

ADDITIONAL SPECIES FOR THE JEMEZ MOUNTAINS, NEW MEXICO, U.S.A.

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ABSTRACT

In this paper, we note 161 species and varieties of plants in the Jemez Mountains verified through voucher specimens. These species were not previously listed in the most detailed previous floristic study in this area *Floristic Studies in North Central New Mexico, U.S.A. the Tusas Mountains and the Jemez Mountains* by Reif et. al. (2009). Most of these specimens are housed in the Jemez Mountain Herbarium (JMH) at the Los Alamos, New Mexico Nature Center. Others are housed in the herbarium at the Museum of Southwestern Biology at the University of New Mexico (UNM), and a few elsewhere as noted (SEINet).

If this number is added to the total for the Jemez Mountains from Reif's work, the new total for the Jemez Mountains is 1,504 taxa. These additions include seven new state records, as well as several species not expected in the Jemez Mountains environment and altitude range. Of special interest are the flora of the San Pedro Parks Wilderness in the northwest part of the range, White Rock Canyon along the Rio Grande, and the desert shrublands west of San Ysidro at the extreme southwest part of the Jemez Mountains.

RESUMEN

En este artículo, citamos 161 especies y variedades de plantas verificadas por medio de especímenes comprobantes. Estas especies no fueron incluidas previamente en la *Flora of the Tusas and Jemez Mountains, New Mexico* de, Reif et al. (2009). La mayoría de estos especímenes están depositados en el Herbario de las Montañas Jémez en el Centro de la Naturaleza de Los Álamos en Los Álamos, Nuevo México. Los demás están en el Herbario de la Universidad de Nuevo México, menos unos pocos más que están alojados en otros lugares que notamos.

Si este número se añade al total para las Montañas Jémez del artículo de Reif, el nuevo total es 1,504 taxa. Estas adiciones incluyen 7 plantas nuevas para el estado así como varias especies inesperadas en el ambiente y la altitud de las Montañas Jémez. De especial interés es la flora del San Pedro Parks Wilderness en el noroeste de la cordillera, el Cañón Piedra Blanca (al borde del Río Grande), y el matorral desértico al oeste de San Isidro en la parte sudoeste más extrema de las Montañas Jémez. Para que esta lista sea completa, incluimos especies que se han escapado de cultivo pero que, al parecer, han quedado bien establecidas en el monte.

INTRODUCTION

The Jemez Mountains of north-central New Mexico can be considered a high elevation "island" surrounded by desert shrublands (Fig. 1, 2). Because of their isolated nature, their location at the confluence of the Rocky Mountains, the Great Basin, and the grasslands and deserts to the south, they harbor a unique flora. With an elevation range of about 6,000 feet, habitats extend from desert-like grasslands to subalpine meadows and forests. Although this flora of the Jemez Mountains of north-central New Mexico had been studied for decades, the only published comprehensive floristic listings of the flora of the Jemez Mountains are those by Foxx et al. (1998) and Reif et al. (2009). Reif consolidated his extensive work in the Santa Fe National Forest (Reif 2006) with that of Brian Jacobs in Bandelier National Monument (Jacobs 1989) and Ronald Hartman's floristic inventory in the Valles Caldera National Preserve (Hartman & Nelson 2005).

A significant number of taxa found in the Jemez Mountains do not appear in Reif's original paper. In this paper, we note those species. Although some of these taxa were found earlier but not published (SEINet), most have been discovered by plant collectors associated with the Jemez Mountain Herbarium (JMH). In addition, several have come from the Los Alamos National Laboratory's collections now housed in JMH, and seven have been found on the Southwest Environmental Information Network's (SEINet) lists which have been verified at the herbarium at Museum of Southwestern Biology Herbarium at the University of New Mexico (UNM). Collections made before about 1960 have been omitted.



FIG. 1. Location of Jemez Mountains, New Mexico.

Here we discuss primarily plants of the Jemez Mountains in the JMH, and three floristically important areas—San Pedro Parks Wilderness (SPP), White Rock Canyon of the Rio Grande (WRC), and the desert shrublands west of San Ysidro and north of Highway 550 that we call the San Ysidro Salient (SYS).

Boundaries the Jemez Mountains used in this paper

Defining the extent of the Jemez Mountains is subjective. We include the mountain and plateau areas extending from the Valles Caldera, the San Pedro Mountains, the Sierra Nacimiento, and the drainages associated with those areas. This area is smaller than that considered by Reif et al. (2009). Specifically, the eastern boundary is the Rio Grande from Española to Cochiti Dam; southern boundary from Cochiti Dam to San Ysidro; western boundary along US Highway 550 from San Ysidro to Cuba; and northern boundary along New Mexico Highway 96 and US Highway 84 from Cuba to Española. These boundaries include interesting lower elevation desert shrubland areas such as the one north of US Highway 550 and west of San Ysidro (Fig. 2.).

Topography, climate, geology and geomorphology

The Jemez Mountains are in north-central New Mexico, approximately 40 miles north of Albuquerque. The mountain range was formed by volcanic eruptions 1.4 to 1.1 million years ago (Goff et al. 1996). The dominate



Fig. 2. Extent of Jemez Mountains.

features created by these violent eruptions include a central caldera rimmed by mountain peaks and on the eastern side of the mountain range a plateau created by the ejection of ash. There is an elevational gradient of a vertical mile from 5,300 at the Rio Grande on the eastern side to over 11,000 feet at the top of the Sierra de Los Valles that rims the caldera. The climate is considered high desert with an average rainfall of 10 inches at lower elevations to 35 inches near the high peaks. The elevation gradient, precipitation and temperature gradients support several plant communities from grasslands, woodlands, to coniferous forests (Allen 2001). Riparian habitats can be found along the Rio Grande and streams within the mountain range. Desert shrublands like those in the Great Basin can be found on the Western edge.

METHODS

This paper is the result of work done at the Jemez Mountain Herbarium. JMh was established in 2005 under the sponsorship of the Pajarito Environmental Education Center (PEEC) (<http://peecnature.org>). The impetus

was the donation to PEEC of some 1,100 sheets made by Brian Reif in the Santa Fe National Forest for a master's thesis at the University of Wyoming (Reif 2006). Over half of that collection came from the Jemez Mountains. In addition, Los Alamos National Laboratory contributed its herbarium specimens to PEEC. From those initial donations, the total number of collections has grown to more than 4,000 sheets. The focus of JMH is to create a collection of all the plants of the Jemez Mountains. Emphasis is given to taxa found in Los Alamos County, which has itself over 1,000 species and varieties. The collection records studied on this study are available on SEINet (<http://swbiodiversity.org/seinet/collections/misc/collprofiles.php?collid=142>).

The nomenclature used is from Allred (2012), with recent changes adapted from SEINet.

The Jemez Mountains contain several rather unique habitats where additional species not listed elsewhere could be found. Our attempt was to study these areas carefully. This strategy proved very successful as many the taxa reported here were found in those locations. Three of these are described in more detail below.

Collection of specimens that are added to the list compiled by Reif was made by persons associated with the Jemez Mountain Herbarium. Some additional information has been incorporated from studies done in the Valles Caldera National Preserve, at Bandelier National Monument, and from Los Alamos National Laboratory. Voucher specimens were collected and deposited in the JMH and species identification confirmed by various local and national botanists. (a number of the more important ones have been donated to the UNM Herbarium in Albuquerque.)

RESULTS AND DISCUSSION

The Jemez Mountains have several vegetation types: spruce-fir, mixed conifer, ponderosa pine forests, piñon-juniper woodlands, and desert shrublands. In addition, there are oak shrublands formed by wildfire on some mountain slopes and high mountain meadows. Specifics of these vegetation types can be found in Reif et al. (2009).

Added to the list from Reif are 161 species (Also noted are 23 species from SEINet but not verified by the authors). Of these 57 (approx. 30%) have been collected in only one location (Table 1).

There are three areas of interest in this research because of their unique geological and floristic characteristics: San Pedro Parks Wilderness, White Rock Canyon of the Rio Grande, and the San Ysidro Salient.

San Pedro Parks Wilderness.—The San Pedro Parks Wilderness (SPP) is located within the San Pedro Range in the northwest corner of the Jemez Mountains. The geology is similar to that of the San Juan Mountains to the north—feldspar and limestone—rather than Colorado Plateau strata or volcanic soils typically found in the Jemez region. The area is an elevated plateau reaching 10,600 feet, a high elevation for the Jemez Mountains. This area receives an average of 35 inches of precipitation per year. Combined with a relatively flat terrain that results in extensive wet meadows (“parks”), the area contains a remarkable flora, much of which seems to be relict from just after the last great Ice Age. Due to the generally wet habitats, many plants accustomed to colder climate have survived by adapting to the slow rise in temperatures 10,000 years ago.

We note that five new state records (species) come from this area. Twenty four additional species were collected here, bringing the total number to 209. Of the total, 31 species, about 15 percent, are found only in the San Pedro Parks and nowhere else in the Jemez Mountains.

White Rock Canyon of the Rio Grande.—Below the town of White Rock in Los Alamos County is a stretch of piñon-juniper woodland ranging from 5,500 feet at the Rio Grande to the canyon rim at 6,400 feet. This is perhaps the last reach of the Rio Grande with relatively undisturbed native flora: north are farmlands of San Ildefonso Pueblo and south in Bandelier National Monument the lowest elevations were submerged by water that backed up behind Cochiti Dam in 1984 and were floristically destroyed. White Rock Canyon is of importance because it is home to an important flora, some from Eastern Plains, and the northern-most occurrences of many other species.

Three-hundred twenty-one (321) species have been collected and verified in White Rock Canyon. Sixteen of these collections were added by this study. Twenty-nine species are found nowhere else in the Jemez Mountains.

TABLE 1. Summary of Additional Taxa. First number represents results based on field collections. The number in parentheses include those verified from other herbaria.

List by taxonomic category		List by special category	
Families	44 (4 new)	Exotic taxa	0
Genera	110	NM Noxious weeds	0
Species	162	Species of conservation concern	0
Hybrids	2	NM Endemic taxa	0
Infraspecies	21	State records	7
List of unique taxa by major plant group			
Ferns Allies	0		
Ferns	6		
Gymnosperms	0		
Angiosperms	155		
Total	161		
Total including those from Reif et al. (2009)—1,504*			

*1,445 is number in Rief et al. 2009, including Tusas Mtns. An estimated 100 of those do not occur in the Jemez and only in the Tusas Mtns. resulting in their total of approximately 1,345. Adding the total additional in this paper we arrive at 1,504.

San Ysidro Salient.—Two miles west of the town of San Ysidro, New Mexico is a low altitude piñon-juniper and desert scrubland area bounded on the south and west by U.S Highway 550, on the north by the Jemez Pueblo and east by New Mexico Highway 4. This area is rich in species not yet reported in the Jemez Mountains such as *Nolina texana*, *Acleisanthes diffusa*, and *Sclerocactus parviflorus*. This study adds 16 new species to the total of 110 reported to occur in this area. Of these, 14 are found nowhere else in the Jemez Mountains.

Taxa of Conservation Concern

Here we note the seven state records that we have found (San Pedro Parks and elsewhere) and include in the Annotated List below.

Species Newly Documented for New Mexico

Bromus hordaceus L., 7/16, 8235, Los Alamos County (Allred)

Crepis tectorum L. 6/94, 7440, Los Alamos County (Keller)

Carex buxbaumii Wahlenb. 8/13, 10,300, San Pedro Parks Wilderness (Reznicek)

Carex magellanica Lam. 8/13, 10,300, San Pedro Parks Wilderness (McGrath)

Carex saxatilis L. 8/09, 10,435, San Pedro Parks Wilderness (Reznicek)

Epilobium oregonense Hausskn. 8/12, 9840, San Pedro Parks Wilderness (Sivinski)

Delphinium occidentale S. Watson, 8/11, 9240, San Pedro Parks Wilderness (Sivinski)

Description of *Delphinium occidentale* S. Watson

This plant was collected in San Pedro Parks Wilderness in rather dense woods. It was about four feet tall and somewhat bushy. It resembles *Delphinium occidentale* in that the plant is tall, glabrous excepting in the inflorescence where it has gland-based hairs (which seems to separate it from other local *Delphiniums*); flowers bi-colored, blue and white; about 60 flowers per spike, which is about 30 inches long.

In Ackerfield (2015), it keys directly, but its distribution map doesn't show it occurring in counties on the border with NM. Nothing in Allred & Ivey (2012) matches it. Warnock (1997) calls it *D. barbeyi* × *D. glaucum*, and comments: “*D. barbeyi* hybridizes extensively with *D. glaucum* in western Colorado and eastern Utah, where plants appearing to be hybridizing [*D. × occidentale* (S. Watson) S. Watson] individuals are often far more common than plants of either putative parent.” In addition, Warnock does not recognize *D. occidentale*. Given all of this, for simplicity we choose to use Ackerfield's specific epithet, noting its apparent close relationships with *D. × occidentale* and Warnock's *D. barbeyi* × *D. glaucum*.

Additional Comments

Packera cana, listed as collected in the Valles Caldera (VCNP) cannot be verified as it is not in the UNM Herbarium. It has been looked for at the given location and not relocated and, because the habitat is not where this species is expected, is probably misidentified.

Purshia stansburyana is included because, Reif collected it significantly west of U.S. Highway 550, and thus not strictly in the Jemez Mountains. Our collection was made on a mesa just south of Jemez Springs.

One grass species, *Muhlenbergia fragilis* has been collected and identified as in the Jemez Mountains but location information was not noted. These should be looked for.

Proposed More Accurate Designations

Packera dimorphophyla var. *dimorphophyla* probably does not occur in the Jemez. Species named that from VCNP and SPP are more correctly *Packera dimorphophyla* var. *intermedia*. This variety is listed (and illustrated) in *Intermountain Flora* and it was thought to occur only in the La Sal Mountains in Utah. However, University of Colorado at Boulder Herbarium has several collections from Colorado. We have found it in numerous fen-like places in Southern Colorado and New Mexico where it is called by Trock (2015) *Packera crocata* (but with yellow not orange flowers). However, in addition to this color exception cauline leaf variety does not support that species. Rather, in the same setting—several hundred plants growing close together—cauline leaves vary from narrow sessile/short petiolate, to classic triangular clasping leaves of *P. dimorphophyla* var. *dimorphophyla*. Comparison of these with the higher elevation *P. dimorphophyla* var. *dimorphophyla* collections from below Wheeler Peak supports a low altitude variety (*Packera dimorphophyla* var. *intermedia*) of this species distinct from *P. crocata* (which may not occur in N.M.).

Spergulastrum lanuginosum seems to have at least two varieties also. *S. lanuginosa* var. *saxosa* is rather common in the Jemez and is characterized as a tangle of stems spreading out from the caudex with a diameter often greater than 15 cm. However, in other, slightly higher elevations and especially in San Pedro Parks, it grows in open semi-dry areas with *Potentilla hippiana* as a very short, dense cluster of short stems, usually less than 5 cm in diameter. While the floral parts are very similar, this dramatic difference in plant shape and size calls for further study perhaps leading to establishment of another variety.

Erigeron speciosus × *formosissimus* is apparently found only on the east side of the Jemez Mountains particularly in the ponderosa habitat around Los Alamos County is a clear cross between *E. speciosus* and *E. formosissimus*. A small plant, it has features of both species: generally glabrous excepting in the inflorescence, but with ciliate leaf margins, and an altitude below *E. formosissimus*, yet with cauline leaves greatly reduced upwards and general growth habit of that species. While yet undescribed in the literature (Nesom 2016), says it represents further evidence of *Erigeron hybridization*.

Orobancha corymbosa Turner Collins is still studying this collection. While it may be a non-standard version of the above species. Turner is interested that it was found under Ponderosa. He knows of no other species of this genus in New Mexico found in ponderosa.

Several species found in the Jemez Mountains bring up the question of what exactly is the ‘native’ flora of this area. *Penstemon strictus* is found in many places but always where it was either planted or escaped from cultivation. Similarly, *Ratibida columnifera* may not be native although due to highway planting, etc. it is very well established.

CONCLUSIONS

The important contributions to our knowledge of the flora of the Jemez Mountains by Reif, Larson, Jacobs, Nelson, and Hartman cannot be understated. Limitations of geography and time restricted their summary to the species collected within the constraints. With the additional collections, mostly from the next decade and housed in the JMH, it is possible to expand not only the number of species known from the Jemez Mountains, but also yields a greater understanding of a wider distributions for some of the less common species.

Most of the additional species reported were collected in specialized habitats found in only one location within the Jemez Mountains, each providing unique environmental conditions that are more prevalent in areas beyond the Jemez Mountains. The floras of White Rock Canyon and the San Ysidro Salient include species typically found farther south: for example: *Acleisanthes diffusa*, *Boerhavia torreyana*, and *Portulaca halimoides* in WRC. Collections from the San Pedro Parks, particularly *Carex* sp., include species usually found in cooler climates to the north or at higher altitudes.

From the high number of additional species reported (24 for SPP, 16 WRC) and the number unique to these locations, two areas of conservation concern stand out. First, the San Pedro Parks Wilderness harbors ~10 relict species normally found elsewhere at higher altitudes and includes five state records reported here.

Fifteen percent of the species found in the San Pedro Parks are not found elsewhere in the Jemez Mountains. The region of White Rock Canyon in Los Alamos County that is the northern-most location along the Rio Grande of many species and about 10 percent of the total in the canyon are unique in the Jemez Mountains.

In addition to these two areas of concern, two other areas warrant further study. The San Ysidro Salient (16 species reported nowhere else in the Jemez) supports an unusual flora that calls for a detailed study. Another area not well documented is the northern foothills of the Jemez Mountains just south of U.S. Highway 84 between Española and Abiquiu. This area of gravelly hills and sandy arroyos supports a flora that has not been thoroughly studied.

ANNOTATED CHECKLIST

The checklist is divided into major plant groups, followed by alphabetical listings of families, genera, and species. Nomenclature follows Allred (2012) with some exceptions as outlined in Stevens (2001) onwards.

The format attempts to give a quick estimate of the location and habitat of the species, and other pertinent information. A few species are immediately adjacent to the designated Jemez Mountain area and are noted as such, e.g., Kitchen Mesa at Ghost Ranch north of Abiquiu.

Content of the annotation is as follows: *genus, species*, attribution, county, date collected, elevation, habitat code and if applicable special area. **SPP**=San Pedro Parks Wilderness; **WRC**=White Rock Canyon; **SYS**=San Ysidro Salient). If annotated, annotator follows.

County designators: **L**=Los Alamos, **S**=Sandoval and **R**=Rio Arriba

Habitat codes are as with Reif et al. (2009) with a few additions.

af Aspen forest	ms Montane shrubland
br Burns	mt Mesa top
cb Canyon bottom	pg Plains-desert grassland
ds Desert shrubland	pj Piñon-juniper
fr Floodplain-arroyo riparian	pp Ponderosa pine forest
mc Mixed conifer	rc Rocky cliffs
ml Marsh-lacustrine	rd Roadside-disturbed
mm Montane meadow	sf Spruce-fir forest
mr Montane riparian	ur Urban

* Species not in JMH but have been verified

! State Record

% only found in one location

FERNS

Dryopteridaceae

Cystopteris bulbifera (L.) Bernh.—L, 10/14, 7130, rc
Gymnocarpium dryopteris (L.) Newman—S, 6/16, 7825, rc

Ophioglossaceae

Botrychium echo W.H. Wagner—R, 7/09, 10,400, mm, SPP, Legler

Botrychium lunaria (L.) Swartz—R, 8/09, 10,460, mm, SPP, Legler
Botrychium hesperium (Maxon & Clausen) W.H. Wagner & Lellinger—R, 8/09, 10,460, mm, SPP, Legler
Botrychium sp. nov. /redrock R, 8/09, 10,460, mm, SPP, (unpublished name by Popovich & Farrar), B. Legler-pers. comm. 11/16

ANGIOSPERMS

Agavaceae

Yucca angustissima Engelm. ex Trel.—R, 6/03, 8100, pp, Karen H. Clary, 2004, TEX
Yucca harrimaniae Trel.—S/16, 5530, pj, ds, SYS

Amaranthaceae

Acanthochiton wrightii Torr.—R, 9/16, 5975, fr, pj
Amaranthus palmeri S. Watson—L, 8/00, 7200, rd
Allenrolfea occidentalis (S. Watson) Kuntze—S, 6/16, 5530, pj, ds, SYS
Chenopodium album L.—L, 7/09, 6660, pj, cb
Corispermum americanum (Nutt.) Nutt.—L, 8/15, 5,400, pj, WRC
Cycloloma atriplicifolium (Spreng.) Coult.—R, 9/16, 5975, fr, pj

Salsola collina Pall.—L, 8/08, 6900, pj, ud, mt, Kelly Allred
Suaeda nigra (Raf.) J.F. Macbr.—S, 7/55, 6500, pj, ds, SYS

Apiaceae

Cymopterus sessiliflorus (W.L. Theob. & Tseng) R.L. Hartm.—S, 5/15, 7075, pj/mt, (Ghost Ranch)

Asteraceae

* *Artemisia cana* Pursh—R, (P. Tonne) 1 mi N of New Mexico Highway 96, 7200, pj
Baccharis wrightii A. Gray—L, 5/15, 5960, pj
Chrysothamnus vaseyi Greene—R, 8/07, 9700, mm

Chrysothamnus viscidiflorus (Hook.) Nutt. subsp. *vicidiflorus*—R, 7/02, 6500, pj, cb, R. Peterson

! *Crepis tectorum* L.—L, 6/94, 7440, rd

Euthamia occidentalis Nutt.—L, 8/99, 5500, fr, WRC

Herrickia glauca (Nutt.) Brouillet—R, 8/16, 6425, pj, fr

Hieracium triste Willd. ex Spreng.—R, 8/08, 9700, mc, SPP

Hymenoxys odorata DC.—S, 6/04, 5530, ds

Leibnitzia seemanii (Sch.-Bip.) G.L. Nesom—L, 6/99, 7760, pp

* *Oxytenia acerosa* Nutt.—S, 7/55, 6500, fr (Helen Cannon collection)

Packera hartiana (Heller) W.A. Weber—L, 5/12, 7200, pp

Packera cynthoides (Greene) W.A. Weber—S, 7/92, 8,500 mc, Troc

Senecio vulgaris L.—L, 4/14, 7275, ur

Solidago missouriensis Nutt. var. *fasciculata* Holzinger—R, 8/09, 10,050, mm, SPP

Solidago multiradiata Aiton—R, 8/09, 9800, mr, SPP

Sonchus oleraceus L.—L, 11/12, 6400, ur

Stenotus armerioides Nutt.—L, 5/86, 6920, pj, mt

Stephenomeria exigua Nutt.—L 8/16, 5960, fr

Symphytotrichum ericoides (L.) G.L. Nesom var. *ericoides*—L, 9/93, 5450, pj, fr

Symphytotrichum ericoides (L.) G.L. Nesom var. *pansum* (S.F. Blake) G.L. Nesom—L, 10/10, 7240, rd

Townsendia annua Beaman—L, 4/99, 5,410, pj

Xanthisma grindelioides (Nutt.) D.R. Morgan & R.L. Hartm.—R, 6/08, 7070, pp

Boraginaceae

Cynoglossum officinale L.—L, 7/08, 7900, rd

Mertensia lanceolata DC. var. *fendleri* A. Gray—L, 4/14, 7220, pp

Brassicaceae

Boechera gracilenta (Greene) Windham & Al-Shehbaz—L, 4/78, 6828, pj (these could have been called *B. lignifera*) (Alexander 2016)

Boechera pallidiflora (Rollins) W.A. Weber—L, 4/14, 6265, pj (Alexander 2016)

Descurainia brevisiliqua (Detling) Al-Shehbaz & Goodson—L, 10/13, 5545, pj, WRC

Lepidium campestre L.—L, 5/13, 8050, mc, cb

Lepidium eastwoodiae Wooton—R, 8/10, 6680, rd

Rorippa palustris (L.) Besser var. *palustris*—S, 6/06, 8350, mr

Cactaceae

Sclerocactus parviflorus Clover & Jotter—S, 5/17, 5540, ds, SYS

Caryophyllaceae

Spergularium lanuginosum Michx. subsp. *saxosum* phase *saxosum* (A. Gray) W.A. Weber—R, 8/11, 9920, mm, SPP

Cerastium nutans Raf.—S, 9/14, 8530, mm

Drymaria leptophylla (Cham. & Schlttd.) Fenzl ex Rohrb.—L, 8/98, 7200, pp, mt

Eremogone aculeata (S. Watson) Ikonn.—S, 5/09, 5900, pj, mt

Silene latifolia L.—7/13, 9560, sf, ra

Crassulaceae

Sedum integrifolium (Raf.) A. Nelson—S, 7/15, 8500, mc

Sedum rhodanthum A. Gray—R, 8/08, 9850, mm, SPP

Commelinaceae

Commelina erecta L.—S, 8/16, 5700, pj, SYS

Cyperaceae

Carex athrostachya Olney—R, 8/11, 9900, mm, SPP

Carex bebbii (L.H. Bailey) Olney ex Fernald—S, 3/91, 8700, mc

! *Carex buxbamii* Wahlenb., Kongl., Vetensk.—R, 8/12, 10,300, mm, mr, SPP, Reznicek

* *Carex macloviana* d'Urv.—R, 7/64, 10,300, mm, mr, SPP, Reznicek

! *Carex magellanica* Lam.—R, 8/13, 10,300, mm, mr, SPP, McGrath

! *Carex saxatilis* L.—R, 8/09, 10,435, mm, mr, SPP, Reznicek

Eleocharis macrostachya Britton—S, 6/06, 8350, mr, Peterson

Ericaceae

Arctostaphylos pungens H.B.K.—L, 9/07, 7700, pp, mt

Euphorbiaceae

Chamaesyce parryi (Engelm.) Rydb.—L, 9/13, 6400, pj, mt

Tragia nepetifolia Cav.—L, 5/4, 5,800, pj, WRC

Fabaceae

Astragalus agrestis Douglas ex G. Don—S, 7/08, 7890, mm

Astragalus allochrous A. Gray—S, 4/11, 5650, cb, SYS

Astragalus brandegeei Porter—L, 9/15, 5500, pj

Astragalus flavus Nutt.—S, 4/07, 7125, pj, rd

Dalea aurea Nutt. ex Pursh—L, 7/99, 5435, pj, fr

Dalea brachystachys A. Gray—L, 8/99, 5400, pj

Dalea enneandra Nutt.—S, 6/16, 5500, pj, ds, SYS

Dalea scariosa S. Watson—S, 4/14, 5570, pj, ds, SYS

Lathyrus arizonicus Britton—L, 5/10, 7860, mc

Lupinus argenteus Pursh var. *myrianthus* (Greene) Isely—S, 6/16, 8100, pp

Pomaria jamesii (Torr. & A. Gray) Walp.—S, 4/14, 5500, pj, ds, SYS

Psorhamnus scoparius (A. Gray) Rydb.—S, 8/16, 5530, pj, ds,, SYS

Thermopsis rhombifolia (Nutt. ex Pursh) Nutt. ex Richardson var. *rhombifolia*—L, 4/10, 6300, pj

Vicia villosa Roth subsp. *villosa*—L, 4/12, 7000, pp, mt

Hypericaceae

Hypericum perforatum L.—L, 7/15, 7130, rd

Juncaceae

Juncus arcticus subsp. *ater* Wild.—R, 7/07, 8200, mm, SPP, Licher

Juncus ensifolius/saximontanus Wikstr. var. *brunescens* (Rydb.) Cronquist—L, 6/08, 8200, fr

Juncus hallii Engelm.—R, 7/09, 10,400, mm, ml, SPP

Juncus nevadensis S. Watson—R, 8/09, 8900, ml, SPP, Rink and Licher

* *Luzula spicata* (L) DC.—R, 6/64, 10,000, mm, SPP, Chauvin

Lemnaceae

% *Lemna trisulca* L.—R, 8/13, 9900, ml, SPP

Linaceae

Linum pratense (Norton) Small, L, 5/17, 6410, pj, WRC

Lythraceae

% *Lythrum salicaria* L.—S, 9/07, 5800, ml

Malvaceae

Anoda cristata (L.) Schlttd.—L, 9/11, 7100, rd

Hibiscus trinoum L.—L, 9/11, 7100, rd

Sphaeralcea angustifolia (Cav.) G. Don var. *oblongifolia* (A. Gray) Shinners—L, 7/99, 5700, pj, WRC

Molluginaceae

Mollugo cerviana (L.) Ser.—L, 8/13, 5775, pj, WRC

Nolinaceae

Nolina texana S. Watson—S, 4/16, 5725, pj, ds, SYS

Nyctaginaceae

Abronia bigelovii Heimerl—R 5/08, 7150, gypsum, pp

Acleisanthes diffusa (A. Gray) R.A. Levin—S, 8/16, 5530, pj, ds, SYS

Boerhavia torreyana (S. Watson) Standl.—L, 8/13, 5800, pj, WRC

Onagraceae

Epilobium campestre (Jeps.) Hoch & W.L. Wagner—R, 8/12, 10,435, ml, SPP

! *Epilobium oregonense* Hausskn.—R, 8/12, 9840, ml, SPP

Orobanchaceae

Orobanche corymbosum (Rydb.) Ferris—L, 8/15, 7200, pp, Collin Tanner

Castilleja austromontana Standl. & Blumer—L, 8/15, 9500, mm (both red and yellow forms)

Pedicularis parryi A. Gray—L, 7/09, 9500, mm

Oxalidaceae

Oxalis latifolia Trel.—L, 8/08 7200, pp, cb

Plantaginaceae

Penstemon fendleri Torr. & A. Gray—R, 6/08, 9800, mm

Poaceae

Agrostis variabilis Rydb.—R, 8/12, 10,435, ml, SPP. Allred

% *Aristida schiedeana* Trin. & Rupr. var. *orcuttiana* (Vasey) Allred & Valdés-Reyna—L, 9/03, 7400, pp, rc

Aristida purpurea Nutt. var. *purpurea*—L, 9/03, 6400, pj, mt

Bothriochloa ischaemum (L.) Keng—L, 8/16, 7620, pp, br

Bouteloua aristoides (Kunth) Griseb.—L, 8/75, 6500, pj, WRC. Allred

Bromus anomalus Rupr. ex E. Fourn.—L, 11/12, 7,850, pp, br, cb

! *Bromus hordaceus* L.—L, 7/16, 8235, pp, br Allred

Bromus secalinus L.—L, 6/10 6420, pj, rd

Bromus sterilis L.—L, 6/01, 9000, rd

Dasyochloa pulchella (Kunth) Willd. ex Rydb.—L, 5/03, 6000, pj, pg

Digitaria californica (Benth.) Henrard—L, 10/11, 5800, pj, pg Allred

Elymus bakeri (E. Nelson) Love—L, 6/04, 9600, br, as Peterson

Elymus elongatus (Host) Runemark subsp. *ponticus* (Podp.) Dorn—L, 6/04, 7720, pp, rd

Elymus longifolius (Smith) Gould—L, 9/02, 7400, pp, br

Elymus × *pseudorepens* (Scribn. & J.G. Sm.) Barkworth—L, 11/14, 7260, pj, mt, br

Enneapogon desvauxii P. Beauv.—L, 9/13, 6320, pj, rc

Eragrostis pectinacea (Michx.) Nees ex Steud. var. *miserimma* (E. Fourn.) Reeder—L, 10/11, 5800, pj ds

Erioneuron pilosum (Buckley) Nash—L 5/04, 6400, pj

Hordeum vulgare L.—L, 10/02, 9400, rd, mc

% *Phalaris canariensis* L.—L, 5/01, 7000, rd, Peterson

Poa leptocoma Trin.—L, 8/16, 10,100, mm,mc, Peterson, Allred

Poa secunda Presl—S, 6/03, 8800, mm, as

Vulpia octoflora Rydb. var. *glauca* (Nutt.) Fernald—L, 5/03, 6000, pj

Vulpia octoflora Rydb. var. *hirtella* (Walter) Rydb. (Piper) Henrard—L, 5/03, 6000, pj

Polemoniaceae

Aliciella haydenii (A. Gray) J.M. Porter—R, 5/08, 6370, pj, Chinle Formation, red mud slope

Gilia closkeyi (Sm.) Sweet—L, 7/14, 5450, pj, sandy flats, WRC

Polemonium occidentale Greene—R, 8/09, 8900, mm, ml, SPP

Polygonaceae

Eriogonum leptocladon Torr. & A. Gray—S, 4/14, 5500 pj, ds, SYS

Eriogonum leptophyllum (Torr.) Wooten & Standl.—L, 8/88, 6400, pj, mt

% *Eriogonum rotundifolium* Benth.—L, 7/09, 6800, pj, mt, sandy slope

Polygonum aviculare L. subsp. *buxiforme* (Small) Costea & Tardif—L, 9/07, 7240, pp, rd

Polygonum aviculare L. subsp. *depressum* (Meisn.) Arcang.—L, 8/08, 8270, mc, rd

Rumex californicus Rech. f.—S, 7/14, 8435, fr

Rumex mexicanus Meisn.—L, 6/13, 7120, pp, cb

Rumex occidentalis Watson—S, 8/17, 7650, mm

Portulacaceae

Phemeranthus longipes (Wooten & Standl.) Kiger—L, 9/06, 7200, pp, rd

Portulaca halimoides L.—L, 8/13, 5775, pj, fr, WRC

Primulaceae

Androsace occidentalis Pursh—L, 2/91, 5450, pj, WRC

Ranunculaceae

Delphinium sapellonis Cockerell—L, 7/10, 9520, mc

! % *Delphinium occidentale* S. Watson—R, 8/11, 9240, mc, SPP (see description above)

Thalictrum revolutum DC.—S, 6/16, 7700, mc, mm

Rosaceae

Prunus emarginata Marshall—L, 4/89, 6250, pj, WRC

Purshia stansburyana (Torr.) Henrickson—S, 5/09, 5970, pj, mt

Sorbus scopulina Greene—S, 7/08, 7150, fr, cb

Ruppiaceae

* *Ruppia cirrhosa* (Petagna) Grande—S, 9/08, 5600, fr, Heil

Rubiaceae

Galium canescens Kunth—8/15, 8880, mm, mc

Galium multiflorum Kellogg var. *coloradense* (Wight) Cronquist—L, 10/11, 7100, br, pp

Galium wrightii A. Gray—S, 8/15, 8880, mc, mm

Salicaceae

* *Salix brachycarpa* Nutt. var. *brachycarpa*—7/01, 9400, ml (Dorn, San Gregorio Lake, SPP)

Salix lucida Muhl.—L, 8/10, 6370, pj, fr Dorn

* *Salix planifolia* Pursh—R, 8/12, 10,375, mm, ml, SPP, (McGrath)

Solanaceae

Lycium torreyi A. Gray—S, 6/16, 5500, pj, ds, SYS

Solanum rostratum Dunal—L, 9/07, 6330, pj, rd

Verbenaceae

Glandularia wrightii (A. Gray) Umber—RA, 8/07, 7300, pp

Violaceae

Viola macloskeyi F.E. Lloyd—L, 6/05, 8530, mc, mm,

Zygophyllaceae

Kallstroemia parviflora Norton—L, 8/13, 5785, pp, fr, WRC

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