

# Vascular Plant Checklist of the Chimney Spring and Limestone Flats Prescribed Burning Study Areas Within Ponderosa Pine Experimental Forests in Northern Arizona



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**Abstract**—This paper presents a vascular plant species list for two sites that are part of a long-term study exploring the effects of varying fire intervals on forest characteristics including the abundance and composition of understory vegetation. The Chimney Spring study area is on the Fort Valley Experimental Forest near Flagstaff, AZ and the Limestone Flats study area is on the Long Valley Experimental Forest, 90 km (56 mi) southeast of Flagstaff. Since 1976 (Chimney Spring) and 1977 (Limestone Flats), three replicates of each of seven burn intervals (1, 2, 4, 6, 8, 10 years, plus unburned) have been maintained by the USFS Pacific Southwest Research Station. Each study area encompasses approximately 40 to 48 ha (99 to 119 acres) of dense ponderosa pine (*Pinus ponderosa*) forest. Our plant species list was generated through systematic sampling of the understory vegetation in 2006 and 2007 as well as surveys of the entire study areas for additional species. We documented a total of 147 species, with 96 species found at Chimney Spring and 123 species at Limestone Flats. There are eight introduced species on the list, with six introduced species found at Chimney Spring and seven found at Limestone Flats. All of the exotic species we found have been intentionally introduced to North America, either directly or indirectly, and are widespread throughout the United States so their presence at these sites is not surprising. This survey will serve as baseline information for these two sites when examining future floristic changes due to continued research on fuels management and prescribed fire.

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**In:** Olberding, Susan D., and Moore, Margaret M., tech coords. 2008. Fort Valley Experimental Forest—A Century of Research 1908-2008. Proceedings RMRS-P-53CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 408 p.

# Introduction

In 1976, a long-term prescribed burn study was initiated by the USFS, Rocky Mountain Forest and Range Experiment Station at the Chimney Spring study area on the Fort Valley Experimental Forest. A year later a similar study was begun at the Limestone Flats study area on the Long Valley Experimental Forest. These studies were designed to examine the effects of varying burn intervals on several forest characteristics including the abundance and composition of understory vegetation. At these study sites 1-ha (2.5 acres) plots have been burned at different frequencies ranging from every year to every ten years for the past 30 years using low-severity fall burns (Sackett and others 1996). At various intervals throughout the last 30 years, data on the abundance and composition of the understory vegetation has been collected as part of these long-term studies.

In 2006 and 2007 we continued the long-term sampling of the understory vegetation using the original sampling protocols for both sites augmented with additional sampling and survey methods. We have compiled a vascular plant species list for Chimney Spring and Limestone Flats from a combination of the recent sampling and surveys of the entire study areas in 2006 and 2007. Although this is a long-term study, historical data is not presented here because prior data was not collected at the same scale (entire site) as the data presented in this paper.

## Methods

### *Study Area and History*

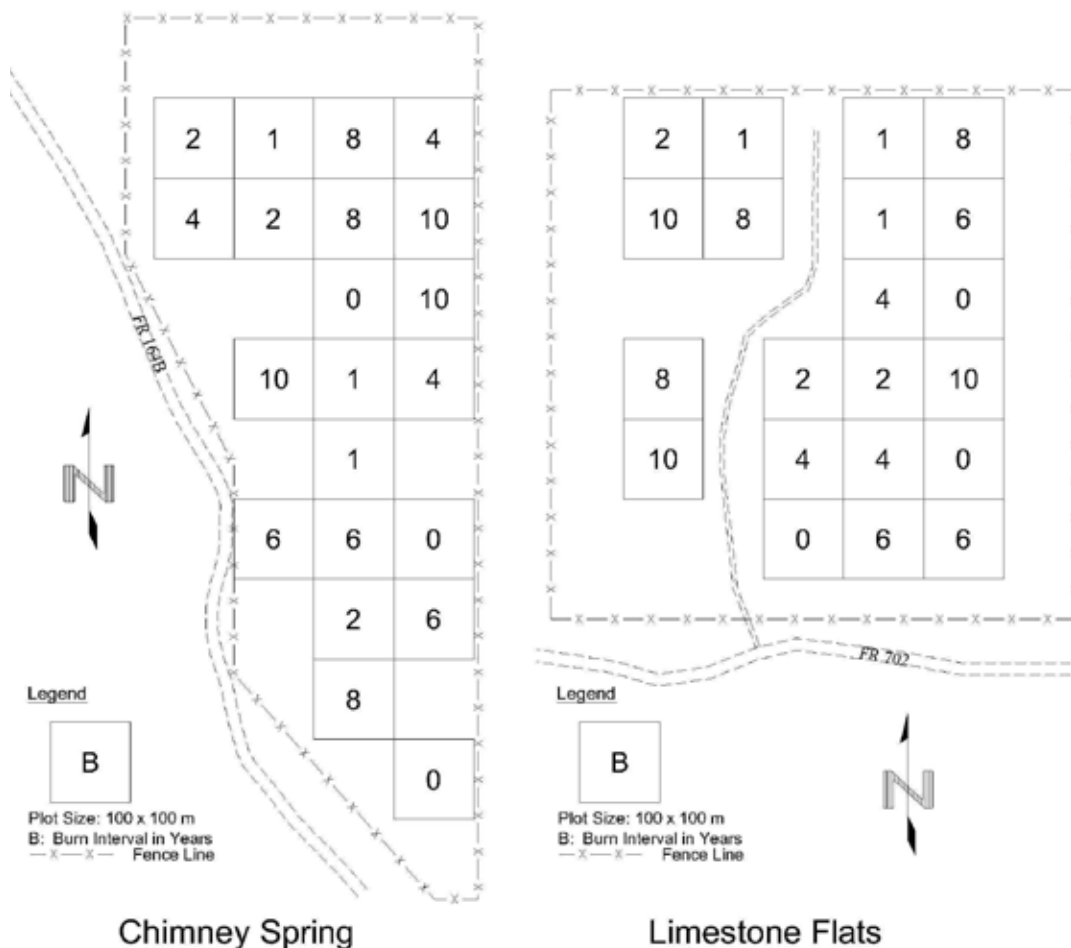
Both study areas are within the Coconino National Forest in northern Arizona. These sites are dominated by dense stands of an almost exclusive *Pinus ponderosa* (ponderosa pine) overstory with a bunchgrass understory dominated by *Festuca arizonica* (Arizona fescue) and *Elymus elymoides* (squirreltail). Chimney Spring is located approximately 11 km (7 mi) northwest of Flagstaff, Arizona at an elevation of 2250 m (7380 ft) on basalt soils with an average annual precipitation of 56 cm (22 inches) (U.S. Department of Agriculture 1995, Western Regional Climate Center 2007). Limestone Flats is approximately 90 km (56 mi) southeast of Flagstaff at an elevation of 2100 m (6900 ft) on limestone/sandstone soils with an average annual precipitation of 66 cm (26 inches) (U.S. Department of Agriculture 1995, Western Regional Climate Center 2007).

Before 1876, surface fires were common at both sites with mean fire intervals averaging 2.5 years (Swetnam and Baisan 1996). Dendrochronological studies in this region document that this frequent fire regime was abruptly halted in the late 1800s primarily due to grazing, logging, and fire suppression (Dieterich 1980a, Dieterich 1980b, Fulé and others 1997, Swetnam and Baisan 1996). Neither site has experienced wildfire since that time. Livestock have been excluded from the study sites since before the studies began and the sites have never been logged with only a few downed and mistletoe-infested trees removed from the sites (Dieterich 1980b, Sackett 1980, Sutherland and others 1991).

## Study Design

The same general study design is used at both Chimney Spring and Limestone Flats. The design includes seven different burn intervals: an unburned control and 1, 2, 4, 6, 8, and 10-year burn frequencies. Chimney Spring encompasses approximately 40 ha (99 acres) and Limestone Flats encompasses approximately 48 ha (119 acres). Each study area is divided into 21 1-ha (2.5 acres) plots, separated by 1-m (3-ft) wide firelines, with each plot randomly assigned one of the seven burn intervals with three replicates of each interval (Figure 1). Beginning in 1976 at Chimney Spring and in 1977 at Limestone Flats, the plots were burned using low-severity fall burns according to each assigned burn frequency.

The original sampling design for the understory vegetation at Chimney Spring used a total of 200 20- x 50-cm (8- x 20-inches) quadrats spaced at 1-m (3-ft) intervals within four permanent 5- x 26-m (16- x 85-ft) subplots in each plot. At Limestone Flats the original understory sampling design is different from that at Chimney Spring. Five permanent 21-m (70-ft) transects were installed in each plot with six 30- x 60-cm (1- x 2-ft) quadrats per transect spaced at 3-m (10-ft) intervals, for a total of 30 quadrats per plot.



**Figure 1.** Plot layouts for the Chimney Spring and Limestone Flats study areas. Numbers indicate the assigned burn interval. Chimney Spring is located at 111° 41' 7.1" W and 35° 16' 0.4" N. Limestone Flats is located at 111° 19' 39" W and 34° 33' 37.9" N.

In 2006 and 2007 a list of the understory flora was compiled at both sites using the above sampling designs. In addition, in 2007 species composition was measured at both sites by systematically searching a 25- x 52-m (82- x 170-ft) subplot within each plot. In addition to the above sampling, both study areas were surveyed in 2006 and 2007 in their entirety for any species not previously found during the sampling. We walked the entire study area, for both sites, within the fence line several times throughout the growing season (from early spring to late fall) and collected any additional species that we had not previously observed.

Nomenclature and nativity are based on Flora of North America (Flora of North America Editorial Committee 1993+), Intermountain Flora (Cronquist and others 1972+), and Arizona Flora (Kearney and Peebles 1960) in that order of priority. The plant checklist format incorporates the guidelines from Palmer and others (1995). Species were verified at the Rocky Mountain Herbarium at the University of Wyoming in Laramie and at the Deaver Herbarium in Flagstaff, Arizona. We deposited voucher specimens at the USFS herbarium at the Rocky Mountain Research Station in Flagstaff, Arizona. Voucher specimens have been collected for nearly all species from both sites and we hope to complete our collection in 2008.

## Results

The vascular plant species list was compiled from the sampling and survey methods described above for the Chimney Spring and Limestone Flats study areas (Appendix A). Table 1 provides a floristic summary of the species found at these study areas. We documented a total of 147 species, with 96 species found at Chimney Spring and 123 species at Limestone Flats. The species list consists of 40 families; 30 at Chimney Spring and 36 at Limestone Flats. There are 24 plant species unique to Chimney Spring and 51 species unique to Limestone Flats. At Chimney Spring, 73 (76 percent) species are forbs, 16 (17 percent) graminoids, and 7 (7 percent) woody species. At Limestone Flats the proportion of species in each functional group is similar with 93 (75 percent) forbs, 23 (19 percent) graminoids, and 7 (6 percent) woody species. Waif species were excluded from this list. There are eight introduced species on the list, with six introduced species found at Chimney Spring and seven found at Limestone Flats. The introduced species range in rate of occurrence from infrequent (difficult to find but found in several locations) to frequent (easily found in common habitats but not dominant) (Palmer and others 1995). *Linaria dalmatica* occurs frequently, *Medicago lupulina*, *Rumex acetosella*, *Taraxacum officinale*, *Tragapogon dubius*, and *Verbascum thapsus* occur occasionally, while *Bromus tectorum* and *Poa pratensis* occur infrequently at Chimney Spring and occasionally at Limestone Flats. The list contains three species that are endemic to northern Arizona: *Draba asprella*, *Hymenoxys jamesii*, and *Triteleia lemmoniae*.

**Table 1.** Floristic summary of the vascular plant species at the Chimney Spring and Limestone Flats Study Areas for 2006 and 2007.

Group	Species				
	Families	Genera	Native	Exotic	Total
Gymnosperm	2	3	5	0	5
Monocot	6	25	29	2	31
Dicot	32	91	105	6	111
Total	40	119	139	8	147

## Discussion

A five-year study examining the effects of prescribed burning on ponderosa pine understory vegetation at sites near both study areas found similar proportions of forb, graminoid, and woody species: 72, 20, and 8 percent respectively (Fowler, data on file). Although that study had greater total species richness (269 vs. 147), it also sampled larger, more diverse habitats, so our survey methods have likely found most of the flora at these sites. We estimate that we have found at least 85 percent of the species at these sites. Short-lived annuals were likely among the under-represented species.

All of the exotic species we found have been intentionally introduced to North America, either directly or indirectly, through seeding programs, as seed contaminants, or in the case of *Linaria dalmatica*, as an ornamental plant (Dodge and others 2008, Fowler and others 2008, Mack and Erneberg 2002). These introduced species are widespread throughout the United States (the western U.S. for *Linaria dalmatica*) so their presence at these sites is not surprising. Although some of these species occur frequently at these study sites, their overall abundance is still quite low. The low abundance and richness of these exotic species at Chimney Spring and Limestone Flats is consistent with other studies that have examined the effects of low levels of disturbance, such as low-severity fire, on invasive species (Crawford and others 2001, Fowler and others 2008, Griffis and others 2001). We were unable to determine the nativity of *Lepidium virginicum* to northern Arizona due to conflicting information from authoritative sources.

This survey will serve as baseline information for these two sites when examining future floristic changes due to continued research on fuels management and prescribed fire practices in the absence of tree harvesting.

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# Appendix A

## *Checklist of Vascular Plants of the Chimney Spring and Limestone Flats Study Areas*

The annotational abbreviations used in this checklist are: native (N), exotic (E), uncertain (U), conservation concern (C). The conservation concern comment is based on Flora of North America Editorial Committee (1993+). The site location abbreviations are as follows: Chimney Spring (CS) and Limestone Flats (LF). The frequency of occurrence ratings follow guidelines set by Palmer and others (1995) and are: abundant, dominant or codominant in one or more common habitats; frequent, easily found in one or more common habitats but not dominant in any common habitat; occasional, widely scattered but not difficult to find; infrequent, difficult to find with few individuals or colonies but found in several locations; rare, very difficult to find and limited to one or very few locations or uncommon habitats. These ratings apply specifically to these two study sites and not the larger area. The species noted as Endemic are endemic to northern Arizona.

### **Apiaceae**

*Cymopterus lemmonii* (J.M. Coult & Rose) Dorn. N, CS frequent, LF frequent

### **Asclepiadaceae**

*Asclepias asperula* (Decne.) Woodson. Antelope horns, N, LF infrequent

### **Asteraceae**

*Achillea millefolium* Linnaeus. Common yarrow, N, CS frequent, LF occasional

*Ageratina herbacea* (A. Gray) R.M. King & H. Robinson. N, LF infrequent

*Agoseris parviflora* (Nuttall) D. Dietrich. N, CS occasional, LF occasional

*Amauriopsis dissecta* (A. Gray) Rydberg. N, CS occasional, LF occasional

*Antennaria marginata* Greene. White-margin pussytoes, N, CS occasional, LF occasional

*Antennaria parvifolia* Nuttall. Small-leaf pussytoes, N, CS frequent, LF frequent

*Antennaria rosulata* Rydberg. Kaibab pussytoes, N, CS infrequent, LF infrequent

*Artemisia carruthii* Alph. Wood ex Carruth. N, CS occasional, LF occasional

*Artemisia ludoviciana* Nuttall subsp. *mexicana* (Willdenow) ex Sprengel D.D. Keck. N, CS occasional, LF occasional

*Chrysothamnus viscidiflorus* (Hooker) Nuttall. N, CS infrequent

*Cirsium wheeleri* (A. Gray) Petrak. N, CS frequent, LF frequent

*Conyza canadensis* (Linnaeus) Cronquist. N, LF occasional

*Dieteria canescens* (Pursh) Nuttall var. *canescens*. N, CS infrequent

*Erigeron divergens* Torrey & A. Gray. N, CS frequent, LF frequent

*Erigeron flagellaris* A. Gray. N, CS occasional

*Erigeron formosissimus* Greene var. *viscidus* (Rydberg) Cronquist. N, CS occasional, LF occasional  
*Erigeron speciosus* (Lindley) de Candolle. N, LF occasional  
*Erigeron tracyi* Greene. N, LF infrequent  
*Heliomeris multiflora* Nuttall var. *nevadensis* (A. Nelson) W.F. Yates. N, CS occasional, LF occasional  
*Heterotheca villosa* (Pursh) Shinnars var. *pedunculata* (Greene) V.L. Harms ex Semple. N, LF frequent  
*Hieracium fendleri* Schultz-Bipontinus. N, CS occasional, LF frequent  
*Hymenopappus mexicanus* A. Gray. N, LF occasional  
*Hymenoxys bigelovii* (A. Gray) K.F. Parker. N, CS occasional, LF occasional  
*Hymenoxys jamesii* Bierner. N, LF infrequent, Endemic, C  
*Laennecia schiedeana* (Lessing) G.L. Nesom. N, CS frequent, LF occasional  
*Packera multilobata* (Torrey & A. Gray) W.A. Weber & A. Löve. N, CS frequent  
*Packera neomexicana* (A. Gray) W.A. Weber & A. Löve var. *neomexicana*. N, LF frequent  
*Pseudognaphalium macounii* (Greene) Kartesz. N, CS frequent, LF occasional  
*Senecio actinella* Greene. N, CS infrequent, LF occasional  
*Senecio eremophilus* Richardson var. *kingii* Greenman. N, CS infrequent  
*Senecio wootonii* Greene. N, CS infrequent  
*Solidago velutina* de Candolle subsp. *sparsiflora*. N, CS frequent, LF frequent  
*Symphotrichum falcatum* (Lindley) G.L. Nesom var. *commutatum* (Torrey & A. Gray) G.L. Nesom. N, CS occasional, LF occasional  
*Taraxacum officinale* F.H. Wiggers. Common dandelion, E, CS occasional, LF occasional  
*Townsendia exscapa* (Richardson) Porter. N, LF infrequent  
*Tragopogon dubius* Scopoli. Yellow salsify, E, CS occasional, LF occasional

### **Berberidaceae**

*Berberis repens* Lindley. N, LF occasional

### **Boraginaceae**

*Lithospermum multiflorum* Torr. ex A. Gray. N, CS infrequent, LF occasional

### **Brassicaceae**

*Boechera fendleri* (S. Watson) W.A. Weber. N, CS infrequent  
*Draba asprella* Greene. N, LF frequent, Endemic  
*Hesperidanthus linearifolius* (A. Gray) Rydb. N, LF infrequent  
*Lepidium virginicum* L. var. *virginicum*. U, LF occasional  
*Noccaea montana* (L.) F.K. Mey. N, LF occasional  
*Pennellia longifolia* (Benth.) Rollins. N, CS infrequent, LF infrequent

## **Caryophyllaceae**

- Arenaria lanuginosa* (Michaux) Rohrbach var. *saxosa* (A. Gray) Zarucchi. N, CS occasional, LF occasional  
*Cerastium nutans* var. *obtectum* Rafinesque. N, LF infrequent  
*Drymaria leptophylla* (Chamisso & Schlechtendal) Fenzl ex Rohrbach var. *leptophylla*. N, CS occasional, LF infrequent  
*Silene antirrhina* Linnaeus. N, LF infrequent  
*Silene laciniata* (A. Gray) C.L. Hitchcock & Maguire subsp. *greggii* Cavanilles. N, LF occasional

## **Chenopodiaceae**

- Chenopodium berlandieri* Moquin-Tandon. N, CS infrequent  
*Chenopodium fremontii* S. Watson. N, CS infrequent, LF infrequent  
*Dysphania graveolens* (Willdenow) Mosyakin. N, CS frequent, LF occasional

## **Commelinaceae**

- Commelina dianthifolia* Delile. N, LF occasional  
*Tradescantia pinetorum* Greene. N, LF infrequent

## **Convolvulaceae**

- Ipomoea plummerae* Gray. N, CS occasional, LF infrequent

## **Cupressaceae**

- Juniperus deppeana* Steudel var. *deppeana*. Alligator juniper, N, LF occasional  
*Juniperus monosperma* (Engelmann) Sargent. One-seed juniper, N, LF infrequent  
*Juniperus scopulorum* Sargent. Rocky Mountain juniper, N, LF infrequent

## **Cyperaceae**

- Carex occidentalis* L.H. Bailey. N, CS frequent, LF frequent  
*Cyperus fendlerianus* Boeckeler. N, CS infrequent, LF occasional

## **Ericaceae**

- Pterospora andromedea* Nutt. Pinedrops, N, LF rare

## **Euphorbiaceae**

- Chamaesyce serpyllifolia* (Pers.) Small. N, CS infrequent, LF infrequent  
*Euphorbia brachycera* Engelm. N, CS infrequent, LF occasional  
*Tragia ramosa* Torr. N, CS infrequent

## **Fabaceae**

- Astragalus humistratus* A. Gray. N, CS frequent, LF infrequent  
*Astragalus tephrodes* Gray var. *brachylobus* (Gray) Barneby. N, LF occasional  
*Cologania longifolia* Gray. N, CS infrequent, LF infrequent  
*Dalea candida* Michx. ex Willd. White prairie clover, N, LF infrequent  
*Dalea filiformis* Gray. N, LF infrequent

*Lathyrus lanszwertii* Kellogg var. *leucanthus* (Rydb.) Dorn. N, LF occasional  
*Lotus wrightii* (A. Gray) Greene. N, CS frequent, LF frequent  
*Lupinus argenteus* Pursh var. *hillii* (Greene) Barneby. N, CS occasional, LF frequent  
*Medicago lupulina* L. Black medick, E, LF occasional  
*Oxytropis lambertii* Pursh. Purple locoweed, N, CS occasional, LF infrequent  
*Thermopsis rhombifolia* (Nutt. ex Pursh) Richardson var. *ovata* (Robinson ex Piper) Egely. N, CS infrequent  
*Trifolium longipes* Nutt. var. *rusbyi* (Greene) H. Harrington. N, CS occasional, LF infrequent  
*Vicia americana* Muhl. ex Willd. N, CS frequent, LF occasional

### **Fagaceae**

*Quercus gambelii* Nuttall. Gambel oak, N, CS infrequent, LF occasional

### **Geraniaceae**

*Geranium caespitosum* E. James. N, CS occasional, LF occasional

### **Grossulariaceae**

*Ribes cereum* Douglas. Wax currant, N, CS infrequent

### **Hydrophyllaceae**

*Nama dichotomum* (Ruiz & Pavon) Choisy. N, CS occasional  
*Phacelia heterophylla* Pursh var. *heterophylla*. N, LF infrequent

### **Iridaceae**

*Iris missouriensis* Nuttall. Rocky Mountain iris, N, CS frequent

### **Lamiaceae**

*Prunella vulgaris* L. var. *lanceolata* (W. Barton) Fern. N, LF infrequent

### **Liliaceae**

*Echeandia flavescens* (Schultes & Schultes f.) Cruden. N, CS occasional, LF infrequent  
*Triteleia lemmoniae* (S. Watson) Greene. N, LF infrequent, Endemic

### **Linaceae**

*Linum australe* A. Heller. N, CS infrequent, LF occasional

### **Nyctaginaceae**

*Mirabilis linearis* var. (Pursh) Heimerl var. *decipiens* (Standley) S.L. Welsh. N, CS infrequent

### **Onagraceae**

*Gayophytum racemosum* Torr. & A. Gray. N, CS occasional, LF occasional  
*Gayophytum ramosissimum* Torr. & A. Gray. N, LF infrequent  
*Oenothera laciniata* Hill. N, LF occasional

## Orchidaceae

*Malaxis soulei* L.O. Williams. N, LF occasional

*Corallorhiza maculata* (Rafinesque) Rafinesque var. *maculata*. N, CS infrequent

## Oxalidaceae

*Oxalis caerulea* (Small) Kunth. N, CS infrequent, LF infrequent

## Pinaceae

*Pinus ponderosa* Douglas ex Lawson & C. Lawson var. *scopulorum*

Engelmann. Rocky Mountain ponderosa pine, N, CS abundant, LF abundant

*Pseudotsuga menziesii* (Mirbel) Franco var. *glauca* (Mayr) Franco. Rocky Mountain Douglas-fir, N, CS infrequent

## Plantaginaceae

*Plantago patagonica* Jacq. N, LF occasional

## Poaceae

*Agrostis scabra* Willd. N, LF infrequent

*Aristida arizonica* Vasey. Arizona threeawn, N, LF occasional

*Blepharoneuron tricholepis* (Torr.) Nash. Pine dropseed, N, CS frequent, LF frequent

*Bouteloua gracilis* (Kunth) Lag. ex Griffiths. Blue gramma, N, CS frequent, LF occasional

*Bromus ciliatus* L. Fringed brome, N, CS occasional

*Bromus tectorum* L. Cheatgrass, E, CS infrequent, LF occasional

*Dichanthelium oligosanthes* (Schult.) Gould. N, LF infrequent

*Elymus elymoides* (Raf.) Swezey subsp. *brevifolius* (J.G. Sm.) Barkworth. Squirreltail, N, CS abundant, LF frequent

*Eragrostis mexicana* (Hornem.) Link subsp. *mexicana*. N, LF occasional

*Festuca arizonica* Vasey. Arizona fescue, N, CS abundant, LF abundant

*Koeleria macrantha* (Ledeb.) Schult. Junegrass, N, LF frequent

*Muhlenbergia minutissima* (Steud.) Swallen. N, CS infrequent, LF occasional

*Muhlenbergia montana* (Nutt.) Hitchc. Mountain muhly, N, CS frequent, LF frequent

*Muhlenbergia ramulosa* (Kunth) Swallen. N, CS occasional, LF infrequent

*Muhlenbergia straminea* Hitchc. Screwleaf muhly, N, CS infrequent, LF occasional

*Muhlenbergia wrightii* Vasey ex J.M. Coult. Spike muhly, N, CS occasional, LF infrequent

*Panicum bulbosum* Kunth. Bulb panicgrass, N, LF infrequent

*Piptochaetium pringlei* (Beal) Parodi. Pringle's speargrass, N, LF occasional

*Poa fendleriana* (Steud.) Vasey subsp. *longiligula* (Scribn. & T.A. Williams) Soreng. Muttongrass, N, CS abundant, LF abundant  
*Poa pratensis* L. subsp. *pratensis*. Kentucky bluegrass, E, CS infrequent, LF occasional  
*Schizachyrium scoparium* (Michx.) Nash var. *scoparium*. Little bluestem, N, CS infrequent, LF occasional  
*Vulpia octoflora* (Walter) Rydb. var. *hirtella* (Piper) Henrard. N, LF occasional

### **Polemoniaceae**

*Gilia aggregata* (Pursh) Sprengel var. *maculata* M.E. Jones. Skyrocket, N, LF infrequent  
*Microsteris gracilis* (Hook.) Greene var. *humilior* (Hook.) Cronq. N, LF infrequent

### **Polygonaceae**

*Eriogonum alatum* Torrey var. *alatum*. N, CS infrequent  
*Eriogonum racemosum* Nuttall. N, CS occasional, LF infrequent  
*Polygonum sawatchense* Small subsp. *sawatchense*. N, CS occasional, LF occasional  
*Rumex acetosella* Linnaeus. Sheep sorrel, E, LF occasional

### **Portulacaceae**

*Lewisia brachycalyx* Engelmans ex A. Gray. N, LF infrequent

### **Ranunculaceae**

*Thalictrum fendleri* Engelmans ex A. Gray. N, CS occasional, LF occasional

### **Rhamnaceae**

*Ceanothus fendleri* A. Gray. N, CS occasional, LF occasional

### **Rosaceae**

*Geum triflorum* Pursh var. *ciliatum* (Pursh) Fassett. N, CS infrequent  
*Potentilla crinita* A. Gray. N, CS frequent, LF frequent  
*Potentilla diversifolia* Lehm. N, CS occasional, LF occasional  
*Potentilla hippiana* Lehm. N, CS occasional, LF occasional  
*Potentilla subviscosa* Greene. N, CS occasional  
*Rosa woodsii* Lindl. var. *ultramontana* (S. Watson) Jeps. N, CS occasional

### **Rubiaceae**

*Houstonia wrightii* A. Gray. N, CS infrequent, LF occasional

### **Saxifragaceae**

*Lithophragma tenellum* Nutt. N, LF infrequent  
*Saxifraga rhomboidea* Greene. N, LF infrequent

## Scrophulariaceae

*Castilleja miniata* Douglas ex Hook. N, CS infrequent, LF infrequent

*Linaria dalmatica* (L.) Miller. Dalmatian toadflax, E, CS frequent

*Mimulus rubellus* A. Gray. N, CS infrequent

*Pedicularis centranthera* A. Gray. N, CS infrequent, LF occasional

*Penstemon virgatus* Gray. N, CS occasional, LF occasional

*Verbascum thapsus* L. Common mullein, E, CS occasional, LF occasional

*Veronica peregrina* L. var. *xalapensis* (H.B.K.) St. John & Warren. N, LF infrequent

## Verbenaceae

*Verbena macdougalii* A.A. Heller. N, CS infrequent

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The content of this paper reflects the views of the author(s), who are responsible for the facts and accuracy of the information presented herein.