b	0.4 b	30	2.0	2.8 c
Winchester	9 ab	0 b	0.1 b	36	2.3	6.8 a
Nezpurs	1 b	0 b	0 b	16	1.3	3.8 c
9076648	0 b	0 b	0 b	4	0.3	3.3 c
LSD (0.05)=	21	3	0.9			varies

[1] Means not significantly different

Discussion

None of the accessions performed to what would be considered acceptable standards. The highest establishment was Joseph with 28% and 6 plants/ft². These results are far lower than would be expected for Idaho Fescue under agricultural conditions with supplemental irrigation. Weed pressure and a late planting date may have had an effect on the planting; but with ample water, low seedling vigor is more likely. Stands increased modestly from 2010 to 2011 but were still low. Accession 9076469 had the highest percent stand with 38. Plant densities were also low with the best density being 2.8 plants/ft² from accession 9076469. Means from percent stand and plant densities were not separable statistically in 2011. Significant differences were detected in plant heights; Winchester had the tallest plants at 6.8 cm followed by 9076469 at 5.5 cm. There was not enough seed in any plot to warrant harvesting in 2011.

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Using pre-germinated seed for field establishment of Nebraska sedge

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Nebraska sedge (*Carex nebrascensis* Dewey) is a major vegetative component in many wetland plant communities in western North America (Ball and Reznicek, 2003). It's above ground biomass provides valuable forage for both livestock and wildlife and cover for nesting waterfowl (Hoag and others, 2011). The extensive dense fibrous and rhizomatous root system of Nebraska sedge provides excellent erosion control and site stabilizing characteristics making it very desirable for wetland and riparian revegetation projects (Hoag and others 2011; Manning and others 1989). Nebraska sedge has been most successfully established by planting transplants from existing populations and by propagating containerized material from seed under greenhouse conditions. Very limited success has been observed from direct seeding in the field (Hoag and Sellers 1995). Direct seeding methods are desirable to provide more flexibility to revegetation efforts and to reduce overall project costs (Kettenring and Galatowitsch, 2007; Shaw and Hurd 1992).

Planting pre-germinated seed of Nebraska sedge and other wetland species for wetland restoration and creation has potential to improve establishment success. Sowing seed which has been pre-germinated into a moist field condition allows roots to penetrate the soil more rapidly than waiting for seed to germinate in the field. This enables the seed to immediately take up available water, and should reduce the incidence of seedlings washing away in flood events.

Pre-germination of seed has been used in a variety of vegetables, fruit trees and grasses (Khan, 1992). Native grasses, sown with pre-germinated seed resulted in faster emergence and greater root biomass in 3 native cool-season grasses, and greater root length in 2 wheatgrass species compared to untreated seed (Mueller and Bowman, 1989).

These techniques are commonly used in rice production. Pre-germinating the seed increases the rate and percentage of seedlings established (Rice Knowledge Bank, 2010). It also reduces the time required for seed to uptake sufficient moisture to initiate the germination process. In the pre-germination process, seed is submerged in a bag in water for 24 to 36 hours or until small shoots appear at end of seed (the roots should not exceed 5 mm in length). The seed is then dried in the bag for 24 hours and then broadcast or seeded with a drum seeder (Rice Knowledge Bank, 2010). Pre-germinated seed is normally directly sown into wet, puddled seedbeds or standing water.

Materials and Methods

The Aberdeen, Idaho Plant Materials Center (IDPMC) conducted a wetland seeding trial investigating the effectiveness of various seed pretreatment protocols and delivery methods including pre-germinated seed and hydroseeding. We also examined two seedbed preparation techniques.

The study was conducted in two, 61 x 15 m (200 x 50 ft) unlined ponds at the Aberdeen PMC. Soils are a Declo silt loam with pH of 7.4 to 8.4. The study was planted on July 7, 2011 and was evaluated through September 26. The study was created using a randomized complete block design with four replications. Each plot measured 3.7 x 12.2 m (12 x 40 ft).

Nebraska sedge seed was purchased from Granite Seed Company, Lehi, Utah. The seed had intact perigynia, (a sack-like structure found in *Carex* spp) which is known to inhibit germination (Hoag and others, 2001; Jones, 1999). Perigynia were removed with a hand-made corrugated seed rubbing board, and then processed with a Westrup LA-LS air screen cleaner with a 1.40 mm screen and light air to an estimated 98% purity. The cleaned seed contained approximately 1.76 million seeds/kg (800,000 seeds/lb).

Seedbed preparation

Two ponds were used to investigate alternative methods of seedbed preparation. One pond was prepared using traditional agronomic practices (traditional method), while the other was prepared for planting to take place in wet muddy conditions (slurry method) similar to conditions used in rice production. The traditionally prepared pond was tilled, then smoothed and packed leaving a human boot print approximately 13 mm (0.5 in) deep. The first pond was flooded on July 1 to get the soil to moisture holding capacity and then allowed to draw down until the soil was firm enough to walk on at the time of planting. The second pond was not packed after tilling and left a human boot print 5 cm (2 in) deep. The non-packed pond was flooded on July 1 and July 5 to create a muddy slurry at the time of planting.

Seed treatment

Two seed pretreatments were examined, stratification and pre-germination. Stratified seed was treated for 32 days at 3° C (37° F) in a sphagnum moss substrate following Hoag and others (2001). The pre-germinated seed was soaked in a warm water bath aerated for 13 days at a constant 35° C (95° F) with 24 hr light. The pre-germination treatment was completed in a Hoffman® growth chamber with 6, 34 watt, lite white fluorescent bulbs and four Profile® 1500 aquarium air pumps fitted with 2.5 cm (1 in) bubbling air stones. Growth chamber photosynthetically active radiation (PAR) was measured at 45 µmols/m²s using an AccuPAR LP-80 ceptometer from Decagon Devices, Inc., Pullman, Washington. At the end of the pre-germinating process approximately 5 % of the seed had visible growth breaking the seed coat.

Seed delivery

Two seed delivery methods were evaluated, hydroseeding and dry broadcasting. Seed that was dry broadcast was allowed to dry for 4 hours following pre-germination and stratification to prevent clumping. The hydroseed application was performed with a rented commercially available 1136 liter (300 gallon) trailer mounted hydroseeder. The hydroseed mixture included a paper based mulch at a rate of 560 kg/ha (500 lb/ac). This is 1/4 the recommended rate for hydroseeding turf grass. The lighter rate of mulch was used to prevent the seed being covered and blocking sunlight required for germination. “Turbo Tack” tackifier from Turbo Technologies Inc., Beaver Falls, Pennsylvania, was added at the standard rate of 3.4 kg/ha (3lb/ac). Table 1 lists the rates of water, seed, mulch and tackifier applied in this study. Figure 1 is a photograph of the hydroseed mixture. Trade names are used solely to provide specific information and

should not be considered a recommendation or endorsement by the Natural Resources Conservation Service.

Table 1. Hydroseed mixture[1]

	Amt/load	Amt/ac
Water	1136 l (300 gal)	12,500 l (3,300 gal)
Seed	0.34 kg (0.75 lb)	3.6 kg (8.0 lb)
Mulch	22.7 kg (50.0 lb)	227 kg (500 lb)
Tackifier	0.14 kg (0.30 lb)	1.36 kg (3 lb)

[1] A 300 gallon load covers 372 m² (4,000 ft²)

Figure 1. Hydroseed mixture of paper mulch, tackifier and seed.

Planting took place on July 7 (Figure 2). The pond prepared with the slurry method had areas of ponded water up to 2.5 cm (1 in) deep. Walking through the plots to spread seed created a thin muddy layer on the surface. All treatments were seeded at an approximate rate of 1,600 PLS/m² (150 PLS/ft²), or 9 kg/ha (8 lbs/ac). Daily maximum and minimum temperatures are shown in figure 3.

Each pond was watered independently with the use of perforated pipe. The ponds were irrigated to a depth of 2.5 to 7.6 cm (1 to 3 in) each time the water had receded, leaving a moist bare surface. The watering depth was increased as the established plants developed. Water was applied to stand just over the leaf tips and then allowed to recede.

Figure 2. Hydroseeding into slurry prepared pond. The hydroseed mixture sank into the water and settled on the muddy surface.

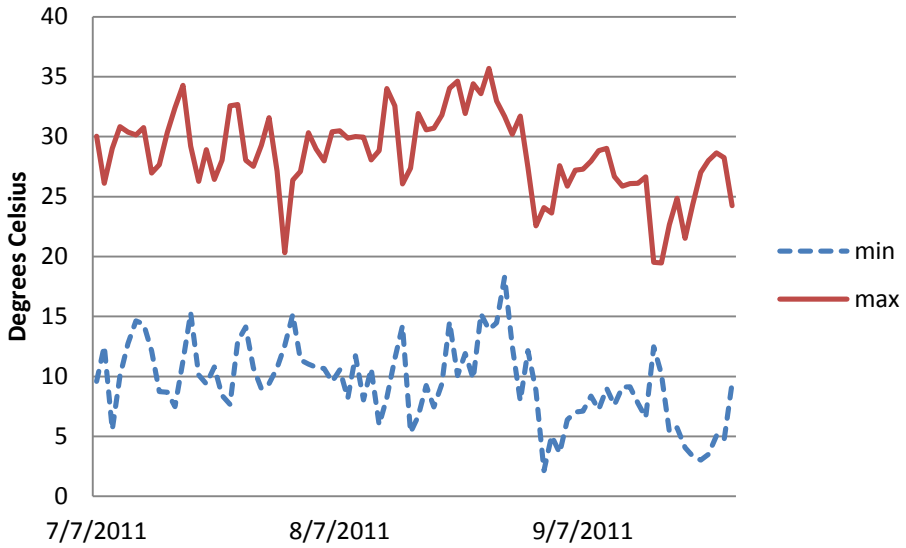

Figure 3. Daily minimum and maximum temperatures at Aberdeen, Idaho from July 7 to September 26, 2011.

Evaluations

Plant density evaluations were conducted using a 1 m² (10.76 ft²) metal grid to obtain density measurements. The grid was divided into 20 cells, each measuring 26 x 20 cm (10 x 8 in). Plant counts were taken in the first, tenth, and twentieth cells of the grid. The grid was placed three times in the plot on the long axis 1, 5 and 10 meters into the plot, thus a total of nine counts were made per plot. The counts were combined and extrapolated to plants/m². The data were analyzed as a split-plot arrangement with the main plot factor being seed delivery technique and the subplot factor being the seed pre-treatment method. The result was 4 split plots (broadcast x

stratified, broadcast x pre-germinated, hydroseed x stratified and hydroseed x pre-germinated). Seedling densities were subjected to analysis of variance procedures in Statistix 8 (Analytical Software, 2003). When significant differences were detected, means were separated using a least significant difference (LSD) test at $p<0.05$. Seedbed preparation methods were not compared statistically because the treatments could not be replicated.

Results

No significant differences were detected for pre-treatment or delivery x pre-treatment for either evaluation (table 2). Significant differences were observed between delivery methods for both evaluations in the slurry prepared pond ($p=0.002$ and $p=0.046$ on August 8 and September 26 respectively) and at the August 8 evaluation in the traditionally prepared pond ($p=0.001$).

Table 2. Establishment plant densities at August 8 (32 days after planting) and September 26 (81 days after planting) in slurry prepared bed and traditionally prepared bed.

Slurry prep.	Aug. 8	Sep. 26
	Plants/m²	Plants/m²
Hydroseed	2673 a	863 a
Broadcasting	1063 b	186 b
LSD	509	652

Traditional prep.	Aug. 8	Sep. 26
	Plants/m²	Plants/m²
Hydroseed	2234 a	321
Broadcasting	759 b	32
LSD	373	N/A

Discussion

No significant differences were detected regarding seed pre-treatment (pre-germinated versus stratified); however significant differences were found comparing seed delivery techniques. Applying seed via hydroseeding had 2 to 3X greater establishment than broadcasting the seed (Figure 4). Hydroseeding resulted in essentially 100 % of PLS establishment regardless of seed pre-treatment, while broadcasting seed resulted in 47 to 66 % establishment based on an anticipated 1600 PLS/m². In the hydroseed plot evaluations of August 8, more plants were observed than was anticipated by the target seeding rate. This is most likely due to the difficulties in calibrating seed delivery from the hydroseeder.

The two seedbed preparation treatments could not be analyzed for statistical differences, but establishment means were higher in the slurry prepared pond than the pond with the traditionally prepared seedbed. Seeding into a slurried seedbed places the seed in a wet environment and allows the seed to be drawn down into the moist surface. This provides excellent conditions for germination and growth at the time of planting.

We observed a marked decrease in establishment from the August 8 evaluation to the September 26 evaluation. We believe this is due to over irrigation which prevented adequate oxygen exchange to the establishing seedlings. This highlights the precise requirement for the amount and timing of water application to facilitate sedge establishment and growth. If water levels cannot be precisely controlled during seedling establishment, revegetation by direct seeding will probably fail.

Conclusions

Our data showed no difference between stratified and pre-germinated seed establishment. This gives the planter two options for seed pretreatment based on their available resources. Pre-

germinating seed takes 7 to 14 days while stratifying can take 30 to 90 days depending on the species. However, when a growth chamber or greenhouse is not available for achieving pre-germination temperatures, cold stratification is a viable alternative.

Figure 4. Nebraska sedge seedlings emerging from a hydroseed mix.

Hydroseeding is applied wet, giving the seed and new seedlings less chance of drying during the first few days after sowing. It provides immediate water as opposed to having to wait for water to enter the system via flooding or rains. In our trial, hydro-mulch applied to standing water sank and stayed in place with little movement. However wave action was minimal in the controlled environment of the study. Broadcast seed also sank. The slurry bed prep method also provides insurance against drying without the risk of seed loss from the initial flooding or watering. These early results indicated that hydroseeding may be an acceptable alternative to greenhouse grown transplants for wetland plant establishment; however the precision of water control required to establish new seedlings may limit the applicability of this technique in many wetland and riparian situations.

Acknowledgements
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Development of pre-germination protocols for wetland seed establishment

2011 Progress Report
Study Number: IDPMC-T-1006-WE
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Introduction

The use of pre-germinated seed for wetland restoration and creation has potential to improve establishment success from direct seeding. Sowing pre-germinated seed into a moist environment allows roots to immediately begin elongating and taking up available water, thus preventing desiccation. It enables the roots to penetrate the soil more rapidly than waiting for seed to germinate under traditional conditions. The roots will anchor more quickly to the soil, reducing the probability of the seed washing away in flood events. Personal observations of non-replicated trials indicate that pre-germinated sedge seed establishes quickly and allows for earlier and more frequent flooding without losing seed to washout or floating.

Rice growers generally broadcast per-germinated seed with roots less than 5mm (Rice Knowledge Bank, 2010). For optimum establishment of pre-germinated seed the seed needs to be germinated quickly and uniformly to ensure that all the seed is in the proper condition for establishment. Root and shoot growth should be initiated, but not of such a length that the young tissues are damaged during broadcast sowing.

The standard method for germinating seed of Nebraska sedge involves 1) removing the perigynium from the achene, 2) subjecting the seed to a cold/moist stratification treatment for approximately 30 days, and germinating the seed at high temperatures with exposure to light (Hoag and others 2001; Shaw and Hurd 1992; Johnson and others 1965). However we observed Nebraska sedge germinating at high levels in hot greenhouse conditions without a stratification treatment. We believe that under certain conditions, the stratification requirement may be circumvented and allow for faster, more uniform germination of sedge seed. The goal of this study is to develop simple pre-germination protocols that can be applied to relatively large quantities of seed for use in wetland plantings.

Materials and Methods

Seed was harvested from an established wetland pond located at the Aberdeen Plant Materials Center, Aberdeen, Idaho in 2000. Seed was cleaned including removal of the perigynium and stored in cold/dry conditions at 4º C (39º F) and approximately 35% relative humidity. A sample of the seed lot was sent to the Idaho State Seed Lab for a tetrazolium (TZ) test in prior to this trial 2010. The results indicated 79% viable seed.

The seed was subjected to 6 germination treatments that involved 3 water conditions: constant soaking; changing the water every 3 days with fresh clean water; and constant soaking with an aquarium aerator. These treatments were conducted in one of two locations: a growth chamber or under greenhouse conditions. The growth chamber was kept at a constant 35° C (95° F) with 24 hr constant light. The chamber used was a Hoffman® growth chamber with 6, 34 watt lite white

fluorescent bulbs, 3 on the door and 3 on the back panel. Greenhouse temperatures were allowed to fluctuate from 24° C (75° F) at night to 35° C (95° F) during the day. Greenhouse lighting was not supplemented, so natural light/dark conditions were maintained. Photosynthetically active radiation (PAR) was measured using a Decagon AccuPAR LP-80 ceptometer®. Greenhouse PAR measured 1300 µmols/m²s at 1:00 pm, and growth chamber PAR measured 45 µmols/m²s. The seed soaking treatments were conducted in 0.47 l (16 oz), glass Mason jars to meet the light requirement of the species (Jones 1999; Kettenring and others 2006). The water change treatment was drained and refilled with clean water every 3 days after initiation. A seventh treatment was conducted using the best results from Hoag and others (2001) as a control. The seed was subjected to a 30 day cold moist stratification in sphagnum moss and then germinated on blotter paper in petri dishes sealed with paraffin wax in a growth chamber with diurnal temperatures of 26° C (78° F) and 37° C (98° F).

The treatments were compared to examine the effect on overall germination, germination rate and root and shoot development. For each of the soaking treatments, 1.65g or approximately 3,000 seeds were placed in each jar. Germination was evaluated daily beginning 6 days after initiation (DAI) through 10 DAI. After 10 DAI, seedlings were evaluated at 14, 21, 28 and 35 DAI. Growth was evaluated similarly, but was ended at 21 DAI. At each evaluation the seed in the jars was stirred to mix floating and sunken seed. Then several hundred seeds and germinants were randomly removed from the jar with a spoon and placed into a Petri dish for evaluation. Twenty five seeds were randomly evaluated under a dissecting scope at 10x magnification to determine germination and growth. Seed was counted as germinated if the seed coat had split revealing cotyledon growth. All germinated seed were then measured for cotyledon and root growth. A germination rate was determined by using the method described by Maguire (1962). The number of seedlings obtained at each counting was divided by the number of days after planting, and the values obtained at each count were summed at the end of the test as follows:

$$\text{Germination rate} = \left(\frac{\text{Number of seedlings}}{\text{Days after planting}}\right) + \ldots + \left(\frac{\text{Number of seedlings}}{\text{Days after planting}}\right)$$

For the control 30 day stratification treatment, 4 replications of 25 seeds were evaluated for germination. Root and shoot development were not evaluated for the 30 day stratification treatment as germinating on blotter paper would not be conducive to large scale pre-germination.

In order to determine the optimum treatment duration, we calculated the total percentage of seed that had germinated and had shoot growth ranging from 0 to 2 mm in length. These data were plotted against the number of days of treatment.

Each evaluation was replicated four times. Germination at 10 DAI, final germination at 28 DAI, and germination rates were analyzed with a one-way analysis of variance with an alpha of 0.05 to determine significance. Means were then separated using a LSD (least significant difference) test. Because the same seed and seedlings were not observed at each evaluation, it was possible for dips in percent germination and growth measurements to occur. Evaluation of the aerated treatments was discontinued at 10 DAI because seed had achieved the maximum expected germination (>100% of TZ test) and shoots had grown in excess of 5mm.

Results

Germination

Both aerated treatments had greater than 80% total germination after 7 days, while all other treatments remained below 50% germination even after 10 days (Figure 1). Total germination after 10 days and germination rates of the aerated treatments were significantly greater than all other treatments (Table 1). By 28 days after initiation the GH soak and GH change treatments had essentially reached the maximum of expected germination and did not differ significantly from the aerated treatments. Germination in the control 30 day stratification treatment appeared to plateau by 28 DAI and had the lowest final germination; significantly lower than all other treatments with the exception of the GC soaking treatment.

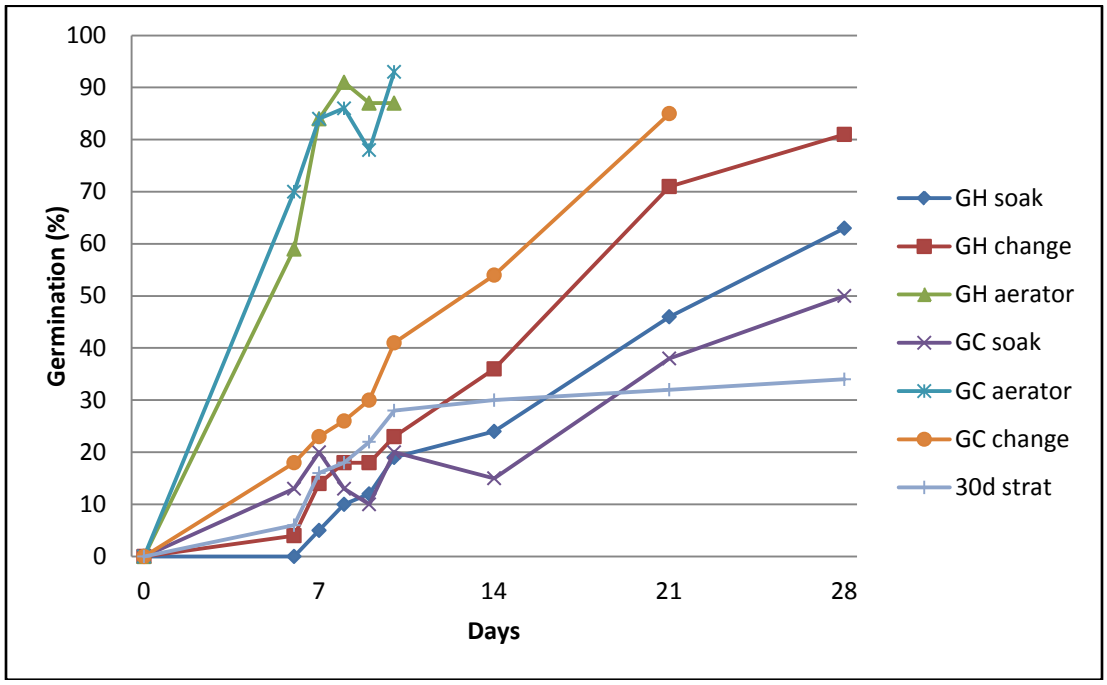

Figure 1.Average total germination of Nebraska sedge under germination treatments. GH=greenhouse, GC=growth chamber, soak=constant soaking, change= water changed every 3 days, aerator=soaked with aquarium aerator. Evaluations ended when germination had reached the maximum of the expected 79%. GH aerator and GC aerator evaluations concluded at 10 DAI; GC change evaluations concluded at 21 DAI.

The two aerated treatments also showed the highest germination rate after 10 days (Table 1). The germination rates of the aerated treatments did not differ significantly from one another, but did differ significantly from all other treatments. The lowest germination rates were observed in the GH soak and 30d stratification treatments.

Table 1. Germination characteristics

Treatment	Germination (10 DAI)	Final germination (28 DAI[2])	Germination rate[1]
	---%---	---%---	
GC aerator	93 a	93 a	13.10 a
GH aerator	87 a	87 a	12.90 a
GC change	41 b	85 a	4.24 b
GH change	23 c	81 a	2.21 c
GC soak	20 c	50 bc	2.49 c
GH soak	19 c	63 b	1.30 d
30d strat	29 c	47 c	1.7 cd
P=	<0.001	<0.001	<0.001
LSD (0.05)	9.8	15.3	0.83

[2] Germination rate is a comparative value with no associated unit of measure; larger numbers signify faster germination.
[1] % germ taken at 10 DAI for aerated treatments and 21 DAI for GC change treatment.

Growth

Quick germination rates in the aerated treatments led to faster shoot and root development (Figures 2 and 3). Shoot lengths after 10 days of the aerated treatments were more than twice those of the other treatments. Roots similarly developed much quicker under aeration. Because aerated treatments germinated quickly and uniformly, most roots and leaves were similar in length. The other treatments germinated at a slow rate over a much longer period of time, which yielded roots and shoots of a much broader range of lengths.

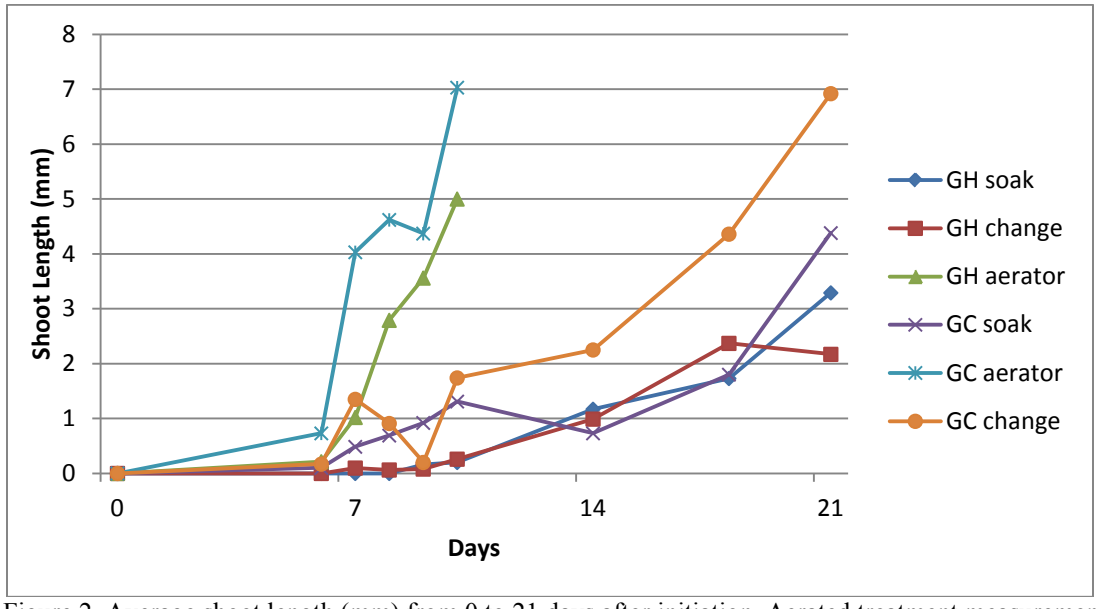

Figure 2. Average shoot length (mm) from 0 to 21 days after initiation. Aerated treatment measurements stopped at 10 DAI when maximum germination was achieved.

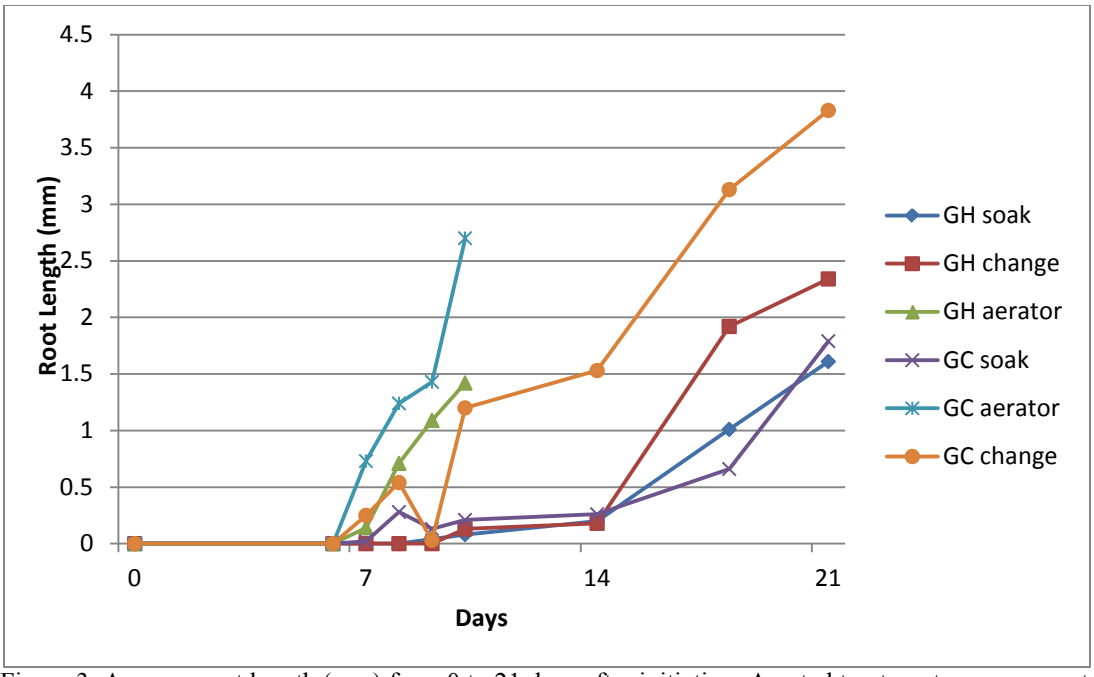

Figure 3. Average root length (mm) from 0 to 21 days after initiation. Aerated treatment measurements stopped at 10 DAI when maximum germination was achieved.

Optimum treatment duration for planting

The two aerated treatments produced rapid and uniform germination, while the remaining treatments initiated germination over a longer period of time (Figure 4). The upward slope of the graph indicates initial germination and growth, where the downward slope indicates shoot lengths increasing beyond the 2 mm threshold. Six days after initiation in the aerated water treatments, 60% of the seed had germinated and bore shoots between 0 and 2 mm in length. At 7 days, the greenhouse aerator treatment had continued to increase to 70% while the percentage of seed germinated in the aerated growth chamber treatment in the 0 to 2mm range had started to decline as more shoots grew longer than 2mm. The percentage of seed with 0 to 2 mm shoots in the greenhouse aerated treatment began to decline at 8 DAI. Quick uniform germination produced a high number of germinants with similar sized shoots. The prolonged germination window of the non-aerated treatments resulted in a much broader range of shoot lengths.

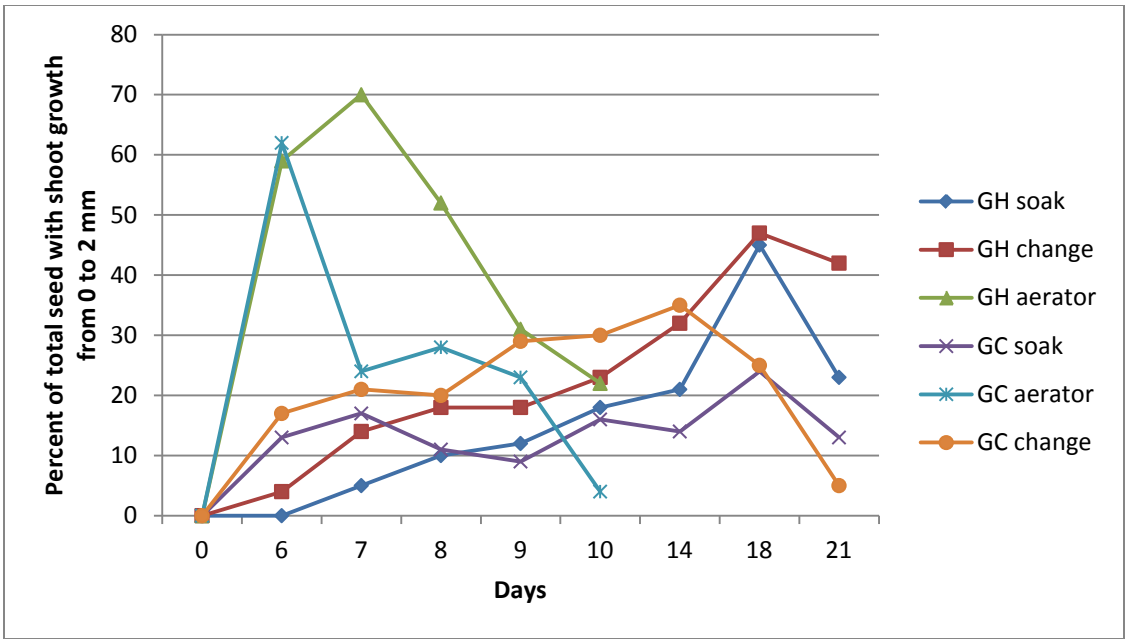

Figure 4. Percentage of the treated seed showing shoot growth from 0 to 2 mm in length. The upward slope of the graph indicates initial germination and growth, where the downward slope indicates increasing shoot lengths beyond the 2 mm threshold. The peaks indicate the DAI with the highest number of germinants with shoots falling in the 0 to 2 mm range.

Discussion Conclusions

With the exception of the growth chamber soaking treatment, all treatments investigated here yielded significantly higher germination and germination rates than the traditional germination procedure involving a 30d cold/moist stratification. Under these conditions, no stratification was required to obtain high rates of germination and growth. These results suggest that significantly less time is required to prepare seed for planting than originally believed.

This study also indicates that soaking seed in warm, aerated water may be a previously undiscovered method of overcoming dormancy in wetland sedges. The highest germination achieved in the control 30 day stratification treatment was 34% out of an expected 79% TZ test, yet essentially all of the soaking treatments evaluated in this trial had significantly greater germination approaching or exceeding the maximum expected. This suggests that fully soaking Nebraska sedge seed fully overcomes physiological dormancy mechanisms while the standard cold moist stratification treatment only partially overcomes seed dormancy.

We also wanted to determine the best treatment and duration of treatment to have seed in optimum condition for seeding into a wetland. The goal was to find a period of time following initiation when the maximum number of seeds had germinated, yet appendages were still relatively small and would be less likely to be damaged during hydroseeding or broadcasting. Our results indicate that the optimum technique for high numbers of germinants with small growth appendages (0 to 2mm) is to sow seed after 6 to 7 days of soaking under aerated water conditions. The rapid germination rates of the aerated treatments provide significantly more uniform growth of seedlings, which will facilitate seeding through hydroseeding or broadcasting equipment. If seeding must be delayed, it may be possible to slow growth by discontinuing

aeration and/or lowering temperatures. Future studies will help determine the viability of this concept.

These results apply to small seed lots in mason jars. For larger scale pre-germination for wetland seedings, these results provide a reference point from which to calibrate pre-germination protocols. Further studies need to be conducted to determine what length of root and shoot can withstand hydroseeding.

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2011 Pollinator Planting
Fish and Game Farm, Field 28

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Introduction

The Conservation Reserve Program of the 2008 USDA Farm Bill promotes the establishment of pollinator friendly habitat. The desired goal in these plantings is to establish nine pollinator species (three flowering in each of the three flowering periods – early, mid and late growing season). The seed mixture can also include native grasses; up to 25% of the total seed mixture.

Establishment of grass-dominant plantings including forbs and shrubs are common and largely successful; however, pollinator plantings consisting predominantly of forbs pose problems not typically encountered with grass plantings. Forbs, especially native forbs, are in many cases not competitive against weed species. Forb plantings also severely limit the herbicides available for controlling broadleaf weeds. Healthy rangeland in the Intermountain West consists of approximately 5 to 25% shrub cover, 40 to 60% grasses and 5 to 20% forbs. There is concern that the 25% grass composition requirement may not provide the necessary competitive ability needed to establish and persist in weed prone sites.

Materials and Methods

In 2011, the PMC established 5 acres of pollinator habitat for display and to research management requirements involved in pollinator friendly plantings. Two pollinator mixes were developed to compare forb establishment and persistence with varying grass composition. The mixes were designed to provide blossoms for foraging insects in all three flowering periods during the growing season (Table 1). Each mixture has the same species components, but they have different proportions of forbs and grasses. The first mix follows NRCS-FSA guidelines and contains 25% grass and 75% forb components (Tables 2). The second mix is designed to mimic natural healthy rangeland conditions, and contains the same species components; however the grasses were doubled to comprise 50% of the total mix, and the forbs were reduced to comprise 50% of the total mix. The mixtures contain only 7 pollinator species of the nine required by the Conservation Reserve Program. This reflects the lack of available forbs suitable for use in arid to semi-arid environments, especially those with late summer bloom periods.

The planting was established in field 28 of the PMC Fish and Game farm 5 miles northeast of Aberdeen. In 2010, the year prior to planting, the field was planted to field corn and managed as

standing food and cover for wildlife habitat. Soil at the planting site is a Declo silt loam with pH of 7.4 to 8.4. Average annual precipitation is 9.39 inches.

Table 1. Pollinator planting mixture components

			Bloom Color and Time			
Scientific Name	Common Name	Variety	spring	summer	late summer	Origin
Pseudoroegneria spicata	Bluebunch wheatgrass	Anatone				Native
Leymus cinereus	Basin wildrye	Magnar				Native
Poa ampla	Big bluegrass	Sherman				Native
Achillea millifolium	Western yarrow	Great Northern				Native
Linum perenne	Blue flax	Appar				Introduced
Medicago sativa ssp. *falcata*	Falcate alfalfa	Don				Introduced
Sanguisorba minor	Small burnet	Delar				Introduced
Onobrychis vicaeifolia	Sainfoin	Common				Introduced
Helianthus annuus	Sunflower	Common				Native
Machaerranthera canescens	Hoary tansyaster	Common				Native

Table 2. Seed mixture percentages

#	Variety	Common Name	25% grass	50% grass
			% of mix	% of mix
1	Anatone	Bluebunch whtg	5	10
2	Magnar	Basin wildrye	5	10
3	Sherman	Big bluegrass	15	30
4	Great Northern	Western yarrow	5	2.5
5	Appar	Blue flax	10	7.5
6	Don	Falcate alfalfa	10	5
7	Delar	Small burnet	15	7.5
8	Eski	Sainfoin	20	10
9	Common	Sunflower	10	5
10	Common	Tansyaster	5	2.5

The corn stubble was mowed in the spring of 2011, and the field was then irrigated to encourage weed seeds to germinate. The field was then sprayed with 64 oz Glyphosate/ac on May 11 prior to planting on May 18. The west half of the field was planted to mix 1 (25% grass), while the eastern half was planted to mix 2 (50% grass).The field was irrigated through the growing season to approximate 14 to 16 inches of annual precipitation, the suitable range for the species in the seed mixture. Fields were mowed three times in early and mid-summer to prevent weeds from going to seed.

The seed mixes were separated according to seeding depth, one mix for drilling seed at 1/4 to 1/2 inch and a broadcast mix for shallow (0 to 1/8 inch) seeding (see appendix). Because the planting was completed using a Truax Rough Rider range drill with alternate row seeding capabilities, the standard seeding rates (Ogle and others, 2011b) were also cut in half. By doing an alternate row seeding, the number of rows planted is effectively halved and seeding rates are therefore adjusted. Seeding rates and drill calibrations are shown in the appendix. All seed was mixed with rice hulls as inert carrier to facilitate flow through seeding equipment using specifications found in St. John and others (2005).

On July 12, 2011, a 200 ft transect was laid diagonally in each field beginning 100 ft from the southwest corner. A frequency grid based on that described by Vogel and Masters (2001) was used to evaluate plant density of the planted species and volunteer weeds. The grid measured approximately 40X41 inches, having four ten inch columns and five rows, totaling 20 cells. Counts were made of the cells that contained at least one plant. Evaluations were made at 20 foot intervals along the transect making a total of 10 counts. The total cells were then added for each species to determine average plants/ft². It was difficult to find target species in the masses of weeds at the time of the evaluation. The native grasses were particularly difficult to find and were not counted in the evaluation.

Results

Despite previous farming practices and weed control efforts, there was an abundance of annual weeds present in both fields. The most prevalent weed species included witchgrass (*Panicum capilare*), shepherd's purse (*Capsella bursa-pastoris*), field bindweed (*Convolvulus arvensis*), volunteer wheat (*Triticum aestivum*), lamb's quarters (*Chenopodium album*), prickly lettuce (*Lactuca serriola*), red-root pigweed (*Amaranthus retroflexus*), prostrate pigweed (*A. blitoides*), nightshade, (*Solanum* sp.) and tumble mustard (*Sisymbrium altissimum*). Mowing provided fair control of annual broadleaf weeds, but witchgrass continued to dominate the fields throughout the season (Figure 1). In late summer, sunflowers covered the field along with a thick understory of witchgrass (Figure 2).

Figure 1. A solid stand of witchgrass. Photo take July 20, 2011.

Figure 2. Sunflowers take over the field. Photo taken September 12, 2011.

The 25% grass seed mix produced two times more total forbs than the 50% grass mixture as might be expected (Table 3). However, overall weed densities were similar for each planting mixture. These differences are to be expected early in the first growing season as the plants are not big enough to directly compete for resources. Few target grasses were observed, as young grass leaves are easily missed in the thick weeds. It should be much easier to find mature grasses in future evaluations.

Discussion

Acceptable establishment densities for NRCS plantings range from 1 to 2 plants/ft² in a 12 to 16 inch precipitation area with loamy soils (Ogle and others, 2011a). Total established plant densities in this planting cannot be calculated without the inclusion of grasses, so only general estimates can be made. Plant densities of 0.28 and 0.59 forbs/ft² would seem to meet the criteria for fair initial establishment; however first year establishment densities should not be used to determine the success or failure of a planting. Plant densities will be evaluated again in 2012 and 2013 to determine long term trends.

Table 3. Plant densities evaluated July 12, 2011.

Target species		25% Grass Mix	50% Grass Mix
		----------Plants/ft²----------	
	Bluebunch wheatgrass	0	0
	Basin wildrye.	0	0
	Big bluegrass	0	0
	Western yarrow	0.02	0.02
	Blue flax	0.07	0.03
	Falcate alfalfa	0.07	0.02
	Small burnet	0.19	0.07
	Sainfoin	0.08	0.09
	Sunflower	0.16	0.05
	Tansyaster	0	0
	Total target species	0.59	0.28
Weed species			
	Witchgrass	1.86	1.78
	Shepherd's purse	0.36	0.23
	Field bindweed	0	0.01
	Wheat	0.04	0.14
	Lamb's quarters	0.19	0.07
	Prickly lettuce	0.04	0.01
	Redroot pigweed	0.25	0.16
	Prostrate pigweed	0.02	0
	Nightshade	0.01	0
	Tumble mustard	0	0.01
	Total weed species	2.77	2.41

In the first growing season annual weeds forced multiple mowing treatments which removed the majority of flowers that were available for foraging insects. Annual sunflower persisted and blossomed despite the mowing and provided food for foraging bumblebees in late summer and early fall. The planted perennial forbs should have a better advantage in future years to compete against annual weeds, and it is hoped that mowing will not be necessary after the first season.

Mowing for weed control should be considered when planning a seeding mixture. If enough weeds are present at a site to warrant several mowing operations during the first growing season,

annual forbs are probably not worth including in the mixture. Annual sunflower survived through 3 mowing treatments at our planting and flowered late in the season. It is unknown how late one can mow sunflower before losing the flowering capabilities but if flower heads are starting to form, it is probably too late to mow. The species used in our planting provide excellent cover for upland birds such as pheasants and Hungarian partridge. The tall sunflower especially provides hiding and nesting cover as well as an abundant and valuable late fall and winter source of food.

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Appendix. Drill Calibrations

Mix 1 drill

Variety	Common Name	% of mix	Pure stand seeding rate* lb PLS/acre	% PLS	lb/bu**	lb PLS/ac PLS*% of mix	bulk seed (lb/ac) PLS/%PLS*100	volume (% of bu) bulk seed/lb/bu*100
Anatone	bluebunch whtg	5	4.00	84.60	21.70	0.20	0.24	1.09
Magnar	basin wildrye	5	4.00	92.70	18.50	0.20	0.22	1.17
Delar	small burnet	15	10.00	94.00	23.10	1.50	1.60	6.91
common	sainfoin	20	17.00	90.00	28.60	3.40	3.78	13.21
common	sunflower	10	11.50	90.00	23.00	1.15	1.28	5.56

* 1/2 of rate in Ogle and others, 2011

** St. John and others, 2005

Mix 1 broadcast

Variety	Common Name	% of mix	Pure stand seeding rate lb PLS/acre	% PLS	lb/bu	lb PLS/ac PLS*% of mix	bulk seed (lb/ac) PLS/%PLS*100	volume (% of bu) bulk seed/lb/bu*100
Sherman	big bluegrass	15	1.00	90.00	17.90	0.15	0.17	0.93
Great Northern	yarrow	5	0.25	90.00	20.60	0.01	0.01	0.07
Appar	blue flax	15	2.00	97.00	46.10	0.30	0.31	0.67
Don	yellow alfalfa	10	2.50	90.00	60.00	0.25	0.28	0.46
common	tansyaster	5	1.00	35.00	12.00	0.05	0.14	1.19

Mix 2

Mix 2 drill

Variety	Common Name	% of mix	Pure stand seeding rate lb PLS/acre	% PLS	lb/bu	lb PLS/ac PLS*% of mix	bulk seed (lb/ac) PLS/%PLS*100	volume (% of bu) bulk seed/lb/bu*100
Anatone	bluebunch wg	10	4.00	84.60	21.70	0.40	0.47	2.18
Magnar	basin wildrye	10	4.00	92.70	18.50	0.40	0.43	2.33
Delar	small burnet	7.5	10.00	94.00	23.10	0.75	0.80	3.45
Eski	Sainfoin	10	17.00	90.00	28.60	1.70	1.89	6.60
common	sunflower	5	11.50	90.00	23.00	0.58	0.64	2.78

Mix 2 broadcast

Variety	Common Name	% of mix	Pure stand seeding rate lb PLS/acre	% PLS	lb/bu	lb PLS/ac PLS*% of mix	bulk seed (lb/ac) PLS/%PLS*100	volume (% of bu) bulk seed/lb/bu*100
Sherman	big bluegrass	30	1.00	90.00	17.90	0.30	0.33	1.86
Great Northern	yarrow	2.5	0.25	90.00	37.00	0.01	0.01	0.02
Appar	blue flax	7.5	2.00	97.00	46.10	0.15	0.15	0.34
Don	yellow alfalfa	5	2.50	90.00	60.00	0.13	0.14	0.23
common	tansyaster	2.5	1.00	35.00	12.00	0.03	0.07	0.60

Interim report of the evaluation of bottlebrush squirreltail selections in five common gardens

September 2011

James Briggs[1/], L. St. John, D. Tilley[2/], H. Woodruff[3/], R. Hybner[4/], G. Fenchel[5/] E. Eldredge[6/]

Abstract

Bottlebrush squirreltail accessions, Toe Jam Selected Germplasm (*E. elymoides* ssp. *californicus*; Fish Creek Selected Germplasm (*E. elymoides* ssp. *elymoides*); Tusas Germplasm (*E. elymoides* ssp. *brevifolius*); Wapiti Germplasm (*E. elymoides* ssp. *brevifolius*) and 9099275 (*E. elymoides* ssp. *brevifolius),* were planted at the Aberdeen, Idaho PMC; Los Lunas, New Mexico PMC; Moccasin, Montana; and Havre, Montana in 2009. The New Mexico PMC planting was a failure. No significant difference in biomass yields was evident at the Idaho or Montana sites after the first growing season, although Tusas, Wapiti, and 9099275 had higher yields than Toe Jam or Fish Creek in 2010. In 2011, no significant differences were evident in biomass yield among entries at the Aberdeen, Idaho PMC, however Wapiti, Tusas, and 9092275, had higher yields than Fish Creek and Toe Jam. Significant differences in percent stand were found following the second over wintering period. Wapiti had a significantly greater stand than Toe Jam and Tusas and Wapiti, 9092275, and Fish Creek had significantly (<P=0.05) greater stands than Tusas. Based on the results to date for the region represented by the Aberdeen PMC site the release Wapiti would be the preferred choice on drier (8-10 inches annual precipitation) sites. Fish Creek and Toe Jam, although adapted, represent different sub-species and did not perform as well as the *E. brevifolius* sub species entries. Fish Creek and Toe Jam likely require sites with more annual precipitation. While Tusas had good biomass yields it had significantly reduced stands over time which may indicate lack of long term adaptability due to reduced winter hardiness. Tusas is the most southerly release and its performance may indicate there are geographical limits to the distance you should move this selection northward.

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Introduction

Bottlebrush squirreltail (*Elymus elymoides* ssp. *elymoides*, ssp. *brevifolius* and ssp. *californicus* and big squirreltail *Elymus multisetus*) are short-lived, drought tolerant, cool season, native bunchgrasses. They are short to medium sized (6 to 22 inches tall), tufted and have fair forage value in winter and spring and poor forage value in summer when seed heads are present. The bristly awns are objectionable to grazing animals and cause difficulties in seed handling, planting and harvesting. These species are often increasers on poor condition to improving rangelands. They are adapted to a wide variety of soils including saline soils in the 8-18 inch precipitation zones (Barkworth 2009). It is

hoped these species will have attributes that will enable them to establish a foothold in annual rangelands dominated by cheatgrass (*Bromus tectorum*) or medusahead (*Taeniatherum caput-medusae*). ARS and NRCS have released three squirreltail accessions; Toe Jam Selected Germplasm (*E. elymoides* ssp. *californicus*) in 2003; Fish Creek Selected Germplasm (*E. elymoides* ssp. *elymoides*) in 2003; and Sand Hollow (*E. elymoides*) in 1996. Sand Hollow is best adapted to sandy foothill rangelands receiving 12 inches or more annual precipitation in the lower Snake River Plains (Monsen 2004). Toe Jam is best adapted to loam to sandy loam soils in the Great Basin and lower to middle Snake River Plains receiving 8-14 inches of precipitation (Monsen 2004). Fish Creek is best adapted to sandy loam to silt loam to clay loam soils receiving 10 inches or more annual precipitation in the middle to upper Snake River Plains (Monsen 2004). Tusas Germplasm (*E. elymoides* ssp. *brevifolius*) was released in 2001 by NRCS and New Mexico State University. It is intended for use in the southwestern United States (USDA1 2006). Wapiti Germplasm (*E. elymoides* ssp. *brevifolius*) and Pueblo Germplasm (*E. elymoides* ssp. *brevifolius)* were released in 2005 by the Upper Colorado Environmental Plant Center and ARS (USDA1 2006). The Upper Colorado Environmental Plant Center also has an experimental accession (9092275) that shows promise for potential release. 9092275 was has been initially identified as *E. elymoides* ssp. *brevifolius* and comes from Eagle County, Colorado, elevation 7,720 feet on a northwest aspect. Larson (2003) conducted a DNA analysis of 46 collections of squirreltail from the intermountain west and identified and plotted on a map several genetically distinct populations of *E. elymoides* ssp. *brevifolius.* Each genetically distinct population is/was associated with different ecoregions (Figure1).

Sand Hollow was not included in this trial because it is no longer commercially available (USDA 2009) and Pueblo was not included because seed was not available.

The purpose of this study was to document performance differences of the selections in common gardens located at sites representing diverse western habitats.

Materials and Methods

Seed of Fish Creek Germplasm, Toe Jam Creek Germplasm, Tusas Germplasm, Wapiti Germplasm, and experimental line 9092275 were planted at Aberdeen, Idaho in spring 2009; and Los Lunas, New Mexico Plant Material Centers (PMC). The Montana PMC planted the Fish Creek and Wapiti lines at 2 off center locations in the spring of 2009. Meeker, Colorado planted the project in August, 2011 with the addition of Pueblo Germplasm and two experimental lines of *E. elymoides ssp. elymoides*Meeker, Colorado, and Fallon, Nevada, proposed fall 2011). Each PMC is able to evaluate performance in different habitats described by Major Land Resource Areas (MLRA) (USDA (2) 2006) and EPA eco-regions. The Aberdeen PMC is located at 4400 feet elevation and is in the Snake River Plain region (MLRA 11 and EPA Eco-region 11), Meeker PMC is located in the Colorado plateau at 6200 feet elevation (MLRA 34a and EPA Eco-region 20), Los Lunas PMC is in the Arizona and new Mexico plateau region at 4800 feet elevation (MLRA 35 and EPA Eco-region 22). The Montana PMC locations were at Havre and Moccasin which are within the North Western Great Plains (MLRAs 52 and 58a and 42 and 43 EPA-ecoregions, respectively).

At the New Mexico and Idaho sites squirreltail entries were planted into an 8 by 20 foot plot with 8-12 inch drill row spacing, replicated 3 times in a randomized complete block design (RCB). The plots were planted at Aberdeen on June 10, 2009. Planting dates were variable and were appropriate to the site. Seeding rate was 7 lbs Pure Live Seed (PLS) per acre. Plots were irrigated to field capacity prior to planting and were subsequently irrigated as needed to ensure establishment during the first growing season. No further irrigation was applied in subsequent years. Weeds were controlled as needed. The Montana sites were not irrigated, and were planted with 14 inch row spacing using a Kincaid single disk plot planter in plots 4.5 X 20 feet replicated 4 times.

In year 1 entries were evaluated for stand and vigor. In years 2-3, documented observations of green-up, anthesis, seed maturity dates, stand evaluated, and ocular evaluation of seed production were all conducted., Air-dry biomass production was determined by harvesting a 1 meter sample from the plot interior.

Results and Discussion

There were no significant (<P=0.05) differences in the number of seedlings established per foot of row 95 days after planting at the Aberdeen site. In the second growing season there was no significant (<P=0.05) difference in stand following the first winter, however following the second winter significant stand reductions were evident. Wapiti had a significantly greater stand than Toe Jam and Tusas and Wapiti, 9092275, and Fish Creek had significantly (<P=0.05) greater stands than Tusas. There were no significant (<P=0.05) differences in biomass production among entries (Table 1) in year 2 or 3 at the Aberdeen site, however Wapiti, 9092275, and Tusas all produced substantially more biomass yield than did Toe Jam and Fish Creek. All entries received similar vigor ratings (Table 2). Entry 9092275, originating in Colorado, was observed as having produced the most seed in both 2010 and 2011 (Table 2). Dates of initial flowering varied by source location of the entry (Table 2). Tusas also displayed variable flowering dates which would be expected since it is a composite of accessions collected over a broad area; one replication first flowered June 8 while the other two replications June 21 during the second growing season (2010). In 2011 Wapiti and 9092275 flowered at about the same date as the previous year, while Fish Creek, Toe Jam, and Tusas flowered about 2 weeks later, although all entries had ripe seed about the same time (Table 2). Flowering and seed ripening dates at Aberdeen were later in 2011 due to below normal temperatures and above normal precipitation during March – May. Growing season rainfall totaled 6.75 inches in year 2, and 8.17 inches in year 3, which is far less than where Fish Creek (15 inches rainfall) and Toe Jam Creek (12 inches rainfall) Germplasms originated (Monsen 2004). Tusas and Wapiti are the same subspecies, but Wapiti was rated as having good vigor while Tusas was the least vigorous among all entries. Figure 2 shows each entry at maturity at the Aberdeen PMC in 2011.

At the New Mexico site germination and establishment was very poor. The poor germination was thought to be due to irrigation problems. Only the Tusas and 9092275 accessions had any germination (8% and 1% respectively) in 1 replication.

The Moccasin, Montana site showed no significant difference in yields (700 and 900 lbs per acre), between Fish Creek and Wapiti accessions in 2010, but both were substantially lower than yields at the Idaho site. 2009 stands were adequate and comparable to the Idaho site, but the Fish Creek stand was less than Wapiti in all plots (59 and 75% respectively).

Nevada PMC did not plant the accessions in 2010 or as of September, 2011. Colorado PMC planted the accessions in late 2011 with initial results anticipated in 2012. This trial is scheduled to continue through 2014.

Table 1. Mean annual biomass yield and percent spring stand of Fish Creek, Toe Jam Creek, Tusas, Wapiti, and 9092275 bottlebrush squirreltail during the second and third growing seasons at the Aberdeen, Idaho Plant Material Center.

Germplasm	Yield 2010	Yield 2011	Stand 2010	Stand 2011
	----------lb/acre----------		----------%----------	
Fish Creek	1173	888	77	64
Toe Jam Creek	1166	715	77	59
Tusas	1348	1418	66	47
Wapiti	1340	1524	82	75
9092275	1409	1299	77	71
LSD (<P=0.05)	NS	NS	NS	14.0

Table 2. Phenological data of Fish Creek, Toe Jam Creek, Tusas, Wapiti, and 9092275 Germplasm during the second and third growing seasons at the Aberdeen, Idaho PMC.

Germplasm	First Flower date 2010	First Flower date 2011	Seed maturity date 2010	Seed maturity date 2011	Height (cm) 2010	Height (cm) 2011	Seed Production[1/] 2010	Seed Production[1/] 2011	Vigor[1/] 2010	Vigor[1/] 2011
Fish Creek	06/04	06/21	07/16	07/20	35	30	5	5	3	3
Toe Jam Creek	06/04	06/21	07/16	07/20	43	35	4	4	3	3
Tusas	06/08	06/29	07/16	07/26	60	52	3	3	5	5
Wapiti	06/21	06/27	07/21	07/29	72	60	2	2	2	2
9092275	06/21	06/29	07/21	07/26	68	63	1	1	3	3

[1/] 1 = Best , 5=Worst

Figure 1. Distribution of genetically distinct groups of *Elymus elymoides* ssp. *brevifiolius*, *Elymus elymoides* ssp. *elymoides*, and *Elymus multisetus* throughout the intermountain west from Larson 2003.

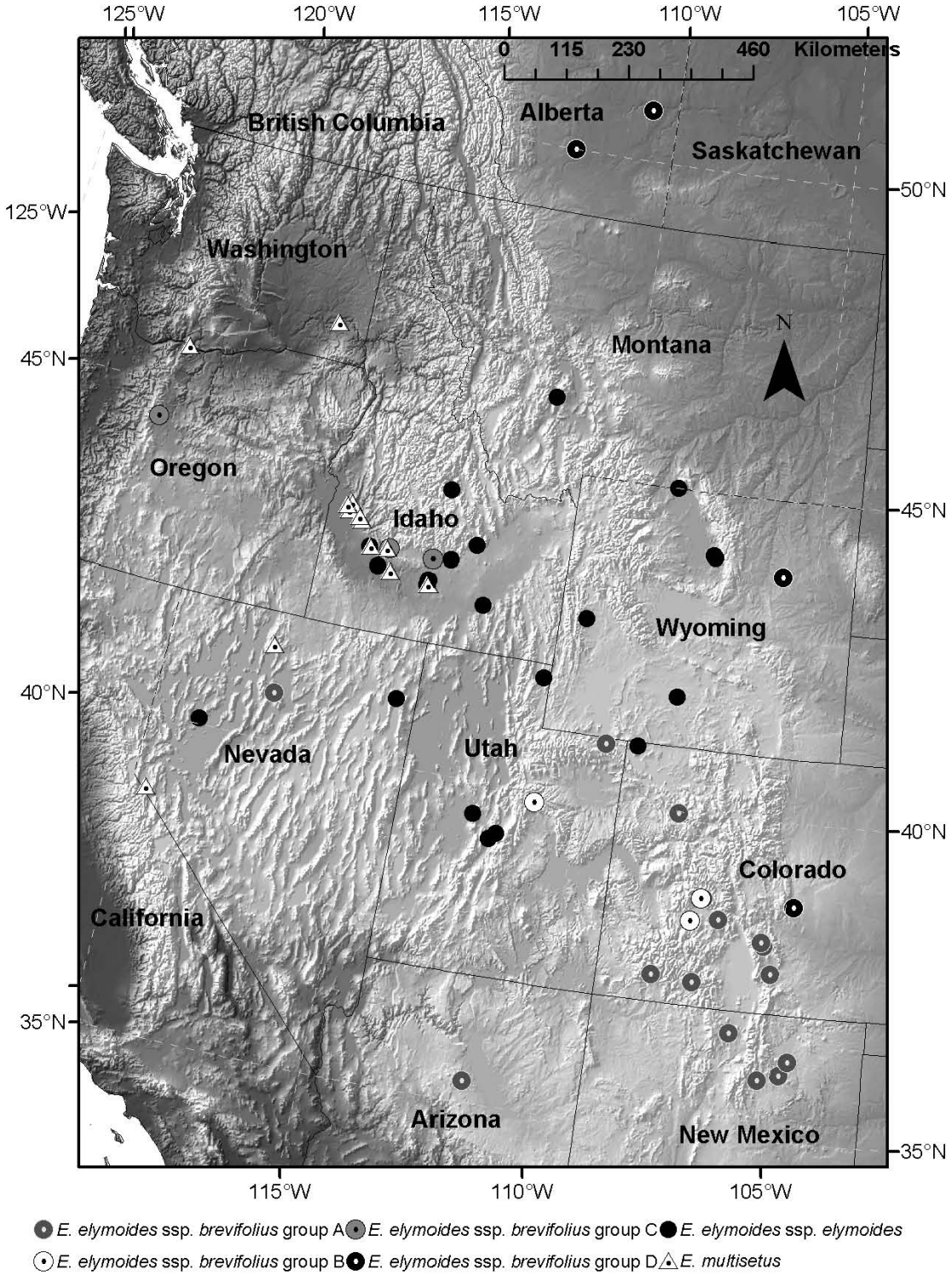

Figure 2. Wapiti, 9092275, Tusas, Fish Creek, and Toe Jam Germplasm at the Aberdeen PMC, 2011.


Wapiti Germplasm


Experimental line 9092257


Tusas Germplasm


Fish Creek Germplasm


Toe Jam Germplasm

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1982 Windbreak Initial Evaluation Planting

2011 Progress Report

Study Number: 16I051K

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Wind erosion is a major cause of soil loss in the Aberdeen PMC service area. Sandy to fine sandy loam soils are particularly prone to wind erosion. Irrigated soils producing low residue crops such as potatoes, dry beans and sugar beets are commonly harvested too late in the fall to allow cover crop establishment before winter. Severe wind erosion also occurs on dry and irrigated cropland due to excessive tillage, leaving the soil surface bare and susceptible to erosion during windy periods.

The objective of this project were to: 1) determine the adaptability of selected varieties and accessions of trees and shrubs to the Major Land Resource Areas (MLRAs) served by the Aberdeen PMC; 2) develop plant materials for use as vegetative barriers to reduce wind erosion in pivot-irrigated fields; 3) develop alternatives to Lombardy poplar for field windbreaks.

Materials and Methods

Fifteen rows approximately 616 feet long were established in field 32 at the Fish and Game farm in 1982. The farm is located 5 miles northeast of Aberdeen. Soil at the site is a Declo silt loam with pH of 7.4 to 8.4. Average annual precipitation is 9.39 inches. Between row spacing is 25 feet. Each plot contained 5 plants. Spacing between plants was 6 feet for shrubs and 14 feet for large trees. Appendix 1 lists accessions that were included in the initial planting and the sources of each accession. Planting took place over a three year period from 1982 to 1985. The plots were sprinkler irrigated until 1994. Since that time, no supplemental irrigation has been provided. There is a water table approximately 6 to 8 feet below the soil surface which is reachable by most trees after several years of growth.

Initial evaluations were conducted in 1985 and 1988. The 1985 evaluation included survival, vigor, uniformity, stem density/windbreak ability, plant height, and cover, or average plant width. Vigor, uniformity, and stem density were measured on a 1 to 9 scale with 1 being “best” and 9 being “worst”. Some accessions planted in 1984 were not evaluated in 1985. The 1988 evaluation did not include vigor or stem density. A summary evaluation was conducted in 2011. Appendix 2 provides data from all evaluations. Missing data or cases where no plants were available to measure are denoted with an “m”.

Discussion

Based upon the 1985 and 1988 evaluations, 21 accessions were identified as having potential value as windbreak materials in the Aberdeen service area (table 1).

Table 1. Promissing accessions identified after 1988 evaluation

Accession	Scientific Name	Common Name
9007990	Rhus trilobata	Skunkbush sumac
9007992	Rhus trilobata	Skunkbush sumac
9007993	Rhus trilobata	Skunkbush sumac
9008382	Cornus sericea ssp. sericea	Redosier dogwood
9031682	Cornus sericea ssp. sericea	Redosier dogwood
'Indigo'	Cornus alba ssp. stolonifera	'Indigo' Silky dogwood
303584	Salix humilis	Prairie willow
370126	Salix sp.	Willow
'Bankers'	Salix cottetii	Cottet willow
9026075	Salix exigua	Sandbar (Coyote) willow
9005049	Salix pentandra	Laurel willow
9021576	Salix sp.	Willow
'Shuberts'	Prunus virginiana	Common chokecherry
9005547	Shepherdia argentea	Silver buffaloberry
9006158	Shepherdia argentea	Silver buffaloberry
Sakakawea	Shepherdia argentea	Silver buffaloberry
Cardan	Fraxinum pennsylvanica	Green ash
9031690	Populus robusta	Robust poplar
9031688	P. deltoides siouxlandii	Siouxland cottonwood
'Imperial'	Populus X Canadensis	Carolina poplar
'King-red'	Elaegnus angustifolia	Russian olive

By 2011 many plots contained no surviving plants. Other plots had many volunteer plants and suckers, and it was difficult to make accurate measurements of the original 5 plants. The most aggressively volunteering species included skunkbush sumac (*Rhus trilobata*), peashrub (*Caragana* spp.), and honeysuckle (*Lonicera* spp.). At the time of the 2011 evaluation, several accessions had 100% survival and excellent vigor ratings indicating they are well adapted to the Aberdeen service area climate. Other accessions showed good windbreak potential, but poor adaptation to the region. Several species showed high overall ratings across accessions. Those accessions exhibiting the best overall performance in 2011 are listed in table 2.

The 2011 data indicate the best mid-sized windbreak species for our service area is Rocky Mountain juniper. This species is slow to develop, but once established becomes a dense hedge effectively blocking or severely restricting the wind. In 1998, Bridger Montana Plant Materials Center released Bridger Select germplasm of Rocky Mountain juniper. It is currently widely used in windbreaks in the Rocky Mountain and Intermountain West. Seed and containerized stock are commercially available. Other mid-sized species that performed well included skunkbush sumac and Siberian peashrub.

Many of the large tree-type accessions such as poplars and cottonwoods had excellent vigor and growth. Stem density rated low among the trees when compared to the shrubs, however, the increased area and width of the trees makes them highly effective windbreak species. The Aberdeen selection of laurel willow was released by Aberdeen Plant Materials Center in 1998 from accession 9005049. The accession was additionally tested at off-center locations near Mountain Home, Idaho and Winnemucca, Nevada. Aberdeen selection of laurel willow was selected for its beauty, hardiness, appropriate growth form for windbreaks, and natural range of adaptability. Parent plants for cutting stock are maintained by the PMC.

Table 2. Promising accessions identified after 2011 evaluation		
Accession	Scientific Name	Common Name
Mid-size trees and large shrubs		
T-31684	*Juniperus scopulorum*	Rocky Mountain juniper
T-7993	*Rhus trilobata*	Skunkbush sumar
T-9052	*Caragana arborescens*	Siberian peashrub
Large trees		
T-5049	*Salix pentandra*	Laurel willow
T-31690	*Populus robusta*	Robust poplar
T-31689	*Populus deltoides ssp. monilifera*	Plains cottonwood
T-31688	*Populus deltoides siouxlandii*	Siouxland cottonwood

Appendix 1. Plot locations and year planted.						
Scientific name	Common name	Row[1]	Block	Accession	Source	Year planted
Rhus trilobata	Skunkbush sumac	1	A1	'Bighorn'	Los Lunas PMC	1982
Rhus trilobata	Skunkbush sumac	1	A2	T-7990	Colorado	1982
Rhus trilobata	Skunkbush sumac	1	B1	T-7992	Colorado	1982
Rhus trilobata	Skunkbush sumac	1	B2	T-7993	Vernal, UT	1982
Rhus trilobata	Skunkbush sumac	1	C1	T-8540	Chalk Creek, UT	1982
Rhus trilobata	Skunkbush sumac	1	C2	T-8541	Spanish fork, UT	1982
Caragana arborescens	Siberian peashrub	1	D1	T-31679	Lawyer Nursery, Plains, MT	1982
Caragana arborescens	Siberian peashrub	1	D2	T-31681	Lincoln Oakes Nursery, Bismarck, ND	1982
Caragana arborescens	Siberian peashrub	1	E1	PI-483449	Rose Lake PMC	1982
Caragana arborescens	Siberian peashrub	1	E2	T-7355	Rose Lake PMC	1982
Caragana arborescens	Siberian peashrub	1	F1	T-7809	Aberdeen PMC	1982
Caragana arborescens	Siberian peashrub	1	F2	T-9052	Hungary	1982
Caragana arborescens	Siberian peashrub	1	G1	T-12533	USSR	1982
Caragana arborescens	Siberian peashrub	1	G2	T-12534	Ireland	1982
Caragana boisii	Bois peashrub	1	H1	T-12535	Ireland	1982
Caragana decorticans	Afghanistan peashrub	1	H2	T-9053	West Germany	1982
Cornus sericea ssp. sericea	Redosier dogwood	2	A1	T-8382	Idaho City, Idaho	1982
Cornus sericea ssp. sericea	Redosier dogwood	2	A2	T-31682	Lincoln Oakes Nursery, Bismarck, ND	1982
Cornus alba ssp. stolonifera	Silky dogwood	2	B1	'Indigo'	Rose Lake PMC	1982
Ligustrum vulgare	European privet	2	B2	'Cheyenne'	Rose Lake PMC	1982
Elaeagnus umbellata	Autumn olive	2	C1	'Elsberry'	Elsberry PMC PI-476986	1982
Cornus sericea ssp. sericea	Redosier dogwood	2	C1	PI-443229	?	1985
Prunus tenella	Russian almond	2	C2	T-6079	Bismarck PMC	1982
Ribes aureum	Golden currant	2	D1	T7308	Larimer county, Colorado	1982
Ribes aureum	Golden currant	2	D2	T-7997	Aberdeen, ID	1982
Ribes aureum	Golden currant	2	E1	T-7998	Aberdeen, ID	1982
Ribes aureum	Golden currant	2	E2	T-7999	Aberdeen, ID	1982

Ribes aureum	Golden currant	2	F1	T-12443	France	1982
Ribes aureum	Golden currant	2	F2	T-15868	Larimer County, CO	1982
Ribes cereum	Wax currant	2	G1	T-15867	Carbon County, WY	1982
Prunus tomentosa	Nanking cherry	2	G2	T-31692	Lawyer Nursery, Plains, MT	1982
Caragana grandiflora	Caucasian peashrub	2	H1	T-12536	Ireland	1982
Caragana maximowicziana	Maximowicz peashrub	2	H2	T-13686	ARS, Cheyenne, WY	1982
Salix humilis	Prairie willow	3	A1	PI-303584	Bismarck PMC	1982
Salix fragilis	Crack willow	3	A2	PI-370126	Bismarck PMC	1982
Syringa amurensis japonica	Japanese tree lilac	3	B1	PI-478008	Bismarck PMC	1982
Shepherdia argentea	Silver buffaloberry	3	B2	T-3196	Bismarck PMC	1982
Malus sargenti	Sargent crabapple	3	C1	'Roselow'	Roselake PMC	1982
Cornus ssp.	Dogwood	3	C1	T-46496	?	1985
Prunus virginiana	Common chokecherry	3	C2	T-31693	Bismarck PMC	1982
Prunus virginiana	Common chokecherry	3	D1	T-31694	Bismarck PMC	1982
Prunus virginiana	Common chokecherry	3	D2	'Shuberts'	Bismarck PMC	1982
Lonicera tatarica sibirica	Red Tartarian honeysuckle	3	E1	PI-477999	Bismarck PMC	1982
Lonicera maackii podocarpa	Amur honeysuckle	3	E2	Cling red	Elsberry PMC	1982
Lonicera korolkowi	Blueleaf honeysuckle	3	F1	T-5399	Bridger PMC	1983
Salix humilis	Prairie willow	3	F2	PI-303584	Bismarck PMC	1983
Shepherdia argentea	Silver buffaloberry	3	G1	T-5547	Bridger PMC	1982
Shepherdia argentea	Silver buffaloberry	3	G2	T-6158	Bridger PMC, PI-478005	1982
Elaeagnus commutata	Silverberry	3	H1	T-19131	Bridger PMC	1982
Crataegus chrysocarpa	Fireberry hawthorn	3	H2	T-16163	Bridger PMC	1982
Salix cottetii	Cottet willow	4	A1	'Bankers'	Bridger PMC, PI-434285	1984
Salix exigua	Coyote willow	4	A2	T-26075	Bridger PMC	1984
Malus anis	Anis apple	4	B1	T-44836	Lawyer Nursery, Plains, MT	1984
Malus antanovka	Antanovka apple	4	B2	T-44837	Lawyer Nursery, Plains, MT	1984
Malus borowinka	Borowinka apple	4	C1	T-44838	Lawyer Nursery, Plains, MT	1984
Malus ranetka	Raneta apple	4	C2	T-44840	Lawyer Nursery, Plains, MT	1984
Malus prunifolia	Pearleaf crabapple	4	D1	T-44839	Lawyer Nursery, Plains, MT	1984

Malus sargenti	Sargent crabapple	4	D2	T-44841	Lawyer Nursery, Plains, MT	1984
Viburnum lanata	Wayfaringtree viburnum	4	E1	T-44880	Lawyer Nursery, Plains, MT	1984
Viburnum opulus	European cranberrybursh	4	E2	T-44881	Lawyer Nursery, Plains, MT	1984
Amelanchier obovalis	Garden serviceberry	4	F1	T-44823	Lawyer Nursery, Plains, MT	1984
Crataegus arnoldiana	Arnold hawthorn	4	F2	T-5731	Bridger PMC	1984
Amelanchier obovalis	Garden serviceberry	4	G1	T-44823	Lawyer Nursery, Plains, MT	1984
Crataegus douglasii	Douglas hawthorn	4	G2	T-25802	Bridger PMC	1984
Crataegus douglasii	Douglas hawthorn	4	H1	T-25805	Bridger PMC	1984
Crataegus Columbiana	Columbian hawthorn	4	H2	T-25795	Bridger PMC	1984
Acer campestre	Hedge maple	5	A1	T-44821	Lawyer Nursery, Plains, MT	1984
Cornus stolonifera siberica	Redosier dogwood	5	A2	T-44827	Lawyer Nursery, Plains, MT	1984
Malus baccata mandshurica	Manchurian crabapple	5	B1	'Midwest'	Bridger PMC, PI-478000	1984
Malus hupehensis	Rose crabapple	5	B2	PI-122586	Bridger PMC	1984
Malus hupehensis	Rose crabapple	5	C1	PI-122586	Bridger PMC	1984
Malus sp.	Crabapple	5	C2	T-25793	Bridger PMC	1984
Cotoneaster adpressa	Early cotoneaster	5	D1	T-44828	Lawyer Nursery, Plains, MT	1984
Cotoneaster divaricata	Spreading cotoneaster	5	D2	T-44829	Lawyer Nursery, Plains, MT	1984
Cotoneaster multiflora	Manyflower cotoneaster	5	E1	T-44830	Lawyer Nursery, Plains, MT	1984
Prunus avium	Mazzard cherry	5	E2	T-44853	Lawyer Nursery, Plains, MT	1984
Prunus mahaleb	Mahaleb cherry	5	F1	T-44854	Lawyer Nursery, Plains, MT	1984
Prunus padus	European birdcherry	5	F2	T-44855	Lawyer Nursery, Plains, MT	1984
Prunus serotina	Black cherry	5	G1	T-44856	Lawyer Nursery, Plains, MT	1984
Pyrus ussuriensis	Harbin pear	5	G2	T-44857	Lawyer Nursery, Plains, MT	1984
Caragana arborescens	Siberian peashrub	5	H1	T-44825	Nevada St. Forestry, Carson City, NV	1984
Caragana arborescens	Siberian peashrub	5	H2	T-44824	Utah State Nursery, Draper, UT	1984
Colutea arborescens	Common bladdersenna	6	A1	T-44826	Utah State Nursery, Draper, UT	1984
Crataegus ambigua	Russian hawthorn	6	A2	T-15897	Bridger PMC	1984

Syringa vulgaris	Common lilac	6	B1	T-45220	Trail Creek Nursery, Victor, ID	1984
Lonicera tatarica	Tartarian honeysuckle	6	B2	T-45195	Trail Creek Nursery	1984
Lonicera sp.	Honeysuckle	6	C1	T-16237	Trail Creek Nursery	1984
Cornus sericea ssp. sericea	Redosier dogwood	6	C2	T-45192	Trail Creek Nursery	1984
Salix eriocephala	Yellow willow	6	D1	T-45210	Native Plants Inc., Sandy, UT	1984
Salix spp.	Willow	6	D1	T-46495	?	1985
Salix eriocephala	Yellow willow	6	D2	T-45210	Native Plants Inc., Sandy, UT	1984
Prunus Americana	American plum	6	E1	T-45202	Native Plants Inc., Sandy, UT	1984
Prunus pumila besseyi	Western sand cherry	6	E2	T-45203	Native Plants Inc., Sandy, UT	1984
Prunus maackii	Amur chokecherry	6	F1	T-45204	Native Plants Inc., Sandy, UT	1984
Prunus mahaleb	Mahaleb cherry	6	F2	T-45205	Native Plants Inc., Sandy, UT	1984
Prunus padus	European birdcherry	6	H1	'Mayday'	Lawyer Nursery, Plains, Mt	1985
Shepherdia argentea	Silver buffaloberry	6	H2	'Sakakawea'	Bismarck PMC	1985
Juniperus monosperma	Oneseed juniper	7	A	T-45194	Native Plants Inc., Sandy, UT	1984
Platycladus orientalis	Eastern arborvitae	7	B	T-13579	?	1985
Picea pungens	Colorado blue spruce	8	A	T-44845	Pinehurst Nursery, Pocatello, ID	1983
Picea abies	Norway spruce	8	B	T-44842	Pinehurst Nursery, Pocatello, ID	1983
Picea glauca	Black Hills spruce	8	C	T-44844	Pinehurst Nursery, Pocatello, ID	1983
Pinus nigra	Austrian pine	8	D	T-44847	Pinehurst Nursery, Pocatello, ID	1983
Juniperus scopulorum	Rocky Mountain juniper	8	E	T-31684	Native Plants Inc., Sandy, UT	1984
Juniperus scopulorum	Rocky Mountain juniper	8	F	T-44833	Nevada St. Forestry, Carson City, NV	1984
Pinus sylvestris	Riga scotch pine	8	G	'Riegensis'	Lawyer Nursery, Plains, MT, T-44851	1984
Cupressus arizonica	Arizona cypress	8	H	T-44831	Nevada St. Forestry, Carson City, NV	1984
Picea abies	Norway spruce	9	A	T-44843	Lawyer Nursery, Plains, MT	1984
Picea pungens	Colorado blue spruce	9	B	T-45197	Trail Creek Nursery, Victor, ID	1984
Pinus ponderosa	Ponderosa pine	9	C	T-44849	Utah State Nursery, Draper, UT	1984
Pinus ponderosa	Ponderosa pine	9	D	T-44848	Nevada St. Forestry, Carson City, NV	1984
Abies concolor	White fir	9	E	T-45190	Native Plants Inc., Sandy, UT	1984

Pinus flexilis	Limber pine	9	F	T-45199	Native Plants Inc., Sandy, UT	1984
Pinus contorta	Shore pine	9	G	'Contorta'	Native Plants Inc., Sandy, UT	1984
Picea pungens	Colorado blue spruce	9	H	T-45198	Native Plants Inc., Sandy, UT	1984
Platycladus orientalis	Easter arborvitae	10	A	T-19853	?	1985
Quercus macrocarpa	Bur oak	11	A	'Plumfield'	Bridger PMC, T-44858	1984
Quercus macrocarpa	Bur oak	11	B	T-5512	Bridger PMC	1984
Quercus lobata	California white oak	11	C	T-45207	Native Plants Inc., Sandy, UT	1984
Populus alba bolleana	Bolleana poplar	11	C	T-46486	?	1985
Quercus turbinella	Shrub live oak	11	D	T-45209	Native Plants Inc., Sandy, UT	1984
Salix purpurea	Purpleosier willow	11	D	'Streamco'	Big Flat, NY PMC	1985
Celtis occidentalis var. reticulata	Netleaf hackberry	11	E	T-45189	Native Plants Inc., Sandy, UT	1984
Populus fremontii	Fremont poplar	11	F	T-45201	Native Plants Inc., Sandy, UT	1984
Peraphyllum ramosissimum	Squawapple	11	G	T-45196	Native Plants Inc., Sandy, UT	1984
Celtis occidentalis	Hackberry	11	H	'Oahe'	Bismarck PMC	1982
Malus baccata mandshurica	Manchurian crabapple	12	A	'Midwest'	Rose Lake PMC, PI-478000	1982
Prunus Americana	Apricot plum	12	A	T-1134	?	1985
Populus robusta	Robust poplar	12	B	T-31690	Plumfield Nurseries, NB	1982
Populus deltoides ssp. monilifera	Plains cottonwood	12	C	T-31689	Plumfield Nurseries, NB	1982
Fraxinum pennsylvanica	Green ash	12	D	T-16218	Bridger PMC	1984
Fraxinum pennsylvanica	Green ash	12	E	'Cardan	Bismarck PMC, PI-469226	1984
Fraxinum pennsylvanica	Green ash	12	F	T-44832	Lawyer Nursery, Plains, MT	1984
Populus X canadensis	Carolina poplar	12	G	'Imperial'	Bridger PMC, PI-432347	1984
Celtis sp.	Hackberry	12	H	T-45191	Bridger PMC	1984
Fraxinum pennsylvanica	Green ash	13	A	'Cardan'	Bismarck PMC, PI-469226	1982
Fraxinum pennsylvanica	Green ash	13	B	T-5379	Bridger PMC	1982
Fraxinum pennsylvanica	Green ash	13	C	T-5380	Bridger PMC	1982
Fraxinum pennsylvanica	Green ash	13	D	T-5381	Bridger PMC	1982

Fraxinum pennsylvanica	Green ash	13	E	T-16217	Bridger PMC	1982
Fraxinum pennsylvanica	Green ash	13	F	Unknown	Bridger PMC	1982
Acer ginnala	Amur maple	13	G	'Flame'	Elsberry PMC, PI-483442	1982
Acer ginnala	Amur maple	13	H	T-31680	Lincoln-oaks Nursery, ND	1982
Prunus armeniaca	Hardy apricot	14	A	T-31691	Bismarck PMC	1982
Pyrus ussuriensis	Harbin pear	14	B	T-6095	Bismarck PMC	1982
Gleditsia triacanthos	Honeylocust	14	C	T-5909	Bismarck PMC	1982
Gleditsia sinensis	Chinese honeylocust	14	D	T-11850	Bismarck PMC	1982
Celtis occidentalis	Hackberry	14	E	PI-476982	Bismarck PMC	1982
Celtis occidentalis	Hackberry	14	F	T-5713	Bismarck PMC	1982
Salix pentandra	Laurel willow	14	G	T-5049	Bismarck PMC	1982
Salix sp.	Willow	14	H	T-21576	Bismarck PMC	1982
Populus deltoides x P. balsamifera	Northwest poplar	15	A	T-31687	Bismarck PMC	1982
Populus sp.	Norway poplar	15	B	T-31686	Bismarck PMC	1982
Populus deltoides siouxlandii	Siouxland cottonwood	15	C	T-31688	Bismarck PMC	1982
Populus deltoides x. P. nigra var. volga	NorEastern cottonwood	15	D	T-19602	Bismarck PMC	1982
Populus deltoides	Eastern cottonwood	15	E	'Ashford'	Bismarck PMC, T-23430	1982
Populus deltoides	Eastern cottonwood	15	F	'Lydick'	Bismarck PMC, T-4457	1982
Populus X canadensis	Carolina poplar	15	G	'Imperial'	Bismarck PMC	1982
Elaeagnus angustifolia	Russian olive	15	H	'King-red'	Los Lunas PMC, PI-434029	1982
[1]Plots with identical row and block numbers were replaced with accessions in year noted.						

Appendix 2. Evaluation data from 1985, 1988 and 2011.

Scientific name	Common name	Accession	Year planted	% survival			Vigor		Uniformity	
				1985	1988	2011	1985	2011	1985	2011
Rhus trilobata	Skunkbush sumac	'Bighorn'	1982	100	60	100	6	2	5	5
Rhus trilobata	Skunkbush sumac	T-7990	1982	100	100	100	1	2	2	3
Rhus trilobata	Skunkbush sumac	T-7992	1982	100	100	100	2	5	2	5
Rhus trilobata	Skunkbush sumac	T-7993	1982	100	100	100	3	1	3	2
Rhus trilobata	Skunkbush sumac	T-8540	1982	60	60	100	5	3	2	6
Rhus trilobata	Skunkbush sumac	T-8541	1982	100	80	80	4	5	3	6
Caragana arborescens	Siberian peashrub	T-31679	1982	100	100	100	3	3	3	4
Caragana arborescens	Siberian peashrub	T-31681	1982	80	80	100	5	2	6	3
Caragana arborescens	Siberian peashrub	PI-483449	1982	100	0	100	5	4	3	7
Caragana arborescens	Siberian peashrub	T-7355	1982	100	80	100	5	4	5	3
Caragana arborescens	Siberian peashrub	T-7809	1982	80	100	100	2	3	3	3
Caragana arborescens	Siberian peashrub	T-9052	1982	80	80	100	4	2	4	2
Caragana arborescens	Siberian peashrub	T-12533	1982	100	60	100	3	2	4	2
Caragana arborescens	Siberian peashrub	T-12534	1982	100	100	100	4	2	5	3
Caragana boisii	Bois peashrub	T-12535	1982	100	100	100	7	4	8	5
Caragana decorticans	Afghanistan peashrub	T-9053	1982	100	40	100	3	2	4	3
Cornus sericea ssp. sericea	Redosier dogwood	T-8382	1982	100	80	80	1	8	1	8
Cornus sericea ssp. sericea	Redosier dogwood	T-31682	1982	100	100	0	5	9	4	m
Cornus alba ssp. stolonifera	Silky dogwood	'Indigo'	1982	100	100	0	4	9	3	m
Ligustrum vulgare	European privet	'Cheyenne'	1982	100	100	0	5	m	4	m
Elaeagnus umbellata	Autumn olive	'Elsberry'	1982	0	0	0	9	9	m	m

Scientific name	Common name	Accession	Year planted	% survival			Vigor		Uniformity	
				1985	1988	2011	1985	2011	1985	2011
Cornus sericea ssp. sericea	Redosier dogwood	PI-443229	1985	m	100	0	m	9	-	m
Prunus tenella	Russian almond	T-6079	1982	100	100	100	3	7	4	8
Ribes aureum	Golden currant	T7308	1982	100	100	40	4	8	4	8
Ribes aureum	Golden currant	T-7997	1982	100	100	40	2	8	3	9
Ribes aureum	Golden currant	T-7998	1982	100	100	40	5	4	6	8
Ribes aureum	Golden currant	T-7999	1982	100	100	40	5	5	5	7
Ribes aureum	Golden currant	T-12443	1982	60	60	40	5	6	5	8
Ribes aureum	Golden currant	T-15868	1982	100	80	40	5	6	5	8
Ribes cereum	Wax currant	T-15867	1982	100	80	40	3	5	2	7
Prunus tomentosa	Nanking cherry	T-31692	1982	100	100	20	2	7	5	m
Caragana grandiflora	Caucasian peashrub	T-12536	1982	100	40	80	4	4	4	7
Caragana maximowicziana	Maximowicz peashrub	T-13686	1982	100	100	100	4	3	3	2
Salix humilis	Prairie willow	PI-303584	1982	80	100	60	1	7	1	6
Salix fragilis	Crack willow	PI-370126	1982	100	100	100	1	5	3	3
Syringa amurensis japonica	Japanese tree lilac	PI-478008	1982	40	40	40	5	5	3	8
Shepherdia argentea	Silver buffaloberry	T-3196	1982	80	100	20	2	6	3	8
Malus sargenti	Sargent crabapple	'Roselow'	1982	100	0	0	8	m	6	m
Cornus ssp.	Dogwood	T-46496	1985	0	80	0		m		m
Prunus virginiana	Common chokecherry	T-31693	1982	80	60	60	4	7	6	6
Prunus virginiana	Common chokecherry	T-31694	1982	100	100	60	5	7	7	7
Prunus virginiana	Common chokecherry	'Shuberts'	1982	100	100	80	3	4	4	5
Lonicera tatarica sibirica	Red Tartarian honeysuckle	PI-477999	1982	100	100	80	4	7	5	7
Lonicera maackii podocarpa	Amur honeysuckle	'Cling red'	1982	100	100	80	8	8	5	6

Scientific name	Common name	Accession	Year planted	% survival			Vigor		Uniformity	
				1985	1988	2011	1985	2011	1985	2011
Lonicera korolkowi	Blueleaf honeysuckle	T-5399	1983	100	100	60	3	7	4	7
Salix humilis	Prairie willow	PI-303584	1983	0	100	0	9	m	m	m
Shepherdia argentea	Silver buffaloberry	T-5547	1982	100	100	100	2	3	2	6
Shepherdia argentea	Silver buffaloberry	T-6158	1982	100	100	80	6	5	5	7
Elaeagnus commutata	Silverberry	T-19131	1982	100	60	60	5	7	3	8
Crataegus chrysocarpa	Fireberry hawthorn	T-16163	1982	100	100	60	3	5	2	2
Salix cottetii	Cottet willow	'Bankers'	1984	100	100	20	5	7	4	m
Salix exigua	Coyote willow	T-26075	1984	100	100	100	2	1	4	2
Malus anis	Anis apple	T-44836	1984	100	100	100	5	4	4	7
Malus antanovka	Antanovka apple	T-44837	1984	100	100	80	7	3	5	3
Malus borowinka	Borowinka apple	T-44838	1984	100	100	100	3	5	4	4
Malus ranetka	Raneta apple	T-44840	1984	100	100	40	7	8	5	6
Malus prunifolia	Pearleaf crabapple	T-44839	1984	100	20	60	5	3	4	3
Malus sargenti	Sargent crabapple	T-44841	1984	100	100	0	6	m	5	m
Viburnum lanata	Wayfaringtree viburnum	T-44880	1984	100	100	100	5	4	4	4
Viburnum opulus	European cranberrybursh	T-44881	1984	100	100	100	5	3	4	3
Amelanchier obovalis	Garden serviceberry	T-44823	1984	100	100	100	7	2	2	2
Crataegus arnoldiana	Arnold hawthorn	T-5731	1984	100	0	100	5	2	3	2
Amelanchier obovalis	Garden serviceberry	T-44823	1984	100	100	40	3	5	5	3
Crataegus douglasii	Douglas hawthorn	T-25802	1984	80	100	80	5	2	6	2
Crataegus douglasii	Douglas hawthorn	T-25805	1984	100	100	100	3	2	5	3
Crataegus Columbiana	Columbian hawthorn	T-25795	1984	100	80	100	8	7	7	4

Scientific name	Common name	Accession	Year planted	% survival			Vigor		Uniformity	
				1985	1988	2011	1985	2011	1985	2011
Acer campestre	Hedge maple	T-44821	1984	100	100	60	6	2	6	2
Cornus stolonifera siberica	Redosier dogwood	T-44827	1984	100	100	80	5	5	5	4
Malus baccata mandshurica	Manchurian crabapple	'Midwest'	1984	100	100	100	2	6	5	4
Malus hupehensis	Rose crabapple	PI-122586	1984	100	60	60	4	3	5	5
Malus hupehensis	Rose crabapple	PI-122586	1984	100	100	100	5	4	3	4
Malus sp.	Crabapple	T-25793	1984	100	100	100	6	3	4	4
Cotoneaster adpressa	Early cotoneaster	T-44828	1984	100	60	60	4	8	4	8
Cotoneaster divaricata	Spreading cotoneaster	T-44829	1984	100	100	80	2	8	2	8
Cotoneaster multiflora	Manyflower cotoneaster	T-44830	1984	100	100	100	4	5	5	2
Prunus avium	Mazzard cherry	T-44853	1984	100	80	0	6	9	5	m
Prunus mahaleb	Mahaleb cherry	T-44854	1984	100	100	60	2	2	3	5
Prunus padus	European birdcherry	T-44855	1984	100	40	20	8	3	3	m
Prunus serotina	Black cherry	T-44856	1984	100	100	80	5	7	3	7
Pyrus ussuriensis	Harbin pear	T-44857	1984	80	80	80	7	4	6	6
Caragana arborescens	Siberian peashrub	T-44825	1984	100	100	100	4	5	5	3
Caragana arborescens	Siberian peashrub	T-44824	1984	0	100	100	m	7	m	5
Colutea arborescens	Common bladdersenna	T-44826	1984	0	40	0	m	9	m	m
Crataegus ambigua	Russian hawthorn	T-15897	1984	0	100	100	m	2	m	4
Syringa vulgaris	Common lilac	T-45220	1984	0	0	0	9	9	m	m
Lonicera tatarica	Tartarian honeysuckle	T-45195	1984	0	40	80	9	7	m	3
Lonicera sp.	Honeysuckle	T-16237	1984	0	80	80	9	7	m	2
Cornus sericea ssp. sericea	Redosier dogwood	T-45192	1984	0	100	60	9	3	m	2

Scientific name	Common name	Accession	Year planted	% survival			Vigor		Uniformity	
				1985	1988	2011	1985	2011	1985	2011
Salix eriocephala	Yellow willow	T-45210	1984	0	0	0	9	9	m	m
Salix spp.	Willow	T-46495	1985	0	60	0	9	m	m	m
Salix eriocephala	Yellow willow	T-45210	1984	0	60	60	9	8	m	8
Prunus Americana	American plum	T-45202	1984	0	100	40	9	7	m	7
Prunus pumila besseyi	Western sand cherry	T-45203	1984	0	0	20	9	3	m	m
Prunus maackii	Amur chokecherry	T-45204	1984	0	0	0	9	9	m	m
Prunus mahaleb	Mahaleb cherry	T-45205	1984	0	0	0	9	9	m	m
Prunus padus	European birdcherry	'Mayday'	1985	0	100	60	9	7	m	8
Shepherdia argentea	Silver buffaloberry	'Sakakawea'	1985	0	100	100	m	6	m	6
Juniperus monosperma	Oneseed juniper	T-45194	1984	100	80	80	7	6	4	4
Platycladus orientalis	Eastern arborvitae	T-13579	1985	0	0	0	9	9	m	m
Picea pungens	Colorado blue spruce	T-44845	1983	100	100	100	3	6	5	3
Picea abies	Norway spruce	T-44842	1983	100	100	80	5	8	4	9
Picea glauca	Black Hills spruce	T-44844	1983	100	100	80	6	7	4	6
Pinus nigra	Austrian pine	T-44847	1983	100	100	100	5	1	5	2
Juniperus scopulorum	Rocky Mountain juniper	T-31684	1984	100	80	80	4	2	4	2
Juniperus scopulorum	Rocky Mountain juniper	T-44833	1984	100	0	m	5	m	6	m
Pinus sylvestris	Riga scotch pine	'Riegensis'	1984	100	100	100	5	2	6	3
Cupressus arizonica	Arizona cypress	T-44831	1984	80	100	80	7	3	5	2
Picea abies	Norway spruce	T-44843	1984	80	0	m	7	m	4	m
Picea pungens	Colorado blue spruce	T-45197	1984	100	0	m	4	m	5	m
Pinus ponderosa	Ponderosa pine	T-44849	1984	80	0	0	7	9	3	m
Pinus ponderosa	Ponderosa pine	T-44848	1984	100	100	100	8	6	3	2
Abies concolor	White fir	T-45190	1984	80	0	0	8	9	4	m
Pinus flexilis	Limber pine	T-45199	1984	100	0	0	4	9	4	m
Pinus contorta	Shore pine	'Contorta'	1984	100	0	0	5	9	5	m

Scientific name	Common name	Accession	Year planted	% survival			Vigor		Uniformity	
				1985	1988	2011	1985	2011	1985	2011
Picea pungens	Colorado blue spruce	T-45198	1984	100	0	20	5	8	4	m
Platycladus orientalis	Easter arborvitae	T-19853	1985	0	60	m	m	m	m	m
Quercus macrocarpa	Bur oak	'Plumfield'	1984	100	0	0	9	9	3	m
Quercus macrocarpa	Bur oak	T-5512	1984	100	0	0	8	9	5	m
Quercus lobata	California white oak	T-45207	1984	100	0	0	8	9	6	m
Populus alba bolleana	Bolleana poplar	T-46486	1985	0	60	m	m	m	m	m
Quercus turbinella	Shrub live oak	T-45209	1984	100	0	0	6	9	6	m
Salix purpurea	Purpleosier willow	'Streamco'	1985	0	100	0	m	9	m	m
Celtis occidentalis var. reticulata	Netleaf hackberry	T-45189	1984	100	0	0	9	9	3	m
Populus fremontii	Fremont poplar	T-45201	1984	100	0	0	8	9	5	m
Peraphyllum ramosissimum	Squawapple	T-45196	1984	100	0	0	8	9	5	m
Celtis occidentalis	Hackberry	'Oahe'	1982	0	100	0	m	9	m	m
Malus baccata mandshurica	Manchurian crabapple	'Midwest'	1982	40	0	0	8	9	4	m
Prunus Americana	Apricot plum	T-1134	1985	0	80	20	m	8	m	5
Populus robusta	Robust poplar	T-31690	1982	100	100	100	3	2	2	2
Populus deltoides ssp. *monilifera*	Plains cottonwood	T-31689	1982	100	100	100	2	2	4	2
Fraxinum pennsylvanica	Green ash	T-16218	1984	80	100	60	6	6	8	2
Fraxinum pennsylvanica	Green ash	'Cardan'	1984	100	100	100	6	6	6	3
Fraxinum pennsylvanica	Green ash	T-44832	1984	80	100	100	6	6	8	2
Populus X	Carolina poplar	'Imperial'	1984	100	100	100	3	6	4	2

canadensis

Scientific name	Common name	Accession	Year planted	% survival			Vigor		Uniformity	
				1985	1988	2011	1985	2011	1985	2011
Celtis sp.	Hackberry	T-45191	1984	100	100	100	7	7	m	4
Fraxinum pennsylvanica	Green ash	'Cardan'	1982	100	100	60	5	7	4	5
Fraxinum pennsylvanica	Green ash	T-5379	1982	100	100	100	5	5	4	5
Fraxinum pennsylvanica	Green ash	T-5380	1982	100	100	100	4	7	3	4
Fraxinum pennsylvanica	Green ash	T-5381	1982	100	100	100	4	8	4	5
Fraxinum pennsylvanica	Green ash	T-16217	1982	100	100	100	5	8	4	4
Fraxinum pennsylvanica	Green ash	Unknown	1982	100	0	100	4	7	4	5
Acer ginnala	Amur maple	'Flame'	1982	0	80	0	m	9	m	m
Acer ginnala	Amur maple	T-31680	1982	0	0	0	0	9	0	m
Prunus armeniaca	Hardy apricot	T-31691	1982	100	0	0	6	m	8	m
Pyrus ussuriensis	Harbin pear	T-6095	1982	80	0	0	8	9	8	m
Gleditsia triacanthos	Honeylocust	T-5909	1982	100	100	100	6	7	7	6
Gleditsia sinensis	Chinese honeylocust	T-11850	1982	100	100	80	6	8	7	8
Celtis occidentalis	Hackberry	PI-476982	1982	100	100	80	7	5	5	4
Celtis occidentalis	Hackberry	T-5713	1982	100	100	100	5	3	3	4
Salix pentandra	Laurel willow	T-5049	1982	100	100	100	1	8	2	1
Salix sp.	Willow	T-21576	1982	100	100	100	3	6	3	2
Populus deltoides x P. balsamifera	Northwest poplar	T-31687	1982	100	100	100	6	7	3	3
Populus sp.	Norway poplar	T-31686	1982	80	100	100	7	2	6	1
Populus deltoides siouxlandii	Siouxland cottonwood	T-31688	1982	100	100	100	1	1	1	1

Scientific name	Common name	Accession	Year planted	% survival			Vigor		Uniformity	
				1985	1988	2011	1985	2011	1985	2011
Populus deltoides x. P. nigra var. volga	NorEastern cottonwood	T-19602	1982	100	100	100	3	3	2	2
Populus deltoides	Eastern cottonwood	'Ashford'	1982	100	100	100	5	3	3	2
Populus deltoides	Eastern cottonwood	'Lydick'	1982	100	100	100	4	5	3	2
Populus X canadensis	Carolina poplar	'Imperial'	1982	100	100	100	3	4	2	2
Elaeagnus angustifolia	Russian olive	'King-red'	1982	80	80	80	5	5	5	7

Vigor and uniformity rated 1 to 9 scale; 1=best, 9=worst or dead. M=missing data.

Appendix 2 (continued).

Scientific name	Common name	Accession	Stem Density			Height (m)			Avg. Cover/Plant Width (m)		
			1985	1988	2011	1985	1988	2011	1985	1988	2011
Rhus trilobata	Skunkbush sumac	'Bighorn'	4	7	2	1.3	2	3.5	1.6	2.2	4
Rhus trilobata	Skunkbush sumac	T-7990	2	9	2	1.5	2.2	3	2.7	3.6	4
Rhus trilobata	Skunkbush sumac	T-7992	1	7	4	1.5	2.2	3.5	2.1	3.2	4
Rhus trilobata	Skunkbush sumac	T-7993	1	7	2	1.4	2.25	4	2.2	3.2	5
Rhus trilobata	Skunkbush sumac	T-8540	3	7	2	1.2	1.8	3.5	1.8	2.7	4
Rhus trilobata	Skunkbush sumac	T-8541	2	7	5	1.2	1.8	4	1.75	2.6	4
Caragana arborescens	Siberian peashrub	T-31679	4	6	6	1.85	2	3	1.2	1.85	3
Caragana arborescens	Siberian peashrub	T-31681	5	4	3	1.3	1.65	2.5	1.1	1.2	2.5
Caragana arborescens	Siberian peashrub	PI-483449	4	0	6	1.3	0	2.8	1	0	2.5
Caragana arborescens	Siberian peashrub	T-7355	7	3	4	2	2	4.5	1.04	1.5	4
Caragana arborescens	Siberian peashrub	T-7809	2	1	4	2	1.8	3.5	1.5	1.4	4
Caragana arborescens	Siberian peashrub	T-9052	5	5	2	1.75	2.7	3.5	1.3	3.3	3.5
Caragana arborescens	Siberian peashrub	T-12533	4	3	6	1.85	2.2	4.5	1.4	2.5	4
Caragana arborescens	Siberian peashrub	T-12534	3	2	4	1.8	1.9	2.9	1.2	2.2	2.8
Caragana boisii	Bois peashrub	T-12535	6	3	2	1.1	2	2.2	0.65	2	2.2
Caragana decorticans	Afghanistan peashrub	T-9053	3	1	3	1.6	0.9	3.5	1.5	0.9	3
Cornus sericea ssp. sericea	Redosier dogwood	T-8382	2	3	8	1.5	2.1	2.5	2.44	2.25	2.5
Ligustrum vulgare	European privet	'Cheyenne'	4	7	m	0.96	1.75	m	0.96	2.35	m
Elaeagnus umbellata	Autumn olive	'Elsberry'	0	0	m	0	0	m	0	0	m
Cornus sericea ssp. sericea	Redosier dogwood	PI-443229	-	3	m	-	1.1	m	-	1.4	m

Scientific name	Common name	Accession	Stem Density			Height (m)			Avg. Cover/Plant Width (m)		
			1985	1988	2011	1985	1988	2011	1985	1988	2011
Prunus tenella	Russian almond	T-6079	2	8	8	1.06	1.3	1.3	1.15	2	2
Ribes aureum	Golden currant	T7308	3	7	8	1.06	1.5	1.2	1.06	2.1	2
Ribes aureum	Golden currant	T-7997	4	2	8	1.3	1.5	1	0.9	1	1.2
Ribes aureum	Golden currant	T-7998	5	1	6	1.2	1.4	2	1.08	1.15	1.5
Ribes aureum	Golden currant	T-7999	5	5	8	1.3	1.5	2	1.04	1.2	1.5
Ribes aureum	Golden currant	T-12443	5	6	8	1.15	1.4	1.5	1.08	1.75	1.5
Ribes aureum	Golden currant	T-15868	5	6	8	1.15	1.4	1.5	1.08	1.75	1.5
Ribes cereum	Wax currant	T-15867	4	1	3	0.65	1	1.2	1.32	1.4	2
Prunus tomentosa	Nanking cherry	T-31692	2	8	5	1.2	1.6	1.7	1.7	m	1.7
Caragana grandiflora	Caucasian peashrub	T-12536	4	1	3	1.5	1.4	2.5	1.6	1.6	2.5
Caragana maximowicziana	Maximowicz peashrub	T-13686	1	7	4	0.68	1.2	2.1	1.08	1.85	2.2
Salix humilis	Prairie willow	PI-303584	1	8	2	2	4.5	4.5	3.1	4.8	4.5
Salix fragilis	Crack willow	PI-370126	2	8	7	2.2	4.5	5	2.3	4.5	4
Syringa amurensis japonica	Japanese tree lilac	PI-478008	4	6	4	0.72	2.8	4	0.76	2.4	4
Shepherdia argentea	Silver buffaloberry	T-3196	2	5	3	1.7	4	4	1.36	4	4
Malus sargenti	Sargent crabapple	'Roselow'	5		m	0.62		m	0.36		m
Cornus ssp.	Dogwood	T-46496		2	m		0.6	m		0.75	m
Prunus virginiana	Common chokecherry	T-31693	3	8	7	1.7	2.95	3.5	1.04	2.75	3.5
Prunus virginiana	Common chokecherry	T-31694	3	6	6	1.8	2.7	3	1.04	2.4	3
Prunus virginiana	Common chokecherry	'Shuberts'	3	8	6	1.5	3	4	0.94	2.6	3
Lonicera tatarica sibirica	Red Tartarian honeysuckle	PI-477999	1	5	6	1.12	2.2	3	1.28	2.4	2.5
Lonicera maackii podocarpa	Amur honeysuckle	'Cling red'	4	3	8	0.42	2	2.2	0.64	2.6	2

Scientific name	Common name	Accession	Stem Density			Height (m)			Avg. Cover/Plant Width (m)		
			1985	1988	2011	1985	1988	2011	1985	1988	2011
Lonicera korolkowi	Blueleaf honeysuckle	T-5399	1	4	4	1.44	1.45	2.2	1.26	1.8	2
Salix humilis	Prairie willow	PI-303584		7	m		4.5	m		4.5	m
Shepherdia argentea	Silver buffaloberry	T-5547	2	7	3	1.5	3.4	4.5	2.7	3.2	4
Shepherdia argentea	Silver buffaloberry	T-6158	4	5	5	1.02	2.6	4.5	0.84	2.4	4
Elaeagnus commutata	Silverberry	T-19131	4	2	5	1.05	1.25	2	0.8	0.8	2
Crataegus chrysocarpa	Fireberry hawthorn	T-16163	5	2	5	1.25	1.2	2	1.04	1	2
Salix cottetii	Cottet willow	'Bankers'	6	8	8	0.2	1.85	2	0.96	3	2
Salix exigua	Coyote willow	T-26075	4	7	m	0.75	3.8	m	1.36	3.9	3
Malus anis	Anis apple	T-44836	7	4	6	0.7	3.9	4.5	0.3	3.4	4.5
Malus antanovka	Antanovka apple	T-44837	8	3	5	0.4	3.5	4.5	0.18	3.4	4.5
Malus borowinka	Borowinka apple	T-44838	5	5	5	0.8	3.9	3.5	0.35	3.4	3.5
Malus ranetka	Raneta apple	T-44840	6	4	6	0.5	3.95	3	0.2	3	3
Malus prunifolia	Pearleaf crabapple	T-44839	5	4	3	0.55	4	4.5	0.24	3.1	4
Malus sargenti	Sargent crabapple	T-44841	5	3	m	0.5	0.9	m	0.18	m	m
Viburnum lanata	Wayfaringtree viburnum	T-44880	5	4	5	0.34	1.1	2	0.26	1	2
Viburnum opulus	European cranberrybursh	T-44881	5	4	4	0.3	1.3	3	0.32	1.7	3
Amelanchier obovalis	Garden serviceberry	T-44823	5	1	7	0.3	1.8	3	0.12	1.3	3
Crataegus arnoldiana	Arnold hawthorn	T-5731	5	0	7	0.32	0	3	0.18	0	3
Amelanchier obovalis	Garden serviceberry	T-44823	5	1	6	0.82	1.8	2.5	0.3	1.3	2.5
Crataegus douglasii	Douglas hawthorn	T-25802	7	1	4	0.45	2.1	3	0.2	1.3	3
Crataegus douglasii	Douglas hawthorn	T-25805	4	5	4	0.6	1.6	3.5	0.3	1.45	3
Crataegus Columbiana	Columbian hawthorn	T-25795	8	1	5	0.24	1.67	2.5	0.06	1.2	2

Scientific name	Common name	Accession	Stem Density			Height (m)			Avg. Cover/Plant Width (m)		
			1985	1988	2011	1985	1988	2011	1985	1988	2011
Acer campestre	Hedge maple	T-44821	8	1	3	0.5	2.1	5	0.12	2.3	4
Cornus stolonifera siberica	Redosier dogwood	T-44827	7	1	3	1.02	1.5	2	0.25	0.9	2
Malus baccata mandshurica	Manchurian crabapple	'Midwest'	4	2	4	0.75	2.5	4	0.45	2.1	4
Malus hupehensis	Rose crabapple	PI-122586	5	3	5	0.62	2.6	5	0.25	2.1	5
Malus hupehensis	Rose crabapple	PI-122586	5	4	6	0.55	2.8	5	0.27	2.2	5
Malus sp.	Crabapple	T-25793	7	4	5	0.6	2.6	4	0.2	2	3
Cotoneaster adpressa	Early cotoneaster	T-44828	2	1	1	0.36	0.7	1	0.35	1.2	3
Cotoneaster divaricata	Spreading cotoneaster	T-44829	3	m	8	0.65	0.85	1	0.45	1.3	2
Cotoneaster multiflora	Manyflower cotoneaster	T-44830	6	6	1	0.55	1.5	3	0.4	1.3	3
Prunus avium	Mazzard cherry	T-44853	8	1	m	0.45	0.4	m	0.1	0.4	m
Prunus mahaleb	Mahaleb cherry	T-44854	5	4	3	0.4	1.85	3.5	0.35	1.25	3.5
Prunus padus	European birdcherry	T-44855	8	2	2	0.85	4.3	6	0.11	2	5
Prunus serotina	Black cherry	T-44856	6	2	7	0.35	2.25	3.5	0.24	2.1	3
Pyrus ussuriensis	Harbin pear	T-44857	8	2	7	0.28	2.6	5	0.09	2	4
Caragana arborescens	Siberian peashrub	T-44825	7	5	3	0.4	0.21	3	0.16	0.85	3
Caragana arborescens	Siberian peashrub	T-44824		4	5		0.25	3.5		2.1	3
Colutea arborescens	Common bladdersenna	T-44826		7	m		2.8	m		2.9	m
Crataegus ambigua	Russian hawthorn	T-15897		4	4		3.2	4		2	4
Syringa vulgaris	Common lilac	T-45220		0	m			m			m
Lonicera tatarica	Tartarian honeysuckle	T-45195		4	8		1.25	3		0.75	2
Lonicera sp.	Honeysuckle	T-16237		3	6		2.5	2		1	2

Scientific name	Common name	Accession	Stem Density			Height (m)			Avg. Cover/Plant Width (m)		
			1985	1988	2011	1985	1988	2011	1985	1988	2011
Cornus sericea ssp. sericea	Redosier dogwood	T-45192		5	4		1.25	3		0.9	2
Salix eriocephala	Yellow willow	T-45210		0	m			m			m
Salix spp.	Willow	T-46495		2	m		2.6	m		1	m
Salix eriocephala	Yellow willow	T-45210		3	7		2.75	2		2	2
Prunus Americana	American plum	T-45202		2	8		2.5	2		1.9	2
Prunus pumila besseyi	Western sand cherry	T-45203		0	7			m			2
Prunus maackii	Amur chokecherry	T-45204		0	m			m			m
Prunus mahaleb	Mahaleb cherry	T-45205		0	m			m			m
Prunus padus	European birdcherry	'Mayday'		4	7		0.5	3.5		1.2	4
Shepherdia argentea	Silver buffaloberry	'Sakakawea'		6	3		3	4		2.25	3
Juniperus monosperma	Oneseed juniper	T-45194	3		5	0.15	0.45	4	0.11	0.3	4
Platycladus orientalis	Eastern arborvitae	T-13579		0	m			m			m
Picea pungens	Colorado blue spruce	T-44845	1	9	5	0.65	3	8	1.9		4
Picea abies	Norway spruce	T-44842	5	9	8	0.85	2.6	5	0.6	1.4	3
Picea glauca	Black Hills spruce	T-44844	5	9	9	0.98	2.8	6	0.55	0.8	4
Pinus nigra	Austrian pine	T-44847	3	9	6	0.55	4	8	0.5	2.5	6
Juniperus scopulorum	Rocky Mountain juniper	T-31684	2	9	1	0.85	2.75	5	0.55	2	5
Juniperus scopulorum	Rocky Mountain juniper	T-44833	5	0	m	0.54	0	m	0.28	0	m
Pinus sylvestris	Riga scotch pine	'Riegensis'	6	9	8	0.44	2.75	10	0.37	0.85	5
Cupressus arizonica	Arizona cypress	T-44831	5	9	3	0.2	0.11	5	0.14	0.45	4
Picea abies	Norway spruce	T-44843	7	0	m	0.15	0	m	0.08	0	m
Picea pungens	Colorado blue spruce	T-45197	5	0	m	0.22	0	m	0.14	0	m
Pinus ponderosa	Ponderosa pine	T-44849	8	0	m	0.2	0	m	0.28	0	m
Pinus ponderosa	Ponderosa pine	T-44848	8	9	8	0.12	0.75	8	0.24	0.4	5

Scientific name	Common name	Accession	Stem Density			Height (m)			Avg. Cover/Plant Width (m)		
			1985	1988	2011	1985	1988	2011	1985	1988	2011
Abies concolor	White fir	T-45190	6	0	m	0.2	0	m	0.18	0	m
Pinus flexilis	Limber pine	T-45199	6	0	m	0.16	0	m	0.15	0	m
Pinus contorta	Shore pine	'Contorta'	8	0	m	0.24	0	m	0.12	0	m
Picea pungens	Colorado blue spruce	T-45198	5	0	7	0.24	0	6	0.12	0	4
Platycladus orientalis	Easter arborvitae	T-19853		9	m		1.4	m		0.65	m
Quercus macrocarpa	Bur oak	'Plumfield'	8	0	m	0.35	0	m	0.1	0	m
Quercus macrocarpa	Bur oak	T-5512	8	0	m	0.25	0	m	0.1	0	m
Quercus lobata	California white oak	T-45207	8	0	m	0.25	0	m	0.1	0	m
Populus alba bolleana	Bolleana poplar	T-46486		9	m		1.25	m		0.4	m
Quercus turbinella	Shrub live oak	T-45209	7	0	m	0.18	0	m	0.08	0	m
Salix purpurea	Purpleosier willow	'Streamco'	7		m		3	m		2.75	m
Celtis occidentalis var. reticulata	Netleaf hackberry	T-45189	9	0	m	0.2	0	m	0.03	0	m
Populus fremontii	Fremont poplar	T-45201	8	0	m	0.15	0	m	0.05	0	m
Peraphyllum ramosissimum	Squawapple	T-45196	9	0	m	0.12	0	m	0.05	0	m
Celtis occidentalis	Hackberry	'Oahe'		1	m		0.35	m		0.25	0
Malus baccata mandshurica	Manchurian crabapple	'Midwest'	7	0	m	0.45	0	m	0.18	0	m
Prunus Americana	Apricot plum	T-1134		1	8		2.25	3		0.35	2
Populus robusta	Robust poplar	T-31690	2	9	7	3.96	9.6	20	2.6	3.6	6
Populus deltoides ssp. monilifera	Plains cottonwood	T-31689	2	8	7	4.42	9	20	2.6	3.6	8
Fraxinum pennsylvanica	Green ash	T-16218	8	9	8	1.1	4.25	8	0.3	1	4
Fraxinum pennsylvanica	Green ash	'Cardan'	7	6	8	0.8	3.8	8	0.25	1.85	4

Scientific name	Common name	Accession	Stem Density			Height (m)			Avg. Cover/Plant Width (m)		
			1985	1988	2011	1985	1988	2011	1985	1988	2011
Fraxinum pennsylvanica	Green ash	T-44832	8	5	8	1.1	4	7	0.3	1.75	4
Populus X canadensis	Carolina poplar	'Imperial'	6	6	8	1.45	8.5	20	0.45	3.6	6
Celtis sp.	Hackberry	T-45191	4	9	8	0.5	5	4	0.27	1	3
Fraxinum pennsylvanica	Green ash	'Cardan'	7	9	7	2.4	4.8	4	1.3	3	3
Fraxinum pennsylvanica	Green ash	T-5379	5	9	7	2.3	4.8	7	1.4	2.75	4
Fraxinum pennsylvanica	Green ash	T-5380	5	9	8	2.6	4.6	10	1.45	3.2	5
Fraxinum pennsylvanica	Green ash	T-5381	4	9	9	2.4	4	9	1.3	2.75	4
Fraxinum pennsylvanica	Green ash	T-16217	5	9	9	2	3.5	6	1.65	3	4
Fraxinum pennsylvanica	Green ash	Unknown	5	0	8	2.2	0	7	1.5	0	5
Acer ginnala	Amur maple	'Flame'		2	m		0.8	m		0.6	m
Acer ginnala	Amur maple	T-31680	0	0	0	0		0	0		m
Prunus armeniaca	Hardy apricot	T-31691	2	0	m	1.1	0	m	0.95	0	m
Pyrus ussuriensis	Harbin pear	T-6095	7	0	m	0.8	0	m	0.5	0	m
Gleditsia triacanthos	Honeylocust	T-5909	6	9	9	1.86	3.5	7	1.6	2.25	3
Gleditsia sinensis	Chinese honeylocust	T-11850	7	9	9	1.95	3.6	8	1.2	2.5	3
Celtis occidentalis	Hackberry	PI-476982	7	9	8	1.77	3.9	6	1.45	3	4
Celtis occidentalis	Hackberry	T-5713	5		8	2.13	4.1	6	1.9	3	5
Salix pentandra	Laurel willow	T-5049	2	9	9	3.8	7.7	7	2.8	5.5	4
Salix sp.	Willow	T-21576	3	9	4	3.5	7.7	7	2.3	5.5	5
Populus deltoides x P. balsamifera	Northwest poplar	T-31687	5	8	8	2.8	9.1	10	1.95	5	6
Populus sp.	Norway poplar	T-31686	4	9	9	2.6	10.1	25	2.1	5	7

Scientific name	Common name	Accession	Stem Density			Height (m)			Avg. Cover/Plant Width (m)		
			1985	1988	2011	1985	1988	2011	1985	1988	2011
Populus deltoides siouxlandii	Siouxland cottonwood	T-31688	3	9	8	4.5	24	30	2.6	6	9
Populus deltoides x. P. nigra var. volga	NorEastern cottonwood	T-19602	2	9	8	4.05	10.2	25	2.9	5	10
Populus deltoides	Eastern cottonwood	'Ashford'	5	8	8	3.95	9.75	25	3.1	5	15
Populus deltoides	Eastern cottonwood	'Lydick'	3	9	7	3.23	7.7	20	2.9	5	10
Populus X canadensis	Carolina poplar	'Imperial'	5	9	9	4.24	21.1	20	2.6	5	10
Elaeagnus angustifolia	Russian olive	'King-red'	3	9	3	2.13	5	8	2.4	3.5	8

2006 Coffee Point Off-Center Evaluation

2011 Progress Report

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INTRODUCTION

In the fall of 2006, the Aberdeen Plant Materials Center (PMC) installed a multi-species off-center planting at the Coffee Point test site 25 miles northwest of Aberdeen, Idaho. Seed was assembled with the assistance of ARS Logan, Utah; Bridger, Montana PMC; Benson Seed Farm; University Nevada, Reno; Department of Defense; Geertson Seed Farm and Los Lunas, New Mexico PMC. The trial contains 58 accessions of 23 species of native and introduced grasses, forbs and shrubs as noted in Appendix 1. Appendix 2 i is a plot map of the planting. The goal of this trial is to evaluate the adaptability of new conservation releases in a low precipitation environment and compare their establishment, production and longevity against traditionally used released plant materials.

The Coffee Point test site is located in Major Land Resource Area (MLRA) 11B, Snake River Plains of the Northwestern Wheat and Range region of the Intermountain West in what historically supported a Wyoming big sagebrush/bluebunch wheatgrass plant community. Climatic conditions are very dry with mean annual precipitation ranging from 8 to 12 inches, average air temperature is 43º F, and the frost free period is approximately 90 days. Soils at the site are the Splittop-Atomic complex with 2 to 8% slopes and effective rooting depth is 20 to 40 inches. The pH of the soil complex is 7.4 to 8.4. The elevation is 4,850 ft.

MATERIALS AND METHODS

Prior to site preparation, we determined the pre-existing cover frequencies by running four 30 meter transects across randomly chosen portions of the test site on April 15, 2006. Intercept determinations were made at each meter. Pre-existing cover consisted of 38.3% litter; 28.3% bare ground; 15.8% P-27 Siberian wheatgrass; 14.2% Hycrest crested wheatgrass and 3.3% Immigrant forage kochia.

The seed bed was prepared with chemical treatment of 16 oz 2,4-D and 64 oz Roundup per acre applied on May 2, 2005, August 1, 2005 and May 17, 2006. The site was disked on August 3, 2006. The trial was planted on November 20, 2006 with a modified Tye Drill with a width of 80 inches (8 spouts at 10 inch spacing). Experimental design was a randomized complete block with 4 replications. Each plot was one drill width wide (80 in) and 20 ft long. Species were arranged into blocks with the exception of introduced grasses, forbs and shrubs making up one block each. Seeding depths were dependent on species and were planted according to Ogle et al (2006). Species were seeded at a target rate of 20 to 30 pure live seeds (PLS) per ft² for large seeded species (<500,000 seeds per pound) and 40 to 50 PLS/ft² for smaller seeded species (>500,000 seeds/lb). PLS was determined by seed lab results or, when lab results were not available, PLS was estimated visually or the PLS from other accessions were averaged. All seed was mixed with rice hulls as an inert carrier for improved seed flow according to St. John et al (2005) with the

exception of fourwing saltbush and Gardener's saltbush. A cover crop of 50% Anatone bluebunch wheatgrass, 20% Bannock thickspike wheatgrass, 20% Magnar basin wildrye and 10% Snake River Plains fourwing saltbush was planted in the prepared areas surrounding the trial.

Establishment year evaluations were conducted on April 30 and May 1, 2007 and again on September 7, 2007 using a frequency grid based on that described by Vogel and Masters (2001). The grid measured approximately 40X41 inches, having four ten inch columns (to incorporate 1 drill row per column) and five rows, totaling 20 cells. The first grid was laid on the rows approximately 1 ft into the plot. Counts were made of the cells that contained at least one plant. Grids were subsequently advanced one grid length in the plot and evaluated four more times giving a total of 100 evaluated cells.

Density evaluations for 2008 took place on April 28 in the same manner as 2007. In August 2008 forage samples were taken from those species blocks judged to have enough production to warrant evaluation: thickspike wheatgrass, slender wheatgrass, and the introduced grass species. A 2X6 ft metal frame was placed in the center of each plot, and all above ground biomass was hand clipped and placed in paper grocery sacks. Forage samples were air dried for two weeks and weighed. Data were then converted to lbs/acre. In 2009, plant densities were recorded on May 19, and forage samples were taken from the introduced grasses block on August 10. In 2010, density measurements were taken on May 19, and biomass harvests of introduced species were taken on August 24. The 2011 density evaluation took place on May 13; forage samples were taken from the introduced grasses on August 10.

All tables have been arranged with accessions ranked from highest plant density to the lowest at the time of the first evaluation. Data were analyzed using the Statistix 8 Analytical software and subjected to an analysis of variance with a significance level of $p<0.05$. If significance was detected, means were separated using a Tukey HSD all pairwise comparison.

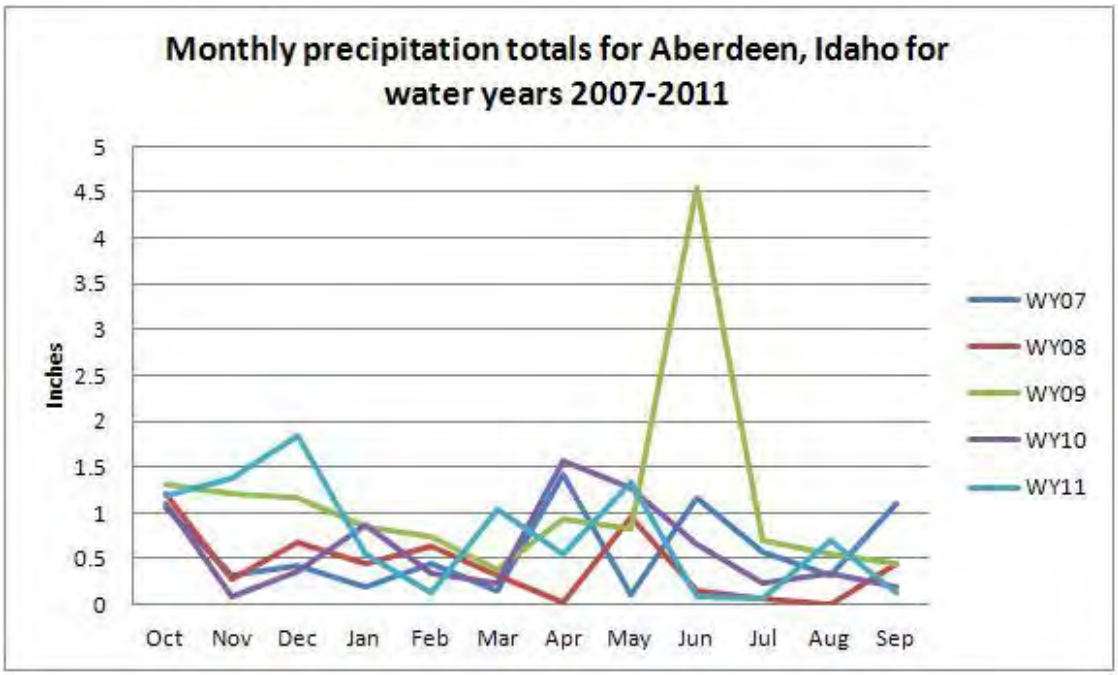
ZEBA

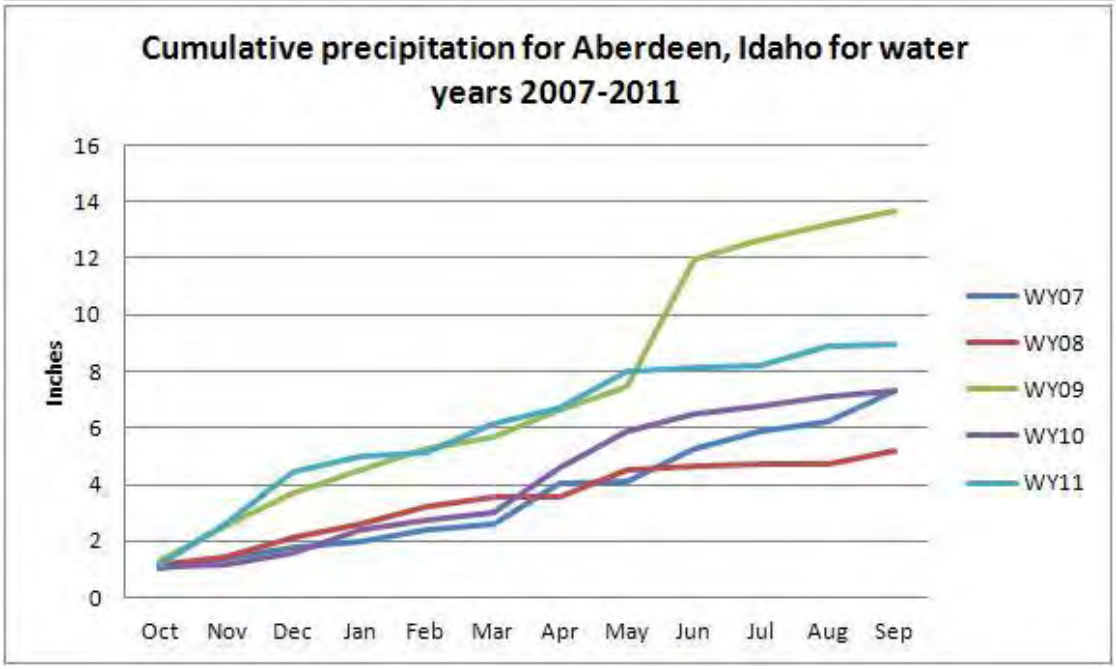
Also included in the planting are single observational plots of Appar blue flax, Goldar bluebunch wheatgrass, Magnar basin wildrye and Nezpar Indian ricegrass treated with ZEBA coating. ZEBA is a super-absorbent cornstarch based polymer. When saturated, the ZEBA molecules form a hydrogel that is able to absorb moisture up to 400 times its original weight and holds and releases water for use by plants over time. The reported result is faster germination, quicker emergence, consistent growth and higher, better-quality yields using less water. ZEBA plots will not be included in any statistical analysis and are only for observational purposes.

RESULTS

At the time of the first evaluation in the spring of 2007, there was major crusting of the soil surface to about 0.5 in depth. Soil moisture conditions below the soil crust were good and most species managed to break through the crust or had germinated in cracks in the soil. Most species had reached 1 to 4 true leaves by the first evaluation. Weed control from the chemical and mechanical treatments was excellent. Young plants of prickly lettuce (*Lactuca serriola*), white-stem blazing star (*Mentzelia albicaulus)*, flixweed (*Descurainia sophia*), lupine (*Lupinus* sp.), tumble mustard (*Sisymbrium altissimum*) and Russian thistle (*Salsola* kali) were common throughout the test site, but were not in numbers that would present a problem with competition.

Rainfall during the establishment year was lower than normal. In the 2007 water year, just over 7 inches of precipitation accumulated at Aberdeen. Spring rains in April helped establishment, but sparse summer rains caused many germinants to die by September. Water year 2008 was also lower than normal in precipitation. From October 1, 2007 through September 30, 2008, Aberdeen only received 5.18 inches of rain. Water year 2009 had over 13 inches of precipitation due in large part to 4 inches of rain fall in June. Hot temperatures in May, 2009 followed by June rains initiated a new flush of weeds in the trial area and likely significantly increased production values of the introduced grasses. Precipitation during the 2010 water year totaled 7.3 inches. The 2011 water year brought good winter and spring moisture. The year ended with a total of 8.98 inches of precipitation.





SPECIES DISCUSSION

In the spring 2007 evaluation, basin wildrye densities ranged from 0.06 plants/ft² (Topinish and Jim Creek) to 0.24 plants/ft² (Trailhead). At the time of the fall evaluation, densities dropped ranging from 0.00 to 0.06 plants/ft ². Plant densities remained low at the 2008 through the 2010 evaluations with the highest density being 0.07 plants/ft² achieved by Trailhead in 2009 and 2010. Plant densities were moderately higher in 2011. These new plants could be volunteers or misidentified Siberian wheatgrass seedlings from the previous cover stand. Overall, however, densities remain low as this site is significantly drier than where one would typically find basin wildrye.

Basin wildrye

		Density					
Accession	PLS	5/07	9/07	4/08	5/09	5/10	5/11
	---%---	----------(plants/ft ²)----------					
Trailhead	86.6	0.24[a]	0.06[a]	0.04[a]	0.07[a]	0.07[a]	0.15[a]
L-46	74.4	0.22	0.03	0.06	0.03	0.02	0.05
L-45	81.7	0.21	0.01	0.08	0.05	0.06	0.08
Magnar	89.6	0.15	0.01	0.03	0.02	0.01	0.05
Washoe	83.9	0.08	0.02	0.01	0.02	0.02	0.03
Gund	89.9	0.08	0.01	0.04	0.01	0.00	0.08
Jim Creek	83.6	0.06	0.01	0.01	0.04	0.02	0.05
Topinish	85.8	0.06	0.00	0.01	0.03	0.01	0.03

[a]Not significant at p<0.05

Although no significant differences were detected between the Sandberg bluegrass accessions, at the spring 2007 evaluation, Opportunity had better overall establishment than all other accessions. Opportunity continued to have the highest density in the fall evaluation (0.06 plants/ft ²), which was significantly higher than all other accessions. In 2008 there was again no significant difference between means. High Plains increased from 0.00 plants/ft ² to 0.06 plants/ft², equaling Opportunity for the top performer. In 2009 High Plains (0.14 plants/ft²) performed better than any other accession, differing significantly from Mountain Home and Opportunity. In 2010, several accessions had significant increases in plant density compared to previous years. The top performers were Duffy (0.46 plants/ft²), High Plains (0.38 plants/ft²), Mountain Home (0.32 plants/ft²) and Wallowa (0.24 plants/ft²). Opportunity had the lowest plant density at 0.01 plants/ft². Fair stands of the true Sandberg bluegrass accessions persisted into 2011. Opportunity Germplasm, a Nevada bluegrass accession native to a higher precipitation area, was not detected in the 2011 evaluation.

Sandberg bluegrass

		Density					
Accession	PLS	5/07	9/07	4/08	5/09	5/10	5/11
	---%---	----------(plants/ft ²)----------					
Opportunity	86.0	0.13[a]	0.06 a	0.06[a]	0.00 b	0.01b	0.00 c
High Plains	95.0	0.07	0.00 b	0.06	0.14 a	0.38 a	0.33 a
Wallowa	83.2	0.02	0.05 b	0.02	0.04 ab	0.24 ab	0.23 ab
Duffy	79.0	0.05	0.00 b	0.01	0.05 ab	0.46 a	0.28 ab
Mtn. Home	85.0	0.05	0.00 b	0.00	0.01 b	0.32 a	0.18 b
Critical value (0.05)			0.05		0.11	0.08	0.14

[a]Not significant at p<0.05

In the bluebunch wheatgrass trial no significance was detected between density means for the spring or fall evaluation during 2007. Plant densities in the spring ranged from 0.01 plant/ ft² to 0.37 plants/ft². The top performer was P-19, a test accession from the ARS (0.37 plants/ft ²). Plant densities generally stayed the same between the spring and fall evaluations indicating good adaptability of the species to the site conditions. The 2008 evaluation yielded significant differences in plant densities. P-19 had the highest density with 0.26 plants/ft ², significantly greater than P-27 with 0.06 plants/ft ². In 2009 no significant differences were detected between accessions. P-19 continued to have the highest recorded plant density at 0.08 plants/ft². Plant densities remained low in 2010 and into 2011. A few plants were located and recorded in plots of P-19, P-22, P-27 and P-32.

Bluebunch wheatgrass

		Density					
Accession	PLS	5/07	9/07	4/08	5/09	5/10	5/11
	---%---	---------- (plants/ft ²)----------					
P-19	92.9	0.37[a]	0.37 [a]	0.26 a	0.08 [a]	0.03 [a]	0.05 [a]
Anatone	88.1	0.33	0.29	0.22 ab	0.02	0.05	0.00
P-24	91.2	0.28	0.28	0.22 ab	0.06	0.07	0.00
9081636	92.0	0.27	0.17	0.12 ab	0.06	0.03	0.00
P-22	85.3	0.24	0.28	0.20 ab	0.06	0.03	0.05
Wahluke	87.3	0.24	0.25	0.18 ab	0.07	0.02	0.00
Goldar	90.6	0.13	0.13	0.10 ab	0.02	0.02	0.00
P-27	87.4	0.11	0.09	0.06 b	0.03	0.01	0.03
P-7	89.4	0.11	0.12	0.11 ab	0.02	0.03	0.00
P-32	86.5	0.01	0.12	0.10 ab	0.02	0.02	0.05
Critical value (0.05)				0.17			

[a]Not significant at p<0.05

Snake River wheatgrass densities were generally higher than those of bluebunch wheatgrass indicating, at least in this trial, greater adaptation to low precipitation conditions. The highest establishment density was 0.50 plants/ft ² achieved by Discovery, and the lowest was 0.32 from E-46 during 2007. Densities decreased between the spring and fall evaluations. Discovery continued to have the highest density (0.35 plants/ft²). In 2008, Discovery had increased slightly to 0.38 plants/ft ², but there were still no detectable significant differences between means. All densities of Snake River wheatgrass dropped from 2008 to 2009. Discovery had the highest density in 2009 and 2010 with 0.11 and 0.12 plants/ft² for the respective years. In 2011 Discovery continued to have the highest density with 0.15 plants/ft², however this was not significantly greater than the remaining accessions.

Snake River wheatgrass

		Density					
Accession	PLS	5/07	9/07	4/08	5/09	5/10	5/11
	---%---	----------(plants/ft²)----------					
Discovery	90.0	0.50[a]	0.35 [a]	0.38 [a]	0.11 [a]	0.12 [a]	0.15 [a]
E-51	91.1	0.39	0.29	0.30	0.05	0.06	0.08
E-45	94.5	0.33	0.18	0.18	0.04	0.07	0.03
E-46	96.3	0.32	0.27	0.26	0.04	0.04	0.05

[a]Not significant at p<0.05

Thickspike and streambank wheatgrass exhibited good drought tolerance and seedling vigor with establishment plant densities between 0.84 and 0.98 plants/ft² during 2007. No significant differences were detected between means. Densities remained high through the fall 2007 evaluation, with all accessions having densities between 0.66 and 0.78 plants/ft². Plant densities of thickspike and streambank wheatgrass remained high in 2008. Sodar streambank wheatgrass had the best plant density with 0.83 plants/ft ², though that did not differ significantly from the other accessions. In 2008 forage yields were measured in the thickspike and streambank wheatgrass plots. The highest yielding accession was Bannock thickspike wheatgrass with 151 lb/ac. No significant differences were detected between forage yield means. In 2009 plant densities had decreased by almost half from the previous year. Sodar had the highest density (0.45 plants/ft²) followed by Critana and Bannock with 0.32 and 0.21 plants/ft² respectively. Densities dropped slightly in 2010 with Sodar having the best plant density with 0.40 plants/ft². Rhizomatous spreading increased the plant densities from 2010 to 2011. All three accessions had high densities ranging from 0.60 plants/ft² (Bannock) to 0.90 plants/ft² (Sodar).

Thickspike and streambank wheatgrass

		Density			Forage	Density		
Accession	PLS	5/07	9/07	4/08	8/08	5/09	5/10	5/11
	---%---	---------(plants/ft²)-------			---(lb/ac)---	----------(plants/ft²)----------		
Sodar	96.5	0.98[a]	0.78[a]	0.83[a]	137[a]	0.45[a]	0.40[a]	0.90[a]
Critana	90.0	0.86	0.67	0.74	133	0.32	0.29	0.78
Bannock	94.3	0.84	0.66	0.73	151	0.21	0.20	0.60

[a]Not significant at p<0.05

Western wheatgrass is typically recommended for use in sites receiving 12 inches or more annual precipitation and is not generally considered well adapted to the conditions faced at Coffee Point. However, some plants did germinate from each of the accessions tested. Densities were very low in 2007, 0.03 to 0.05 plants/m² in the spring and slightly lower in the fall. In 2008 western wheatgrass densities remained very low with Rosana having the highest density of 0.07 plants/ft². In 2009 the only accession with living plants in the evaluated plots was Rosana with 0.04 plants/ft². In 2010 plant densities had rebounded somewhat with Rosana, Recovery and 9081630 having 0.13, 0.07 and 0.06 plants/ft² respectively. Western wheatgrass densities increased dramatically in 2011, most likely due to rhizomatous spreading. Rosana had the highest density with 1.00 plants/ft². Recovery and accession 9081630 had lower densities with 0.53 plants/ft² and 0.48 plants/ft² respectively.

Western wheatgrass

		Density					
Accession	PLS	5/07	9/07	4/08	5/09	5/10	5/11
	---%---	----------(plants/ft²)----------					
Rosana	90.0	0.05[a]	0.02[a]	0.07[a]	0.04[a]	0.13[a]	1.00[a]
Recovery	90.0	0.03	0.03	0.03	0.00	0.07	0.53
9081630	85.0	0.03	0.03	0.01	0.00	0.06	0.48

[a]Not significant at p<0.05

Among the slender wheatgrass accessions, First Strike slender wheatgrass from the Department of Defense and ARS had significantly greater plant densities than Copperhead from the Montana PMC during 2007. First Strike was developed for improved traits in germination and establishment for use on military training grounds. The other tested accession, Pryor did not

differ significantly in establishment from the other accessions. At the fall evaluation, the ranking remained constant, although densities decreased for all accessions. In 2008 slender wheatgrass densities of First Strike and Pryor increased slightly to 0.45 and 0.34 plants/ft ² respectively, both significantly greater than Copperhead (0.08 plants/ft ²). In 2008 accession First Strike yielded 143 lb/ac of forage, and Pryor had an average forage yield of 75 lb/ac. By 2009 there were no living slender wheatgrass plants recorded. This was presumably due to the short-lived nature of the species and/or the summer drought of 2008. Sparse plants were observed in the 2010 and 2011 evaluations, and stands remained negligible.

Slender wheatgrass

		Density			Forage	Density		
Accession	PLS	5/07	9/07	4/08	8/08	5/09	5/10	5/11
	---%---	---------(plants/ft²)---------			---(lb/ac)---	---------(plants/ft²)---------		
First Strike	90.0	0.53 a	0.37 a	0.45 a	143 a	0.00 [a]	0.02 [a]	0.03 [a]
Pryor	95.9	0.46 ab	0.30 ab	0.34 a	75 ab	0.00	0.01	0.00
Copperhead	85.0	0.23 b	0.08 b	0.08 b	0 b	0.00	0.00	0.00
Critical value (0.05)		0.28	0.28	0.18	86			

[a]Not significant at p<0.05

In the bottlebrush squirreltail trial, accession 9019219, a test material from the Montana PMC had an establishment density of 0.65 plants/ft² during 2007 and was significantly greater than the plant density of Toe Jam Creek (0.20 plants/ft²). Fall plant densities remained essentially the same as spring. Accession 9019219 is likely the subspecies *elymoides* and is currently being tested by Bridger PMC in Montana, while Toe Jam Creek is subspecies c*alifornicus* and was collected in a higher precipitation area near Elko, Nevada. In 2008 squirreltail density means were not statistically different. Accession 9019219 had 0.58 plants/ft ² and Toe Jam Creek had a density of 0.20 plants/ft ². In 2009 accession 901219 had an average of 0.39 plants/ft², while Toe Jam Creek had 0.12 plants/ft². In 2010, accession 9019219 had an average plant density of 0.40 plants/ft² compared to Toe Jam Creek with 0.14 plants/ft². in 2011 Accession 9019219 had 0.33 plants/ft² compared to 0.10 plants/ft² from Toe Jam Creek, but means were not significantly different.

Bottlebrush squirreltail

		Density					
Accession	PLS	5/07	9/07	4/08	5/09	5/10	5/11
	---%---	---------- (plants/ft²)----------					
9019219	85.0	0.65 a	0.57 a	0.58[a]	0.39 [a]	0.40 a	0.33 [a]
Toe Jam Creek	92.2	0.20 b	0.15 b	0.20	0.12	0.14 b	0.10
Critical value (0.05)		0.32	0.37			0.06	

[a]Not significant at p<0.05

Shrub densities were low and were not statistically different in the spring 2007 evaluation. Most accessions had meager amounts of germinants; however Snake River Plains fourwing saltbush and the accession of Gardner's saltbush from the Montana PMC both had fair establishment with 0.17 and 0.15 plants/ft² respectively. In the fall evaluation the saltbush accessions continued to have relatively good densities (0.19 for Gardner's and 0.13 for Snake River Plains). Other accessions had negligible establishment. In 2008 Snake River Plains fourwing saltbush and Gardener's saltbush both had densities of 0.19 plants/ft ². Open Range winterfat and Wyoming big sagebrush both had minimal establishment with densities of 0.06 and 0.01 plants/ft ²

respectively. Snake River Plains fourwing saltbush and Gardener's saltbush had significantly greater plant densities than the other evaluated shrubs in 2009 with 0.24 and 0.20 plants/ft² respectively. In 2010 Snake River Plains had 0.32 plants/ft² and Gardener's saltbush had 0.13 plants/ft². In 2011 Snake River plains was recorded at 0.15 plants/ft². No plants were found in the Gardeners saltbush plots. All other accessions had insignificant plant densities from 2009 through 2011.

Shrubs

Accession	PLS	Density 5/07	9/07	4/08	5/09	5/10	5/11
	---%---	---------- (plants/ft²)----------					
Snake River Plains fourwing saltbush	44.5	0.17[a]	0.13 ab	0.19 a	0.24 a	0.32 a	0.15 a
9016134 Gardener's saltbush	30.0	0.15	0.19 a	0.19 a	0.20 a	0.13 ab	0.00 b
Open Range winterfat	80.8	0.02	0.04 bc	0.06 ab	0.03 b	0.04 b	0.03 b
Wytana fourwing saltbush	45.0	0.01	0.00 c	0.00 b	0.01 b	0.01 b	0.00 b
Northern Cold Desert winterfat	85.2	0.00	0.00 c	0.00 b	0.00 b	0.01 b	0.00 b
Wyoming big sagebrush	21.3	0.00	0.01 bc	0.01 b	0.01 b	0.02 b	0.00 b
Critical value (0.05)			0.13	0.15	0.15	0.06	0.05

[a]Not significant at $p<0.05$

In the forb trial, only Maple Grove Lewis flax and the test accession of Phacelia, 9081632, from the Montana PMC had fair establishment. Maple Grove had a plant density of 0.45 plants/ft² and was significantly greater than all other accessions with the exception of Phacelia which had a density of 0.28 plants/m² during 2007. All other accessions had essentially zero plants emerge. In the fall, Maple Grove continued to have the best density (0.20 plants/ft²). Most of the Phacelia plants had died by the fall evaluation, and Cedar Palmer penstemon had an increase in density, from 0.00 to 0.06 plants/ft². In 2008 the only forbs with surviving plants in the plots were Maple Grove Lewis flax and Great Northern western yarrow. Maple Grove had significantly better plant density than all other accessions with 0.36 plants/ft ². In 2009, only Eagle western yarrow had plants visible within the evaluated plots, but only recorded 0.01 plants/ft². In the 2010 evaluation Eagle western yarrow had the highest density at 0.03 plants/ft² and Great Northern western yarrow had 0.01 plants/ft². All other accessions had no plants. No plants were detected during the 2011 evaluation.

Forbs

Accession	PLS	Density 5/07	9/07	4/08	5/09	5/10	5/11
	---%---	----------(plants/ft²)----------					
Maple Grove Lewis flax	93.0	0.45 a	0.20 a	0.36 a	0.00 b	0.00 b	0.00
Phacelia	81.8	0.28 ab	0.00 b	0.00 b	0.00 b	0.00 b	0.00
Great Northern w. yarrow	90.0	0.01 b	0.00 b	0.01 b	0.00 b	0.01b	0.00
Cedar Palmer penstemon	95.0	0.00 b	0.06 ab	0.00 b	0.00 b	0.00 b	0.00
Eagle w. yarrow	90.0	0.00 b	0.01 b	0.00 b	0.01 a	0.03 a	0.00
Richfield firecracker penstemon	92.2	0.00 b	0.00 b	0.00 b	0.00 b	0.00 b	0.00
Antelope prairie clover	98.0	0.00 b	0.00 b	0.00 b	0.00 b	0.00 b	0.00
Old Works penstemon	95.0	0.00 b	0.00 b	0.00 b	0.00 b	0.00 b	0.00
Stillwater prairie coneflower	94.5	0.00 b	0.00 b	0.00 b	0.00 b	0.00 b	0.00
Critical value (0.05)		0.34	0.18	0.17	0.01	0.01	

As a group, the introduced grasses outperformed all others with regard to establishment. All performed well with the lowest density coming from Bozoisky II Russian wildrye with a density of 0.54 plants/ft² during 2007. The best density was achieved by Vavilov II, a new release in 2008 of Siberian wheatgrass from the ARS, DOD and NRCS which had 1.48 plants/ft². Fall densities were generally slightly lower than in the spring, but all accessions maintained good plant densities. Vavilov II again had a significantly higher density than all other accessions (1.46 plants/ft²). In 2008 Vavilov II densities remained significantly greater than all other accessions with 1.53 plants/ft ². Forage yields of Vavilov II were also significantly greater than the other tested accessions. Vavilov II yielded 1176 lb/ac of forage, while the next closest yield came from Vavilov with 528 lb/ac. In 2009 the introduced grasses continued to outperform all other species evaluated. Vavilov II again had the highest plant density with 1.32 plants/ft ² and forage yield of 2165 lb/ac. In 2010 Vavilov II had significantly higher density than all other accessions with 1.31 plants/ft². Vavilov had the second highest plant density with 0.83 plants/ft². Vavilov II also had the highest forage yield in 2010 with 2522 lbs/ac with Vavilov close behind with 2352 lbs/ac. The introduced grass stands remained high in the 2011 evaluation. Little change in density was observed between 2010 and 2011. Vavilov and Vavilov II again had the highest forage yield in 2011 with 2446 and 2094 lb/ac respectively. Bozoisky and Bozoisky II produced good amounts of forage with 1437 and 1195 lbs/ac respectively, while Mustang produced 494 lb/ac.

Introduced grasses

		Density					
Accession	PLS	5/07	9/07	4/08	5/09	5/10	5/11
	---%---	---------- (plants/ft²)----------					
Vavilov II Siberian wheatgrass	90.0	1.48 a	1.46 a	1.53 a	1.32 a	1.31 a	1.10 a
Vavilov Siberian wheatgrass	90.0	0.74 b	0.68 b	0.75 b	0.68 b	0.83 ab	0.68 b
Mustang Altai wildrye	90.0	0.75 b	0.58 b	0.70 b	0.24 b	0.47 b	0.48 b
Bozoisky Select Russian wildrye	90.7	0.70 b	0.65 b	0.65 b	0.60 b	0.73 b	0.58 b
Bozoisky II Russian wildrye	90.0	0.54 b	0.59 b	0.63 b	0.58 b	0.69 b	0.55 b
Critical value (0.05)		3.70	0.42	0.39	0.45	0.53	0.24

Introduced grasses

	Forage			
Accession	8/08	8/09	8/10	8/11
	---------- (lb/ac)----------			
Vavilov II Siberian wheatgrass	1176 a	2165 a	2522 a	2094 a
Vavilov Siberian wheatgrass	528 b	1505 ab	2352 ab	2446 a
Mustang Altai wildrye	56 b	595 b	827 ab	494 c
Bozoisky Select Russian wildrye	189 b	669 b	1350 ab	1437 b
Bozoisky II Russian wildrye	168 b	799 b	618 b	1195 b
Critical value (0.05)	527	1239	1815	216

Introduced grass plots, May 2009.

Vavilov II August 2009.

Zeba Initial Evaluation

We also included one plot each of Magnar basin wildrye, Goldar bluebunch wheatgrass, Appar blue flax and Nezpar Indian ricegrass which were treated with Zeba® moisture retention seed coating. Because there was only one plot of each accession, these plots could not be analyzed statistically and only general observations can be made. The treated Magnar seed had a mean density of 0.71 plants/ft² as compared with 0.15 plants/ft² achieved in the untreated plots during 2007. Likewise, the treated Goldar plot had an average plant density of 0.43 plants/ft² while the untreated plots averaged only 0.13 plants/ft². Appar and Nezpar were not included in the main trial, so a comparison cannot be made, however, the results achieved with Magnar and Goldar are favorable. In the fall evaluation, all densities had decreased with the exception of Nezpar which increased from 0.09 to 0.15 plants/ft². From 2007 to 2008 there were increases in plant densities for all accessions except Nezpar. The top plant density was recorded by Appar blue flax with 0.43 plants/ft². In 2009 only Magnar basin wildrye and Goldar bluebunch wheatgrass still had viable plants in the evaluation with 0.11 and 0.06 plants/ft² respectively. The 2010 evaluation revealed 0.02 plants/ft² of Nezpar and 0.04 plants/ft² of Goldar. Zeba plots were not evaluated in 2011.

Zeba®

Accession	PLS	Density 5/07	9/07	5/08	5/09
	---%---	----------(plants/ft²)----------			
Magnar	87.3	0.71[a]	0.24[a]	0.30[a]	0.11[a]
Goldar	92.0	0.43	0.32	0.35	0.06
Appar	91.3	0.33	0.26	0.43	0.00
Nezpar	79.3	0.09	0.15	0.04	0.00

[a] Means not separated

SUMMARY

Meager precipitation during the first two seasons provided a good opportunity to test the assembled accessions under extreme drought conditions. Several species and accessions proved unable to establish and survive at the Coffee Point test site. All three species of introduced grasses had good establishment and survival through the 2011 season. Native grass species that had good performing accessions included thickspike and streambank wheatgrass, Snake River wheatgrass, western wheatgrass and bottlebrush squirreltail. Of the forbs, only Maple Grove Lewis flax had a fair stand in 2008, yet these had all but disappeared by 2009. By 2011 all of the forbs had essentially died out. Of the shrubs, Snake River Plains fourwing saltbush and Gardener's saltbush had good initial establishment and continued to have stands through 2010, however in 2011 only Snake River Plains fourwing saltbush and Open Range Winterfat had a measurable stand.

The next evaluations will be in 2016 (ten year) to measure long-term persistence and forage yield.

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Vogel, K.P. and R.A. Masters. 2001. Frequency grid-a simple tool for measuring grassland establishment. Journal of Range Management 54(6): 653-655.

Appendix 1. List of species and accessions

Species	Accession	Seed source
Basin wildrye	Trailhead	MTPMC
	Washoe	MTPMC
	Topinish	Benson Seed Farm
	Jim Creek	Benson Seed Farm
	Gund	UNR
	Magnar	IDPMC
	L-45	ARS
	L-46	ARS
Sandberg bluegrass	High Plains	MTPMC
	Mountain Home	FS
	Duffy Creek	Benson Seed Farm
	Wallowa	Benson Seed Farm
	Opportunity	MTPMC
Bluebunch wheatgrass	P-7	ARS
	P-32	ARS
	Wahluke	Benson Seed Farm
	9081636	MTPMC
	Anatone	IDPMC
	Goldar	IDPMC
	P-19	ARS
	P-24	ARS
	P-22	ARS
	P-27	ARS
Snake River wheatgrass	Discovery	ARS
	E-45	ARS
	E-46	ARS
	E-51	ARS
Thickspike wheatgrass	Critana	MTPMC
	Bannock	IDPMC
	Sodar	IDPMC
Western wheatgrass	Rosana	MTPMC
	9081630	MTPMC
	Recovery	DOD/ARS/IDPMC
Slender wheatgrass	Pryor	MTPMC
	First Strike	DOD/ARS
	Copperhead	MTPMC
Bottlebrush squirreltail	9019219	MTPMC
	Toe Jam Creek	ARS
Shrubs	Wytana fourwing saltbush	MTPMC
	SRP fourwing saltbush	IDPMC
	9016134 Gardner saltbush	MTPMC
	N. Cold Desert winterfat	IDPMC
	Open Range winterfat	MTPMC
	Wyoming big sagebrush	BLM
Forbs	Great Northern w. yarrow	MTPMC
	Eagle w. yarrow	FS and Geertson
	Antelope P. clover	MTPMC

	Stillwater coneflower	MTPMC
	9081632 Phacelia	MTPMC
	Old works penstemon	MTPMC
	Cedar Palmer penstemon	NMPMC
	Maple Grove Lewis flax	IDPMC
	Richfield penstemon	IDPMC
Introduced Grasses	Bozoisky Russian wildrye	ARS/MTPMC
	Bozoisky II Russian wildrye	ARS
	Vavilov Siberian wheatgrass	ARS
	Vavilov II S. wheatgrass	IDPMC
	Mustang Altai wildrye	ARS
ZEBA	Nezpar Indian ricegrass	IDPMC
	Magnar basin wildrye	IDPMC
	Goldar b. wheatgrass	IDPMC
	Appar blue flax	IDPMC

Appendix 2. Plot map; Coffee Point, 2006

34’	20’				14’					34’
1.	Trailhead	Washoe	Jim crk	Magnar	1.	Rosanna	Recovery	9081630	Rosanna	1.
2.	Washoe	Jim crk	Topinish	L-45	2.	9081630	Rosanna	Rosanna	Recovery	2.
3.	Topinish	Gund	Trailhead	Washoe	3.	Recovery	9081630	Recovery	9081630	3.
4.	Jim crk	L-45	L-46	Topinish	4.	Pryor	Pryor	First Strike	Copper	4.
5.	Gund	Magnar	Washoe	L-46	5.	First Strike	Copper	Copper	Pryor	5.
6.	Maganr	Trailhead	Gund	Jim crk	6.	Copper	First Strike	Pryor	First Strike	6.
7.	L-45	L-46	L-45	Gund	7.	9019219	Toe jam	9019219	Toe jam	7.
8.	L-46	Topinish	Magnar	Trailhead	8.	Toe jam	9019219	Toe jam	9019219	8.
9.	High plains	Mt home	Wallowa	Duffy	9.	Wytana	SRP	Gardner’s	Open range	9.
10.	Mt home	Wallowa	Duffy	High plains	10.	SRP	Gardner’s	WY sage	NCD	10.
11.	Duffy	9081633	High plains	9081633	11.	Gardner’s	Open range	NCD	WY sage	11.
12.	Wallowa	Duffy	9081633	Mt home	12.	NCD	Wytana	Open range	Gardner’s	12.
13.	9081633	High plains	Mt home	Wallowa	13.	Open range	WY sage	SRP	Wytana	13.
14.	p-7	p-32	Goldar	Anatone	14.	WY sage	NCD	Wytana	SRP	14.
15.	p-32	9081636	p-27	Goldar	15.	Great northern	Eagle	Old works	Stillwater	15.
16.	Wahluke	p-7	9081636	p-32	16.	Eagle	Phacelia	m. grove	Old works	16.
17.	9081636	p-27	p-19	p-22	17.	Antelope	Great northern	Richfield	Antelope	17.
18.	Anatone	p-24	p-32	p-19	18.	Stillwater	Cedar	Phacelia	Great northern	18.
19.	Goldar	p-22	p-24	Wahluke	19.	Phacelia	M. grove	Stillwater	M. grove	19.
20.	p-19	Goldar	Anatone	p-7	20.	Old works	Stillwater	Antelope	Richfield	20.
21.	p-24	Wahluke	p-22	p-27	21.	Cedar	Antelope	Great northern	Cedar	21.
22.	p-22	p-19	p-7	p-24	22.	Maple grove	Richfield	Cedar	Eagle	22.
23.	p-27	Anatone	Wahluke	9081636	23.	Richfield	Old works	Eagle	Phacelia	23.
24.	Discovery	e-45	e-51	e-46	24.	Bozoisky	Vav II	Mustang	Vavilov	24.
25.	E-45	e-46	Discovery	e-51	25.	Boz II	Bozoisky	Vavilov	Mustang	25.
26.	E-46	Discovery	e-45	e-45	26.	Vavilov	Mustang	Vav II	Bozoisky	26.
27.	E-51	e-51	e-46	Discovery	27.	Vav II	Vavilov	Boz II	Vav II	27.
28.	Critana	Bannock	Bannock	Sodar	28.	Mustang	Boz II	Bozoisky	Boz II	28.
29.	Bannock	Critana	Sodar	Critana	29.	ZEBA Nezpar	ZEBA Magnar	ZEBA Goldar	ZEBA Appar	29.
30.	Sodar	sodar	critana	bannock	30.	blank	blank	blank	blank	30.
	20’									

→ NE

Curlew National Grassland Off-Center Evaluation

2011 Progress Report

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INTRODUCTION

In November of 2010, the Aberdeen Plant Materials Center (PMC) installed a multi-species planting at an off-center test site located on the USDA-Forest Service Curlew National Grassland located approximately 30 miles south of American Falls, Idaho in cooperation with the Caribou/Targhee National Forest. The trial includes accessions of primarily native grasses, forbs and shrubs adapted for use in MLRA 13 Eastern Idaho Plateaus (13 to 18 inch plus precipitation areas). The trial contains 63 accessions of 35 species of native and introduced grasses, forbs and shrubs as listed in Table 1. Appendix 1 is a plot map of the planting. The goal of this trial is to evaluate the adaptability of new conservation releases in mid-elevation mountain big sagebrush/grass ecosystems and compare their establishment, production and longevity against traditionally recommended released plant materials. The site will also serve as a display nursery for the Forest Service and other conservation practitioners to view plant species and releases in a natural setting.

The Curlew test site historically supported a mountain big sagebrush/bluebunch wheatgrass plant community. Climatic conditions are semi-arid with mean annual precipitation ranging from 12 to 25 inches, and the frost free period is approximately 90 days or less. The soil at the site is a silty clay loam to silt loam. The elevation is 5,216 ft.

MATERIALS AND METHODS

The study area was burned by wildfire in 2006. In fall 2009 the study site was plowed and packed, followed by applications of 16 oz 2, 4-D and 64 oz glyphosate on June 18, 2010 and July 29, 2010. The trial was planted on November 17, 2010 using a Tye Drill with a drill width of 80 inches (8 rows at 10 inch spacing). Experimental design is a randomized complete block with 3 replications. Each plot is one drill width wide (80 in) and 20 ft long. Seeding depths are dependent on species and were planted according to Ogle et al (2010). Species were seeded at a target rate of 20 to 30 pure live seeds (PLS) per ft² for large seeded species (<500,000 seeds per pound) and 40 to 50 PLS/ft² for smaller seeded species (>500,000 seeds/lb). Pure live seed values were determined by seed lab results or, best estimates when lab results were not available. All seed was mixed with rice hulls as an inert carrier to improve seed flow according to St. John et al (2005). A cover crop was planted in the unplanted prepared areas surrounding the trial consisting of 40% Anatone bluebunch wheatgrass, 20% Sherman big bluegrass, 15% Bannock thickspike wheatgrass, 10 percent Magnar basin wildrye, 5% Maple Grove Lewis flax, 5% Richfield firecracker penstemon, 5% Great Northern western yarrow, and 0.25 lbs/ac Snake River Plains fourwing saltbush. The plots were mowed to approximately four inch height on September 29,2011 for weed control.

Seeding with the Tye drill.

Initial plant establishment was measured on July 11, 2011 using a frequency grid based on that described by Vogel and Masters (2001). Data were analyzed using the Statistix 8 Analytical software and subjected to an analysis of variance with a significance level of $p<0.05$. In cases where significance was detected, means were separated using a Least Significant Difference (LSD) all pairwise comparison. Analyses were broken into five groups, 1) all species, 2) native grasses, 3) introduced grasses, 4) forbs, and 5) shrubs. All tables have been arranged with accessions ranked from highest plant density to the lowest at the time of the first evaluation.

There are no weather stations located near the Curlew site or in nearby locations with similar elevation and conditions. The closest weather station is the Bull Canyon weather station located 11 miles north of the Curlew study site at an elevation of 6,418 ft. During water year 2011, Bull Canyon recorded 22.7 inches of precipitation. The Curlew study site, being lower in elevation, probably received less precipitation than Bull Canyon, but the Curlew test site received normal to above normal precipitation for the year.

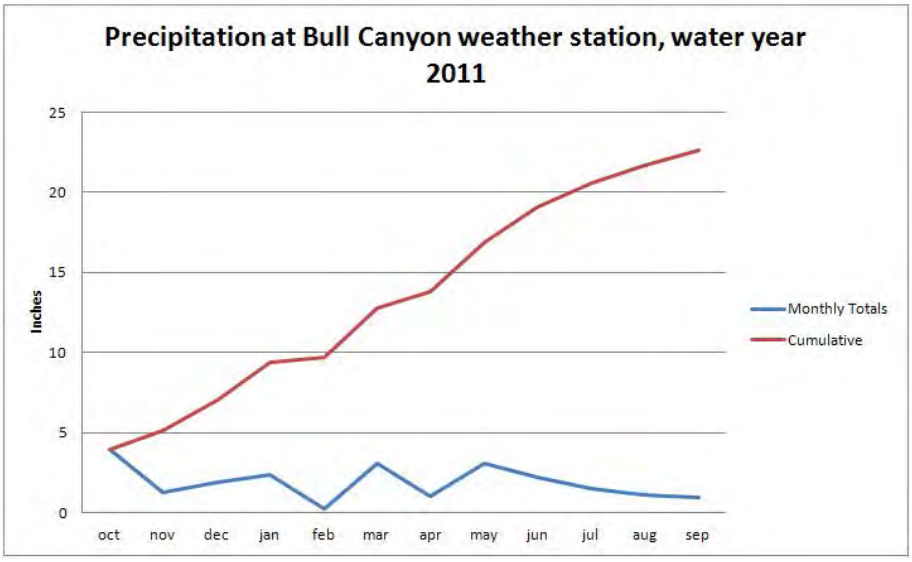

Table 1. Species and accessions

Bluebunch wheatgrass
- Anatone
- Goldar
- P-7
- P-33

Snake River wheatgrass
- Secar
- Discovery

Western wheatgrass
- Recovery
- Rosana
- Arriba

Slender wheatgrass
- First Strike
- Pryor

Basin wildrye
- Washoe
- Magnar
- Trailhead
- Continental

Bluegrass
- Sherman big bluegrass
- Opportunity Nevada bluegrass
- Mt. Home Sandberg bluegrass
- High Plains Sandberg bluegrass
- Reliable Sandberg bluegrass

Green needlegrass
- Cucharas

Fescue
- 9076469 Idaho fescue
- Covar sheep fescue
- Durar hard fescue

Streambank/Thickspike wheatgrass
- Sodar
- Bannock
- Critana

Squirreltail
- Fish Creek bottlebrush squirreltail
- Sand Hollow big squirreltail
- Toe Jam Creek bottlebrush squirreltail
- Wapiti bottlebrush squirreltail
- 9019219 bottlebrush squirreltail
- 9092275 bottlebrush squirreltail

Forbs
- Maple Grove Lewis flax
- Appar blue flax
- Richfield firecracker penstemon
- Great Northern western yarrow
- Antelope prairie clover
- Phacelia
- 9076577 Douglas' dustymaiden
- NBR-1 basalt milkvetch
- Don falcata alfalfa
- Timp northern (Utah) sweetvetch
- Delar small burnet
- Sainfoin
- Lutana cicer milkvetch
- Stillwater prairie coneflower

Shrubs
- Wyoming big sagebrush
- Snake River Plains fourwing saltbush
- Northern Cold Desert winterfat
- Wytana fourwing saltbush

Altai wildrye
- Mustang

Crested wheatgrass
- Ephraim
- Hycrest
- Hycrest II
- Nordan

Russian wildrye
- Bozoisky Select
- Bozoisky II

Siberian wheatgrass
- Vavilov
- Vavilov II

Meadow brome
- Regar
- Cache

RESULTS

Establishment densities ranged from essentially zero plants to 13 plants/m² (table 2). Eight out of the top ten species to establish were introduced grasses, four of which were crested wheatgrass accessions. The highest ranking native grasses were Fish Creek bottlebrush squirreltail and Pryor slender wheatgrass, both of which are short-lived perennials commonly used as a nurse crop with r longer lived species in a seed mixture. In general, forbs had moderate establishment success, while the shrub accessions with the exception of Wyoming big sagebrush had low establishment numbers the first year evaluation.

Native grasses had a broad range of establishment densities (table 3) ranging from 0.2 plants/m² (Sand Hollow) to 11.6 plants/m² (Fish Creek).

Introduced grasses all had excellent establishment (table 4). The lowest plant density recorded was 6.7 plants/m² from Bozoisky Russian wildrye. Cache meadow brome had the highest density with 13.0 plants/m².

Forbs (table 5) generally had lower establishment numbers than the grasses; however good stands were observed in many plots.

All shrub species had low initial establishment (table 6). No significant differences were detected between means.

A seeded plot of Cache meadow brome. Photo taken on October 24, 2011.

Table 2. All species

Accession	Density[1] July 11, 2011	Accession (cont.)	Density July 11, 2011
	-- (plants/m ²)--		-- (plants/m ²)--
Cache	13.0 a	Recovery	4.3 h-q
Hycrest II	12.1 a-b	NBR-1	4.0 i-q
Fish Creek	11.6 a-c	Durar	3.9 i-q
Nordan	11.6 a-c	9076469	3.8 i-q
Pryor	11.5 a-d	Bannock	3.6 j-q
Ephraim	11.1 a-e	Maca/CHDO2	3.6 j-q
Vavilov	9.6 a-f	Opportunity	3.5 j-q
Bozoisky II	9.5 a-g	Washoe	3.5 j-q
Hycrest	9.0 a-h	Phacelia	3.3 k-q
Covar	8.5 a-i	Secar	3.3 k-q
Delar	8.1 b-j	9019219	3.1 k-q
Maple Grove	8.1 b-j	Sherman	3.1 k-q
Anatone	7.6 b-k	Trailhead	3.1 k-q
Don	7.6 b-k	Continental	2.4 l-q
Timp	7.6 b-k	High Plains	2.4 l-q
Regar	7.5 b-k	9092275	2.3 l-q
Vavilov II	7.5 b-k	Magnar	2.3 l-q
Appar	7.0 c-l	Wyoming big sagebrush	1.5 m-q
Mustang	6.8 d-l	Great Northern	1.5 n-q
Bozoisky	6.7 e-l	Richfield	1.5 n-q
Sodar	6.7 e-l	Wapiti	1.3 o-q
Critana	6.6 e-l	Lutana	1.2 o-q
First Strike	6.3 f-m	Stillwater	1.1 p-q
P-7	6.2 f-n	Cucharas	0.9 q
Sainfoin	5.9 f-o	Mountain Home	0.9 q
P-33	5.8 f-p	Reliable	0.7 q
Goldar	4.7 g-q	Snake River Plains	0.5 q
Rosana	4.5 h-q	Wytana	0.3 q
Toe Jam	4.5 h-q	Sand Hollow	0.2 q
Douglas' dustymaiden	4.4 h-q	Antelope	0.1 q
Discovery	4.4 h-q	Northern Cold Desert	0.1q
Arriba	4.3 h-q		
LSD (0.05)	4.8		

[1] For plants/ft², divide by 10.76

Table 3. Native grasses

Accession	Density[1] July 11, 2011	Accession (cont.)	Density July 11, 2011
	-- (plants/m ²)--		-- (plants/m ²)--
Fish Creek	11.6 a	Durar	3.9 b-g
Pryor	11.5 a	9076469	3.8 b-g
Anatone	7.6 a-c	Bannock	3.6 b-g
Sodar	6.7 a-d	Opportunity	3.5 b-g
Critana	6.6 a-d	Secar	3.3 b-g
First Strike	6.3 a-e	Sherman	3.1 b-g
P-7	6.2 a-f	9019219	3.1 b-g
P-33	5.8 b-f	High Plains	2.4 c-g
Goldar	5.7 b-g	9092275	2.3 c-g
Rosana	4.5 b-g	Wapiti	1.3 d-g
Toe Jam Creek	4.5 b-g	Cucharas	0.9 e-g
Discovery	4.4 b-g	Mountain Home	0.9 e-g
Arriba	4.3 b-g	Reliable	0.7 f-g
Recovery	4.3 b-g	Sand Hollow	0.2 g
LSD (0.05)	5.5		

[1] For plants/ft², divide by 10.76

Table 4. Introduced grasses

Accession	Density[1] July 11, 2011
	-- (plants/m ²)--
Cache	13.0 a
Hycrest II	12.1 a-b
Nordan	11.6 a-c
Ephraim	11.1 a-c
Vavilov	9.6 a-c
Bozoisky II	9.5 a-c
Hycrest	9.0 a-c
Covar	8.5 a-c
Regar	7.5 b-c
Vavilov II	7.5 b-c
Mustang	6.8 c
Bozoisky	6.7 c
LSD (0.05)	5.0

[1] For plants/ft², divide by 10.76

Table 5. Forbs

Accession	Density[1] July 11, 2011
	-- (plants/m ²)--
Delar	8.1 a
Maple Grove	8.1 a
Don	7.6 a-b
Timp	7.6 a-b
Appar	7.0 a-c
Sainfoin	5.9 a-d
Douglas' dustymaiden	4.4 b-e
NBR-1	4.0 c-e
Phacelia	3.3 d-f
Great Northern	1.5 e-f
Richfield	1.5 e-f
Lutana	1.2 e-f
Stillwater	1.1 e-f
Antelope	0.1 f
LSD (0.05)	3.4

[1] For plants/ft², divide by 10.76

Table 6. Shrubs

Accession	Density[1] July 11, 2011
	-- (plants/m ²)--
Wyoming big sagebrush	1.5
Snake River Plains	0.5
Wytana	0.3
Northern Cold Desert	0.1
LSD (0.05)	N/A

[1] For plants/ft², divide by 10.76

Douglas' dustymaiden seedlings. Photo taken October 24, 2011.

SUMMARY

This progress report documents data from the first growing season. First year evaluations are often misleading as establishment densities can change dramatically from the first to second growing season. In future evaluations, the grass plots will be clipped in the second and fourth growing seasons to determine air-dry forage production.

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Fence

Anatone	9076469	Timp	Rosanna	Critana	Secar	Stillwater	Don	Magnar
Goldar	Covar	Delar	Antelope	Cucharas	Wapiti	NBR-1	Maple Grove	Hycrest
P-7	Sodar	Sainfoin	Sand Hollow	Don	Wytana	Sherman	Rosanna	Timp
P-33	Bannock	Lutana	N. C. Desert	Washoe	MACA	Antelope	Great Northern	Bozoisky Sel.
Secar	Critana	MACA	Pryor	Maple Grove	Magnar	High Plains	Secar	Sand Hollow
Discovery	Fish Creek	Stillwater	CHDO	Great Northern	Nordan	9076469	9019219	Wapiti
Recovery	Sand Hollow	WY big sage	Sherman	Anatone	Arriba	Sainfoin 2 bu	Mt. Home	P-7
Rosanna	Toe Jam	S. R. Plains	NBR-1	Trailhead	Durar	First Strike	Critana	S. R. Plains
Arriba	Wapiti	N. C. Desert	Reliable	Timp	Opportunity	Mustang 2 bu	Sodar	Pryor
First Strike	9019219	Wytana	Hycrest	Appar	Sainfoin	Goldar	Phacelia	Cucharas
Pryor	9092275	Mustang	P-33	9019219	P-7	Ephraim	Trailhead	Wytana
Washoe	Maple Grove	Ephraim	Sodar	Recovery	Covar	Bannock	Toe Jam	WY big sage
Magnar	Appar	Hycrest	Mustang	Phacelia	Bozoisky II	Appar	P-33	Discovery
Trailhead	Richfield	Hycrest II	High Plains	Mt. Home	Stillwater	Continental 2 bu	Opportunity	Vavilov
Continental	Great Northern	Nordan	Vavilov	WY big sage	Fish Creek	Hycrest II	Delar 2 bu	Lutana
Sherman	Durar	Bozoisky Sel.	9092275	First Strike	Bozoisky Sel.	Recovery	Anatone	Reliable
Opportunity	Antelope	Bozoisky II	Delar	Ephraim	Cache	Cache	Bozoisky II	Regar
Mt. Home	Phacelia	Vavilov	Discovery	9076469	Goldar	9092275	Richfield	Durar
High Plains	CHDO	Vavilov II	Richfield	Regar	S. R. Plains	N. C. Desert	Covar	CHDO
Reliable	NBR-1	Regar	Lutana	Toe Jam	Vavilov II	Vavilov II	Fish Creek	Arriba
Cucharas	Don	Cache	Bannock	Hycrest II	Continental	Washoe	MACA 2 bu	Nordan

Rep. 1

Rep. 2

Rep. 3

Curlew National Grassland Off-center Evaluation
Planted November 17, 2010

Initial Toxicity Screening of Groundsel (*Senecio* spp.)

2011 Progress Report
Derek J. Tilley, PMC Agronomist
Loren St. John, PMC Team Leader
Natural Resources Conservation Service
Plant Materials Center
Aberdeen, Idaho

Groundsels and ragworts are biennial or perennial herbs of the composite family (Asteraceae) in the genus *Senecio*. Several species of groundsel were identified as having potential for Intermountain and Rocky Mountain rangeland plantings. Initial plantings conducted by the Aberdeen Plant Materials Center (IDPMC) and the Upper Colorado Environmental Plant Center (UCEPC) indicated that these species are relatively easy to establish and have positive seed production attributes. Species of interest included *S. multilobatus, S. integerrimus*, and *S. atratus*.

A literature search revealed however that other members of *Senecio*, including tansy ragwort (*S. jacobaea*), Ridell's ragwort (*S. ridellii*) and threadleaf ragwort (*S. flaccidus*) contained toxic compounds making them unsuitable for use in rangelands (USDA-ARS, 2011). No information was available however for the species of interest. It was decided to make numerous collections of the key species and have toxicity analysis performed by the ARS Poisonous Plant Research Laboratory in Logan, Utah.

A total of 26 collections were sent for analysis including 14 *S. multilobatus*, 8 *S. integerrimus*, 2 *S. atratus*, 1 *S. canus* and 1 *S. streptanthifolius*. Samples were analyzed for pyrrolizidine alkaloids (PA's). All samples were found to have alkaloids. Most samples contained a mixture of saturated (non-toxic alkaloids) and 1,2-unsaturated (toxic alkaloids). Among the samples five different chemotypes (samples containing similar alkaloid composition) were also categorized; those with the same chemo type number have a similar chemical composition or profile. Chemo types II, III, and IV have samples of highest toxicity risk.

The table below shows the estimated concentrations of alkaloids as percent total alkaloid by dry weight and percent toxic alkaloids by dry weight of the plant samples sent from Aberdeen and Meeker. Risk is determined by the percent toxic alkaloid, and a number of the samples are relatively high especially when comparing percent total alkaloids and percent toxic alkaloids.

Sample	Species	Chemo type	% dw total alkaloids	% dw toxic alkaloids
3510	*multilobatus*	I	0.21	0.10
3512	*multilobatus*	II	0.13	0.12
3513	*multilobatus*	I	0.16	0.04
3515	*integerrimus*	II	0.10	0.10
3516	*multilobatus*	II	0.43	0.36
3517	*multilobatus*	II	0.13	0.09
3518	*multilobatus*	III	0.50	0.48
3519	*multilobatus*	III	0.37	0.35
3520	*integerrimus*	IV	1.11	0.22
3521	*integerrimus*	IV	0.81	0.12
3522	*integerrimus*	IV	0.98	0.34

3523	*multilobatus*	III	0.34	0.24
3524	*multilobatus*	II	0.61	0.57
3525	*multilobatus*	II	0.30	0.19
3526	*multilobatus*	II	0.27	0.16
3527	*multilobatus*	II	0.23	0.19
3528	*multilobatus*	II	0.37	0.34
3529	*integerrimus*	IV	0.62	0.28
3530	*multilobatus*	II	0.30	0.28
3531	*integerrimus*	IV	1.68	0.87
3532	*integerrimus*	IV	1.49	0.25
3533	*integerrimus*	IV	0.43	0.08
3534	*canus*	II	0.38	0.35
3536	*streptanthifolia*	II	0.17	0.16
flowers	*atratus*	V	0.90	0.11
leaves	*atratus*	V	1.00	0.12

Pyrrolizidine alkaloids are found in many species of plants throughout the world. Plants of primary importance in the United States include *Amsinckia spp.* (fiddleneck), *Crotalaria* spp. (Rattlebox), *Cynoglossum* spp. (hound's tongue), *Heliotropium* spp. (common heliotrope), and *Senecio* spp. Plants containing PA's are distributed throughout the United States and are most prevalent in the northwest regions (Savage, 1999; Galey, 2002). These plants are not palatable to livestock and are avoided when better quality grazing is available. Most cases of PA poisonings occur when pastures are overgrazed and in early spring when there is a limited supply of green forage. PA concentrations in plants are not substantially decreased if fed fresh or dried. Therefore, toxicity can occur from contaminated hay, silage, or grain; and may be seen at any time of the year (Talcott, 2003). All livestock are susceptible to PA toxicity. Horses and cattle are at greater risk while small ruminants, especially sheep, are less susceptible (Galey, 2002). PA toxicity has historically been a significant problem, but with modern herbicides and better grazing management practices this problem has been minimized in some areas.

Pyrrolizidine alkaloid concentrations vary among plants but, historically, *Senecio* spp have presented the greatest risk to livestock (Talcott, 2003). It has been estimated that ingestion of *Senecio* plant material equivalent to 1% to 5% body weight daily will cause hepatic disease within a few weeks in horses and cattle.

Based on these findings, IDPMC has decided to discontinue further evaluation of Senecio spp. We believe that other species could be found which would fill the same ecological role without the associated toxicity risk.

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PLANT MATERIALS

2011

IDAHO EVALUATION SUMMARIES

FIELD, DSI and DEMONSTRATION PLANTINGS

IDAHO DIVISION I
PLANT MATERIALS PLANTINGS

FIELD OFFICE: BONNERS FERRY

ID99005 Paul Headings Regar meadow brome - Field Plantings (2). Materials ordered February 22, 1999. Field 1–pure stand of Regar. Field 2-mixed stand of Regar and alfalfa. Purpose – demonstration planting to document growth patterns, production, and forage quality. Site characteristics – MLRA E43b, silt loam soils, 5-10 percent slopes, north aspect, 2300 feet elevation, 24 inch precipitation zone, non-irrigated, T62N R1E NW ¼ Section 2. FY99 planted spring 1999. FY00 due to dry years 1999 and 2000 stand establishment was slow, but excellent stands in each field are establishing. Plantings average 3 tons per acre. FY01 Planting 1 - The "pure" stand of Regar Brome planting averaged 2 ton/acre. A forage analysis indicted the crude protein to be 8.75%. The forage grass for hay is fine leaves and stems. The hay feeds well to animals. In hot dry weather, the "windrows" have to be carefully harvested and cured to avoid damaging brittle leaves and stems. The crop can be "pulverized" easily. The average bale weight was 103 pounds. The owner applied 110 lbs. 40-0-0 to enhance production and will increase application rates up to 200 lbs/acre 40-0-0. There were no second cuttings since the field was planted three years ago due to poor to fair moisture conditions. Planting 2 - The Regar/Agate alfalfa mixture established well. The first cutting has grass present and makes great cattle feed. The second cutting has very little grass within the alfalfa due to slow recovery. This may be due to dry weather conditions. Also, this may be a good attribute for the producer who can sell hay with grass and no grass. FY01 Planting 1 - The "pure" stand of Regar has an excellent stand with 5 plants per square foot, good vigor, and 4000 pounds per acre production. Landowner applied 220 lbs. 40-0-0 in early spring. Planting 2 - Regar/alfalfa mixture has a good stand with 2 Regar/5 alfalfa plants per square foot, fair to good vigor, and 7000 pounds per acre production. FY06 The field is still in production. It has been an excellent hay crop averaging 4 tons/ac dryland over the 10 year period with one year producing 5.5 tons/ac. Landowner applies 300 pounds/ac of Nitrogen each spring. This grass needs to be managed for harvesting - cut and windrow at 50% cured. 80% cured results in loss of leaves because it is too brittle because of fine leaves. Cooperator also reports Regar also does well when planted with alfalfa, is easy to manage and he is very happy with it. FY07 - FY11 no evaluations. **Cancel**

ID00016 Boundary Creek WRP – cropland area planted to permanent perennial species field planting. A mix of Alkar tall wheatgrass, Greenar intermediate wheatgrass, Ranger alfalfa, birdsfoot trefoil, red clover, Sherman big bluegrass, tufted hairgrass, orchardgrass, and timothy at critical area planting rates was dormant planted on 1000 acres in late fall 1999. A 42 feet air-seeder with fertilizer attachment planted mix with 2000 units per acre of nitrogen, phosphorus, potassium, and sulfur applied 1 inch below and to side of seed. FY00 excellent stand establishing with some species as tall as 3-4 feet by early July. In October wild oats were present throughout stand. FY0 permanent wildlife planting mixture established well utilizing the 42-foot air seeder. The drill was calibrated with the producer based upon 14.2 lbs. PLS/acre. A "flush" of wild oats occurred the first year. The stand was seeded the 1st week of November 1999. The "so called dormant planting" resulted in some sprouting of clovers due to a warmer than normal late fall. As a result, some mortality occurred in the clovers. An excellent stand of Alkar tall wheatgrass, Greenar intermediate wheatgrass, birdsfoot trefoil, Ranger alfalfa, Latar orchardgrass, timothy and clover exists. The Sherman big bluegrass is "spotty" due to becoming overpowered by the other species in the mix. There are some ridges in the field with quackgrass, which is good cover. IDF&G is actively spot spraying the Canadian thistle. They plan to obtain a boom sprayer in order to treat the acreage more uniformly. FY02 overall stand is good to excellent with the primary species including Alkar tall wheatgrass, Greenar intermediate wheatgrass, Latar orchardgrass and redtop. Some birdsfoot trefoil, clover, timothy, and alfalfa are present in scattered locations. Tufted hairgrass and Sherman big bluegrass were not found. FY04 prescribed burned fall 2004 (15 acres) to rejuvenate existing stand – resulted in excellent response in plant vigor. Stand is primarily Latar, Alkar, Greenar, and alfalfa – general overall stand is predominately wheatgrasses and orchardgrass. Providing excellent wildlife nesting and escape cover. FY11 in the last few years it appears all legumes were sprayed out due to Canada thistle control. There are extensive areas of solid tall and intermediate wheatgrass providing very good nesting cover. However; these species tend to lay down over winter due to wet snow and rain. This thatch build up does responds to cool moist prescribe burns. The best tall stiff structured grasses are Magnar and Trailhead basin wildrye; Bozoisky Russian wildrye and tall wheatgrasses. Of all basin wildryes, Magnar has best cover structure. Other areas have extensive very competitive dominance by orchardgrass. In future only recommend about 10-20% orchardgrass in seed mixtures. Orchardgrass has a "wimpy" structure but is very palatable for all wildlife. Remarks: to plan again; mixes for extensive areas along levees with well drained soils would include stiff structured grasses such as tall wheatgrass and basin wildrye. On wetter basins or fringe areas mixes would include tufted hairgrass and bluejoint reedgrass. As an understory grass, plant Sherman big bluegrass.

ID04002 Dave Wattenburger Field Planting. Delar small burnet ordered August 19, 2003. Planting seeded fall 2004. No evaluations FY05 – FY11. **Cancel**

ID06007 Idaho Fish and Game – Field planting for wildlife winter nesting habitat. Blackwell switchgrass and 905439 switchgrass seed ordered March 9, 2006. Site characteristics: Farnhampton silt loam soil, 0-2 percent slopes, south aspect, elevation 1760 feet, 24 inch precipitation, non-irrigated, T65N R2W Sections 23 and 25. FY06 Idaho Fish and Game field planting of native grasses is slow establishing. The field was mowed in 2006 for wild oats weed control. FY07- FY10 no evaluations. FY11 Planting failed – **Cancel.**

ID06008 Bernie Heinemann – Riparian Field Planting. Coyote willow (50); 9067541 Peachleaf willow (20); 9067546 Peachleaf willow (20); 9067549 Peachleaf willow (20); 9067375 Peachleaf willow (20); 9067376 Peachleaf willow (20); and 9067560 Peachleaf willow (20) cuttings ordered February 2006. Site characteristics: Porthill silt loam soil, 5 percent slopes, 2000 feet elevation, 24 inch precipitation, non-irrigated, T65N R1W, Section 10. FY06- FY10 no evaluations. FY11 There is good stand of willows along wet fringe areas of the wetland enhancement. There was about 40% mortality due to deer browsing. The remaining willows are about 8 feet tall and are doing well. This is providing good shade and habitat from the Peachleaf willows. Unfortunately I cannot tell which varieties are better. I do know the coyote willow is spreading nicely along the wet fringe area with its creeping root characteristics. I feel it has spread with new shoots about 3 feet beyond what was planted.

FIELD OFFICE: COUER D'ALENE
ID11006 John Burton. Four pounds of Clearwater Selection Venus penstemon was shipped to field office on March 18, 2011. This seed is being included in a seed mix including 25% Latar orchardgrass, 45% Delar small burnet, 20% hairy vetch and 10% Clearwater Selection Venus penstemon.

FIELD OFFICE: PLUMMER
None

FIELD OFFICE: SANDPOINT
None

IDAHO DIVISION II
PLANT MATERIALS PLANTINGS

FIELD OFFICE: GRANGEVILLE
ID02002 Teresa Seloske Forest Field Planting. Lind Douglas fir (30 plants) and Yakima Douglas fir (13 plants) ordered July 16, 2001. Plants delivered to FO April 3, 2002 by WAPMC. FY02 Planting completed April 6, 2002. Lind Douglas fir 10 percent survival with poor vigor. Yakima Douglas fir 15 percent survival with fair vigor. Survival effected by extremely dry conditions. FY03 very hot dry summer resulted in failure of this planting. File was cancelled at end of 2003. FY06 field determination indicated the Yakima ecotype failed to establish, but the Lind ecotype is still alive. Lind ecotype has not grown much, but there is good survival of this ecotype during field evaluation in July 2006. FY08 this planting initially suffered from very hot dry summers and plant did not appear to be doing well. Following a number of years of root system establishment, this planting is doing somewhat better. The Lind ecotype is doing much better than the Yakima ecotype. The Lind ecotype could probably be recommended on sites where we would normally only recommend ponderosa pine. **Next evaluation 2012.**

ID04009 Carl Skyrman demonstration planting. Anatone bluebunch wheatgrass and Secar Snake River wheatgrass. Seed ordered March 8, 2004. Site characteristics: Chard sandy loam soil, northwest aspect, 1820 feet elevation, 16-22 inch precipitation, non-irrigated, T26N R1E NW1/4 Section 13. FY04 – Secar and Anatone were planted side by side in the spring of 2004. Good stands for each with > 5 plants per square foot establishing and it is hard to differentiate between plantings. Anatone plants were a bit more robust than Secar plants during evaluation 7/22/04. FY05 no evaluation. FY06 (4/25/06) good established stand, Carl will spray with Sencore for cheatgrass and ventenata control. FY08 pictures of planting indicate good establishment of most seeded species. FY09- FY11 no evaluations.

ID05003 Steve Hunter – starthistle control project. Rush intermediate wheatgrass, Tegmar intermediate wheatgrass and Newhy hybrid wheatgrass were ordered February 4, 2005. Site characteristics: 3 acres, MLRA B9, Bluesprin skeletal loam soil, 20 percent slopes, southwest aspect, elevation 2700 feet, 18 inch precipitation zone, non-irrigated,

T30, R3, NW ¼ section 36. FY05 not planted. FY06 planted May 22, 2006 into poorly prepared seedbed. Fair stand establishing with about 0.25 plants/ft2 and fair vigor. FY08 Rush poor stand with 15 percent survival and fair vigor; Tegmar fair stand with 40 percent survival and fair vigor; Newhy poor stand with 25 survival and fair vigor. Plants on site are very stunted. Starthistle plants have been significantly reduced on the site. However, there has been an invasion of ventenata, annual fescue, medusahead and cheatgrass on the site and they are stressing the planted perennial grasses. FY09- FY11 no evaluations.

ID05004 Tony Carson (combined with ID04004) – field planting. Anatone bluebunch wheatgrass, Magnar basin wildrye, Nezpar Indian ricegrass, High Plains Sandberg bluegrass, Rosana western wheatgrass, Sherman big bluegrass, Snake River Plains fourwing saltbush and Northern Cold Desert winterfat were ordered February 4, 2005. Site characteristics: 1 acre, Lickskillett – Tannahill silt loam soil complex, 45 percent slopes, south aspect, elevation 1960 feet, 16 inch precipitation, T28N, R1E, NE ¼ section 12. FY05 seeding was completed in early spring 2005. Half of the seeded area was treated with a straw pellet mulch. Above average spring rainfall resulted in very encouraging initial stand establishment with positively identified plants of Northern Cold Desert winterfat, Rosana western wheatgrass, Nezpar Indian ricegrass, Anatone bluebunch wheatgrass and many small seedlings present on July 13, 2005. FY06 April 25, 2006 excellent stand establishing, primarily seedlings, but also includes a few established grasses and fourwing saltbush. Good soil moisture during evaluation and cooperator will irrigate in 2-3 weeks if no additional rains occur. FY07 Snake River Plains fourwing saltbush fair stand with good vigor and about 35 inches tall. Northern Cold Desert winterfat fair stand with good vigor and about 6 inches tall. Nezpar Indian ricegrass, Sherman big bluegrass and Rosana western wheatgrass poor stands with fair vigor and about 3- 4 inches tall. Too soon to conduct a complete evaluation of stand. FY08 Anatone fair stand with fair vigor; Magnar poor stand with very poor vigor; Nezpar poor stand with poor vigor; High Plains very poor stand; Rosana good stand with good vigor; Sherman good stand with good vigor; Snake River Plains good stand with good vigor; Northern Cold Desert good stand with good vigor. Anatone and Rosana are the grasses doing the best on this very difficult eroded low fertility site. Both Snake River Plains fourwing saltbush and Northern Cold Desert winterfat are doing very well. **Next evaluation 2012.**

ID05006 Gary Crea (combined with ID04008) – Feedlot species adaptation trial. (1st planting P27 Siberian wheatgrass, Sodar streambank wheatgrass, Topar pubescent wheatgrass, Vavilov Siberian wheatgrass, Rush intermediate wheatgrass, Rosana western wheatgrass, Durar hard fescue and Alkar tall wheatgrass) (2nd planting Newhy hybrid wheatgrass, Critana thickspike wheatgrass, and Rosana western wheatgrass) Seed was ordered on February 4, 2005. Site characteristics: 0.5 acres, MLRA B9, Ferdinand-Flybow-Riggins soil complex, 2-8 percent slopes, west to southwest aspect, 20-24 inch precipitation, non-irrigated, T31N, R1E, SW of SW ¼ of section 27. FY04 overall the stand establishment is excellent due to good rainfall this year. Stand establishment exceeds 2 plants per square foot for all species except Alkar. The grasses are suppressing weeds in the feedlot. FY05 stand is spotty possibly due to excessive weed competition during establishment. FY06- FY11 no evaluations.

ID05007 Les Killgore – field planting. Covar sheep fescue, Durar hard fescue, Bannock thickspike wheatgrass and Rosana western wheatgrass seed was ordered on February 4, 2005. Site characteristics: 1.5 acres, MLRA E43a, loamy skeletal soil, 10 percent slopes, east aspect, elevation 2200 feet, 18 inch precipitation, non-irrigated, T28N, R1E NE ¼ section 33. FY05- FY06 not planted. FY07- FY11 no evaluations. **Cancel**

ID06005 Tony Carlson – Field planting of Rush intermediate wheatgrass, Bozoisky Russian wildrye, Magnar basin wildrye, Nezpar Indian ricegrass, and Sherman big bluegrass. Seed ordered February 21, 2006. Site characteristics: silt loam soil, 2 percent slopes, east aspect, 2100 feet elevation, 14-15 inch precipitation, non-irrigated, T28N R1E NE 1//4 Section 12. **FY06** seeded spring of 2006 (4/25/06) excellent stand establishing and seeding will be sprayed for broadleaf weed control. FY07- FY11 no evaluations. **Cancel**

ID07009 Daryl Mullinix Ventenata Study. Demonstration planting seed ordered February 14, 2007. Site was prepared for planting in fall of 2006 and spring of 2007. Site was planted on May 8, 2007. Layout-(south end) 1. Delar small burnet; 2. Pryor slender wheatgrass; 3. Secar Snake river wheatgrass; 4. Union Flat blue wildrye; 5. Regar meadow brome; 6. Covar sheep fescue; 7. Latar orchardgrass; 8. Bromar mountain brome; 9. Alkar tall wheatgrass; 10. Durar hard fescue; 11. Sherman big bluegrass; 12. Winchester Idaho fescue; 13. Foothills Canada bluegrass; 14. Bozoisky-Select Russian wildrye; 15. Rush intermediate wheatgrass; 16. Tuscany tall fescue; 17. Rosana western wheatgrass; 18. Sodar streambank wheatgrass; 19. Vavilov Siberian wheatgrass; 20. Lutana cicer milkvetch; 21. Syn-1 alfalfa (north end). FY07 Mark Stannard visited the plots on 7/27/07. The weeds were not bad but he mowed the plots to keep the weeds from going to seed. The grasses were doing fairly well. Vavilov was the best performing grass and

alfalfa, cicer milkvetch, and small burnet were also doing very well. The ground was very hard and very dry. A lot of the plants were totally dormant. FY08 Mark spoke with Dr. Prather, Univ. of Idaho, and he indicated that he didn't have funding to do ventenata work. Mark prefers that plots not be sprayed. Sandlund talked with Daryl in early March and asked him not to spray the plots and to give them a 20-30 feet buffer strip around the plots not sprayed. The plots have a heavy infestation of ventenata and meadow foxtail. Rich Gribble and Bob Sandlund mowed the plot in late July. Species doing best include: Delar, Tuscanny II, Vavilov, Alkar, and Syn-1 alfalfa (getting hammered by deer). All other species are struggling. They recommend that plots be wick with Roundup in 2009 to control meadow foxtail. Spraying plots with sencor and diuron should also be considered. FY09 no evaluation.
FY10 evaluations: The meadow foxtail and ventenata competition was very heavy in all plots. In the fall of 2009 the adjacent field was sprayed with Outrider at 2/3 oz per acre. The plots were sprayed in Nov. 2009. The spray application did an excellent job controlling the ventenata and the meadow foxtail. Most of the planted species were having a difficult time prior to the spray application. Unfortunately the spray also had an adverse affect on plants within the plot. 1. Delar small burnet - only a couple of plants remain very poor vigor; 2. Pryor slender wheatgrass - a good population of plants, seeding out, plants are smaller than would be expected; 3. Secar Snake River wheatgrass - poor population and extremely poor vigor; 4. Union Flat blue wildrye - poor stand and poor vigor; 5. Regar meadow brome - none found; 6. Covar sheep fescue - very poor population and vigor; 7. Latar orchardgrass - good population plants are stunted; 8. Bromar mountain brome - none found; 9. Alkar tall wheatgrass - good population and fair vigor; 10. Durar hard fescue - none found; 11. Sherman big bluegrass - none found; 12. Winchester Idaho fescue - none found; 13. Foothills Canada bluegrass - fair population, poor vigor; 14. Bozoisky Russian wildrye - none found; 15 . Rush intermediate wheatgrass - good population fair vigor; 16. Tuscany tall fescue - poor population and poor vigor; 17. Rosana western wheatgrass - good population beginning to spread, fair vigor; 18. Sodar streambank wheatgrass - none found; 19. Vavilov Siberian wheatgrass - good population , fair vigor; 20. Lutana cicer milkvetch - none found.; 21. Syn-1 alfalfa - none found. Plot will be sprayed with a broad leave herbicide. **Next evaluation 2012.**

ID07010 Debbie Hatter – Butcher Creek woody field planting. 15 cuttings each of coyote willow and Laurel willow were ordered March 1, 2007. Shipping is scheduled for April 2 for delivery on approximately April 6th. Site characteristics MLRA B9, DeMasters-Riggins silt loam soil, 10 percent slopes, north aspect, 3200 feet elevation, 24 inch precipitation, T30N R3E SW Quarter Section 15. FY07 cuttings shipped in early April. FY08 Laurel willow 67 percent survival with fair vigor; coyote willow 13 percent survival with fair vigor; First year leader growth is about 3- 4 inches. FY09 – FY11 no evaluations. **Cancel**

ID08006 Debbie Hatter – riparian field planting. Laurel willow, coyote willow, peachleaf willow and black cottonwood cuttings were ordered March 10, 2008 for delivery in late March. FY08 Laurel willow 82 percent survival with excellent vigor; coyote willow 74 percent survival with fair vigor; Peachleaf willow 96 percent survival with fair vigor; black cottonwood 89 percent survival with fair vigor. FY09- FY11 no evaluations. **Cancel**

ID08008 Sydney Yuncevich Spirit sweetgrass adaptation planting. Sprigs were ordered on March 11, 2008 for shipping sometime in mid April. FY08 excellent stand with good vigor – sprigs were planted in pots, kept outside and watered occasionally. All survived and they will be planted out next spring. FY09- FY11 no evaluations.

ID08013A East of Grangeville Area demonstration plots. Packets of Anatone Germplasm bluebunch wheatgrass, Goldar bluebunch wheatgrass, 9076517 western wheatgrass, Bannock thickspike wheatgrass, P7 bluebunch wheatgrass, Bonilla big bluestem, Bison big bluestem, Forestburg switchgrass, Tomahawk Indiangrass, Critana thickspike wheatgrass, Rosana western wheatgrass, Foothills Germ. Canada bluegrass, 905439 switchgrass, Spirit sweetgrass (10 sprigs), PI-232247 California oatgrass, 9056244 California brome, Cave-In-Rock switchgrass, Salado alkali sacaton, Blackwell switchgrass, Kanlow switchgrass and 9080250 blue wildrye were ordered 3/20/08. FY08 plantings completed in late spring. FY09and FY11 no evaluations. **Cancel**

ID08013B White Bird Area demonstration plots. Packets of Anatone Germplasm bluebunch wheatgrass, Goldar bluebunch wheatgrass, 9076517 western wheatgrass, Bannock thickspike wheatgrass, P7 bluebunch wheatgrass, Bonilla big bluestem, Bison big bluestem, Forestburg switchgrass, Tomahawk Indiangrass, Critana thickspike wheatgrass, Rosana western wheatgrass, Foothills Germ. Canada bluegrass, 905439 switchgrass, Spirit sweetgrass (10 sprigs), PI-232247 California oatgrass, 9056244 California brome, Cave-In-Rock switchgrass, Salado alkali sacaton, Blackwell switchgrass, Kanlow switchgrass and 9080250 blue wildrye were ordered 3/20/08. FY08 plantings completed in late spring. FY09and FY11 no evaluations. **Cancel**

ID09008 Daryl Mullinix field planting. 9076516 western wheatgrass was ordered February 2009. Purpose: adaptation and competition with the weed Ventenata. Site Characteristics: MLRA 9B, Chard sandy loam soil, 5- 8 percent slope, north aspect, 1800 feet elevation, 14- 16 inch rainfall, non-irrigated, T27N R1E NW1/4 Section 23. FY09- FY11 no evaluations.

ID09010 Jeff Goldman field planting. 9076516 western wheatgrass seed ordered February 2009. Purpose: adaptation and competition with the weed Ventenata. Site Characteristics: MLRA 43A, Ferninand silt loam soil, 8- 12 percent slope, east aspect, 3500 feet elevation, 20- 22 inch rainfall, non-irrigated, T30N R3E NW1/4 Section 12. FY09- FY11 no evaluations.

ID10009 Tim Bodine field planting. Recovery western wheatgrass, Vavilov II Siberian wheatgrass and Hycrest II crested wheatgrass (2 acres each) seed was ordered March 1, 2010. Purpose: adaptation to control winter annual grass – ventenata. Site characteristics: MLRA 43, silt loam soil, 5- 7 percent slopes, south aspect, 3570 feet elevation, 20- 22 inch precipitation, non-irrigated, T31N R2E SE quarter Section 10. FY10- FY11 no evaluations.

ID11004 Doug Boggin field planting. Recovery western wheatgrass seed ordered March 3, 2011. Site 1 erosion control planting. Site 2 hayfield conversion.

ID11005 _____ field planting. 200 cuttings of coyote willow and 50 cuttings of white willow were shipped in March 2011.

ID11007 Daryl Mullinix field planting. Recovery western wheatgrass, Vavilov II Siberian wheatgrass and Rush intermediate wheatgrass seed was ordered March 24, 2011. Purpose adaptation and erosion control. Site characteristics: loamy fine sand soil, 8 percent slopes, NW aspect, 1540 feet elevation, 16 inch rainfall, non-irrigated, T27N R1E SW1/4 Section 23.

FIELD OFFICE: LEWISTON

ID82001 Pat Richardson Starthistle control field planting. Covar sheep fescue planted in early 1980's. FY01 good to excellent stand with 2 plants per foot squared average, excellent vigor, fair spread for bunch grass. Plants are 10 inches tall with seedheads averaging 14 inches tall and 6-inch diameter plants. Overall Covar is providing good starthistle control. Starthistle is present in plot, but not reproducing seed. Where Covar has 4 plants per foot squared, starthistle is not present. Covar is moving slowly downslope into starthistle dominated area. FY04 excellent stand of Covar with excellent vigor, 7 inch height and light infestation of yellow starthistle. FY06 plots were heavily grazed by horses – some plants appear to be uprooted by hoof action. **FY07** good stand with fair vigor – stand is being very heavily grazed to ½ inch stubble height. Stand continues to exclude yellow starthistle with only 3- 4 plants observed within the plots. The edges of the plot are infested with Japanese brome, cheatgrass and medusahead. Plot was measured with GPS unit to determine actual size (203 ft x 80 ft = 0.37 acres). **Next evaluation will be in 2012.**

FIELD OFFICE: MOSCOW

ID06001A Lee and Roxanne Carrick riparian field planting. Cuttings ordered August 9, 2005. Cuttings to be shipped mid-late October 2005. Site characteristics: MLRA B9, Hampson silt loam soil, 0-3% slopes, NW aspect, 2600 feet elevation, 24 inch precipitation, non-irrigated, T41N R3W NW ¼ Section 3. 85 each of Rivar Mackenzie willow, Curlew Drummond willow, and Silvar coyote willow will be dormant fall planted 2005. FY06 planted November 4, 2006. FY08 Curlew Drummond willow 39 percent survival with good vigor and 24 inch height; Rivar Mackenzie willow 68 percent survival with good vigor and 36 inch height; Silvar coyote willow 22 percent survival with good vigor and 60 inch height. FY09- FY11 no evaluations.

ID06001B Lee and Roxanne Carrick riparian field planting. Plants to be shipped early-mid April 2006. Site characteristics: MLRA B9, Hampson silt loam soil, 0-3% slopes, NW aspect, 2600 feet elevation, 24 inch precipitation, non-irrigated, T41N R3W NW ¼ Section 3. 60 each of Blanchard blue elderberry, Okanogan snowberry, St Maries mockorange and 125 Cheney redosier dogwood will be spring planted in 2006. FY06 planted May 25, 2006. FY08 Cheney redosier dogwood 1 percent survival with poor vigor; St Maries Lewis Mockorange 2 percent survival with poor vigor; Okanogan snowberry 68 percent survival with good vigor and 6- 12 inch height; Blanchard blue elderberry 10 percent survival with fair vigor. FY09- FY11 no evaluations.

FIELD OFFICE: NEZPERCE

ID08011 David Mosman – Anatone bluebunch wheatgrass seed increase. Seed shipped August 31, 2006. FY07 due to drought conditions, this seed was not planted. Additional seed was shipped March 18, 2008. FY08 not seeded – plans to chemical fallow fields this year and will plant Anatone this fall. FY09- FY11 no evaluations. **Cancel**

ID08012 David Mosman – Vavilov II Siberian wheatgrass seed increase. Seed shipped March 18, 2008. FY08 not seeded – plans to chemical fallow fields this year and will plant Vavilov II this fall. FY09- FY11 no evaluations. **Cancel**

ID09006 _____ Nezperce Field Office. coyote willow, Laurel willow, golden willow and white willow cuttings were ordered February 2009 from Aberdeen PMC. University of Idaho Nursery provided thinleaf alder, redosier dogwood, Lewis mockorange (syringe), Drummond willow, Mackenzie willow, bittercherry, aspen and black cherry for this project. Plants were stored in a cooler prior to planting. Planting was scheduled for mid April 2009. FY09- FY11 no evaluations.

FIELD OFFICE: OROFINO

ID04011 Clearwater County Riparian Project. 9067541 peachleaf willow, 9067546 peachleaf willow, 9067 549 peachleaf willow, 9067568 black cottonwood, 9067569 black cottonwood, 9023 733 redosier dogwood, 9023739 redosier dogwood, 9023740 redosier dogwood and Okanogan snowberry. Cuttings ordered March 5, 2004. Site characteristics: Cobbly soil, flat aspect, 1100 feet elevation, 26 inch precipitation, non-irrigated. FY04 – FY06 no evaluations. **FY07** 9067541 peachleaf willow -30% survival with good vigor, 9067546 peachleaf willow -30% survival with good vigor, 9067549 peachleaf willow -20% survival with good vigor, 9067568 black cottonwood - failed, 9067569 black cottonwood - failed, 9023 733 redosier dogwood - failed, 9023739 redosier dogwood - failed, 9023740 redosier dogwood - failed and Okanogan snowberry - failed. FY08– FY11 no evaluations. **Cancel**

IDAHO DIVISION III
PLANT MATERIALS PLANTINGS

FIELD OFFICE: CALDWELL

ID07001 Wayne Newbill (Ada County) field planting. Regar meadow brome and Cache meadow brome irrigated forages trial. Seed ordered August 10, 2006. Seed will be planted in late summer – early fall and surface irrigated (furrows) for establishment. Seed was delivered on 8/18/06. **FY06** weed control using 2 pints Roundup per acre was applied on 8/30/06 followed by discing, corrugating, pre-irrigation, harrowing, seeding with drill – 7 inch spacing on 9/9/06 and final corrugation. Regar is located in west field and Cache is located in east field. Fields were irrigated following planting. Initial evaluation in later fall 2006 indicated best stand establishment was Regar accession. **FY07** Regar - excellent stand, excellent vigor, 18 inch height and 3 plus plants per foot squared. Cache - excellent stand, excellent vigor, 12 inch height and 3 plus plants per foot squared. Cooperators rates Regar good to excellent and Cache good during establishment year. FY08 Both fields looked very good and had only mild weed issues. There was one cutting of hay and one period of grazing. Yield was reduced due to fact that it took Wayne awhile to find someone to hay the field and it should have been harvested 3 weeks prior to when it was cut and during that time it was not irrigated. Reduced available water did have an effect most notably on the Regar and patches of it did not recover from it as well as hoped. Appears to have gone dormant, I think it will come back in the spring.
FY08 Regar: Excellent stand on South end, as you get further down to the end where Wayne land leveled the quality decreases and there are some patches of weeds and lowered yields. There are also a few areas where the grass has gone prematurely dormant, probably due to lack of water during first cutting of hay. Field was grazed for two weeks continuously with 6 young horses. Grazing was fairly short when finished, but plants have recovered nicely. 6 horses x 1.25 Au x .5 Mth = 3.75 AUM's 3.75/ 1.2 Ac = 3.1 AUM's/ac 1 AUM = 915 lbs 915 x 3.1 = 2,836/2000= 1.4 Tons 1.4 + 4.2 tons of hay = 5.6 Tons/ Ac Yield. **FY08 Cache:** Excellent stand throughout even down to North end where the soil is less than desirable, surprising because the soil in this field is very shallow and of poorer quality than the other field. The field seems to have suffered no ill effects from the lack of moisture that affected the West field. It was grazed for one week continuously with 6 young horses. 6 horses x 1.25 Au x .25 Mth = 1.88 AUM's 1.88 / 1ac = 1.9 AUM's/Ac 915 x 1.9 = .9 Tons .9 + 4.2 = 5.1 tons/ Ac yield. **FY09 Regar:** stand quality has decreased since last year with patches dying off – it is believed the hardpan (salt- calcium deposits) on this property at relatively shallow depths is affecting the stand. **FY09 Cache:** stand quality has decreased since last year with patches dying off – it is believed the hardpan (salt- calcium deposits) on this property at relatively shallow depths is affecting the stand. The Regar stand is more effected by this die off than the Cache stand. Newhy hybrid wheatgrass (a very salt tolerant

species) will be planted into the patches to determine if stand can be salvaged. **FY10 Regar:** Good stand with 3+ plants/ft2, 10 inch height, 3.6 AUMs/ac. **FY10 Cache:** Good stand with 3+ plants/ft2, 8 inch height, 2.75 AUMs/ac. Fields were grazed in late spring, mowed during summer and grazed again in fall thus not all production is accounted for under the AUMs/ac figures. **FY10 Newhy:** The dead areas (high calcium carbonates locations) were over-seeded with Newhy RS wheatgrass and look much better this year. Both fields would benefit from applications of 2,4D for clover, plantain and other herbaceous weed control. In addition, irrigated forage grasses require fairly high levels of fertility and both fields would probably benefit from applications of fertilizer (primarily nitrogen since this is intended to be an irrigated grass pasture).

ID07002 Doug Austin (Ada County) field planting. Regar meadow brome, orchardgrass and alfalfa field planting. Seed ordered August 28, 2006. Seed was planted in late summer – early fall and irrigated for establishment. Site characteristics: silt loam soil, 0-2 percent slope, 2800 feet elevation and irrigated. Seed was planted in early September 2006 and irrigated for establishment. FY07 stand 75% Potomac orchardgrass, 10% Regar meadow brome and 15% alfalfa – cooperator took 3 cuttings of hay (1st 0.6 ton/ac; 2nd 0.9 ton/ac and 3rd 1.5 ton/ac = 3 ton/ac for first year). FY08 Field had excellent utilization, no species being avoided. Some small 10 feet diameter spots with discolored foliage. Was unclear if this was a excess moisture issue as the soil was slightly muddy and trampled and had more weeds than surrounding areas. However, areas were minimal and overall had excellent weed control. Yielded 47 tons total on 12 acres and then began grazing. Yielded 17 AUM's on 12 acres. May yield some additional AUM"s as weather seems to be holding and grass is still up. FY09 excellent stand of all species with approximately 6 tons of production this year from 4 cuttings. Following haying, fall grazing is planned. Alfalfa has decreased from about 15 percent of stand to 5- 10 percent of stand. **Next evaluation scheduled for 2012.**

ID08014 Jim Classen WHIP field planting. Garrison creeping foxtail seed (18 pounds) ordered April 3, 2008.FY08 Garrison good stand with 4 plants per square foot and excellent vigor. Despite difficulties in planting late (see attached assistance notes from 6/6/08 through 9/3/08) and difficulties in watering due to water seeping into neighbors field the stand is emerging with a good density. Majority of plants are very small around 6 inches, but have developed some seed heads. There are some areas where plants achieved full height and are about 2 feet. The stand is somewhat patchy, but that is largely due to water regime. In areas that received too much water at bottom of pond. There is no Garrison Creeping Foxtail, however yellow nut-sedge, barnyard grass and smartweed are growing, which although weeds are excellent duck and wildlife food. Other areas where it was too dry along the berm have a heavy weed infestation problem mainly Kochia. The bulk of the area is intermittent with mustard and cocklebur. However there is enough grass underneath that I believe next year will largely crowd out weeds. Field was flood irrigated several times over the season for several days. More irrigation was not possible due to flooding neighbor's alfalfa field. When last cutting of hay is removed the pond will be flooded for fall months. That will test the Creeping Foxtail and determine its suitability. FY09 this is an excellent stand of Garrison creeping foxtail, plants are robust and healthy. Some weeds are still present in thinner areas of the planting. On berms where Siberian wheatgrass was planting, a thick stand of kochia exists. FY10 this is an excellent stand with 4 plants/ft2, 36-40 inch height and excellent vigor. The inner pond is flooded and the Garrison looks great (100 percent cover); the outer berm built to prevent flooding of adjacent alfalfa field has less water available resulting in a thinner Garrison stand and increased weed pressure. FY11 We are very satisfied with this stand of Garrison creeping foxtail. Plants are healthy and have suppressed weeds to where there is hardly any weed infestation. Recommend status reviews only every couple of years. **Next evaluation 2014.**

ID09003 Forest Clifton erosion control field planting. Vavilov and Vavilov II Siberian wheatgrass seed was ordered October 30, 2008. Site characteristics: 4 acres; purpose - soil erosion, conservation cover, fire reduction, weed control; soil - Lankbush sandy loam; slope- 30%; aspect - south; elevation – 2600 ft; precipitation - 10"; irrigation – no; T5N R2W Qrtr Section NW ¼ of SE Section 32. Seed will be broadcast planted in November and then rolled to press seed into seedbed. FY09 it is too early to determine stand establishment. It appears that more plants are establishing in the Vavilov II side of planting than on the Vavilov side of planting. **FY10** Both the Vavilov and Vavilov II plantings have established nicely except for the lower portion of the accession Vavilov where there are very few seedlings. The seed may have been buried too deep to sprout and a reseeding is recommended in this area. The Vavilov planting on the upper slope is thriving; about 5-7 plants per square feet. On the Vavilov II side, there are more plants overall. The Vavilov II accession took a little longer to establish, but now it is looking better than the accession Vavilov. The Vavilov II side has an average of 3 plants per square feet, with some areas at top of slope with densities of 7 plants per square feet. Weeds are not too tall, but there is still pressure in some areas with mustard. The Landowner mowed the stand/weeds in May. Mustard, Russian thistle and kochia are most common on the Vavilov side. Bulbous bluegrass died after being mowed. Overall the wheatgrass has filled significantly this year and the stand is expected to look great

next year. FY11 this seeding is establishing well and there are new plants from this year. The plants established on the upper slope (of the Vavilov side) are suppressing weeds and yet, have spread out, leaving bare ground in between plants. While some areas like the upper slope are thriving, other areas struggle with weed pressure and difficult soil. The North end of the Vavilov side is under weed pressure from mustards and field penny cress. The south end of the Vavilov side also has more weed pressure. We talked to Mr. Clifton about mowing during the early spring or spraying to control weed pressure. Also, a reseeding of the south end of the Vavilov area this fall could improve current stand. On the south side of the field just behind the house there is an area where very few plants grow in general. We were pleased to see that more grass seedlings than weeds are growing in this area. Although the Vavilov II seeding is under more weed pressure and seems to be having a more difficult time getting strongly established, there are several seedlings that will continue to grow and suppress weeds. Several younger seedlings on the Vavilov II side (particularly on the north end), have great potential. Mr. Clifton did not get a chance to reseed lower portions of the fields this spring due to the strange weather we had, but will try to add seed and reseed the lower portions.

ID11009 CB River Ranch field planting. Formerly ID06002 CB River Ranch WRP upland planting. Original stand failed . Site Characteristics: Feltham loamy fine sand soil, 3-12 percent slope, NE aspect, 11 inch precipitation. Field sprayed multiple times in 2010 for site preparation. No tillage was performed. Field dormant planted to Vavilov II Siberian wheatgrass in late fall 2010. Germination and good initial stand establishment during March 2011 field visit. With good rains during spring from March through May stand continues to look very good. July 2011 evaluation: Vavilov II Siberian wheatgrass was seeded November 18, 2010. Due to a wet spring this year, the seeding was very successful. It is very easy to see where the seed was drilled because so many seedlings have surpassed the three-leaf stage. Some seedlings have grown just past the three-leaf stage, but other seedlings from this year are producing a seed head. The smaller seedlings on the East side of the field look damaged perhaps from the herbicide applied in the spring; however, green leaves are showing through the brown. Even in some areas (i.e. entrance to field) where there appeared to be no germination early this spring, there is now a stand of seedlings. Large patches of kochia on the north end of the field and near the entrance continue to grow, but are too mature to be sprayed now, will schedule mowing to keep from going to seed. There is some cheatgrass but pressure is minimal and plants are relatively small and they have already gone to seed so will monitor this fall for further herbicide application. Existing Siberian Wheatgrass from previous seeding is still present and plants have enlarged and are vigorous although spotty across the field.

ID12002 Hermis Sparks grassed waterway critical area planting demonstration. Seed mixture includes Vavilov II Siberian wheatgrass, Recovery western wheatgrass, Rush intermediate wheatgrass, Regar meadow brome and Garrison creeping foxtail. Site characteristics: 1 acres; purpose - soil erosion and weed control; soil – Elijah silt loam; slope- 2%; aspect – east and west; elevation – 2631 ft; precipitation - 10”; irrigation – yes; T3N R1W Section 34. Planting planned for late March 2012.

FIELD OFFICE: EMMETT

ID04016 Richard Zamzow WRP upland field planting. Vavilov Siberian wheatgrass, Sodar streambank wheatgrass, Bannock thickspike wheatgrass and Magnar basin wildrye. Seed ordered July 2003. Site characteristics: fine sandy loam soil, 2100 feet elevation, 10-12 inch precipitation, aspect-flat. Planting planned for fall 2003. FY04- FY11 no evaluations. **Cancel**

ID07007 V Dot Ranch – Jim Little field planting. Seed ordered 1/10/07. Seed mix 1: Anatone bluebunch wheatgrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Sherman big bluegrass, Snake River Plains fourwing saltbush; Seed mix 2: Goldar bluebunch wheatgrass, Bannock thickspike wheatgrass, Washoe basin wildrye, High plains Sandberg bluegrass, Wytana fourwing saltbush. Site characteristics: wildfire burn 2006, stony clay loam soil, 3000 feet elevation, 12-16 inch precipitation, ESD – Stony Loam 12-16 bluebunch wheatgrass, basin big sagebrush, bitterbrush, Sandberg bluegrass. Mixtures (one acre each) will be broadcast planted in mid to late winter and where possible using ATV dragged-raked to incorporate seed. FY07- FY11 no evaluations. **Cancel**

ID09009 Richard Zamzow WRP upland field planting. Vavilov II Siberian wheatgrass. Seed ordered February 2009. Site characteristics: fine sandy loam soil, 2100 feet elevation, 10-12 inch precipitation, aspect-flat. Planting planned for spring 2009. FY09 and FY11 no evaluations.

ID10002 Randy Heffner field planting. Bozoisky Russian wildrye and Manifest intermediate wheatgrass fall and winter forage trial. Seed ordered September 2, 2009. Site Characteristics: Boise County, MLRA B10, 6 acres, dormant fall planting, Brownlee sandy clay loam, 5-10 percent slope, south aspect, 2800 feet elevation, 14-16 inch rainfall, irrigated, T7N R2E NE1/4 Section 2. FY10- FY11 no evaluations.

FIELD OFFICE: MARSING/GRANDVIEW

ID11001 Ron Bitner – vineyard cover crop/erosion control trial. Vavilov II Siberian wheatgrass, Ephraim crest wheatgrass, Roadcrest crested wheatgrass and Recovery western wheatgrass seed was ordered September 23, 2010. Yellow mustard and basalt milkvetch will be obtained by landowner for this trial. Planting is planned for early November 2010. Site characteristics: Canyon County Idaho, MLRA 11, Jacquith loamy fine sand soil, 1- 3 percent slopes, 2630 feet elevation, 7- 11 inch rainfall zone, site is irrigated, T3N R4W SE Quarter Section 5. FY10 the IDFG 7 ft drill was rented to complete the plantings. The grass planting was completed November 3rd and the basalt milkvetch was seeded on November 4th. The yellow mustard will be planted in February 2011. FY11 June 10, 2011 initial evaluation: Vavilov II Siberian wheatgrass 12 lb/ac has a good stand with 18 plants per square foot and fair vigor; Vavilov II Siberian wheatgrass 24 lb/ac has good stand with 32 plants per square foot and fair vigor; Ephraim crested wheatgrass 12 lb/ac has fair stand with 13 plants per square foot and fair vigor; Ephraim crested wheatgrass 24 lb/ac has fair stand with 24 plants per square foot and fair vigor; Recovery western wheatgrass 17 lbs/ac has poor stand with 14 plants per square foot and poor vigor; Recovery western wheatgrass 34 lbs/ac has poor stand with 27 plants per square foot and poor vigor; Roadcrest crested wheatgrass 12 lb/ac has poor stand with 11 plants per square foot and poor vigor; Roadcrest crested wheatgrass 24 lb/ac has poor stand with 18 plants per square foot and poor vigor; basalt milkvetch at 6 lb/ac, 12 lb/ac and 18 lb/ac failed – may have been seeded too deep; yellow mustard 15 lb/ac has good stand with 23 plants per square foot and good vigor.

FIELD OFFICE: MOUNTAIN HOME

None

FIELD OFFICE: PAYETTE

None

FIELD OFFICE: WEISER

ID94025 Eckhardt Ephraim crested wheatgrass, Magnar basin wildrye, Mankota Russian wildrye, Trailhead basin wildrye, P27 Siberian wheatgrass, Manska pubescent wheatgrass, Reliant intermediate wheatgrass, Bannock thickspike wheatgrass, Schwendimar thickspike wheatgrass, Greenar intermediate wheatgrass, Sherman big bluegrass, Secar Snake River wheatgrass, Goldar bluebunch wheatgrass, Bozoisky Russian wildrye, Hycrest crested wheatgrass, Rush intermediate wheatgrass demo plots. Site is clay loam soil, non-irrigated, 10-12 inch ppt, 3000 feet elevation, and 5% slopes on NE exposure. Seed ordered July 1994. FY94 and FY95 due to drought conditions, seeding planned for spring 96. FY96 planted April 9, 1996 by hand planting and raking plots to control bulbous bluegrass competition. June 19, 1996 evaluation for establishment: Mankota poor, Manska good, Sherman very poor, Greenar good, Trailhead fair, Reliant good, Bozoisky good, Bannock good. July 8, 1996 establishment: Mankota fair, Manska good, Sherman poor, Greenar good, Trailhead fair, Reliant good, Bozoisky good, Bannock good, Goldar good, Rush excellent, Secar fair. Rush has the best stand establishment to date with Goldar next. FY97 no evaluation. FY98 first set of plots; Reliant is out producing all other plots, Greenar is second in production, Sherman hand planted plot is third in production, Sherman broadcast plot failed, T6633-P is fourth in production. Second set of plots; Bozoisky performed the best with Mankota second, and trailhead the poorest. The wildryes, thickspike wheatgrasses and intermediate wheatgrasses have shown adaptation to this area and could play a roll in revegetating local rangelands. FY99 plots were grazed this spring and grazing preference was evaluated. Plots: Greenar and Reliant were grazed the heaviest, followed by Mankota and Bozoisky Russian wildrye. This was uniform for all replications. Thickspike wheatgrasses and all other varieties had slight utilization. Basin wildryes were not utilized. Grazing preference for the larger plantings: Bozoisky Russian wildrye was used the heaviest, followed by Goldar bluebunch wheatgrass, and Rush intermediate wheatgrass used the least. Cattle are grazing Fourwing saltbush. The producer is very happy with results from these plots and uses the information to make his planting decisions. Cattle in mid May grazed FY00 the small plot species. Grazing preference was for Goldar, Bozoisky, and the intermediate wheatgrasses. The intermediate wheatgrasses are spreading into adjacent plots. Moderate use was made on Magnar and Trailhead. Sherman was used only slightly. Fourwing saltbush was utilized and continues to get taller (20 inches tall). In the large acre sized plots adjacent to a Hycrest planting, grazing preference (mid May) in order are: 1) Goldar, 2) Bozoisky, 3) Rush, and 4) Secar. Use of Goldar was similar

too slightly heavier than the Hycrest. FY01 all plots are grazed this year. Utilization was heaviest on Greenar intermediate wheatgrass and Reliant intermediate wheatgrass plots. The larger plantings showed grazing preference was highest for Bozoisky Russian wildrye, then Goldar bluebunch wheatgrass, followed by Rush intermediate wheatgrass. FY03 plots were grazed this fall at time of evaluation. FY04 – Cattle preference (cows were moved into filed 4 days prior to evaluation on 10/5/04). Most preferred species during this period was Bozoisky-Select Russian wildrye which was grazed very close. Second most preferred species was Goldar bluebunch wheatgrass which was grazed to a uniform 2 inch stubble height. Secar Snake River wheatgrass and Rush intermediate wheatgrass were not utilized. FY05 no evaluation. FY06 – observations in late June, grazing preference was Goldar bluebunch as first choice, Bozoisky-Select Russian wildrye as second choice, Rush intermediate as third and Secar as least desirable. FY10 Bozoisky Russian wildrye appears to be the preferred grazing species and grazing pressure is affecting stand health and stand is beginning to look very poor. Goldar bluebunch wheatgrass is probably the next preferred grazing species after Russian wildrye. Secar Snake River wheatgrass is the least preferred grazing species in trial. Rush intermediate wheatgrass is the most aggressive species in the trial and stand survival is high. Because of light grazing pressure, Rush is moving into Goldar bluebunch wheatgrass plots. **Next evaluation 2013.**

ID96024 Howard Sutton Rush intermediate wheatgrass, Luna pubescent wheatgrass, and Oahe intermediate wheatgrass field planting. Site is loam soil, non-irrigated, 15-17-inch ppt, 3320 feet elevation, 1-4% slope on south exposure. Seed ordered March 14, 1996. FY96 planted in May into good seedbed with good weed control. Good stand establishing with about 3 plants per foot squared, each species was planted with alfalfa in alternate rows and alternating sections. FY97 good stands with excellent vigor of each cultivar. The Oahe/alfalfa stand was cut for hay and produced 1.5 tons/acre. Because of topography the Rush/alfalfa and Luna/alfalfa were not cut for hay. The entire field was grazed; grazing was uniform across all trials so preferences could not be determined. Producer is very happy with all three from standpoint of production potential when seeded with alfalfa. FY98 good stands and vigor for each species with about 7 plants per square foot. Yield for all species was about 5000 pounds per acre or about 3 AUMs per acre. Cattle are selecting Luna as first choice, then go to Rush before Oahe. The Rush was more mature than Luna when steers were put in pasture which may account for selection choices. FY99 good stands and vigor of all three species. Entire 84 acre seeding provided 135 AUMs or 1.6 AUMs/ac. Due to later season of use; cattle prefer Luna and Oahe to Rush. Rush initiates growth earlier and is more mature when cattle are turned into pasture, which probably accounts for this preference. FY00 similar report to last year. FY01 good stands and vigor for all species. Grazing preference continues to be for Oahe, followed by Luna, and the Rush. Production is about the same for all species although reduced this year due to two years of extreme drought. FY02 good stand, and vigor with greatly reduced production this drought year for all accessions. Produced 0.5-0.7 AUM/Acre for each accession, less than 50% of the normal precipitation year. Grazing is slowing spread of these species. FY04 – good stands with good vigor for all species. Production was approximately 0.7 FY05- FY11 no evaluations. **Cancel**

ID02010 Hugh Pangman - New Meadows Riparian Planting. 9067541 Peachleaf willow - Baker source and Golden willow. 50 cuttings ordered February 11, 2002 for shipment in early May 2002. To be planted with waterjet stinger. FY02 willows were planted through cobbly site using a backhoe to watertable located at 5-6 feet depth. 95 survival of each species. Peachleaf willows are 18-20 inches tall and Golden willows are 24 inches tall. Golden willows are more vigorous with more stem growth. FY03 Peachleaf willow 95 percent survival with 36-48 inch height. Golden willow local cuttings also have 95 percent survival with 48 inch plus height. Producer is please with this planting. FY04 no evaluation. FY05 end of 4th growing season - peachleaf willow 90% survival with excellent vigor, 15 feet plant height, 10 feet crown width, 3 inch DBH. Golden willow 90% survival with very good vigor, 10 feet plant height, 6 feet crown width and 2 inch DBH. Peachleaf plants are more vigorous than golden willow, but in a slightly better site based on soil and moisture availability. Plants are protected from grazing by domestic livestock. FY06 evaluation – peachleaf willow 90 percent survival, excellent vigor, 22-25 feet tall, 15 feet crown width; golden willow 90 percent survival, good vigor, 11-12 feet tall, 8 feet crown widths. Evaluate again in 2007 to document a good record of the success of planting and growth rates. FY07- FY11 no evaluations. **Cancel**

ID02011 Tom Vogel - Paddock Riparian Planting. 9067546 Peachleaf willow - Burns source and local coyote willow. 50 cuttings ordered February 11, 2002 for shipment in late March 2002. To be planted with waterjet stinger. FY02 willows were planted on April 3, 2002 using the waterjet stinger. Stream was dry for most of July and August. Peachleaf willows have about 75 percent survival with some leader growth up to 36 inches. Coyote willow has about 60% survival. FY03 – FY11 no evaluations. **Cancel**

ID11008 Dean Dryden Riparian Planting. Duane Pearson (Emmett), Travis Youngberg (Weiser), Mike Raymond (Weiser), Tom Yankey (Volunteer), Blake Tubbs (Payette), and Dean Dryden (Landowner) participated in a willow planting field day to train and educate staff on planting willow cuttings and poles using the waterjet stinger to stabilize streambank erosion in New Meadows area. 50 poles of Golden Willow (local collection donated by Tom Yankey) and 40 poles of Peachleaf Willow (donated by the PMC) and 5 cottonwood poles (donated by PMC) were planted. Survival will be evaluated next spring.

IDAHO DIVISION IV
PLANT MATERIALS PLANTINGS

FIELD OFFICE: BURLEY
None

FIELD OFFICE: GOODING/FAIRFIELD
ID01007 Spring Cove Ranch – Butler demonstration plantings of Magnar basin wildrye, Snake River Plain fourwing saltbush, and Northern Cold Desert winterfat. Seed ordered March 16, 2001. Site characteristics: Planting 1. Vertisol soil, 11-inch rainfall, irrigated, 3300 feet elevation, south of Pioneer Reservoir. Planting 2. Sodic soil, 12-inch rainfall, irrigated, 3500 feet elevation, near Clover Creek – Hill City Road – southern base of Bennett Mountain foothills. FY01 - FY04 seed not planted due to extreme drought. Cooperator plans to plant fall 2004. FY05 Planting Site 1: Seed again not planted. Dan said he still wants to drill the Magnar next spring (2006) in the planned site (Planting Site 1). Said site in 2005 was too dry. As of 1/10/06 site is under flood waters. Moisture should be good for spring 2006 planting. He said he will drill seed in spring 2006. FY07 Dan has not planted the Magnar yet on account of other farming activities, but still wants to keep the seed and says he will try to get it planted this fall (2007). FY08 Spring Cove Ranch, called Dan last week, he said he did get the Magnar in the ground (about 3 acres or something, small seeding) last fall (fall 2007). He said he disked the ground twice and broadcast the Magnar and left as is. He felt he had enough seed coverage due to the soil condition after working and did not harrow or follow up for seed coverage. He did not take a close look after this growing season but believed he needed another year before making a judgment as not much apparently came. FY09 and FY11 no evaluations.

FIELD OFFICE: JEROME/ SHOSHONE/HAILEY
None

FIELD OFFICE: RUPERT
None

FIELD OFFICE: TWIN FALLS
Twin Falls SWCD/Twin Falls Highway District ID00007 Drought tolerant landscape-weed control demonstration plantings. Seed ordered March 1, 2000 for late March delivery. Planting 1: Vavilov Siberian wheatgrass, Bozoisky Russian wildrye, and Ladak alfalfa. Planting 2: Hycrest crested wheatgrass, Bozoisky Russian wildrye, and Ladak alfalfa. Planting 3: Secar Snake River wheatgrass, Critana thickspike wheatgrass, Trailhead basin wildrye, Rimrock Indian ricegrass, and Wytana fourwing saltbush. Planting 4: Secar Snake River wheatgrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Nezpar Indian ricegrass, and Snake River Plain fourwing saltbush. Site characteristics: MLRA B11A, Portneuf silt loam soil, 0-2 percent slopes, north exposure, 3800 feet elevation, 10-12 inch precipitation, irrigated for establishment only, T11S R18E SW1/4 of SW1/4 of Section 13. FY00 due to very dry spring the planting was delayed until better planting conditions occur. FY01 site was planted in mid to late April and sprinkler irrigated in May to assist with plant establishment. Site was also mowed several times during growing season for weed control. Because of mowing, species identification was not possible – estimated initial stand establishment for all plantings are fair with good plant vigor. FY02 introduced plantings are well established - native plantings failed. Introduced seed of Vavilov Siberian wheatgrass (15 lb) and Bozoisky Russian wildrye (5 lb) was ordered on September 15, 2002 to replant failed portion. Planting completed for October 25, 2002 (dormant planting). FY03 field observation determined that little establishment has occurred this year due to drought conditions. FY04 stands were mowed in June and inadequate moisture was available for regrowth. Wytana fourwing saltbush and Snake River Plains fourwing saltbush are becoming more evident with scattered plants throughout plantings 3 and 4. Mowing is keeping the fourwing saltbush short, but does not appear to be killing the shrubs. FY05 this is the first year of above normal spring moist since plantings were installed. Planting 1: good stand of Vavilov (2-3 plants/ft^2), Bozoisky (2 plants/ft^2) and alfalfa (< 1 plant/ft^2) and good vigor for grasses and poor vigor for alfalfa. Planting 2: good stand of Hycrest (3

plants/ft^2) and thickspike (2 plants/ft^2). Wytana fourwing saltbush and Snake River Plains fourwing saltbush are becoming more evident and plants are larger than last year throughout the older plantings 3 and 4. FY08 Mowing operations have ceased and overall stands are improving. Planting 1: good stand of Vavilov, Bozoisky and alfalfa with good vigor for grasses and poor vigor for alfalfa. Planting 2: good stand of Hycrest and thickspike. Wytana fourwing saltbush and Snake River Plains fourwing saltbush are becoming more evident and plants are larger than earlier years. FY10 the north planting continues to look fairly good with good stand of Vavilov (2-3 plants/ft^2), Bozoisky (2 plants/ft^2) and alfalfa (< 1 plant/ft^2) and good vigor for grasses and poor vigor for alfalfa; the south planting continues to struggle with poor stands and vigor overall. **Evaluations will longer be collected for this planting.**

ID03001 Walt Coiner Field Planting
Evaluations will longer be collected for this planting.

	Stand					Vigor				
Species	2003	2004	2005	2006	2010	2003	2004	2005	2006	2010
Irrigated Perennial Cover										
Sherman big bluegrass	good	fair	fair	fair	poor	exc.	fair	exc.	exc.	poor
Talon Canada bluegrass	good	exc.	exc.	exc.	good	exc.	exc.	exc.	exc.	good
Foothills C. bluegrass	exc.	exc.	exc.	exc.	good	exc.	exc.	exc.	exc.	good
Durar hard fescue	fair	exc.	fair	good	fair	exc.	exc.	fair	good	fair
Semi-Irrigated Perennial Cover										
Covar sheep fescue	poor	fair	good	good	exc.	fair	good	exc.	exc.	exc.
Quatro sheep fescue	poor	good	exc.	good	exc.	fair	good	exc.	exc.	exc.
Bozoisky R. wildrye	poor	v. poor	good	good	good	fair	poor	good	good	good
Newhy hybrid wheatgrass	poor	failed	fair	fair	failed	fair	v. poor	good	good	failed
Roadcrest c. wheatgrass	good	fair	poor	poor	failed	good	good	good	fair	failed
Vavilov S. wheatgrass	good	exc.	exc.	good	destroyed	good	exc.	exc.	good	destroyed
Ephraim c. wheatgrass	exc.	fair	exc.	exc.	destroyed	good	fair.	exc.	exc.	destroyed
Sodar s. wheatgrass	good	poor	poor	poor	destroyed	fair	poor	poor	poor	destroyed
Paiute orchardgrass	fair	fair	fair	fair	destroyed	fair	fair	fair	fair	destroyed
Dryland Perennial Cover										
Vavilov S. wheatgrass	good	exc.	exc.	good	good	good	exc.	exc.	good	good
Bozoisky R. wildrye	poor	v. poor	good	good	failed	fair	poor	good	good	failed
Sherman big bluegrass	v. poor	v. poor	good	good	failed	poor	v. poor	good	good	failed
Rosana w. wheatgrass	fair	good	exc.	exc.	exc.	good	good	exc.	exc.	good

Recommendations based on evaluation years
Irrigated – Foothills and Talon Canada bluegrass are the best fully irrigated ground cover choices
Semi-irrigated – Vavilov Siberian wheatgrass, Rosana western wheatgrass, Bozoisky Russian wildrye and Ephraim crested wheatgrass provide the best ground cover
Dryland – Vavilov Siberian wheatgrass mixed with Rosana (Recovery) western wheatgrass provides best ground cover

ID04003 Steve Schuyler field planting – windbreak. Siouxland poplar, Carolina poplar, Golden willow and Laurel willow cuttings. Cuttings ordered January 12, 2004. Site characteristics: 0-1 percent slope, north aspect, 8-10 inch precipitation zone, irrigated-gravity, Portneuf silt loam soil. Planted April 10, 2004 – weed barrier fabric was installed – planting protected with snow fence along west edge. FY04 survival and height - 91 percent – 35 inches Laurel willow, 42 percent – 6 inches Carolina poplar, 82 percent – 42 inches Golden willow, 0 percent Siouxland poplar. FY05 replacements ordered February 22nd 10 golden willow, 25 Carolina poplar, and 5 Laurel willow. Evaluation August 11, 2005- Laurel willow 94% survival with excellent vigor, 8 feet height and 5 feet crown width; Carolina poplar 58% survival with excellent vigor, 9.3 feet height and 7.5 feet crown width; Golden willow 82% survival with excellent vigor, 9.5 feet height and 11 feet crown width.; Siouxland poplar failed. FY08 Laurel willow 89 percent survival with good vigor and 15.5 feet height; golden willow 82 percent survival with excellent vigor and 20 feet height; Carolina poplar 58 percent survival with excellent vigor and 28 feet height. FY09 Laurel willow 89 percent survival with yellowing leaves possibly iron clorosis; Golden willow 82 percent survival; Poplar 58 percent survival. FY11 Laurel willow 89 percent survival, Golden willow 82 percent survival and poplar 58 percent survival. A gall

problem is affecting the poplars in this planting – in the spring of 2011 chemicals were injected into the soil to deal with the gall issue. The treatments appear to be clearing up the problem.

ID04006 Dickenson 319 riparian woody planting. Laurel willow, golden current, Wood's Rose, redosier dogwood, Siberian peashrub, coyote willow, golden willow, chokecherry, blue spruce, and Austrian pine. Plantings are protected from grazing and grass is mowed around pines, spruce, juniper and sumac.
FY04 planted in May 2004. Plantings are protected from grazing with a fence and arranged in clumps (copses) for natural appearance. Laurel willow 92 percent survival, excellent vigor, 24-36 inch height. Golden current 100 percent survival, excellent vigor, and 18-24 inch height. Wood's rose 100 percent survival, excellent vigor, and 18-24 inch height. Redosier dogwood 60 percent survival, fair vigor, and 18-24 inch height. Siberian peashrub 100 percent survival, excellent vigor, and 18-24 inch height. Coyote willow 80 percent survival, good vigor and 12-48 inch height. Golden willow 100 percent survival, excellent vigor and 72 inch height. Chokecherry 23 percent survival, poor vigor and 36 inch height. Blue spruce 73 percent survival, good vigor and 36 inch height. Austrian pine 100 percent survival, excellent vigor and 36 inch height. FY05 evaluation August 11, 2005- Laurel willow 100% survival, excellent vigor, 4-8 feet height and 2 feet crown width; Golden current 92% survival, excellent vigor, 4 feet height and 2.5 feet crown with; Wood's rose 100% survival, excellent vigor, 2.5 feet height and 3 feet crown width; Redosier dogwood 83% survival, excellent vigor, 4 feet height and 2 feet crown width; Siberian peashrub 12% survival, very poor vigor; Coyote willow 33% survival, good vigor, 5 feet height and 0.5 feet crown width; Golden willow 90% survival, excellent vigor, and 6 feet height; chokecherry 27% survival, fair vigor and 4.4 feet height; blue spruce 73% survival, fair vigor and 4.5 feet height; Austrian pine 100% survival, excellent vigor and 4.6 feet height; Rocky Mountain juniper 100% survival, excellent vigor and 14 inch height; Skunkbush sumac 80% survival, good vigor and 2 feet height. FY08 Laurel willow 100 percent survival with excellent vigor and 15 feet height; coyote willow failed; Peachleaf willow 80 percent survival with fair vigor and 15 feet height; Simom poplar failed; Carolina poplar failed; Firecracker penstemon failed. FY11 evaluations were conducted too late this year.

ID05002 Perinne Coulee 319 Project riparian planting. Redosier dogwood (accessions 9023733, 9023739 and 9023740), Laurel willow and Peachleaf willow (accessions (9067375, 9067376, 9067541, 9067546, 9067549 and 9067560) cuttings were ordered February 4, 2005. Planted spring 2005. Survival and identification difficult in 2005. FY07 Peachleaf willow 50 percent survival with good vigor and 10 feet height; Laurel willow and red-osier dogwood failed. FY08 58 percent survival with good vigor and 11 feet height; Laurel 14 percent survival with poor vigor and 2.5 feet height (affected by saline soil conditions. FY09 Peachleaf 25 surviving with 12 feet height and 12 feet crown width; Laurel 11 surviving with feet height. FY11 evaluations were conducted too late this year.

ID08007 Twin Falls Canal Company riparian project. Laurel willow, peachleaf willow accessions 9067546 and 9067376 and black cottonwood accession 9067538 were ordered March 10, 2008 for delivery in late March. FY08 Peachleaf willow 55 percent survival with fair vigor and 2 feet height; Black cottonwood failed; Laurel willow 37 percent survival with fair vigor and 15 inch height. FY09 Peachleaf 7 surviving with 6 feet height; black cottonwood 1 surviving with 1 foot height; Laurel 7 surviving with 5 feet height. FY11 evaluations were conducted too late this year.

ID09004 Guerry Ranch Inc. Crtitical Area Planting – snowdrift locations for erosion control. 9076517 western wheatgrass and Rosana western wheatgrass seed ordered February 5, 2009 for delivery on April 1, 2009. Site Characteristics: MLRA 25, Kavon loam, 5- 35 percent slopes, east aspect, elevation approximately 7000 feet, 20- 25 inch precipitation, rangeland, T16S R13E SE1/4 of Section 17. FY09 planting completed in fall. FY10 no evaluation. FY11 the seeding failed. **Cancel**

ID09007 Twin Falls Britt Pond Riparian Planting. 9076375 peachleaf willow (10 cuttings) and 9076376 peachleaf willow (50 cuttings) cuttings ordered February 2009. Planted on May 8, 2009. FY09 Peachleaf 23 surviving; Laurel 7 surviving. FY11 evaluations were conducted too late this year.

ID09012 Twin Falls East Perrine Riparian Planting. 9076375 peachleaf willow (40 cuttings) ordered February 2009. Planted on May 8, 2009. FY11 evaluations were conducted too late this year.

IDAHO DIVISION V
PLANT MATERIALS PLANTINGS

FIELD OFFICE: AMERICAN FALLS/ABERDEEN
None

FIELD OFFICE: BLACKFOOT
None

FIELD OFFICE: FORT HALL
ID03002 Shoshone-Bannock Tribe Demonstration Planting. Nezpar Indian ricegrass, Goldar bluebunch wheatgrass, Magnar basin wildrye, Sodar streambank wheatgrass, High Plains Sandberg bluegrass, and Sherman big bluegrass seed was ordered September 30, 2002. Planting completed early November 2002. FY03 no evaluation. FY04 Nezpar Indian ricegrass excellent stand and vigor with 24 inch height. Goldar bluebunch wheatgrass excellent stand and vigor with 24 inch height. Magnar basin wildrye excellent stand with good vigor and 36 inch height. Sodar streambank wheatgrass excellent stand and vigor with 30 inch height. Sherman big bluegrass good stand with good vigor and 30 inch height. Very poor stand and vigor with 8 inch height (only 3 plants came up – seed may have been buried too deep). FY05 evaluation June 15, 2005. Magnar excellent stand, 98% survival, excellent vigor and 48 inch height; Nezpar good stand, 90% survival, good vigor and 36 inch height; Goldar good stand, 95% survival, good vigor and 42 inch height; Sodar excellent stand, 98% survival, excellent vigor and 42 inch height; Sherman excellent stand, 98% survival, excellent vigor and 38 inch height; High Plains failed and will be replanted next year and irrigated for establishment. FY06 excellent stands of Goldar bluebunch wheatgrass and Magnar basin wildrye, good stands of Sodar streambank wheatgrass, and Sherman big bluegrass, fair stand of Nezpar Indian ricegrass and High Plains Sandberg bluegrass failed. FY07 no evaluation. FY08 common camas excellent stand with 90 percent survival and excellent vigor. Demo plots – Magnar basin wildrye 98 percent survival with excellent vigor and 48 to 60 inch height; Nezpar Indian ricegrass very poor stand with 10 percent survival and poor vigor; Goldar bluebunch wheatgrass fair stand with 70 percent survival and good vigor; Sodar streambank wheatgrass excellent stand with 80 percent stand and good vigor; Sherman big bluegrass good stand with 60 percent stand and good vigor; High Plains Sandberg bluegrass failed. FY10 Clearwater Venus penstemon, Snake River Plains fourwing saltbush and Opportunity Nevada bluegrass seed ordered to add to demonstration plots. No evaluation.

FIELD OFFICE: MALAD
None

FIELD OFFICE: MONTPELIER
None

FIELD OFFICE: POCATELLO
None

FIELD OFFICE: PRESTON
None

FIELD OFFICE: SODA SPRINGS
ID05001 Michael Tingey – Irrigated forages Demonstration Plots. Latar orchardgrass, Regar meadow brome, Cache meadow brome, Paiute orchardgrass, Garrison creeping foxtail, Rush intermediate wheatgrass, Bozoisky Russian wildrye, 905439 switchgrass, Blackwell switchgrass and Lutana cicer milkvetch seed was ordered February 4, 2005. SCD/Cooperator Supplies the following: Paddock meadow brome, Forager alfalfa, Kemal festolium, Potomic orchardgrass, Rebound meadow brome, Fuego tall fescue, Tekapo orchardgrass, Mara perennial ryegrass, Barliza timothy, Pradel meadow fescue, Barloex tall fescue, Bariane tall, fescue, Barcell tall fescue, Baridana orchardgrass, Hakari Alaska brome, Birdsfoot trefoil, Sainfoin, Sorgam, Grazing corn, Lakota prairie brome and Alice white clover. Site characteristics: 0.8 acres, MLRA B13, Rexburg-Ririe silit loam soil complex, 1-4 percent slopes, north aspect, elevation 5140 feet, 12-14 inch precipitation, irrigated, T11S R41E SW ¼ section 19. Planted in late spring 2005 due to persistent rainfall that did not allow earlier final land preparation and planting. FY10 planting destroyed. **Cancel**

Species	Percent Stand		Vigor		Height	
	2005	2011	2005	2011	2005	2011
Kura Clover	0		0		0	
Forager alfalfa	exc.		good		24”	
Lutana cicer milkvetch	good		good		6”	
Alice white clover	poor		fair		4-6”	
Birdsfoot trefoil	fair		good		3”	
Eski sainfoin	good		good		12”	
Baridana orchardgrass	poor		good		16”	
Tekapo orchardgrass	fair		good		12”	
Paiute orchardgrass	poor		fair		12”	
Latar orchardgrass	poor		fair		12”	
Potomic orchardgrass	fair		good		12”	
Satin orchardgrass	poor		good		8”	
Renagade orchardgrass	fair		good		18”	
Rebound meadow brome	good		good		24”	
Cache meadow brome	fair		good		30”	
Regar meadow brome	fair		good		12”	
Lakota prairie brome	good		exc.		36”	
Hakari Alaska brome	85		exc.		12”	
Seine tall fescue	30		good		24”	
Johnstone tall fescue	20		good		18”	
Bronson tall fescue	50		good		24”	
Bariane tall fescue	35		good		12”	
Dovy tall fescue	50		good		18”	
Pradel tall fescue	50		good		12”	
Garrison creeping foxtail	10		fair		12”	
Rush intermediate whtgrs	40		fair		6”	
Bozoisky Russian wildrye	35		poor		4”	
Kemal festolium	90		exc.		24”	
Mara perennial ryegrass	85		good		8”	
Barliza timothy	5		poor		4”	
Outlaw timothy	5		poor		8”	
Blackwell switchgrass	15		fair		18”	
9005439(MT) switchgrass	5		fair		8”	
Garrison sorgum-sudan	90		good		54”	

ID05012 Don Ayers – herbaceous windbreak field planting. Magnar basin wildrye seed ordered March 15, 2005. Site Characteristics: Lantonia-Chinahat silt loam soil, 1-4 percent slopes, 5983 feet elevation, 14-16 inch precipitation, non-irrigated, T8S R41E NW ¼ Section 24. FY05 Two of the four rows had good emergence and two rows had very poor emergence. Ground preparation was much better in rows that the best emergence. Plants that emerged have grown well and look very healthy - fair stand with 4 plants/ft^2, good vigor and 4 inch height. Several more plants emerged in the fall. FY06 planting was accidentally tilled and destroyed – cooperator plans to replant. **Cancel**

ID09002 _____ - Recovery western wheatgrass field planting. Seed shipped September 29, 2008. FY09 – FY10 no evaluations.

ID09005 Alan Rasmussen – riparian field planting. Laurel willow, white willow, coyote willow, golden willow, 9076375 peachleaf willow, 9067538 peachleaf willow cuttings ordered February 2009. Site characteristics: MRLA 13, 4 acres, Iphil silt loam soil, 0- 2 percent slopes, northwest aspect, 5230 feet elevation, 14-16 inch rainfall, irrigated, T11S R40E NW¼ Section 11. FY10 1- 2 percent survival with fair vigor.

ID10001 Curtis Reed field planting. Magnar basin wildrye seed ordered August 30, 2009. Seeding planned for late October 2009. Purpose: vegetative filter strip (dust control). Site characteristics: MLRA 13; silt loam soil; 0-1 percent slope; east aspect; elevation 6240; 18- 20 inch precipitation; non-irrigated; T8S R41E sections 5 and 6. FY10 no evidence of establishment or survival – evaluate next year for final establishment determination.FY11 no evaluation

IDAHO DIVISION VI
PLANT MATERIALS PLANTINGS

FIELD OFFICE: ARCO

ID03003 Hill-Freeman Snake River Plain fourwing saltbush field planting. Seed ordered October 18, 2002. FY03 one half pound of Snake River Plains fourwing saltbush was included in a five acre marginal pastureland seeding adjacent to Warm Springs Creek on Barton Flat (South Custer County). The entire seeding area of 13.3 acres included a three and a half acre stand of decadent crested wheatgrass. A seed mix of Vavilov Siberian wheatgrass (1.2 lbs/ac), Bannock thickspike wheatgrass (2.0 lbs/ac), Bozoisky Russian wildrye (1.2 lbs/ac), Rincon fourwing saltbush (0.25 lbs/ac), and Bighorn skunkbush sumac (0.25 lbs/ac) was broadcast over the seeding area. The area was then rolled to obtain seed to soil contact on a firm weed free seedbed. FY04- FY06 no evaluations. FY07 Vavilov Siberian wheatgrass good stand with good vigor - 2 plants per feet squared; Bannock thickspike wheatgrass good stand with good vigor - 2 plants per feet squared; Bozoisky Russian wildrye poor stand with fair vigor - trace plants per feet squared; Snake River Plains fourwing saltbush failed; Bighorn skunkbush sumac – failed. FY08 – FY11 no evaluations.

FIELD OFFICE: DRIGGS

None

FIELD OFFICE: IDAHO FALLS

ID07014 Winterfeld Goldar bluebunch wheatgrass for seed increase. Seed shipped March 1, 2007. FY07 did not plant. FY08 planted June 5, 2008. FY10 harvested – seed not conditioned. FY11 no evaluation.

ID08003 Winterfeld Bannock thickspike wheatgrass seed increase. Seed shipped February 28, 2008. FY08 planted June 5, 2008. FY10 excellent stand with approximately 4000 pounds production. FY11 no evaluation.

ID08004 Winterfeld Vavilov II Siberian wheatgrass seed increase. Seed shipped February 28, 2008. FY08 planted June 5, 2008. FY10 excellent stand with approximately 7600 pounds production. FY11 no evaluation.

ID09001 Winterfeld Richfield firecracker penstemon seed increase. Seed shipped September 24, 2008. FY10 not planted. FY11 no evaluation.

FIELD OFFICE: REXBURG

None

FIELD OFFICE: RIGBY/TERRETON

ID09011 Carl Ball – Hamer Farms Field Planting – vegetative cross wind strips demo plantings. Rush intermediate wheatgrass, Manifest 9092056 int. wheatgrass, Bozoisky Russian wildrye, Mankota Russian wildrye, Luna pubescent wheatgrass, Largo tall wheatgrass and Alkar tall wheatgrass seed ordered April 15, 2009. Site Characteristics: MLRA 11; Corassy Butte loamy sand soil; 2- 4 percent slopes; SW aspect; 4800- 4900 feet elevation; full irrigation; T7N R36E Sections 13 and 14. FY09 strips were planted on June 8, 2009. FY10 Rush intermediate wheatgrass excellent stand, 68 inch height, very good density, outstanding performance, rates very high for use in cross wind strips; Bozoisky Russian wildrye excellent stand, 20 inch height, not enough height for cross wind strips, irrigation may be too much water for this species; Mankota Russian wildrye excellent stand, 20 inch height, not enough height for cross wind strips, irrigation may be too much water for this species; Alkar tall wheatgrass good stand, 68 inch height, not as dense as Rush, outstanding performance, rates very high for use in cross wind strips; Largo tall wheatgrass good stand, 72 inch height, not as dense as Rush, outstanding performance, rates very high for use in cross wind strips; Manifest intermediate wheatgrass fair stand, 50 inch height, drifting sand appears to be affecting stand quality, ergot present in seedheads, not a good choice for cross wind strips; Luna pubescent wheatgrass excellent stand, 53 inch height, drifting sand appears to be affecting stand quality, ergot present in seedheads, not a good choice for cross wind strips.

FIELD OFFICE: RIGBY/DUBOIS

ID89015 Wagoner Luna pubescent wheatgrass, P-27 Siberian wheatgrass, Sodar streambank wheatgrass, Greenar intermediate wheatgrass, Delar small burnet, Trevois alfalfa field planting on rangeland. Site is gravelly loam soil with a pan at 5-6 inches, non-irrigated, 12-inch rainfall, 6300 feet elevation, and 3% slopes on NE exposure. FY89 ripped

rangeland in spring and seeded mix in fall of 1990. FY91 excellent stand establishing with production about 1400 lbs/ac. FY92 clipping data: No Treatment - 318 lbs/ac., chisel only treatment (native species) - 495 lbs/ac., chisel/disc/seed treatment - 1110 lbs/ac. Clipped 7/9/92. FY93 Clipped plots resulted in production of 1200-2000 lbs/ac. FY94 production of about 800 lbs/ac in extremely droughty year. Non treated rangeland producing about 100 lbs/ac this year. FY95 excellent stand Luna and Greenar, Good stand P-27, Sodar and Travois and Poor stand of Delar. Stand produced 1400+ lbs/acre this year. High antelope use of stand was noted. Stand was grazed 3 weeks in spring and 4 weeks in fall with good management. FY96 excellent stand of Trevois and good stands of Luna, P27, Sodar, and Greenar. Very poor stand of Delar. Considered 90% stand overall. Produced 1000 lbs/ac in very poor moisture year. Stand is doing great under good management. FY03 Disc-Seed treatment – near fence good stand of natives – primarily crested wheatgrass in seeding with 5-6 percent sagebrush and 600 pounds per acre production in very dry year. Ripped-Disc-No Seed treatment – sagebrush very heavy with forage producing about 200 pounds per acre and brush producing about 200 pounds per acre in very dry year. Ripped-Disc-Seed treatment – excellent stand of primarily Bozoisky wildrye, Nordan crested wheatgrass, P27 Siberian wheatgrass and some Trevois alfalfa. Very little intermediate wheatgrass left in stand. Production is about 1000 pounds per acre in very dry year. FY05 There is a good stand of native bluebunch wheatgrass, Sandberg bluegrass and Indian ricegrass near west fence-line producing about 750 pounds per acre. The disced and seeded stand near west fence has a good stand of crested wheatgrass with about 5 percent sagebrush invasion and producing about 1000 pounds per acre. The ripped, disced and seeded area has an excellent stand of primarily Nordan crested wheatgrass and Bozoisky Russian wildrye with 3-4 plants per square foot, excellent vigor and producing about 1300 pounds per acre this year. P27 Siberian wheatgrass, Greenar intermediate wheatgrass and Trevois alfalfa are present, but in much lower amounts. **Planting will no longer be evaluated, but will be maintained for training purposes.**

ID90025 Wagoner Rush intermediate wheatgrass field planting on rangeland. Site is gravelly loam soil with a pan at 5-6 inches, non-irrigated, 12-inch rainfall, 6300 feet elevation, and 3% slopes on NE exposure. FY89 ripped rangeland. FY90 planted April 1990. FY91 excellent stand establishing with no weeds. Production is 1400 lbs/ac. FY92 stand excellent with 1200 lbs/ac production. FY93 excellent stand producing 2000+ lbs/ac. Grazing value - appears to be a highly preferred/selected species according to cooperator. FY94 excellent stand producing 800 lbs/ac in very droughty year. FY95 excellent stand producing 1800+ lbs/acre. Rush is the most productive species in all range trials. FY96 excellent stand with 5-10 plants/ft2 producing 1000-lbs/ac and good vigor in very low rainfall year. FY03 good to excellent stand with 3 plants per square foot and good to excellent vigor. Producing 700 pounds per acre in very dry year – produces about 1400 pounds per acre in average to favorable years. Sagebrush invasion is about 1-5 percent of plant community. No weeds in stand. **Planting will no longer be evaluated, but will be maintained for training purposes.**

ID90035 Wagoner Bozoisky Russian wildrye field planting on rangeland. Site is gravelly loam soil, non-irrigated, 12-inch ppt, 6200 feet elevation, and 2% slopes on NE exposure. FY90 planted April. FY91 good stand establishing. FY92 excellent stand producing 1100 lbs/ac. FY93 90% + stand and up to 4' tall, estimated production 1200-1400 lbs/ac. FY94 good stand producing about 600 lbs/ac in very droughty year and only 50% of plants produced seedheads this year. FY95 good stand producing 1200+ lbs/acre. This species is doing very well and is well adapted to site. FY96 good stand with 4-5 plants/ft2 and 1200-lbs/ac production in very low summer rainfall year. FY03 good stand of P27 Siberian wheatgrass and Bozoisky Russian wildrye with 3 plants per square foot and good to excellent vigor. Stand is producing about 800 pounds per acre in a very dry year. Estimate 1400-1600 pounds per acre in an average to favorable moisture year. FY05 the Bozoisky Russian wildrye stand is maintaining very well with approximately 3 plants per square foot, excellent vigor and production about 1200 pounds per acre. Cattle seek out this species year around according to cooperator. **Planting will no longer be evaluated, but will be maintained for training purposes.**

ID92013 Webster Regar meadow brome, Bozoisky Russian wildrye, Luna pubescent wheatgrass, Critana thickspike wheatgrass field planting on rangeland. Site is gravelly silt loam soil, non-irrigated, 14-inch rainfall, 6000 feet elevation, and 4% slopes on SE exposure. FY92 site sprayed for weed control, but too dry to seed. FY93 seeding not completed. FY94 very poor moisture conditions, planting not installed. FY95 good stand of all species establishing with good spring moisture. FY96 good stand of all species with 2-4 plants/ft2 and good vigor on all except Regar has fair vigor. Stand had low production and is still establishing. FY97 good stands for all species with 60% stands and good vigor - they have been slow to establish on this tough site. FY99 Bozoisky and Luna good stands, Regar and Critana fair stands. FY03 good to excellent stand of Bozoisky Russian wildrye and Regar meadow brome with 3 plants per square foot (70% Bozoisky – 30% Regar), good vigor and about 1500 pounds per acre production in a very dry year. Good to excellent stand of Bozoisky Russian wildrye and Trevois alfalfa with 3 plants per square foot (70%

Bozoisky – 30% Trevois), good vigor and about 1500 pounds per acre production in a very dry year. Fair to good stand of Critana thickspike wheatgrass with 9 plants per square foot, poor vigor and about 400 pounds per acre production in a very dry year. Good to excellent stand of Luna pubescent wheatgrass with 5 plants per square foot, good vigor and about 1500 pounds per acre production in a very dry year. Bozoisky is heavily grazed (80-90 percent utilization) by cattle and elk and stands are maintaining very well. FY05 Plot 1: good stand with 2 plants per square foot - Bozoisky Russian wildrye 100% survival, Regar meadow brome failed, Trevois alfalfa 50% survival; stand producing about 1300 pounds per acre. Cattle and elk are utilizing the stand at about 60 percent utilization on Bozoisky and 30 percent utilization on alfalfa. Plot 2: excellent stand with 3 plants per square foot – Bozoisky 100 percent survival and Trevois 50 percent survival; stand is producing about 1700 pounds per acre; Cattle and elk are utilizing stand with about 85 percent utilization on Bozoisky and 30 percent utilization on alfalfa. Plot 3; fair stand of Critana thickspike wheatgrass with 9 plants per square foot and fair vigor; stand is producing about 700 pounds per acre. Cattle and elk are not utilizing this plot. Plot 4: good stand of Luna pubescent wheatgrass with good vigor and 5 plant per square foot; stand is producing about 1700 pounds per acre; Cattle and elk are not utilizing this stand. **Planting will no longer be evaluated, but will be maintained for training purposes.**

FIELD OFFICE: SALMON/CHALLIS

ID80100 IDL Bradbury Flat Multiple Adaptation Evaluation. Planted March 25, 1980. Evaluations 8/7/84, 8/6/86, 7/12/89, 7/7/92, 11/14/95, 9/99, 5/21/03 and 7/25/07. FY07 evaluation by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY12**.

Accession	Stand	Plants/ft2	Vigor	Comments
B1574 crested wheatgrass	70%	1.0	good-exc.	
P27 Siberian wheatgrass	65%	0.5	good	
Sodar streambank wheatgrass	65%	1.5	good	
AB447 crested wheatgrass	60%	0.5	good	
Secar Snake River wheatgrass	60%	0.25	fair-good	high residue problems
Hatch winterfat	50%	0.5	good-exc.	
AB764 winterfat	50%	0.5	good-exc.	
AB922 fourwing saltbush	1%	< 0.1	fair-good	
AB942 fourwing saltbush	1%	< 0.1	fair-good	

Nezpar Indian ricegrass, Luna pubescent wheatgrass, Goldar bluebunch wheatgrass, Magnar basin wildrye, Topar pubescent wheatgrass, Appar blue flax, NM1143 Firecracker penstemon, Bandera R.M. penstemon, Cedar Palmer penstemon, NM1123 Venus penstemon, AB555 aster, R885a black-eyed susan, Delar small burnet, Immigrant forage kochia, Ladac alfalfa, buckwheat species, and arrowleaf balsamroot failed.

ID80101 IDL Bradbury Flat Multiple Adaptation Evaluation. Planted November 7, 1981. Evaluations 8/7/84, 8/6/86, 7/12/89, 7/7/92, 11/14/95, 9/99, 5/21/03 and 7/25/07. FY07 evaluation by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY12**.

Accession	Stand	Plants/ft2	Vigor	Comments
B1574 crested wheatgrass	50%	0.5	good	
P27 Siberian wheatgrass	60%	0.75	excellent	
Sodar streambank wheatgrass	80%	1.25	excellent	
AB447 crested wheatgrass	65%	0.5	good-exc.	
Secar Snake River wheatgrass	50%	0.25	good-exc.	High residue problems
AB764 winterfat	20%	0.15	poor	
AB585 winterfat	1%	<0.1	very poor	
AB922 fourwing saltbush	3%	0.1	very poor	
AB942 fourwing saltbush	2%	<0.1	very poor	
Immigrant forage kochia	3%	0.1	fair-good	
Bozoisky Russian wildrye	70%	0.5	excellent	
Vinall Russian wildrye	70%	0.7	excellent	

Nezpar Indian ricegrass, Luna pubescent wheatgrass, Goldar bluebunch wheatgrass, Magnar basin wildrye, Topar pubescent wheatgrass, Appar blue flax, NM1143 firecracker penstemon, Bandera R.M. penstemon, Cedar Palmer penstemon, NM1123 Venus penstemon, Delar small burnet, Lodorm green needlegrass, Blair smooth brome, and Paiute orchardgrass failed

ID82102 BLM Centennial Multiple Adaptation Evaluation. Planted late October 1982. Evaluations 8/7/84, 7/28/86, 7/13/89, 6/26/92, 6/20/95. FY99 not evaluated. Evaluated 5/21/03. Evaluated 7/24/07 by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY12**.

Accession	Stand	Plants/ft2	Vigor	Comments
GP52 alfalfa	10%	0.1	fair-good	
BC79 alfalfa	3%	0.05	fair	
RS1 wheatgrass cross	25%	0.5	good	
RS2 wheatgrass cross	15%	0.25	fair	
Newhy hybrid wheatgrass	75%	1.0	good	
Scarlet globemallow	1%	<0.1	fair-good	
Ephraim crested wheatgrass	85%	1.25	fair-good	
Barton western wheatgrass	5%	0.25	poor-fair	
Topar pubescent wheatgrass	1%	<0.1	very poor	
Whitmar beardless wheatgrass	25%	0.25	fair-good	
Goldar bluebunch wheatgrass	25%	0.5	fair-good	
Secar Snake River wheatgrass	50%	0.75	fair-good	
Vinall Russian wildrye	60%	0.75	good-exc.	
Bozoisky Russian wildrye	45%	0.25	excellent	
U7881 alfalfa	1%	<0.1	very poor	
Nordan crested wheatgrass	70%	0.75	good	

Lutana cicer milkvetch, Canbar Canby bluegrass, Immigrant forage kochia, Bandera R.M. penstemon, Cedar Palmer penstemon, Appar blue flax, Paiute orchardgrass, P27 Siberian wheatgrass, Nezpar Indian ricegrass, Magnar basin wildrye, and yellow sweetclover failed

ID82103 BLM Spud Alluvial Multiple Adaptation Evaluation. Planted late October 1982. Evaluations 8/7/84, 7/28/86, 7/13/89, 6/25/92, 11/14/95, 9/99, 5/20/03 and 7/25/07. FY07 evaluation by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY12**.

Accession	Stand	Plants/ft2	Vigor	Comments
RS1 wheatgrass cross	85%	1.5	fair	
RS2 wheatgrass cross	85%	1.5	fair	
Fairway crested wheatgrass	85%	1.5	fair	
Immigrant forage kochia	50%	2.0	excellent	many young plants
Ephraim crested wheatgrass	75%	1.0	good	
Barton western wheatgrass	<5%	0.1	poor	
Whitmar beardless wheatgrass	70%	1.0	fair	
P27 Siberian wheatgrass	90%	1.5	good	
Goldar bluebunch wheatgrass	30%	0.3	poor	
Secar Snake River wheatgrass	80%	0.75	fair-good	
Vinall Russian wildrye	70%	1.0	good-exc.	
Bozoisky Russian wildrye	85%	0.75	excellent	

BC79 Synthetic alfalfa, GP52 Synthetic alfalfa, scarlet globemallow, Cedar Palmer penstemon, Appar blue flax, Paiute orchardgrass, Topar pubescent wheatgrass, Nezpar Indian ricegrass, Magnar basin wildrye, and yellow sweetclover failed.

ID82104 BLM Jeff's Flat Multiple Adaptation Evaluation. Planted late October 1982. Evaluations 8/7/84, 7/28/86, 7/13/89, 6/26/92, 9/99 5/19/03 and 7/24/07. FY07 evaluated by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY12**.

Accession	Stand	Plants/ft2	Vigor	Comments
GP52 Synthetic alfalfa	1-5%	<0.25	fair	
BC79 Synthetic alfalfa	1-5%	<0.25	fair	
Manchar smooth brome	50%	4	good	
Baylor smooth brome	50%	4	good	
Durar hard fescue	75%	3	good-exc.	
Covar sheep fescue	45%	2	good	
Nordan crested wheatgrass	25%	0.5	fair-good	
P27 Siberian wheatgrass	40%	0.75	good	

Greenar intermediate wheatgrass	65%	4	excellent
Magnar basin wildrye	5%	0.1	fair
Vinall Russian wildrye	3%	0.1	poor
Bozoisky Russian wildrye	5%	0.1	fair

RS1 wheatgrass cross, RS2 wheatgrass cross, Hycrest crested wheatgrass, Delar small burnet, Lutana cicer milkvetch, Cedar Palmer penstemon, Appar blue flax, Paiute orchardgrass, Sherman big bluegrass, yellow sweetclover failed.

ID82105 BLM Round Valley Multiple Adaptation Evaluation. Planted late October 1982. Evaluations 8/7/84, 8/6/86, 7/12/89, 6/25/92, 11/13/95, 9/99, 5/19/03 and 7/23/07. FY07 evaluated by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY12**.

Accession	Stand	Plants/ft2	Vigor	Comments
RS1 wheatgrass cross	1%	<0.1	fair	
RS2 wheatgrass cross	1%	<0.1	fair	
Immigrant forage kochia	2%	<0.1	fair-good	
Scarlet globemallow	1%	<0.1	fair	
Nordan crested wheatgrass	70%	1.0	good	
P27 Siberian wheatgrass	70%	1.0	good-exc.	
Vinall Russian wildrye	30%	0.5	good	
Bozoisky Russian wildrye	75%	1.5	excellent	
Nordan crested wheatgrass	60%	1.0	fair-good	

GP52 synthetic alfalfa, BC79 synthetic alfalfa, Critana thickspike wheatgrass, Bandera R.M. penstemon, Cedar Palmer penstemon, Appar blue flax, Paiute orchardgrass, Goldar bluebunch wheatgrass, Secar Snake River wheatgrass, Barton western wheatgrass, Topar pubescent wheatgrass, Whitmar beardless wildrye, Nezpar Indian ricegrass, Magnar basin wildrye, yellow sweetclover failed.

ID82106 BLM Gooseberry/Sheep Creek Multiple Adaptation Evaluation. Evaluated 7/7/92, 5/19/03 and 7/23/07. FY07 evaluation by Dan Ogle, Mark Olson and Nate Matlack - **Next evaluation FY12**.

Accession	Stand	Plants/ft2	Vigor	Comments
Nordan crested wheatgrass	5%	0.1	fair-good	
Bozoisky Russian wildrye	10%	0.2	poor-fair	
Vinall Russian wildrye	10%	0.3	fair	
Sherman big bluegrass	95%	1.5	fair-good	
Greenar intermediate wheatgrass	2%	<0.1	very poor	
P27 Siberian wheatgrass	1%	<0.1	very poor	
Ephraim crested wheatgrass	3%	<0.1	poor	
Durar hard fescue	85%	2	good	
Covar sheep fescue	80%	2	fair-good	
Manchar smooth brome	50%	0.5	fair	
Baylor smooth brome	20%	0.25	fair	
Fairway crested wheatgrass	5%	0.1	fair	

Magnar basin wildrye, Appar blue flax, Paiute orchardgrass, Cedar Palmer penstemon, Bandera R.M. penstemon, Lutana cicer milkvetch, Delar small burnet, RS2 wheatgrass cross, RS1 wheatgrass cross, BC79 synthetic alfalfa, and GP52 synthetic alfalfa failed.

ID08001 Shiner Ranch Field Planting. Vavilov II Siberian wheatgrass seed ordered 9/27/07 and shipped 10/4/07 for November dormant planting.
Seed mixture 1 (5 ac): Vavilov II Siberian wheatgrass, Bozoisky Russian wildrye, falcata alfalfa;
Seed mixture 2 (75 ac): Vavilov Siberian wheatgrass, Bozoisky Russian wildrye, falcata alfalfa
Site Characteristics: Leadore gravelly loam soil, 2-6 % slope. South aspect, 5,600 feet elevation, 8-12 inch rainfall, non-irrigated, T17N R24E NE1/4 Section 2. FY07 - a four acre field planting that contained Vavilov II Siberian wheatgrass, Bozoisky Russian wildrye and falcata (yellow blossom) alfalfa was planted in November 2007. The rest of the planting area was planted to Vavilov Siberian wheatgrass, Bozoisky Russian wildrye and falcata (yellow blossom) alfalfa in November 2007. The Vavilov II and Bozoisky Russian wildrye seed was furnished by the PMC and the falcata alfalfa was purchased by the cooperator. We wanted to evaluate the Vavilov II release with Vavilov, the standard currently available on the market and also evaluate the falcata alfalfa as a potential dryland forage type alfalfa

that may do well in this area. A ½ pound of alfalfa was planted per acre. There is some information available on the internet describing this alfalfa.

FIELD OFFICE: ST. ANTHONY

ID06009 John Taft – Henrys Lake WRP. Field planting of 100 Engelmann spruce and 100 quaking aspen. Planting completed June 20 and 21, 2006 at 7 separate locations. One gallon potted plants; Engelmann spruce - 3 feet tall and quaking aspen 4- 5 feet tall; were planted using a skid steer with mounted 10 inch auger to dig holes. Each tree was planted by hand, pressed in by foot pressure and watered with bucket following planting. Hydrology – soil moisture varied from saturated locations near ponds at south end of project to field capacity at ponds at north end of project. FY08 – FY11 no evaluations.

FY07 Spruce – survival is poor with approximately 20% survival overall. Top growth die back is common with approximately half of the surviving plants green near base, but dead above. These are expected to die. Approximately 15 plants throughout entire WRP site show fair to good bud growth. Winter was open and plants were exposed most of winter – this may have resulted in top growth injury. Spring moisture since March has been very poor resulting in drought injury. Spruce is doing best in sites with saturated conditions. On sites that are drier and better drained, spruce is struggling.

FY07 Aspen – survival is good with approximately 50% survival overall. Top growth die back is common with approximately half of the surviving plants leafing along stem and about half sprouting from the base. Winter was open and plants were exposed most of winter – this may have resulted in top growth injury. Spring moisture since March has been very poor resulting in drought injury. Aspen is doing best in sites with very good soil moisture to saturated conditions. On site that are drier and better drained, aspen is struggling.
Site 1 berm near pond - was the only location where wildlife use was evident – probably moose.
Site 2 berm near pond
Site 3 wetland near road junction – aspen are in nearly standing water (water table within 6 inches of surface)
Site 4 upland just across bridge on right side of road
Site 5 upland to east of ponds on south end of property
Site 6 wetlands near ponds on south end of property

PLANT MATERIALS

2011

UTAH EVALUATION SUMMARIES

FIELD AND DEMONSTRATION PLANTINGS

UTAH AREA 1
PLANT MATERIALS PLANTINGS

UT05003 Swaner Nature Preserve riparian planting. Peachleaf willow (accessions 9067375, 9067376, 9067541, 9067546, 9067549 and 9067560), Redosier dogwood (accessions 9023733, 9023739 and 9023740) and Blanchard blue elderberry cuttings were ordered February 4, 2005. Site characteristics: East Canyon Creek, Summit County, MLRA E47, Echocreek-Kovich loam soil, 1-2 percent slope, NW aspect, 6350 feet elevation, 16 inch precipitation, non-irrigated, T1S R4E SE ¼ Section 18. FY05 peachleaf willow 9067375 85% survival, fair vigor, 12-24" height; peachleaf willow 9067376 100% survival, good vigor, 24-36" height; peachleaf willow 9067541 73% survival, fair vigor, 12-18" height; peachleaf willow 9067546 100% survival, good vigor, 24" height; peachleaf willow 9067549 88% survival, fair vigor, 24" height; peachleaf willow 9067560 85% survival, good vigor, 24-36" height. All peachleaf willows are performing well under severe reed canarygrass competition. Redosier dogwood 9023733 10% survival, very poor vigor, 3" of new growth; redosier dogwood 9023739 failed; redosier dogwood 9023740 100% survival, poor vigor, 6" of new growth; Blanchard blue elderberry failed. Elderberry stock was not in containers and plants were very difficult to handle. Recommend not sending elderberry plants without containers in the future.FY06 peachleaf willow 9067375 50% survival, fair vigor, 18-24" height; peachleaf willow 9067376 77% survival, fair vigor, 24-36" height; peachleaf willow 9067541 57% survival, fair vigor, 18-24" height; peachleaf willow 9067546 67% survival, fair vigor, 18-24" height; peachleaf willow 9067549 67% survival, fair vigor, 24-36" height; peachleaf willow 9067560 78% survival, fair vigor, 36-48" height. All peachleaf willows are performing well under severe reed canarygrass competition and high water this spring. Redosier dogwood 9023733 failed; redosier dogwood 9023739 failed; redosier dogwood 9023740 failed; Blanchard blue elderberry failed. FY08 all dogwood accessions and the elderberry failed. All Peachleaf willow accessions had some survival with accession 9067375 36% survival, 9067376 28% survival, 90673741 4% survival, 9067346 72% survival, 9067349 60% survival and 9067560 24% survival. Accessions range from 24 to 36 inches in height. Quackgrass and Reed canarygrass competition is severe so any Peachleaf survival is impressive. FY10 Peachleaf willow survival: 9067375 – 8 percent, 9067376 – 8 percent, 9067541 – 4 percent, 9067546 – 4 percent, 9067549 – 36 percent and 9067560 – 36 percent; dogwood and elderberry failed. Weed competition from quackgrass and Reed canarygrass is very severe. FY11 no evaluation.

UT07004C Zan Harris Logan Field Office. 9067549 and 9067560 Peachleaf willow accessions and coyote willow cuttings were shipped April 4, 2007. FY08 30 percent survival of 9067549 and 9067560 and 20% survival of coyote willow. Site is heavily infested with Reed canarygrass. FY10 Peachleaf willow survival: 9067549 - 28 percent and 9067560 - 32 percent; Coyote willow survival - 66 percent. This planting is performing very well. FY11 no evaluation.

UT09003 Lyle Holmgram Tremonton Field Office adaptation trial. 10 plants of 9008027 silver buffaloberry were ordered February 2009 for delivery in late March. FY10 Silver buffaloberry – 30 percent survival and about 8 inches tall. Site characteristics: MLRA 28A, riparian planting, silt loam soil, 3- 35 percent slopes, south aspect, 4312 feet elevation, 14 inch rainfall zone, non-irrigated, T11N R3W NW Qtr Section 2. FY11 no evaluation.

UT10001 Basque Cross Ranch Tremonton Field Office field planting. Vavilov II Siberian wheatgrass seed was ordered September 3, 2009 for shipment on October 13, 2009. Site Characteristics: MLRA 28A; 5 acres; gravelly loam soil; 6- 10 percent slope; south aspect; 5600 feet elevation; 10- 12 inch precipitation; non-irrigated; T13N R12W SE1/4 Section 30. FY10 initial establishment – Vavilov II Siberian wheatgrass good stand with 4 plants per foot squared and excellent vigor; Bozoisky II Russian wildrye plants not apparent; Oahe intermediate wheatgrass good stand with 4 plants per foot squared and excellent vigor; Ranger alfalfa fair stand with 0.2 plants per foot squared and excellent vigor. Overall planting is establishing very well. FY11 no evaluation.

UT11004 Lyle Holmgren Tremonton Field Office field planting. Washoe basin wildrye, Trailhead basin wildrye, Magnar basin wildrye, Newhy RS wheatgrass, Recovery western wheatgrass and Silver buffaloberry seed was ordered January 14, 2011 for delivery in early February. Silver buffaloberry plants (20) were ordered for delivery in late February. Site characteristics: MLRA 28A, riparian planting, silt loam soil, 3- 35 percent slopes, south aspect, 4312 feet elevation, 14 inch rainfall zone, non-irrigated, T11N R3W NW Qtr Section 2.

UT12001 Val Simmons Provo Field Office saline demonstration plots. Recovery western wheatgrass, Bozoisky Russian wildrye, Newhy hybrid wheatgrass, Mankota Russian wildrye, Rosana western wheatgrass, Shoshone manystem wildrye, Garrison creeping foxtail seed was ordered June 2, 2011. Site characteristics: MLRA D28, strongly alkali silty clay soil, 1-2 percent slopes, south aspect, 4540 feet elevation, 14-16 inch rainfall, non-irrigated.

UT12002 Earl Christiansen Provo Field Office demonstration planting. Nezpar Indian ricegrass, Bannock thickspike wheatgrass, First Strike slender wheatgrass and Snake River Plain fourwing saltbush seed was ordered June 2, 2011. Site characteristics: MLRA D28, fine sandy loam soil, 2- 4 percent slopes, north aspect, 4550 feet elevation, 12- 14 inch rainfall, non-irrigated.

UT12003 Earl Christensen Provo Field Office demonstration Planting. Vavilov II Siberian wheatgrass, Bozoisky-Select Russian wildrye and First Strike slender wheatgrass seed ordered June 2, 2011. Site characteristics: MLRA D28, fine sandy loam soil, 2- 4 percent slopes, north aspect, 4550 feet elevation, 12- 14 inch rainfall, non-irrigated.

UTAH AREA 2
PLANT MATERIALS PLANTINGS

UT99001 Graymont Western (Lime plant) – Fillmore FO Vavilov Siberian wheatgrass critical area planting. 20 pounds of Vavilov seed was ordered November 19, 1998. The Vavilov will be planted in a mix, which will include Nordan crested wheatgrass, Sodar streambank wheatgrass, Critana thickspike wheatgrass, Nezpar Indian ricegrass, and forbs and shrubs. Site characteristics are a crushed gravelly – silty material lain over rock – cobble material; this material hardens to a near cemented pavement when packed and as moisture occurs; rainfall is about 8-10 inches; site is very windy. Site modifications recommended included 10 ton per acre composted straw, fertilizer based on soil tests, ripping prior to seeding resulting in a rough - rocky soil surface with about 50% of surface being exposed rock to provide micro-sites where seedlings would be protected from constant winds were recommended. FY99 no evaluation. FY00 Three site preparation treatments were installed in the fall/spring of 1998/1999 including 1. Planting directly into shallowly scarified site where soil surface was shattered and smooth; 2. Planting into moderately ripped site where soil surface was rough with approximately 25 percent of surface exposed angular rock; and 3. Planting into severely ripped site where soil surface was very rough with approximately 50 percent of surface exposed large angular rock. Company Manager indicated the past two years were dry winters with below normal rainfall season long. The mid growing season evaluation, on June 6, 2000, indicated Sodar streambank wheatgrass, Bannock or Critana thickspike wheatgrass, Vavilov Siberian wheatgrass, Nezpar Indian ricegrass, penstemon species, scarlet globemallow, winterfat, fourwing saltbush, and Wyoming big sagebrush were all planted and present to some degree on each treatment. Treatment 1 had a 5-10 percent stand present, plants were very small (stunted), and not reproducing (no seedheads present). Treatment 2 had a 30-40 percent stand present, plants were average sized, and a few were reproducing. Treatment 3 had a 70-90 percent stand, plants were tall for site (high vigor), and a high percentage of plants were reproducing. FY01 Graymont has produced a publication "Assessment of Revegetated Test Benches and Reference Transects at Cricket Mountain Plant" that describes the success of this trial. **FY06** May 16th – planting is excellent with approximately 75% Vavilov Siberian wheatgrass, 20% Nordan crested wheatgrass-Sodar streambank wheatgrass-Critana thickspike wheatgrass, 1% Nezpar Indian ricegrass, and 4% Richfield firecracker penstemon-Immigrant forage kochia-sweetclover-fourwing saltbush. The most severely disturbed site has an excellent stand and the moderately disturbed site has a good to excellent stand. The control with no ripping has a poor to failed stand. There are also plantings completed in years following the test plantings. The sites are typically moderately disturbed with good to excellent stands and species mixtures include additional species including Bozoisky Russian wildrye, rabbitbrush, Immigrant forage kochia and penstemon. On one west slope the seeding mixture included fourwing saltbush, shadscale in mixture with grasses and forbs. Due to droughty conditions, this planting only established shadscale approximately 60% of community and fourwing saltbush 10% of community. From these observations, the strongest species appear to be Vavilov Siberian wheatgrass, Bozoisky Russian wildrye, Richfield firecracker penstemon, Immigrant forage kochia, shadscale and fourwing saltbush. **Next evaluation planned for 2012.**

UT03001 Merlin Webb – Cedar City FO. Seed shipped February 2003. Rimrock Indian ricegrass, Critana thickspike wheatgrass, Trailhead basin wildrye, Volga mammoth wildrye , Nezpar Indian ricegrass, Bannock thickspike wheatgrass, Magnar basin wildrye, Vavilov Siberian wheatgrass, P-27 Siberian wheatgrass, Snake River Plains fourwing saltbush broadcast seeded into good seedbed on February 22, 2003 - rained soon after planting. FY03 no evaluation. FY04 stand/survival – Planting # 1 P27 fair/100%, Bannock fair/100%, Nezpar fair/100%, Mesa alfalfa fair/100% and Volga failed. Planting # 2 Vavilov fair/100%, Nezpar fair/100%, Bannock fair/100%, Magnar poor/25%, Volga failed, and Snake River Plains failed. FY05 Planting # 1 P27 fair stand with ½ plant/ft2 – Bannock fair stand with ¼ plant/ft2 – Nezpar poor stand with 1/10 plant/ft2 – alfalfa poor stand with 1/10 plant/ft2 – Volga failed. Mix has about 1 plant/ft2. Planting # 2 Vavilov good stand with 4 plants/ft2 - Nezpar poor stand with 1/10 plant/ft2 – Bannock fair stand with ½ plant/ft2 – Magnar and Volga failed – Snake River Plains fourwing saltbush fair

stand with ¼ plant/ft2. Mix has 4.9 plants/ft2. Vavilov had the best survival of all plants in this trial and thus was able to respond to better moisture conditions that occurred this year. FY08 Plot 1 - Volga fair stand, Nezpar poor stand, P27, Bannock and alfalfa failed. Plot2 - SRP fourwing saltbush good stand, Magnar and Volga fair stand, Bannock and Vavilov poor stand and Nezpar very poor stand. FY10 Planting # 1 P27 failed – Bannock failed – Nezpar poor stand – alfalfa failed – Volga poor stand. Sand dropseed dominates the site with globemallow very common. Planting # 2 Vavilov good stand with 0.5 plants/ft2 - Nezpar very poor stand – Bannock very poor stand – Magnar fair stand - Volga fair stand – Snake River Plains fourwing saltbush fair stand. Vavilov dominates the site following excellent spring and summer rain in 2010. **Next evaluation planned for 2013.**

UT07002 Niels Hansen seed increase planting. Northern Cold Desert winterfat seed shipped February 8, 2007. Seed will be planted the spring of 2007. FY07 In the spring of 2007 6.5 acres of Northern Cold Desert Germplasm Winterfat was planted. The seeding rate was approximately 2 lbs per acre in rows five feet apart using a ten foot double disk grain drill with all but three of the drops taped shut. Row spacing was 5 feet. Soil had been prepared in the fall of 2006 with no tillage in the spring and soils were firm. On 3/20/07 seed was placed in a groove 1/4 to1/2 inch deep, but there was no packing wheel. The actual seeding rate was less due to adding too many rice hulls with the seed and occasional plugging. There were very harsh spring conditions for germination because there was no rain. It rained the second week in June and some winterfat germinated, but there was no rain again for four weeks. About 30 plants survived. They grew a foot tall by fall of 2007 and had heavy seed production. FY08 in fall of 2007 part of the winterfat field was replanted using left-over seed. The DWR cone seeder with 1/4 inch depth bands was used for this planting. In spring of 2008 the field was tilled for several reasons: no new seedlings were observed; the stand was too thin for production; and a significant encroachment of squarrose knapweed was observed. Landowner is holding back a half acre of this land where there were about 30 winterfat plants that grew where he spilled some seed cleaning the drill. These plants were hand-transplanted to a five foot spacing and will be sprinkle irrigated because he believes winterfat responds well to mid summer moisture. In fall of 2008 or spring of 2009 additional winterfat seed will be planted into weed barrier material. The other 6 acres have been spot sprayed with Milestone, sprayed with glyphosate first week of June, tilled twice in June, and sprayed with glyphosate and 2,4-D July 12. Some weed seed will persist next year, but weeds that have sprouted are gone. FY09 - FY11 no evaluations.

UT07005 Niels Hansen seed increase planting Bozoisky II Russian wildrye. In the spring of 2007 cooperator planted 6 acres of Bozoisky II Russian wildrye after fall tillage and spring application of glyphosate. A ten foot grain drill with all but four drops taped closed was used for planting. There were no packer wheels and site was sprinkled. Row spacing was 35 inches. This was sprinkle irrigated every two weeks, with some being irrigated every four weeks. This was not adequate irrigation scheduling for sprouting seed, but was mandated by the irrigation company since it was a short water year. Weeds (prostrate knotweed) were sprayed once with 2,4-D in June and again with Weedmaster in July. The spring planted Russian wildrye established well, though with the cool soil temperatures at 6000 feet it didn't sprout significantly until the last of May. It was planted in March. Four ton/acre of turkey manure was applied to field in August 2007 and then 67 lbs/acre Urea was applied in May of 2008 after a soil test showed low N levels. Site was irrigated with subsurface drip on four of the 6 acres. FY09 - FY11 no evaluations.

UT07006 Niels Hansen seed increase planting Gooseberry Leaf Globemallow. In April 2007 1/2 acre of Gooseberry Leaf Globemallow was planted in 30 rows using the DWR cone seeder at 1/4 inch depth. It was planted after 1 quart per acre application of glyphosate. No emergence occurred until late May. Due to early planting, weed pressure was too high; kochia and Russian thistle dominated the stand. A weed wick was used for weed control in June, mowed between rows and cooperator also did a lot of hand weeding. A significant number of plants survived. In the spring of 2008 landscape fabric was laid and plants were pulled through to control weeds and facilitate seed collection. FY09 - FY11 no evaluations.

UT08009 Stuart Johnson – Richfield FO field planting. Rush intermediate wheatgrass and Regar meadow brome seed ordered May 27, 2008. Planting scheduled for July- August. Location is a mountain sage site, loamy soil, 2-3 percent slopes, north aspect, 7000+ feet elevation, 16 inch rainfall, T22S R3W NE ¼ Section 33. FY08 The seed was delivered to Stuart on June 30th. He plans to planted the seed by the end of July. 2009 will be the first growing season for evaluations. FY09 no evaluation. FY10 two sites were seeded; Site 1: embankment around an irrigation pond; Rush intermediate wheatgrass has a fair stand; Regar meadow brome failed; site is heavily grazed to a 2 inch stubble height. Site2: stream diversion area; evidence of Rush intermediate wheatgrass establishment; Regar meadow brome failed; due to equipment traffic to repair stream down cuttings only remnant stand still exists. FY11 no evaluation.

UT09001 Niels Hansen seed increase planting Vavilov II Siberian wheatgrass. Cooperator intends to plant Vavilov II Siberian wheatgrass in a dormant fall planting in 2008 or spring of 2009 after treatment of glyphosate for weed control of knapweed. FY09 - FY11 no evaluations.

UT10002 Niels Hansen seed increase planting Vavilov II Siberian wheatgrass. 50 PLS of Foundation seed shipped 11/12/09. FY10 - FY11 no evaluations.

UTAH AREA 3
PLANT MATERIALS PLANTINGS

UT86018 Smith – Roosevelt FO Hycrest crested wheatgrass, Ephraim crested wheatgrass, Appar blue flax, Arriba western wheatgrass, T28606 needle and thread, Magnar basin wildrye, and Nordan crested wheatgrass field planting. FY90 Hycrest, Ephraim, Appar, Magnar, Nordan all 80-100 % survival. Arriba and T28606 are less than 40% survival. FY91 and FY92 no evaluations. FY93 Hycrest, Ephraim, Appar, Nordan, and T28606 doing best. Magnar and Arriba poor stands. Sagebrush invading site, heavy use by elk, and Appar has many new seedlings. FY94 Hycrest, Appar, Arriba, and Nordan all have good stands. Ephraim, T28606 and Magnar have fair stands. All species are adapted to site and wildlife use is heavy. FY95 no change except vigor has improved due to excellent moisture year. FY96 Hycrest, Ephraim, Appar, T28606 and Nordan have good vigor. Fair vigor for Arriba and Magnar. FY97 Hycrest, Ephraim, Appar, Arriba and Nordan good stands. T28606 and Magnar fair stands. Many sagebrush seedlings within plots, particularly heavy in Arriba western wheatgrass and T28606 needle and thread. FY98 Hycrest, Ephraim, Appar, Arriba, Magnar, and Nordan all have excellent vigor. T28606 has good vigor. FY99 very heavy wildlife use in winter and spring. Poor regrowth due to dry spring/ summer and fair regrowth following late summer rains. Planting is being invaded by sagebrush. FY00 Heavy spring use by wildlife and a very dry spring and summer. Rains began in early September and plants began to green-up. Evaluation indicated good vigor for Ephraim, Appar, Arriba, T28606, Nordan and fair vigor for Hycrest and Magnar. FY01 fair to poor vigor for all species following two years of drought and heavy wildlife use. Sagebrush invasion is effective plant growth and vigor. FY03 good stands of Hycrest, Ephraim, Arriba and Nordan. Fair stands of T28606 needle and thread and Magnar. Appar failed. Area is experiencing heavy wildlife use. FY04 Stands are experiencing heavy wildlife use – no livestock use for the last two years. Good vigor and stands of Hycrest, Ephraim and Nordan. Fair vigor and stands of Arriba, T28606 and Magnar. Poor stand and vigor of Appar – most plants are along the edge of planting. FY05 Stands are experiencing heavy wildlife use – no livestock use for the last three years. Good to excellent vigor and stands of Hycrest, Ephraim, Nordan, Arriba and T28606. Fair vigor and stand of Magnar. Appar failed. FY10 Hycrest, Ephraim, Arriba and Nordan continue to have good stands. T28606 and Magnar have fair stands. **Next evaluation 2013**

UT93005 Smith – Roosevelt FO Trailhead basin wildrye, Magnar basin wildrye field planting for erosion control. FY94 planted October 1993 and initial evaluation indicated Magnar with best seedling establishment and Trailhead doing best in run in areas. FY95 both Trailhead and Magnar rated good stands. Magnar is best adapted. FY96 good stands for both, good vigor for both, good drought tolerance for both, all seedheads of both species eaten by wildlife. FY97 excellent stands and plant vigor for both cultivars. Plant height about 50 inches for Magnar and 38 inches for Trailhead. Magnar has excellent seed production and Trailhead has fair seed production. FY98 excellent vigor and long seedheads for both cultivars. Magnar is a more robust and taller plant than Trailhead. FY99 no evaluation. Excellent stands of each with good vigor and approximately 50 inch height. Basal areas are getting larger, but no seed production this year due to spring/summer drought. FY00 due to very dry spring and summer with rains coming in early September resulting in green-up, both Trailhead and Magnar had fair vigor and only 36-40 inches of growth. FY01 both Magnar and Trailhead have poor vigor after very dry spring and summer (7.7 inches of precipitation this year). Each plant only has 2-3 reproductive stems, which probably did not produce seed this year. FY03 – Fair vigor for both Magnar (45 inch height – 0.5 AUM/ac) and Trailhead (38 inch height – 0.3 AUM/ac). Elk are using the fall green-up. FY04 due to lack of summer thunder storms there is only a fair stand with fair vigor for both Magnar and Trailhead. FY05 Magnar fair stand with good vigor, 50 inch height, 0.6 AUMs/ac – Trailhead fair stand with good vigor, 40 inch height and 0.4 AUMs/ac. FY10 fair stand with good vigor for both Magnar (42 inch height) and Trailhead (38 inch height). **Next evaluation 2013**

UT98005 Prevedel – Roosevelt FO Rush intermediate wheatgrass sprinkler irrigated field planting. Materials ordered 3/30/98. FY98 planted August 16, 1998 into excellent seedbed. FY99 excellent stand with excellent vigor and 20 plants per square foot. In early August plants went from very palatable to coarse. Fall rains softened it up making it more

palatable to elk now utilizing field. FY00 stand produced approximately 3000 pound/acre under sprinkler irrigation. Elk graze stand until it gets rank, but will graze regrowth. Cooperator states Rush is an excellent grass for intensive grazing systems. FY01 excellent stand and vigor with 7 AUMs per acre. Cooperator is very satisfied with Rush intermediate wheatgrass performance. FY03 Rush is doing very well in the excessive heat of this summer and is becoming more dominant in the pasture mix of Rush, Regar meadow brome and Paiute orchardgrass. Still producing about 7 AUM/ac. FY04 good stand and vigor – Rush is out performing Regar meadow brome pastures. Both Rush and Regar stands are being invaded by quackgrass. FY05 good to excellent stand with excellent vigor and producing 13 AUMs/ac irrigated. FY06 good to excellent stand with excellent vigor and producing 13 AUMs/ac irrigated. Early warm up and severe summer heat limited production. FY07 Prevedel trial looked good. Brett tried to plant alfalfa with the Rush but it has not done well. Furthermore with the alfalfa in it does not allow him to spray out weeds (knapweed) in the spring without affecting the alfalfa. He has decided he will end up spraying out the weeds and alfalfa and going back to a grass only pasture. He indicated that to increase the vigor of the pastures he needs/plans to fertilize. FY10 good stand with 4 plants per foot square, excellent vigor and approximately 4.5 AUMs/ac. Stand might benefit from fertilization. **Next evaluation 2013**

UT05004 Mike Wilcox – Monticello FO field planting. This is a dormant spring or fall planting of Topar pubescent wheatgrass and Rush intermediate wheatgrass. Barnam loam soil, 3 percent slopes, south aspect, 6000 feet elevation, 14 inch precipitation, non-irrigated, T31N R26E Section 8. Seed ordered March 3, 2005. FY06 not planted – cooperator plans to plant in spring of 2007. FY07 planting was drill seeded in late September 2007. FY09 - FY11 no evaluations.

UT07001 James Wheeler – Monticello FO field planting. Seed of P-7 bluebunch wheatgrass, Anatone bluebunch wheatgrass, Regar meadow brome, Cache meadow brome, Rush intermediate wheatgrass, Topar pubescent wheatgrass, Paiute orchardgrass, Bozoisky Russian wildrye, Vavilov Siberian wheatgrass and Sherman big bluegrass were ordered on August 28, 2006. A dormant fall planting is scheduled for late October to early November. Site characteristics include MLRA 36, silty clay loam soil, 0-2 percent slopes, NE aspect, 14-16 inch precipitation, T32S R26E NE ¼ Section 31. FY06 seed was drill planted into prepared seedbed on November 17, 2006. Soil moisture and fall rain was good prior to and after planting. It turned cold and snowy soon after planting. FY07 this area is suffering from the current drought conditions. Kyle explained that they did have some grass coming up from the planting in the spring but not much since. We walked around and looked and in fact did find some dormant grass plants that had become established. Dan indicated that it looks as if they got established enough for them to come up this next spring. We did see quite a few weeds in the planting but that is to be expected in the early stages of a new planting. Kyle and his Dad are optimistic and look forward to this coming spring to see how the grasses come back. FY10 Rush intermediate wheatgrass excellent stand with excellent vigor; Vavilov Siberian wheatgrass good stand with excellent vigor; P27 Siberian wheatgrass fair stand with excellent vigor. Anatone bluebunch wheatgrass, Regar meadow brome, Cache meadow brome, Topar intermediate wheatgrass, Paiute orchardgrass poor to very poor stands. FY11 no evaluations.

UT08002 Sam E. Jones (Reservation) Monticello FO Demonstration Plots. Nezpar Indian ricegrass, Vavilov Siberian wheatgrass, Vavilov II Siberian wheatgrass, 9076517 western wheatgrass, Rimrock Indian ricegrass, Rosana western wheatgrass, Paloma Indian ricegrass, Alma blue grama, Hachita blue grama, Grants cane bluestem and Westwater alkali muhly seed was ordered Jan. 14, 2008. Site Characteristics: sandy clay loam soil, 0-3% slope, 5000 feet elevation, 8-10" rainfall zone. FY10 planting has not been completed. FY11 no evaluation.

UT08004 Kyle Wheeler Monticello FO irrigated forages field planting. Rush intermediate wheatgrass, Tegmar intermediate wheatgrass, Regar meadow brome, Cache meadow brome and Paiute orchardgrass seed ordered Jan. 14, 2008. Site Characteristics: silty clay loam soil, 0-3% slope, 7000 feet elevation, 10-12" rainfall zone and irrigated. FY10 good to excellent stand of all species planted. FY11 no evaluation.

UT11001 Monument Valley High School (Monticello) demonstration planting. Nezpar Indian ricegrass, Paloma Indian ricegrass, Rimrock Indian ricegrass, Cochise spike dropseed, Vavilov II Siberian wheatgrass, P27 Siberian wheatgrass and Volga mammoth wildrye seed ordered March 30, 2010. Planting planned for fall 2010. Purpose – field/demonstration planting – FFA project. Site characteristics – MLRA 35, 5 acres, Monue-Sheppard complex fine sandy loam, 1-3 percent slope, 5180 feet elevation, 7- 8 inch rainfall, T43S R16E SW1/4 Section 32. FY10 planted fall 2010. FY11 no evaluation.

UT11002 Grand County demonstration plantings. Paloma Indian ricegrass, Nezpar Indian ricegrass, Viva galleta, Arriba western wheatgrass, Recovery western wheatgrass, Secar Snake River wheatgrass, Discovery Snake River

wheatgrass and Jemez NM olive seed plants ordered July 12, 2010. Seed for 6 demonstration plot locations in Grand County. Plantings intended to determine replacement species for tamarisk removal projects.

UT11003 Chris Carter Castle Dale FO field planting. P27 Siberian wheatgrass, Vavilov II Siberian wheatgrass, Nezpar Indian ricegrass, Northern Cold Desert winterfat and Immigrant forage kochia seed was ordered September 22, 2010. Seeding is planned for late fall (dormant) 2010. Site characteristics – MLRA 34, Killpack/Sagar loam soil, 0-3 percent slopes, 5700 feet elevation, 7- 9 inch precipitation zone, non-irrigated, T17S R9E SE ¼ Section 24.

UT11005 Lee Thayne Price FO demonstration plantings. Toe Jam Creek squirreltail, Discovery Snake River wheatgrass, Secar Snake River wheatgrass, Arriba western wheatgrass, Recovery western wheatgrass, Nezpar Indian ricegrass, Rimrock Indian ricegrass, Viva galleta, Vavilov II Siberian wheatgrass, Bannock thickspike wheatgrass, Sodar streambank wheatgrass and Northern Cold Desert winterfat seed was ordered March 24, 2011. Plots will be established at two locations (upland and bottomland -with expected additional moisture with early spring runoff).

UT12008 Price City River Walk. Seed of multiple species was ordered June 7, 2011. Plants will be greenhouse propagated fall- winter 2011- 2012 and planted in spring 2012.