

**March 2011**

**Colorado Plateau Native Plant Program  
Five-Year Strategy & Action Plan**



*Colorado Plateau in Southeastern Utah*



*Globemallow*

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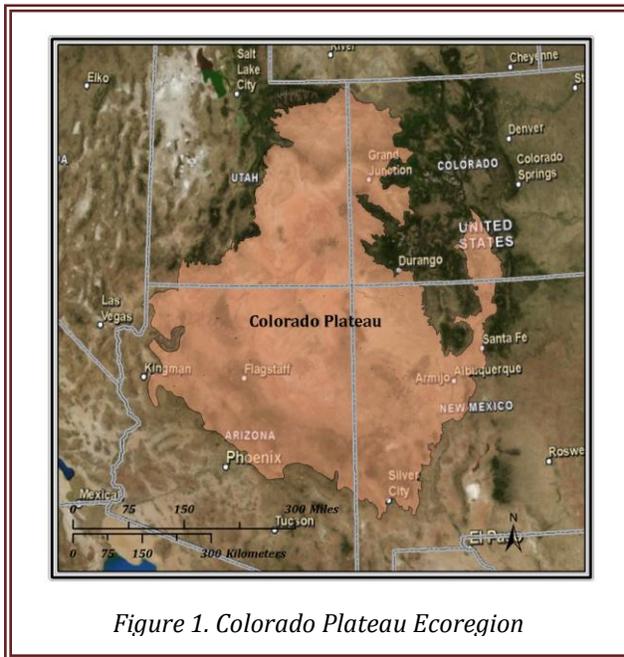
# COLORADO PLATEAU NATIVE PLANT PROGRAM FIVE-YEAR STRATEGY AND ACTION PLAN

MARCH 2011

## INTRODUCTION

The Colorado Plateau Native Plant Program (CPNPP) was created in response to a lack of sufficient variety and quantity of regionally adapted native plant materials for ecosystem restoration in the Colorado Plateau ecoregion. The Colorado Plateau (Figure 1) includes a wide variety of ecosystems and associated plant communities and the demand for native plant materials has increased significantly over the past several years because of the need to restore these ecosystems to more resilient states.

Seed can be made available in two unique manners. The first is through wildland seed collection, which is simply the collection of native seed from wildland settings. While effective for some, primarily woody species, this may



*Figure 1. Colorado Plateau Ecoregion*

not be practical or economical for most species given annual seed production, access, or a variety of other reasons. For these latter species, it will be necessary to increase the amount of materials through the agricultural practice of seeding and growing native species as a crop, from which seed is harvested. For many native “workhorse” species, or those that are most commonly used and needed in large quantities for revegetation projects, there is a need for them to be available at reasonable prices. For this to happen, they need to be produced in such a manner.

Demand for native seed fluctuates annually based primarily on variations in annual wildfire incidents. Because of this, the seed industry is challenged in its ability to predict and produce the amount of seed necessary for restoration, as well as emergency stabilization needs. And, as a result, there are often either deficits or over-abundances of supplies of critical native materials. It is our challenge to stabilize this native seed market by identifying resource restoration

needs beyond those used for wildfire restoration activities, including wildlife habitat or range improvement activities. These other needs must be explored and expanded in order to help provide stability to the market.

Nationally, the Bureau of Land Management (BLM) purchases a tremendous amount of seed annually for revegetation purposes, mostly for fire rehabilitation. In 1999, which was a year with many large fires, the BLM bought over 6.5 million pounds of seed and, as is shown in Figure 2, the BLM bought more than twice the amount of non-native as native seed. In contrast, the BLM purchased over 7 million pounds of seed in 2007 and more than half was native. The availability of native seed has been a limiting factor and it is clear that efforts are needed to increase the supply of native plant materials for future uses. In addition, there is a need to increase awareness regarding the values associated with using native plant materials for ecosystem restoration.

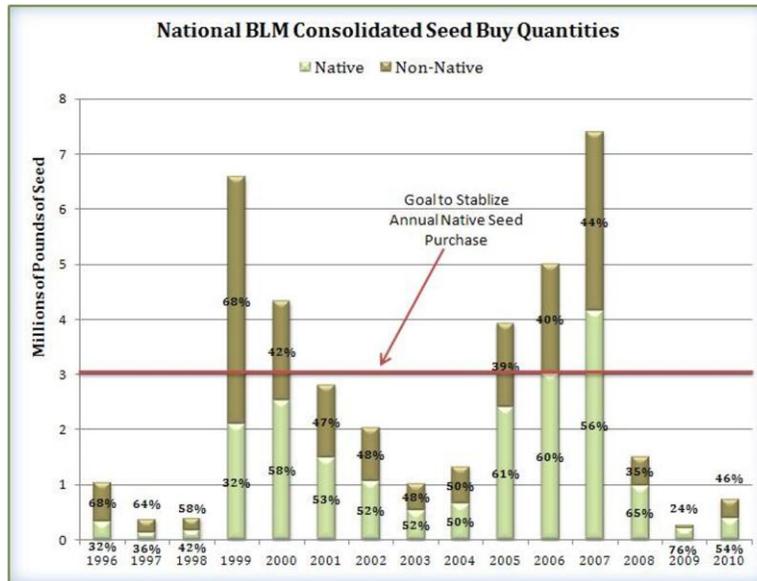


Figure 2. BLM's National **Consolidated Seed Buy** quantities between 1996 and 2010 and goal to stabilize the native seed market at 3 million pounds of native seed purchased annually

Warehouse capacity needs to increase in order to improve our ability to purchase and store select workhorse species and to help stabilize the commercial development and price of these seed. This increase in capacity will also increase our ability to store wildland seed collections. In years where the need for seed is lower, they would be stored in the appropriate environment for use in later years when demand is higher.

**BY IMPLEMENTING THIS STRATEGIC PLAN, THE COLORADO PLATEAU NATIVE PLANT PROGRAM WILL BE BETTER ABLE TO:**

- Increase the knowledge and understanding of the values and importance of using native plant materials for ecosystems restoration.
- Contribute to the increased availability of regionally adapted native plant materials for use in restoration of native plant communities.
- Identify and provide access to management practices that will result in the restoration of native plant communities.
- Provide an economic benefit to businesses in the Colorado Plateau and facilitate a market for native plant materials and services.

Participation in, and coordination with the Colorado Plateau Native Plant Program (CPNPP) is strictly voluntary, however a Memorandum of Understanding (MOU) will be developed, which will clarify participation and roles played by the various partners. It is the desire of participants in this program that actions be prioritized and conducted in the appropriate manner. Existing programs are free to continue working independently of the CPNPP, but will benefit from sharing information and coordinating efforts in order to limit the potential for redundancy in research and development of native plant materials.

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## VISION

*The vision of the Colorado Plateau Native Plant Program is a Colorado Plateau that supports healthy and resilient native plant communities now and for future generations.*

## GOALS AND OBJECTIVES

Three following goals were identified to assist in the development and ongoing operation of the Colorado Plateau Native Plant Program. Objectives are designed to meet immediate, as well as long term goals. Some represent one-time events, while others are ongoing with regularly scheduled updates. The timelines associated with each objective are described below.

### **Goal 1 – Identify existing and Future needs for native plant materials for restoration purposes on the Colorado Plateau**

#### **OBJECTIVES**

##### **1.1 Develop and Follow a Five-Year Strategy and Action Plan.**

**Action Item 1.1.1:** Update the 5-year strategy and action plan annually in accordance with the BLM’s Budget Planning System (BPS) in order to establish and maintain the program’s annual operating budget needs.

**Action Item 1.1.2:** Identify Partners for this program and develop a Memorandum of Understanding (MOU) that outlines the cooperation among Federal, State, Tribal, and local governments, and non-governmental partners and stakeholders in the development and implementation of an ecoregion-wide program (CPNPP) for the development of native plant materials for ecosystem restoration. Current and potential partners will be updated as necessary. A list of potential partners is included in [Appendix A](#).

**Action Item 1.1.3:** Identify current and future native plant materials needs on the Colorado Plateau. Update annually. [Appendix B](#) includes a list of species identified for development for this ecoregion.

**Action Item 1.1.4:** Evaluate existing and potential facilities for evaluation and increase of native species.

**Action Item 1.1.5:** Annual work plans will be completed in coordination with the BLM’s budget system and prior to the beginning of each fiscal year, which begins on October 1. These plans will be coordinated between the CPNPP and the established working groups (See Action Item 1.1.7 below).

**Action Item 1.1.6:** Establish a network of growers in the Colorado Plateau.

**Action Item 1.1.7:** Identify needed “Working Groups” to focus on a variety of tasks such as: 1) Grants and Agreements; 2) Web development and maintenance; 3) Outreach and Education; 4) Seed Certification and Increase; and 5) Liaison with private industry. Working group members will be selected from interested individuals associated with this program. No previous experience in any of the focus areas is required, but could be beneficial to completing associated tasks. Working group team members will determine the appropriate means for working on their tasks, including the number and timing of meetings, how meetings are to be conducted (e.g. in person or via conference calls). They will work closely with the CPNPP Coordinator to identify tasks, priorities, and expected completion dates.

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**Goal 2 – Follow the National Native Plant Materials Development Program protocol<sup>1</sup> to develop an adequate supply of diverse, economical, and regionally-adapted native plant materials for restoration efforts on the Colorado Plateau.**

**OBJECTIVES**

**2.1 Native Seed Collection**  
– *Annually collect seed from each of the four states included in the Colorado Plateau.*

**Action Item 2.1.1:**  
Work within the agencies and with partners to set criteria in order to establish a list of priority *Target Species*.

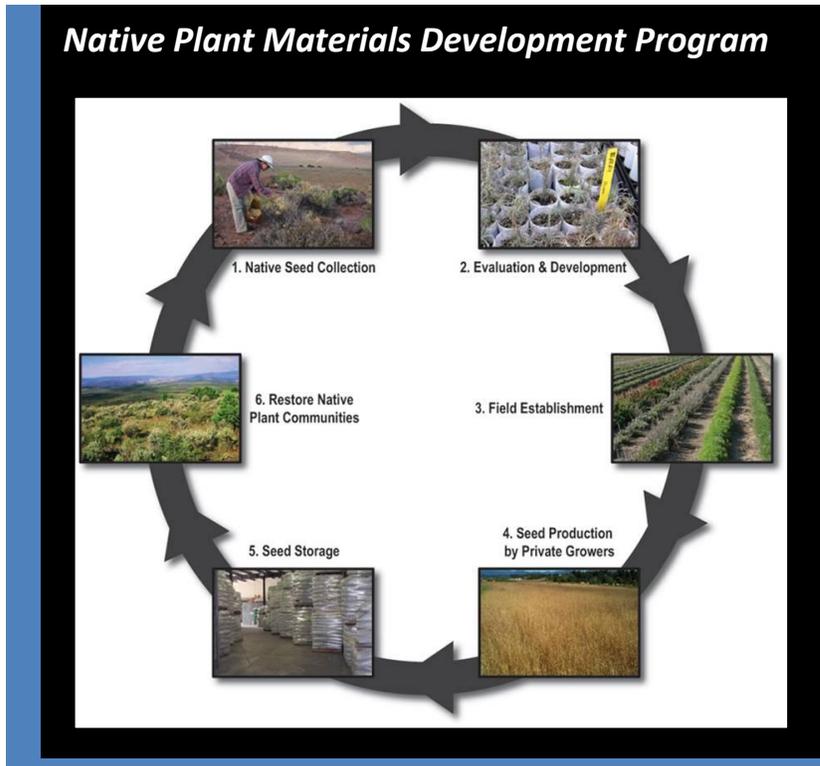
**Action Item 2.1.2:**  
Utilized Chicago Botanical Garden interns as well as other sources to collect *Target Species* in the Colorado Plateau.

**Action Item 2.1.2:**  
Inventory existing native seed materials, maintain information on species collected using the SOS collections form, and establish an on-line database of seed availability, location, and quantity.

**Action Item 2.1.3:** Work within the agency and with partners to establish a permitting process for improving the ability to allow needed wildland seed collections on public lands that: 1) is simple to implement; and 2) allows for monitoring where seeds are being collected; and 3) monitors the amount of seed being collected from each site.

**Action Item 2.1.4:** Assure that all collections include information necessary for *Site Identified* certification.

**2.2 Evaluation and Development – Begin/continue evaluation and development of priority target native plant materials.**



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<sup>1</sup> The National Native Plant Materials Development Program protocol includes six steps: 1) Native Seed Collection; 2) Evaluation and Development; 3) Field Establishment; 4) Seed Production by Private Growers; 5) Seed Storage; and 6) Restoration of Native Plant Communities. The CPNPP will not actively be involved in Restoring Native Plant Communities (Step 6), but will concentrate on following Steps 1-5 of this strategy and report accomplishments in each category annually.

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**Action Item 2.2.1:** Work with the USGS Southwest Biological Science Center, UP Partnership, NRCS Plant Material Centers, and other partners to evaluate native plant materials for future increase.

**Action Item 2.2.2:** Begin new genetic adaptability studies, and continue existing efforts, with focus on priority target species.

### **2.3 Field Establishment – Increase native seed for distribution to private growers.**

**Action Item 2.3.1:** Based on Evaluation and Development findings, establish increase fields for purposes of providing native seed to growers.

### **2.4 Seed Production by Private Growers**

Provide native seed to private growers in order to increase production of native plant materials. Focus on developing the program for growers in the Colorado Plateau, but use all available sources for increasing production.

**Action Item 2.4.1:** CPNPP will work closely with private growers to enable them to grow native plants for production of seed or other plant materials in demand for use especially within the Colorado Plateau. Assistance will be in the form of information about: 1) available native plant materials; and 2) known best management practices for the production of native plant materials; as well as through 3) workshops and field demonstrations addressing a wide variety of aspects associated with native plant materials.

### **2.5 Seed Storage**

Use existing facilities and identify future needs to store native plant materials for use in ecosystem restoration efforts.

**Action Item 2.5.1:** Identify native plant materials needs for restoration efforts beyond those necessary for Emergency Stabilization and Rehabilitation (ESR) and use available seed storage facilities to help stabilize the market for these materials.

**Action Item 2.5.2:** Identify additional seed storage needs and potential locations and partners to increase the capacity of storage facilities.

### **2.6 Ecosystem Restoration**

All research and development associated with this program is focused on the restoration or native ecosystems and are in support of the BLM's national Manual (1740) and Handbook (1740-2) direction.

### **2.7 Purchasing Authorities**

**While included in the National Native Plant Materials Development Program, it is an important objective to develop ecoregion-based protocols that assist in the creation of contracts and agreements to help maximize the cost effectiveness of available funding.**

## **Goal 3 – Identify existing methodologies and work with partners to develop and test new methodologies to ensure successful establishment and persistence of native plant materials.**

### **OBJECTIVES**

**3.1 Identify existing information regarding technology and methods for successfully establishing native plant materials.**

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**Action Item 3.1.1:** Work with partners, such as Plant Materials Centers, universities, and Forest Service Research to provide information regarding existing restoration technologies and identify research opportunities to improve those capabilities.

**3.2 Identify adaptable prescriptions for different landscapes and species.**

Information regarding existing prescriptions will be compiled, evaluated, and updated regularly as new information becomes available.

**Action Item 3.2.1:** Develop Restoration Paradigms and Guidelines that work to meet a variety of goals and objectives on the ground, and that are cost-effective.

**Action Item 3.2.2:** Use existing site information, such as Ecological Site Descriptions, within each ecological section to assist in the development of restoration prescriptions.

**Action Item 3.2.3:** Adaptable management prescriptions will be developed over time as different landscapes are defined and as species are identified for restoration and rehabilitation efforts.

**3.3 Ensure adequate evaluation of native plant materials for use in restoration.**

**Action Item 3.3.1:** Develop a screening guide to assist in the determination of the feasibility of using any given germplasm for release.

**Action Item 3.3.2:** Publish evaluation information on website as well as in hard copy format.

**Goal 4 – Communicate within agencies, partners, and the public regarding the roles, responsibilities, values, and products of the CPNPP.**

**OBJECTIVES**

**4.1 Establish demonstration areas, workshops, symposiums, publications, website, and other means to assist in efforts to inform individuals regarding the development and use of native plant materials for ecosystem restoration activities.**

**Action Item 4.1.1:** Develop Outreach and Education materials focused on conservation, sustainability, restoration, and research issues related to the development and use of native plant materials. Provide information to: 1) increase awareness of the importance of ecosystem restoration; 2) enhance knowledge and skills associated with ecosystem restoration; 3) identify potential knowledge gaps and any efforts underway or planned to fill those gaps; and 4) provide recommendations for achieving restoration goals.

**Action Item 4.1.2:** Identify existing demonstration areas in order to showcase the successes associated with the use of native plant materials in restoration efforts (identify the need for new demonstration areas).

**Action Item 4.1.3: Update the** CPNPP website at least quarterly. The web site will be a “living” element in the CPNPP program. It will include direction regarding how to find native plant materials for users. In addition, it will provide information to growers and other users about the status of species in development. Success stories will be highlighted and links will be made with other agency web pages.

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**Action Item 4.1.4:** CPNPP Coordinator will attend, as well as sponsor or co-sponsor workshops and/or symposia annually. These will provide an opportunity to share information gathered through efforts of the Initiative.

**Action Item 4.1.5:** Transcripts for publications will be submitted as appropriate for inclusion in conference and symposia proceedings.

**Action Item 4.1.6:** Identify other options available for communications of available information regarding the development and use of native plant materials.

#### ***4.2 Identify and stimulate interest in new products (releases) as they become available.***

**Action Item 4.2.1:** Develop a list of contacts including name, organization, location, phone, email, website, and capabilities by working group and by geographic area

**Action Item 4.2.2:** Announce the availability of information on the CPNPP web page regarding available and especially new releases of native seed to those included in the mailing list identified above in Objective 4.2, Action Item 1.

#### ***4.3 Develop outreach materials to assist in communications efforts***

**Action Item 4.3.1:** In addition to publications and websites, develop a brochure that illustrates the value and uses of native plant materials on the Colorado Plateau.

**Action Item 4.3.2:** Complete annual reports at the end of each calendar year to discuss efforts in progress and completed, as well as any necessary updates to the CPNPP Program.

## **ROLES OF THE CPNPP COORDINATOR**

The primary role of the CPNPP Coordinator is to maintain awareness and distribute information regarding research and development of native plant materials for Colorado Plateau restoration efforts. Following are duties that have been identified for the CPNPP Coordinator:

- Coordinate various actions dealing with the management of native plants on the Colorado Plateau for the BLM. Actions involving the restoration and conservation of native plant communities will be the focus of this program. **Emphasis will be placed on at-risk and degraded watersheds** to achieve broad improvements in ecosystem health on the Plateau.
- Ensure **coordination and consistency of native plant materials collection and development** and native plant management within and among the Plateau states of Utah, Colorado, New Mexico, and Arizona.
- Ensure that **development of native plant materials is conducted using proper protocol**. Coordinate these efforts with the appropriate State Offices and Washington Office Plant Conservation Program Lead, Seeds of Success Coordinator, and the National Seed Coordinator.
- Ensure that development of native plant materials is **coordinated internally with other BLM program needs**, such as Wildlife, Endangered Species, Fire, Riparian, Weeds, Range, and Energy Development.
- **Coordinate the organization of and the implementation** of the Colorado Plateau Native Plant Program. This will involve development of the **organization structure, identification of roles and responsibilities, and coordination** of all activities associated with the CPNPP. The incumbent will be the primary contact for the CPNPP.

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- **Coordinate activities with the various external entities** working with native plants on the Plateau including the Uncompahgre Plateau working group, various universities and colleges, other federal agencies (e.g. USFS, NPS, FWS, NRCS, ARS, and USGS), State agencies, such as the Utah Division of Wildlife Resources, CPCESU, and others.
  - Coordinate the **development or compilation of a management assessment and strategy** for the Plateau. This assessment and strategy will include an overall analysis of **biological, physical, and socio-economic elements** of the Plateau, identification of management concerns and needs, and criteria for use in identification and prioritization of management, conservation, and restoration activities.
  - Insure that strategies developed are **consistent with national and state initiatives and priorities for the Department of Interior and BLM**, including the Healthy Rangelands Initiative, Sagebrush Ecosystem Conservation Initiative, Healthy Forests Initiative, Healthy Land Initiative, etc.
  - Conduct outreach activities associated with native plant management on the Plateau to **coordinate scientific studies and research being conducted** by various universities and research organizations such as USGS, universities, and entities associated with the CPCESU.
  - **Provide technical expertise and technology transfer** including, but not limited to:
    - Web sites, peer reviewed publications, technical references, technical bulletins, technical notes, symposia, workshops, and field trips.
  - Coordinate and guide the **development and location of demonstration sites** that showcase the application of restoration and conservation activities and treatments on the Plateau.



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## **APPENDIX A: CURRENT PARTNERS OF THE COLORADO PLATEAU NATIVE PLANT PROGRAM**

The following is a list of Federal, State, Tribal, and local governments, and non-governmental partners and stakeholders in the development of native plant materials for ecosystem restoration on the Colorado Plateau (listed in alphabetical order). An MOU is currently (March 2011) being developed for partners to formalize partnerships with federal and state agencies. In addition,

- **Federal Agencies**
  - Bureau of Land Management State and District Offices – UT, CO, AZ, NM
  - US Geological Survey
  - US Forest Service – Intermountain, Rocky Mountain, & Southwestern Regions and Forests
  - US Forest Service – Rocky Mt. Research Station (Provo Shrub Lab, Albuquerque)
  - National Park Service
  - NRCS - Plant Material Centers ( Los Lunas, Aberdeen, Montrose)
  - US Fish and Wildlife Service Offices in AZ, CO, NM, & UT
  - USDA Agricultural Research Service
  
- **State Agencies**
  - Utah Division of Wildlife Resources
  - Colorado Division of Wildlife
  
- **Non-Governmental Organizations (NGOs)**
  - Northern Arizona Native Seed Alliance (NANSA)
  - The Nature Conservancy
  - Uncompahgre Partnership
  - Utah Partners for Conservation and Development
  - Tamarisk Coalition
  - Red Butte Gardens and Arboretum
  
- **Universities**
  - University of Utah
  - Northern Arizona University
  - Southern Utah University
  - Brigham Young University
  
- **Private Companies and Organizations**
  - Native Seed Companies & Nurseries
  - High Lonesome Ranch
  
- **Oil and Gas Companies**
  - Williams Company



## APPENDIX B: TARGET SPECIES FOR THE COLORADO PLATEAU

The following species were identified in 2006 by the BLM's National Native Plant Conservation Program Manager, National Seed Specialist, and Utah State Botanist except where noted. This list has not been prioritized, but the current emphasis is on the development of forbs because of the historic focus on grasses and the lack of available forb materials.

### GRASSES

| Scientific Name                 | Common Name                                  | Plant Communities <sup>2</sup> |
|---------------------------------|--|--------------------------------|
| <i>Achnatherum hymenoides</i>   | Indian ricegrass                             | Sands, ARTR, SDS               |
| <i>Achnatherum robusta</i>      | Sleepygrass                                  | SG, PJ, DS, PP                 |
| <i>Bouteloua aristidoides</i>   | Needle grama                                 | BB, DS, PJ                     |
| <i>Bouteloua barbata</i>        | Six weeks grama                              | DS                             |
| <i>Bouteloua curtipendula</i>   | Side oats grama                              | SDS, DS, SG, ARTR, PJ, PP      |
| <i>Bouteloua gracilis</i>       | Blue grama                                   | DS, SG, SDS, ARTR, PJ, PP      |
| <i>Bromus marginatus</i>        | Mountain brome <sup>3</sup>                  |                                |
| <i>Buchloe dactyloides</i>      | Buffalograss                                 | SG                             |
| <i>Distichlis stricta</i>       | Inland saltgrass                             | SDS, GW                        |
| <i>Elymus elymoides</i>         | Bottlebrush, squirreltail (Colorado Plateau) | DS, GW, SDS, ARTR, PJ, PP, MB  |
| <i>Elymus trachycaulus</i>      | Slender wheatgrass <sup>3</sup>              | ARTR, PJ, MB, DS               |
| <i>Hesperostipa comata</i>      | Needle and thread                            | Sands, DS, ARTR, PJ, MB        |
| <i>Hilaria jamesii</i>          | Galleta grass                                | SDS, BB, DS, PJ, GW            |
| <i>Koeleria macratha</i>        | Junegrass <sup>3</sup>                       | ARTR, PJ, MB, DS               |
| <i>Muhlenbergia asperifolia</i> | Scratchgrass                                 | SDS, ARTR, PJ                  |
| <i>Munroa squarrosa</i>         | False buffalograss                           | DS, SDS, ARTR, PJ, SG          |
| <i>Panicum virgatum</i>         | Switchgrass (Colorado Plateau)               | SG, TG, PJ, Meadows            |
| <i>Pascopyrum smithii</i>       | Western wheatgrass                           | ARTR, DS, PJ, MB               |
| <i>Poa fendleriana</i>          | Muttongrass <sup>3</sup>                     | ARTR, DS, PJ, MB               |
| <i>Poa secunda secunda</i>      | Sandberg's bluegrass (Colorado Plateau)      | DS, GW, ARTR, PJ, MB, SDS      |
| <i>Pseudoroegneria spicata</i>  | Bluebunch wheatgrass (Colorado Plateau)      | ARTR, DS, PJ, MB, PP           |
| <i>Schizachyrium scoparium</i>  | Little bluestem (Colorado Plateau source)    | SG, DS, PJ, PP, TG             |
| <i>Sporobolus airoides</i>      | Alkali sacaton                               | SDS, GW                        |
| <i>Sporobolus contractus</i>    | Spike dropseed                               | DS, PJ                         |
| <i>Sporobolus cryptandrus</i>   | Sand dropseed                                | PJ, Sands, ARTR                |
| <i>Vulpia octoflora</i>         | Six week fescue                              | SDS, BB, PJ, ARTR, GW, SG      |

<sup>2</sup> **Legend for Plant Communities:** ARTR: big sagebrush, BB: blackbrush, DS: desert shrub, GW: greasewood, MB: mountain brush, PJ: pinyon pine-juniper, PP: ponderosa pine, SDS: salt desert shrub, Sands: sandy soils, SG: shortgrass prairie, TG: tallgrass prairie

<sup>3</sup> Additional species suggested by botanists and range management specialists from the Dixie, Manti-LaSal, and Fishlake National Forests

## FORBS

| Scientific Name                                    | Common Name                             | Plant Communities              |
|--|---|--------------------------------|
| <i>Asclepias asperula</i>                          | Milkweed                                | DS, ARTR, PJ, MB, PP           |
| <i>Astragalus utahensis</i>                        | Utah milkvetch                          | ARTR, PJ, MB, SG               |
| <i>Balsamorhiza sagittata</i>                      | Arrowleaf balsamroot (Colorado Plateau) | ARTR, MB, PJ, PP               |
| <i>Cleome lutea</i>                                | Yellow beeplant                         | DS, SDS, PJ, PP                |
| <i>Crepis occidentalis</i>                         | Western hawksbeard                      | ARTR, PJ, MB                   |
| <i>Cryptantha tenuis</i>                           | Slender cryptanth                       | BB, SDS, DS, ARTR, PJ, MB      |
| <i>Cymopterus purpureus</i>                        | Sweetroot spring-parsley                | ARTR, PJ, MB, PP, Sands, Clays |
| <i>Erigeron pumilis</i> or <i>E. canus</i>         | Vernal daisy                            | SDS, ARTR, MB, PJ, PP          |
| <i>Gaillardia pinnatifida</i> / <i>G. aristida</i> | Blanketflower                           | BB, DS, PJ, PP                 |
| <i>Hedysarum boreale</i>                           | Northern sweetvetch                     | ARTR, DS, PJ, MB, PP           |
| <i>Ipomopsis aggregata</i>                         | Skyrocket gilia                         | ARTR, PJ, PP, Riparian         |
| <i>Lathyrus lanszwertia</i>                        | Sweetpea                                | MB, Riparian, PP, ARTR         |
| <i>Lupinus caudatus</i>                            | Utah lupine                             | ARTR, PJ, MB, PP, SG           |
| <i>Malacothrix sonchoides</i>                      | Desert dandelion                        | BB, DS, ARTR, PJ               |
| <i>Mentzelia albicaulis</i>                        | Small-flower blazing-star               | BB, GW, DS, ARTR, SG, PJ, PP   |
| <i>Mentzelia multiflora</i>                        | Smoothstem blazing-star                 | DS, SDS, ARTR                  |
| <i>Mirabilis multiflora</i>                        | Four O'clock                            | BB, PJ                         |
| <i>Oenothera elata</i>                             | Colorado Plateau evening-primrose       | ARTR, PJ, PP, Riparian, Sands  |
| <i>Oenothera pallida</i>                           | White evening-primrose                  | GW, DS, BB, ARTR, PJ, MB, PP   |
| <i>Orthocarpus purpureoalbus</i>                   | Owlslover                               | ARTR, PJ, MB, PP               |
| <i>Penstemon barbatus</i>                          | Beardlip penstemon                      | PP, Riparian, Sands            |
| <i>Penstemon eatonii</i>                           | Firecracker penstemon                   | BB, DS, ARTR, PJ, PP, MB       |
| <i>Penstemon lentus</i>                            | Abajo penstemon                         | ARTR, PJ, MB, PP, Sands        |
| <i>Phacelia crenulata</i> & <i>hastata</i>         | Desert bluebells                        | SDS, PJ, ARTR, MB, PP          |
| <i>Ratibida columnaris pulchella?</i>              | Red Mexican-hat                         | SDS, ARTR                      |
| <i>Sphaeralcea parvifolia</i>                      | Small-flower globemallow                | DS, BB, SDS, ARTR, PJ, MB      |
| <i>Viguiera multiflora</i>                         | Goldeneye                               | ARTR, PJ, MB                   |
| <i>Wyethia arizonica</i>                           | Mulesear                                | PP, MB, PJ                     |
| <i>Wyethia scabra</i>                              | Wyethia                                 | BB, DS, PJ, PP, Sands          |
| <i>Yucca angustissima</i>                          | Narrowleaf yucca                        | Sands, BB, ARTR, PJ, PP        |
| <i>Yucca baccata</i> or <i>Y. bailey</i>           | Bananaleaf yucca                        | DS, PJ, PP, ARTR, MB           |

## SHRUBS

| Scientific Name                             | Common Name                             | Plant Communities                   |
|---|---|-------------------------------------|
| <i>Amelanchier utahensis</i>                | Utah serviceberry                       | Riparian, MB, ARTR, SG, PJ, PP      |
| <i>Artemisa filifolia</i>                   | Sand sage                               | Sands, BB, DS, PJ                   |
| <i>Artemisia nova</i>                       | Black sagebrush v                       | GW, ARTR, DS, PJ, MB                |
| <i>Artemisia spinescens</i>                 | Bud sagebrush                           | DS, GS, BB, PJ, Silt, Clay, Gravels |
| <i>Artemisia tridentata tridentata</i>      | Basin big sagebrush                     | ARTR, PJ, DS                        |
| <i>Artemisia tridentata vaseyana</i>        | Mountain big sagebrush                  | ARTR, DS, PJ, MB, PP                |
| <i>Artemisia tridentata wyomingensis</i>    | Wyoming big sagebrush v                 | DS, ARTR, PJ, MB                    |
| <i>Artemisia tripartita</i>                 | Three-tip sagebrush                     | ARTR, MB                            |
| <i>Atriplex canescens</i>                   | Fourwing saltbush (southwestern states) | SDS, ARTR, GW, PJ, MB, SG, Sands    |
| <i>Atriplex confertifolia</i>               | Shadscale                               | GW, DS, SDS, ARTR, PJ               |
| <i>Atriplex nuttallii, obovata, cuneata</i> | Castle Valley saltbush                  | DS, GW, SDS, ARTR, Saline, Riparian |
| <i>Cercocarpus intricatus</i>               | Littleleaf mountain mahogany            | DS, PJ, MB, PP                      |
| <i>Cercocarpus montanus</i>                 | Mountain mahogany                       | MB, ARTR, PJ, PP                    |
| <i>Chrysothamnus nauseosus</i>              | Rubber rabbitbrush                      | ARTR, PJ, DS, Saline, Riparian      |
| <i>Coleogyne ramosissima</i>                | Blackbrush                              | BB, DS, Sands, Clays                |
| <i>Ephedra nevadensis</i>                   | Nevada Mormon-tea                       | DS, SDS, BB, ARTR, PJ, Sands        |
| <i>Ephedra viridis</i>                      | Green ephedra                           | DS, BB, SDS, Sand, ARTR, MB, PJ     |
| <i>Eriogonum cernuum</i>                    | Nodding buckwheat                       | DS, SDS, ARTR, PJ, MB, PP           |
| <i>Eriogonum corymbosum</i>                 | Crispleaf buckwheat                     | DS, BB, PJ, PP, ARTR                |
| <i>Eriogonum deflexum</i>                   | Skeleton buckwheat                      | BB, DS, PJ                          |
| <i>Eriogonum divaricatum</i>                | Spreading buckwheat                     | DS, GW, PJ                          |
| <i>Eriogonum inflatum</i>                   | Desert buckwheat                        | DS, SDS, BB                         |
| <i>Eriogonum umbellatum</i>                 | Sulphur buckwheat                       | ARTR, MB, PJ, PP                    |
| <i>Eriogonum wrightii</i>                   | Wright's buckwheat                      | PJ, MB, ARTR, PP                    |
| <i>Falugia paradoxa</i>                     | Apache-plume                            | DS, Riparian, BB, ARTR, PJ          |
| <i>Fraxinus anomala</i>                     | Single-leaf ash                         | BB, DS, PJ, PP, MB                  |
| <i>Grayia spinosa</i>                       | Spiny hopsage                           | BB, DS, SDS, ARTR, PJ               |
| <i>Juniperus monosperma</i>                 | One-seed juniper                        | MB, PJ, SG                          |
| <i>Juniperus osteosperma</i>                | Utah juniper                            | Riparian, DS, ARTR, MB, PJ, PP      |
| <i>Juniperus scopulorum</i>                 | Rocky Mtn. juniper                      | MB, PJ, PP                          |
| <i>Krashennikovia lanata</i>                | Winterfat                               | DS, SDS, ARTR, PJ                   |
| <i>Larrea tridentata</i>                    | Creosote bush (South Colorado Plateau)  | DS, BB                              |
| <i>Mahonia fremontii</i>                    | Fremont's barberry                      | DS, SDS, PJ, MB                     |
| <i>Pinus edulis</i>                         | Pinyon pine                             | ARTR, MB, PJ, PP                    |
| <i>Pinus monophylla</i>                     | Single-leaf pinyon pine                 | ARTR, MB, PJ                        |
| <i>Pinus ponderosa</i>                      | Ponderosa pine (Colorado Plateau)       | PP, MB                              |
| <i>Purshia mexicana</i>                     | Cliffrose                               | BB, PJ, PP, DS, MB                  |
| <i>Purshia tridentata</i>                   | Bitterbrush                             | ARTR, MB, PJ, PP                    |
| <i>Quercus gambelii</i>                     | Gambel's oak                            | MB, ARTR, PJ, PP, Riparian          |
| <i>Quercus pauciloba/Q. undulata</i>        | Wavy-leaf oak                           | ARTR, MB, PJ, PP                    |
| <i>Rhus trilobata</i>                       | Lemonade bush                           | Riparian, MB, PJ                    |
| <i>Sarcobatus vermiculatus</i>              | Greasewood                              | GW, SDS, Saline Riparian            |
| <i>Zuckia brandegei</i>                     | Siltbush                                | Sands, Silts, DS                    |