Sego Lily

Newsletter of the Utah Native Plant Society
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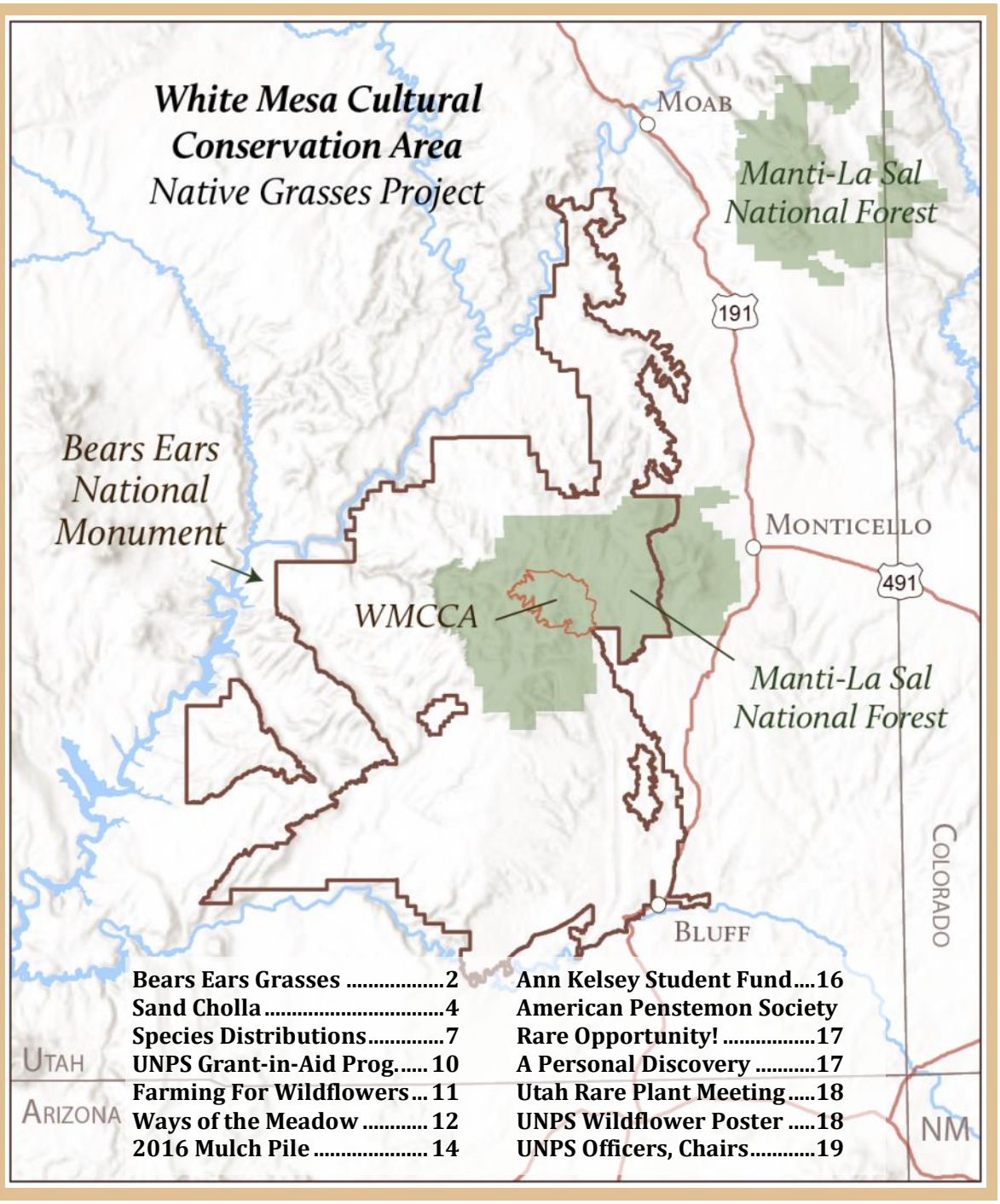
Celebrate!

BEARS EARS NATIONAL MONUMENT



Native and Exotic Grasses in a Livestock-Free Allotment in Bears Ears National Monument

by Mary O'Brien, Grand Canyon Trust, UNPS Canyonlands/Moab Chapter

There's a cattle allotment in the new Bears Ears National Monument in southeastern Utah that is pretty special right now. Listed as the Gooseberry allotment by the Manti-La Sal National Forest (MLSNF), it has had a different name since 2012: White Mesa Cultural and Conservation Area (WMCCA), with reference to the nearby Ute Mountain Ute Tribe town of White Mesa. It also has a different management situation: No cattle grazing, at least until 2021. Under a Memo of Understanding between the Ute Mountain Ute Tribe, Grand Canyon Trust, and the Forest Service, this is the one area in the entire 1.2-million acre MLSNF that is being permitted to be free of livestock grazing.

The cattle-free status of WMCCA was one of three reasons Sue Smith, a retired computer scientist and high school science teacher living in Prescott, Arizona, decided to study its native grasses for a Utah State University masters degree in Natural Resource Management. The other two reasons? She had fallen in love with the area while teaching a plant identification course for Trust volunteers in southern Utah; and both Sue and the Trust wanted to learn about how native grasses that have not been grazed by permitted livestock for 15 years are faring amid exotic grasses.

After two seasons of field work (2015, 2016), variously assisted by three Trust staff, seven interns, and 20 volunteers, Sue is getting some answers to three questions:

- What is the current composition and cover of native, mostly bunchgrass (caespitose) species?
- What is the current composition and cover of rhizomatous Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis)*, and other exotic grass species?
- Are there differences in native/exotic grass composition at different sites within similar plant communities and soil types?

Sue asked these three questions at 15, randomly-generated transect sites within each of three

Meadow diversity at work: *Hesperostipa comata* and *Koeleria macrantha*...and one sedge. Photo by Mary O'Brien.

vegetation communities (mesic meadow, aspen woodlands, and ponderosa pine) throughout the WMCCA. The December 28, 2016 designation of Bears Ears National Monument creates a good moment to present some of the results, which will be completed by June 2017:

In the **mesic meadow** plots, exotic grasses dominated, providing 20%-75% of the vegetation cover, with *Poa pratensis* (Kentucky bluegrass) accounting for 63% of the exotic grasses; *Bromus inermis* (smooth brome) 21%, and *Phleum pretense* (timothy) 14%. Native grasses provided less than 20% of the vegetation cover in 12 of the 15 plots; 0% in four; and, at the most, 36%. Of these, *Hesperostipa comata ssp. comata (*needle-and-thread) was the most common,

Mary O'Brien (l.) and Sue Smith completing a last aspen grasses transect. Photo by Andrew Mount.

with some *Achnatherum lettermanii* (Letterman's needlegrass) and *Muhlenbergia montana* (mountain muhly).

The **aspen woodlands** are lacking young aspen trees to replace them, and snowberry (*Symphoricarpus oreophilus)* exceeds 20% of the understory composition in 7 of the 15 plots.

Native grasses accounted for 0% to 52% of the understory composition, with five of the 15 plots accounting for less than 20%. Differing from the mesic meadows, the most common native grasses beneath aspen were *Achnatherum nelsonii* (Columbia needlegrass)*, Elymus elymoides* (squirreltail) *and Festuca thurberi* (Thurber's fescue). Exotic grasses accounted for 1%-78% of the vegetation composition in the 15 plots. Again, *P. pratensis* and *B. inermis* were the most common exotic grasses, with *Dactylis glomerata* (orchard grass) the third most common.

Native grasses fared comparatively best in the **Ponderosa pine** plots (0%-61% of the vegetation cover), with the same aspen-understory native species dominating, and also *H. comata* ssp. *comata.* Exotic grasses (89% of which was *P. pratensis*) accounting for 4-45% of the vegetation; *B. inermis* accounted for only 1% of the vegetation beneath ponderosa pine.

While smooth brome, orchard grass and timothy have been actively seeded by the Forest Service and ranchers in the past, Kentucky bluegrass has largely spread on its own amid disturbance. All of these exotic grasses except orchard grass are rhizomatous, able to spread vegetatively and densely, eliminating open ground that could be occupied by native bunchgrasses.

This study raises at least two critical questions:

First, are the native grasses holding, gaining, or losing ground in the absence of cattle grazing (but in the presence of large elk and deer populations)? Answering this calls for long-term monitoring of specific patches.

Secondly, what management practices will expand or contract the native and exotic grasses on Bears Ears National Monument and the Manti-La Sal NF? A native bunchgrass community allows for greater grass, forb, and wildlife diversity than does a near-monoculture of a rhizomatous, exotic grass such as smooth brome or timothy.

This assessment is timely because the Manti-La Sal NF has begun the multi-year process of revising their forest plan for the first time in 31 years; and because the BLM, Forest Service, National Park Service, and Ute Mountain Ute Tribe, Navajo Nation, Ute Indian Tribe of the Uintah Ouray, Hopi Nation, and Zuni Tribe will begin to develop a Bears Ears Monument Management Plan.

Almost taller than Sue: *Festuca thurberi* beneath ponderosa pine. Photo by Mary O'Brien.

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On March 31, 2016, the UNPS Board of Directors voted to support

Bears Ears National Monument.

We celebrate the official designation of this monument.

Sand Cholla, Tiny, Spiny and Stunning

by Marv Poulson UNPS

What does Cactus bring to mind? Maybe a barrel-like dome, a sprawling prickly pear, or a small tree like shrub like one of the stemmed Cholla Cacti. When we think of stemmed cacti it might bring to mind the familiar tree or shrub like *Cylindropuntia acanthocarpa*, Buckhorn Cholla, or the widespread *Cylindropuntia imbricata*, Cane Cholla, or the highly variable and adaptive *Cylindropuntia whipplei*, Plateau Cholla or Whipple Cholla. Each of these have many branched stems that can grow to more than 6 feet though C. whipplei grows lower in stature.

Would a stemmed cactus less than 10 inches tall and usually forming a low mat with tiny cylindrical branches tweak your interest? That's exactly what one of our seldom seen miniature cactus looks like, a small compact mat-like subshrub.

Grusonia pulchella, long known as *Opuntia pulchella*, has several common names, including: Sand Cholla, Great Basin Cholla, Sagebrush Cholla, and Dwarf Cholla. The historic association with Cholla Cactus comes from their common names because of the similarity of this little ankle high cactus to its larger cylindrical-stemmed cousins. All photos are *Grusonia pulchella*.

Among cylindrical stemmed cactus, G. pulchella is distinct in our range. Sometimes, one *Cylindropuntia* , *C. whipplei* may look similar to Sand Cholla when they assume compact and low growing habits induced by unusually harsh conditions. Two other similar *Grusonia* species occur well south in the Mojave and Sonoran deserts, demonstrating the strong geographic differentiation among the species.

Close Cousins

Of the other mat forming cylindric-stemmed cactus, *Grusonia parishii*, Matted Cholla, and *Grusonia kunzei*, Devil's Cholla, grow well to our south. *Grusonia parishii* in the central and southern Mojave Desert. *G. parishii* occurs in locally common, widely scattered populations as in Joshua Tree National Park's Queen Valley and on bajadas midway between Cottonwood Spring Visitor Center and White Tanks along The South Park Road.

Grusonia kunzei, a little taller growing, matte type cactus, grows at generally lower elevations than other grusonia. *G. kunzei* represents the genus in Southern Arizona's Sonoran Desert's, silty, sandy, or gravelly flats and hills, then south into Sonora and Baja. Populations are widely scattered in the boarder area of Oregon Cactus National Monument. Puerto Blanco Drive, which begins near the visitors center gives access to this cactus rich area.

Grusonia pulchella grow much further north and in elevation. They are a bit challenging to locate when not in bloom. They are not only small, but also frequently grow within or among small shrubs such as species of *Artemisia*, *Atriplex* and *Ephedra*. Their dark coloration and irregular habit perform effectively to disguise them when walking by too quickly. Slow scans of the ground where these lovely little cactus grow will reveal many plants near where one is found. The rarity is in the widely spaced populations.

Flowering season, late May into June, makes spotting the Sand Cholla much easier with their lovely, soft pink, rose to purplish flowers almost flagging for attention. Like most cacti in our range, the flowers open by late morning when the sun is full. Clouds and evening cause them to close as pollinators become less active and rain or dew could foul loose pollen on the many stamens.

This decidedly unique dwarf species grows on the slopes of gravely alluvial fans, ancient lake and dry wash shores and on sandy bottom lands, mostly in Great Basin Desert which suggests one of the common names, Great Basin Cholla. The Sand Cholla forms locally common, scattered populations, through the central and western Great Basin region of Utah, Nevada, and in the border area of east-central California.

Unlike its larger chollas, the tiny Sand Cholla grows as ground hugging, mat-like clumps, usually less than 12 inches across. By contrast, most cholla cacti are known for branching, shrub or tree-like habits. Even the other *Grusonia* species generally grow larger and with larger joints.

Another characteristic that distingushes *G. pulchella* are evolved strategies to survive the extremes of intense summer heat and shattering sub-zero winters where all others of the genus would fail. When conditions become extreme, the Sand Cholla may shed its branches and regrow them quickly each year. A large, spine-protected, tuberous root maintains reserves to not only support regrowth of the crown, but to also sustain flowering in even moisture stressed conditions.

Another effective survival strategy of Sand Cholla derives from an ability to bloom and reproduce while still quite young. In addition, the heavily spined tuberous root discourages harvesting by critters or

people and can survive and revive after long periods of stress.

Variations of spines and glochids among *G. pulchella* have sometimes been considered grounds for naming another separate species "micropuntia." Comparative study now show that only a single species, *Grusonia pulchella*, Sand Cholla, is appropriate since the flowers and seeds of all of the plants appear identical.

Description

Stems: forming low, inconspicuous clumps, usually only a few centimeters tall.

Joints: usually larger at the top end, 2.5 to 4 and sometimes up to 10 cm long, 0.5 to 1.2 or up to 2.5 cm in diameter.

Tubercles: not prominent, yet not merging, 6-9 mm long and about 4 mm wide.

Spines: longer ones mostly toward the top of the joint, white to gray, brown or pink, 8-15 per areole,

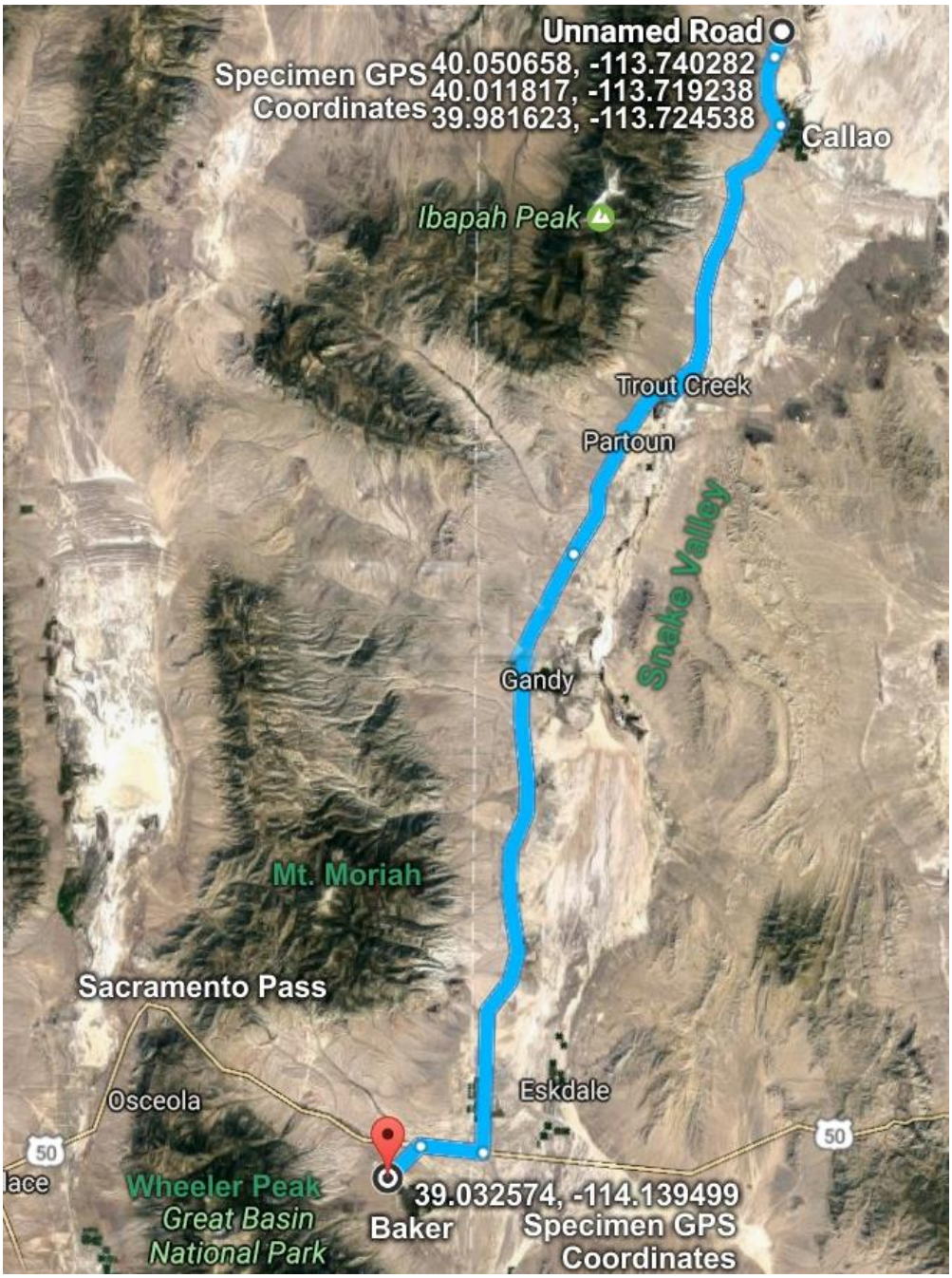
up to 6 cm long.

Glochids: inconspicuous, yellow, to 9 mm long.

Flowers: pink, rose to purple, 3 to 4 cm in diameter, 3 to 4.5 cm long.

Fruit: fleshy and smooth, reddish colored at maturity, 2 to 3 cm long, 1 to 1.2 cm in diameter, with prominent areoles and soft spines.

Distribution: Gravelly, sandy hills and slopes at elevations 3600 - 5700 ft. (1200-1900 m.) scattered throughout Western Utah's Great Basin, Central Nevada and the border region of east -central California. The few California plants are considered endangered there because of their relative local scarcity. Other wise, *G. pulchella* is considered locally common through out its range.



Grusonia pulchella Snake Valley locations with GPS reference coordinates. I have found *G. pulchella* in several locations along the sparsely vegetated, gravelly, sandy northeastern flanks of the Deep Creek Mountains of far west-central Utah. Clearly, similar habitat for the species abounds and my explorations are far from exhaustive. The most convenient location I have found for photographing these small cacti is 80 miles to the south, at the opposite end of Snake Valley. There is a population near the intersection of Cut Off Road and US-50 just west of Baker, Nevada. This location is accessible on paved roads where as none of the other places I have found Sand Cholla require extensive drives on dirt roads.

Like all the small cacti, the Sand Cholla is a treat to photograph. One thing I have noticed every time I setup the camera over the proportionately large flowers, a myriad of tiny insects are squirming among the stamens for pollen while various bees come and go in their own quests. Like the flowers of Prickly Pear Cactus, the petals of *G. pulchella* have a delicate translucent quality that plays nicely when back or side lit. With a 12 inch white card to reflect a little of the strong light back into the shadows cast by the bright sun, pictures will be less contrasty and generally quite pleasing. I do like to grovel with my flower subjects to get close and notice the lovely details. Cactus are favorite subjects for me.

Species Distributions in Utah

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There is increasing demand for open access to data about national resources, including the nation's biological resources, from many different sectors. One response to this demand has been the development of herbarium networks through which multiple herbaria share their specimen records and images. In Utah, most herbaria contribute their records to SEINet, a network to which over 180 US herbaria contribute. There are several urls that give access to these records, the one focusing on Utah and Nevada being http://intermountainbiota.org. There are three problems networks as a source of distributional information: 1) verification of the identification of the specimens involved is not an integral part of the digitization process; 2) the names used reflect use of different taxonomic treatments; and 3) few herbaria have digitized all their holdings. These problems can be addressed but doing so is a major task.

Utah is fortunate in that each edition of A Utah Flora (Welsh et al. 1987, 1993, 2003, 2008, 2015) includes a list of the counties in which the authors knew the included taxa to occur but, the data are elements in a print volume, they cannot be analyzed. They are, however, based on specimens whose identification has been verified by the authors based on the taxonomic interpretation presented in the volumes. Because of the value of having access to such carefully curated information, we decided to make data from the fourth edition (Welsh et al. 2008) internet accessible. The purpose of this article is to draw attention to the availability of the file and present some simple analyses of the data.

Methods

We used an Access® (Microsoft 2013) database for recording county-level distribution data from A Utah Flora, ed. 4 (Welsh et al. 2008). Taxa stated to be present in all counties were recorded as such; those described as "possibly present in …" were counted as present in the counties mentioned. Taxa reported to be present in Utah but without a specific county were not counted as being present but a note was added to the record. Data from the database were exported to an Excel® (Microsoft 2013) spreadsheet and the list of taxa uploaded to SEINet using its checklist feature. This revealed that the checklist had 123 records with problematic names and duplicate records for two names. After correcting these problems, the taxon list was again uploaded to intermountainbiota.org (Click Flora Projects/Utah/Research Checklists/A Utah Flora) and the spreadsheet was sent to Tony Frates who made it available for download from the Utah Native Plant Society web site.

We explored county-level variation by calculating the total number of taxa and the taxon density (number of taxa per km2) in each county. Data on the land area of each county were obtained from Wikipedia.

Results

The primary result of this study is the spreadsheet available at http://www.unps.org/UtahFlora/UF4thDistributionData.xlsx. This shows 3957 taxa as present in at least one Utah county. Of these, 912 were known from only one county and 118 from all 29 counties. The number of taxa per county varies from 371 (Morgan county) to 1923 (Washington county) (Table 1). The range in taxon density is from 0.051 – 0.786 taxa/km2. The five counties with the highest taxon density were, in descending order, Davis, Salt Lake, Daggett, Weber, Piute. The counties with the lowest density were, in ascending order, Tooele, Millard, Box Elder, San Juan, and Emery.

A list of all the taxa included in Welsh et al. (2008) can be viewed as a list of scientific names, scientific names plus authors, scientific and vernacular names, or scientific names and images at intermountainbiota.org: see Flora Projects for Utah/A Utah Flora. The images are taken from those in the system. In general images of living plants are given priority over specimen images. There are also tools for generating flash card quizzes and generating a dynamic key at the top of the checklist page but we have not attempted to ensure that there is an image for each name nor to provide the morphological data needed to make the dynamic key feature work.

Discussion

The problems in the original spreadsheet were of

three kinds: data entry errors, errors in Welsh et al., and absence of a name from the SEINet backbone. They seemed to be equally frequent but no formal count was made. Most errors in the first two categories involved a single letter or use of the wrong gender for the epithet. The majority of the names absent from the SEINet backbone were cultivated taxa. We have added them.

Welsh et al. (2008) stated that the total number of taxa treated in the volume was 4025, comprised of 2746 native species and 425 native infraspecific taxa plus 853 introduced species. The total number of taxa we found was only 3957, a difference of 68. Adding the numbers given in Welsh et. al for native species in each family yields a total of 2764, not the 2825 he reports, leaving a difference in the two totals of 7 taxa. These may reflect omissions on our part.

The correlation between the number of taxa in a county and its area is low (r = 0.29). This is not surprising. Utah's counties differ significantly in their topographic variability, an attribute known to be associated with high taxonomic diversity because of the environmental variation associated with differences in elevation, slope and aspect, differences that can be magnified by variability in substrate and soils. This helps account for the high number of taxa found in Washington and Garfield counties and the low counts for some of Utah's larger counties such as San Juan, Tooele and Millard counties but the data suggest that other factors are also at play. For example, although San Juan county is almost twice as large as Kane county, its taxon count is only 93 higher. Similarly, although Piute county is slightly larger than Salt Lake county, it has about 66% as many taxa and Garfield county which is 50% larger than Duchesne and appears to have similar topographic and soil variability has only 68 more taxa.

One factor affecting the number of taxa reported for a county is proximity to a herbarium with a major collecting program (Barkworth and Capels 2000). This probably contributes to the large number of taxa reported for Utah County, home to Brigham Young University where Welsh is based. Uintah County is home to Goodrich, a botanist who worked for the US Forest Service, creating a herbarium that now belongs to the Uinta Basin campus of Utah State University. Another factor may be at play in Duchesne county, which is home to many oil wells as well as many narrowly distributed species. The combination of the two has led to funding field work to determine the distribution of these species, a process that has inevitably resulted in better documentation of the many other species present.

Taxon density offers a direct look at the relationship between number of taxa and land area (Fig. 1). Comparison of the relative size of the two columns for each county emphasizes that, in some instances a low taxon count is associated with a high taxon density. This is true, for example, of Davis, Weber, and Piute counties. It also suggests that further floristic study of the low density counties might prove rewarding.

Comparison with SEINet

As noted in the introduction, another source of distributional data for Utah is SEINet, an internet resource available via intermountainbiota.org. It makes available information from over 180 US herbaria. Searching it for records from Utah will yield a different number each day because few herbaria have been able to upload all their records. For example, the Intermountain Herbarium has only uploaded about 60% of its records so far and many of these are from outside Utah. Another problem is that the identifications are made with many different sources. One consequence is that a single taxon may have records under multiple names. There are tools for establishing synonymy relationships with Symbiota, the software that runs SEINet, but Utah botanists have not, as yet, found the time and support to establish a single treatment for all the taxa that occur in the state. SEINet also includes records of voucher specimens for experimental plantings such as those grown in Cache county by the late Dr. D.R. Dewey for his cytogenetic studies. These come up as being from Utah but they are not mapped and are meant to be marked as cultivated taxa but sometimes they were not. There are also some fungal and non-vascular plant records in SEINet. For all these reasons, searching SEINet for records from Utah will yield many more taxa than reported by Welsh et al. (10,471 on 11 Jan 2017). Another potential reason for there being a higher number in SEINet is that, as Welsh states, he rarely visited other herbaria in the state because by far the best collection of Utah plants is in the Brigham Young University herbarium which is now, very appropriately named the Stanley L. Welsh Herbarium. We do not dispute Welsh's statement. Nevertheless, it is likely that some additional county records are located in other herbaria.

Our intent with this project was to encourage the development of county level checklists and the

sharing of new discoveries, whether of taxa or new county level distributions. Clearly, anyone working on such projects will need to consult Welsh et al. (2015) in addition to the checklist provided here and the records available on SEINet. Then they should get out in the field, make specimens, and, as they do so, share their knowledge with others. The software that runs SEINet (Symbiota 2016) includes great tools to assist those interested in doing so.

Conclusions

Preparation of the various editions of *A Utah Flora* is a truly magnificent contribution to knowledge of Utah's flora. Such floras, like the volumes of the *Intermountain Flora* (Cronquist et al. 1972, 1977, 1984, 1989, 1994, 1997; Holmgren et al. 2005, 2012) are the essential foundation for research in many different fields but are particularly important to those who wish to ensure that future inhabitants of Utah will be able to enjoy the plant diversity that is available today. Our goal in making the distributional data in Welsh et al. (2008) freely available has been to increase the value of the information it contains and encourage further study of Utah's floristic diversity. We thank and praise Dr. Stanley Welsh and his co-authors for their efforts.

Acknowledgements

We thank Jerry Jorgenson, Ben Lail, for supporting and facilitating our efforts to make floristic information more easily accessible and Tony Frates for his comments on an earlier version of this paper and uploading the data to the UNPS web site.

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County	Taxon Count	Land Area (km2)	Taxon Density
Beaver	1073	6708	0.160
Box Elder	987	14882	0.066
Cache	1130	3017	0.375
Carbon	749	3828	0.196
Daggett	1069	1805	0.592
Davis	608	774	0.786
Duchesne	1346	8394	0.160
Emery	1058	11557	0.092
Garfield	1414	13403	0.105
Grand	1200	9510	0.126
Iron	902	8539	0.106
Juab	1078	8785	0.123
Kane	1300	10334	0.126
Millard	1020	17021	0.060
Morgan	371	1577	0.235
Piute	863	1963	0.440
Rich	797	2665	0.299
Salt Lake	1386	1922	0.721
San Juan	1393	20254	0.069
Sanpete	926	4118	0.225
Sevier	1130	4949	0.228
Summit	1052	4848	0.217
Tooele	924	17977	0.051
Uintah	1370	11603	0.118
Utah	1587	5188	0.306
Wasatch	887	3046	0.291
Washington	1923	6283	0.306
Wayne	984	6374	0.154
Weber	700	1492	0.469

Fig. 1. Plot of taxon number versus area for Utah's counties.

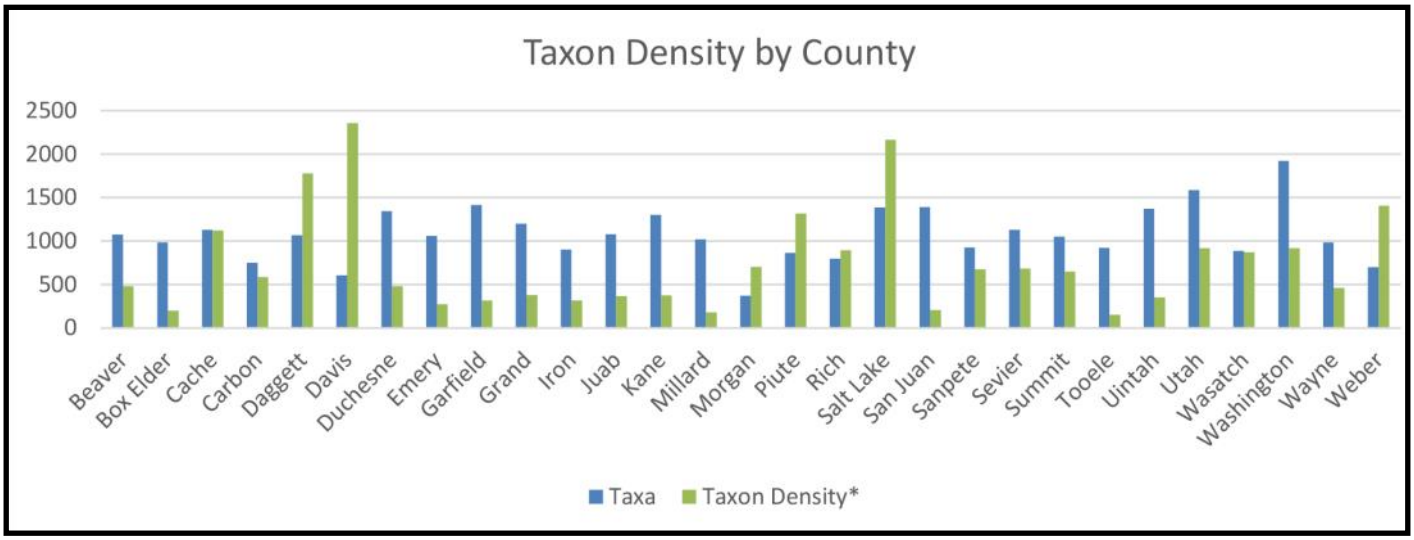

Fig. 1. Taxon density by county. To yield numbers of comparable size, figures for taxon density have been multiplied by 3000.

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Utah Native Plant Society Grant-in-Aid Program

With the New Year the application window for the Grant-in-Aid program has opened for the year 2017. UNPS grants are supposed to provide seed funding for newly devised research projects or auxiliary support of projects already funded by other entities, with the purpose of advancing our scientific knowledge of native plants in Utah.

The main target population are students at institutions of higher learning. , however, faculty and citizen scientists are also welcomed to submit proposals for scientific research projects. The average level of funding has been historically $500 per proposal, but requests up to $1000 will be considered for project of high scientific value.

For details on how to submit proposals go to the UNPS website at http://www.unps.org/PAGES/grantprogram.html.

The deadline for proposal submissions is April 15 2017. Applicants will be informed about the grant committee's decision by the end of May. You can contact Raven Reitstetter (raven.reitstetter13@alumni.colostate.edu) if you have any questions.

Dry Farming For Wildflowers

by Kayo Robertson

Two years ago my partner and I, contrary to all common sense, purchased some eight acres of beat-up rangeland in the mouth of Birch Creek Canyon. Birch Creek is a small, now largely de-watered, canyon that flows from the Bear River Range in Cache Valley towards the Bear River.

Typical of much western land, the previous owners had taken all they could and left the rest. A hundred and fifty years of livestock grazing along with ill conceived attempts to poison sagebrush and weeds had left much of the place a carpet of burdock, dyer's woad, teasel, Canada thistle, ragweed, cheat grass, hounds tongue, dead, dying sage and rabbit brush. This history along with no legal development, occupancy, water or mineral rights made the parcel affordable.

I'm no stranger to the work and play of turning a patch of earth into a garden of native and drought tolerant vegetation. My intent was to manually remove the jungles of Eurasian monocultures that commandeered so much of the sunlight, water and soil. Since quite a few of the weeds had seed lives of only two or three years I reasoned that an effective removal of seeding weed plants combined with a massive seeding of natives could result in some major vegetation changes. I soon found out that nothing I'd ever attempted quite prepared me for this journey. It quickly became clear that success is not merely dependent on hard work and many good seeds. It also depends upon unknowns and variables such as the impact of vole, deer, rabbit and turkey populations, summer temperatures, well timed rains, drought and huge pre-existing seed banks of many weedy species. Establishing new plants without a water source presented a difficult and steep learning curve.

Questions blossom as richly as woad and hound's tongue. When everything is changing is the age old reliance upon baseline data still relevant to present conditions? Is it possible to renew a few acre island in an ocean of weeds? When a pound of wild geranium seeds costs $350 while a pound of Eurasian red clover costs $6 a pound is native plant exclusivity affordable?

What about planting commonly available species that are native to Utah but not native to Cache Valley such as poppy mallow, pinyon pine and buffalo berry? Should the focus be more about ecological functions and less about re-establishing extirpated natives? What about university's gift of a ten year old Gingko tree? They grew here 80 million years ago. Is forgoing the use chemical treatments just a new-age Puritanism or does it make scientific sense? Am I really working with the canyon's ecosystem or am I just another half-educated do-gooder playing God and sweating up a storm behind a variety of hand tools?

A lifetime passionately devoted to ecological education hardly prepared me for this work. It propels me at ever increasing speed into the heart of my own ignorance. After two years of work and practice, here is the ever changing takeaway.

The Takeaway

1. I don't have the knowledge or authority to determine what a "healthy" landscape is. Is a lava flow unhealthy? Or a moonscape? Nevertheless, I make decisions and implement them.
2. Decisions are questions. What happens if I clear this of burdock or cheat grass? Which of these seeds I plant will take root?
3. Work with time. Now is the time for seeds not fruits. Seeds are questions. The fruit is in the seed.
4. Think like fire.
5. Respect plants I am trying to discourage as much as those I wish to encourage.
6. Research, research and more research. Carefully watch the effect of any action taken.
7. Be careful. Good intentions are not enough.
8. Work towards diversity.
9. Consult and query anyone who has experience.
10. Consider broad botanical functions such as pollination, bank stabilization, forage, water retention and community.
11. Any cultivation that leaves an open space will quickly be filled and usually with weeds. Manageable ('good') weeds have a short seed life (1 to 3 years). Weeds such as cheat grass and ragweed ('bad weeds') have seed viabilities of ten years and more. Use weeds to fight weeds.
12. Be playful. Despite the heavy work load, remember the only thing I am actually bringing to health is my own understandings and attitudes.

This autumn, wiping sweat from my brow, I put aside all pretense of 're-habilitation' or 'healing' the land. The truth is I am simply another farmer; a dry farmer. I am farming for wildflowers. Really, it's not a bad occupation.

If any of you kindred spirits involved in similar efforts would like to compare notes please give me a call at 435-563-8272. Too much solitary occupation drifts towards drudgery.

Ways of the Meadow

by Neal Dombrowski, Botanist, Red Butte Garden and Arboretum

A meadow is a soft place with wispy grasses and dainty flowers where the wind creates harmony and the sun electrifies color. A meadow is also a habitat where wildlife interacts with plants as part of the ecosystem. Dragonflies appear to float effortlessly in search of prey, native bees pollinate flowers and get rewarded with pollen or nectar, racer snakes and bobcats search for rodents, and in Red Butte Garden's Wildflower Meadow, a Cooper's hawk nests between adjacent stands of oak.

Creating a meadow-like low water landscape has caught the interest of homeowners and landscapers alike. So much so that in 2016, the Utah Nursery and Landscape Association conference lead by keynote speaker, Lauren Springer Ogden, highlighted meadows and particularly as habitats. In an interesting discussion, Steve Love of the University of Idaho Extension, talked about the processes of creating garden meadows—similar to what has been done to create Red Butte Garden's Wildflower Meadow, located near the Garden's Oak Tunnel.

This year begins the sixth growing season since active meadow development began in 2011. The first three years were spent eradicating aggressive weeds, but by the end of the fourth year we began to feel a sense of accomplishment. Beginning with a palette of bunch grasses, native perennials and other low-water meadow plants including bulbs were added. The Meadow has evolved over the last five years into a diverse assemblage of native species, some of which germinated from the resting seed bank already in the soil. At last inventory, there are over two dozen grass species in the Meadow, originally only six of which were planted.

A Wildflower Meadow displays plants adapted for low-water use. For the first two or three years after sowing seed or planting, a Meadow needs irrigation to establish the root systems of the desired plant species. After the initial establishment period, watering can be reduced significantly to none at all if you're planting ative species or low water plants.

The visual transformations of the Wildflower Meadow throughout the year begin with the early bulbs

shooting beyond the greening grasses and perennial foliage in early spring. Meadow Camas (*Camassia quamash*), Wild Hyacinth (*Triteleia grandiflora*), and Pink Nodding Onion (*Allium cernuum*) are some of the native bulbs that can be used in your Meadow. Later in the spring, regionally native Prairie Junegrass (*Koeleria macrantha*), Giant Sacaton (*Sporobolus wrightii*), Little Bluestem (*Schizachyrium scoparium*), and Prairie Dropseed (*Sporobolus heterolepis*) start to mound in shades of green as native forbs including Utah Sweetvetch (*Hedysarum boreale*), Blue Flax (*Linum perenne*), Mexican Hat (*Ratibida columnifera*), and Bee Balm (*Monarda fistulosa*) are open for business to pollinators, offering sweet smells and bright colors to frolickers. By season's end, the grasses get their chance to shine as their bright green, blue, and deep red foliage and inflorescences shimmer with the light and dance in the wind.

The Garden's Meadow is planted in a unique location at the mouth of Red Butte Canyon and adjacent to Red Butte Creek. This is a place that rewards long, silent observation.

Many of these low water use practices employed and developed can be used to create your own residential meadow. You'll notice loose, wild plantings popping up in your neighborhood. Those weedy, low water parking strips are perfect locations for a meadow. Contact UNPS or your local extension agent to make some great plant selection for your very own meadow.

WANTED

• UNPS Treasurer •

UNPS is looking for a volunteer Treasurer to help us write out a few checks a month and help with our accounting and reports.

Some experience helpful but will train.

Contact Bill King, chair: mzzzyt@aol.com or 801-582-0432 or 801-808-6393

From the 2016 Mulch Pile

The good, the bad, and looking ahead

by Tony Frates, Conservation co-chair

While 2016 was a difficult year, it did actually have a few bright spots.

One of those was of course the designation of Bears Ears National Monument, which UNPS strongly supported and provided comments with respect to rare plants and their ecosystems that would benefit by such a designation. The monument has far more support from the tribes and from Utahns in general than the general public (locally and nationally) has been led to believe. Americans, and the world, will benefit from this designation, which we applaud.

While we lost several board members who have played critical roles on behalf of the organization who after many years of service made life-changing choices (Larry and Therese Meyer, Jason Alexander and Walt Fertig), we are also thrilled to have an excellent incoming group of new board members that will have new ideas and provide direction for the future. We remain, however, highly indebted to these and other former board members, and thank all of them for the extensive contributions of time and energies on behalf of UNPS.

The ongoing efforts by our Fremont Chapter who had another successful Penstemon festival in 2016, and the resurgence and new energy within the Canyonlands and Cedar City chapters, as well as the continued high level of engagement by the Salt Lake chapter, all are much appreciated. Awareness and appreciation lead to conservation.

Our March 8, 2016 rare plant conference was well-attended (almost 90 paid registrants) and highly informative, and had tremendous support from our board of directors. On May 25, 2016, our rare plant committee published Calochortiana (our technical journal) Num. 3 containing the most extensive update and review of vascular plants in Utah yet undertaken. It was an update to the December 2012 UNPS rare plant list which was published in Calochortiana Num. 1 and was an accumulation of an additional three plus years of knowledge and several hundred hours of work. As the most comprehensive evaluation of imperiled Utah vascular native plant species yet conducted, we felt that it warranted a press release which was issued on that same date. The almost 250 page long document is the single most comprehensive evaluation of imperiled Utah vascular plant species ever completed, containing an expanded evaluation of some 1214 taxa (out of roughly 3,200 for the state). We now consider 1/3rd of our flora to be rare and of conservation concern, with 18% at elevated levels of concern, and 6% at the high level of concerns. There was a 20% increase in taxa ranked from high to extremely high concern (the two highest rankings) since 2009.

And even though a Utah plant species has not been federally listed under the Endangered Species Act in the last 15 years other than *Sphaeralcea gierischii* in 2013 (and even that was only as a result of litigation that we were not a party to), our candidate species count did increase in 2016, even if only temporarily, from three to five, as a result of an October 25, 2016 Colorado court decision.

Green lights were given and/or are in process with respective to several massive Uinta Basin projects that we were involved in commenting on directly or with other concerned groups. One of those was Newfield Exploration's Monument Butte project involving some 5,750 new oil and gas wells over a 16 year period plus associated roads and infrastructure (plus 226 miles of new roads and pipelines, 318 miles of new pipeline adjacent to existing roads, 21 new compressor stations, a gas processing plant, 7 new water treatment and injection facilities, 12 gas and oil separation plants, 6 water pump stations, the drilling of a freshwater collector well, and the expansion of 6 existing water treatment and injection facilities and 3 existing compressor stations). In all, over 10,000 acres will be disturbed (Newfield, based in Houston, Texas, with an office in China) wanted to disturb over 16,000 acres, over and above the extensive acreage that has already been disturbed since they have already drilled over 2,000 wells on a unit that is apparently the largest in the federal system in the lower 48 states.

According to BLM's own analysis, and as reported by WildEarth Guardians, the drilling and fracking corresponding to this latest Monument Butte proposal would release more than 60 million metric tons of carbon pollution annually, equivalent to 17 coal-fired power plants, and with enough carbon pollution to melt 70 square miles of Arctic sea ice every year.

An appeal to the final decision is in progress.

Meanwhile and in light of the Monument Butte project, we nominated the listed *Sclerocactus brevispinus* for a top 10 list consideration with respect to the Endangered Species Coalition list for 2017.

A similar massive project announced last year is being been proposed by Crescent Energy (based in Calgary) involving potentially over 3,900 oil wells which abuts the Newfield project to the north, and with similar infrastruc-

ture impacts. As a result, we remain even more concerned about *Penstemon flowersii* than ever. It already had significant indirect impacts from energy development but will be faced with increased indirect impacts as well as now likely direct impacts.

Estonia's Enefit American Oil right-of-way utility corridor inched closer to approval with a favorable indication in a BLM DEIS released last year. That oil shale project near the Utah-Colorado border is expected to last 34 years as outlined in the document. The EPA however has been highly critical of the DEIS, as have others. UNPS filed comments in mid-June of 2016 urging the no action alternative due in part to lack of adequate protections for listed and sensitive plant species and their ecosystems.

The Uinta Basin's highly restricted *Frasera ackermaniae* represents an increasing concern not due to energy development but due to recent OHV impacts observed in 2016; it is likely one of several species in Utah that probably should be petitioned for listing, along with central Utah's *Eriogonum mitophyllum* which has severe ongoing gypsum mining threats.

A new small occurrence of the federally listed *Arctomecon humilis* (Low bear-poppy) was found on habitat predicted to contain it, or that was viewed as critical habitat that could be used to help establish it, going all the way back to 1991 in a scientific journal article by Deanna Nelson and Kimball Harper. But that species is about to have yet another highway soon impacting it, as habitat segmentation in the area continues unabated. Washington County, like Utah County, wants to become just like Salt Lake County: overbuilt and overpopulated with far too many roads, and not enough natural open space in development and planning processes. Meanwhile in late September of 2016, the USFWS released its 5-year review for the species (that was almost itself approaching five years past due). While exhaustive and very helpful in numerous respects, it misses some important observations and recommendations, and it barely mentions some of the horrific habitat disruption caused by SITLA's development agenda not the least of which was the road built directly through its White Dome habitat, and which occurred during the five years under review.

Another unexpected happening in 2016 related to the location of a larger occurrence on adjoining, but somewhat different habitat, for the federally listed Autumn buttercup (*Ranunculus aestivalis*) that has received so much attention over the years and which was thought to be closer to the brink of extinction than most other species in Utah, and which was located during Utah Natural Heritage Program surveys. The habitat that previously has been protected appears to represent a fringe area that may not be truly representative of the type of habitat the species actually requires, and now appears have some habitat on federal lands that was previously unknown. Had this species not been listed, this additional searching never would have occurred. The importance of Endangered Species Act listing for plant species regardless of land ownership considerations cannot be overstated.

Non-native plants continued to flourish in Utah landscapes in 2016. But as of June 1, 2016, the state of Utah finally considers Myrtle spurge (*Euphorbia myrsinites*) and Russian Olive (*Elaeagnus angustifolia*) to be noxious weeds and their retail sale or propagation in the nursery and greenhouse industry is now prohibited (Class 4 status). This does not mean that you have to remove these plants if they happen to be growing in your front yard, but we would greatly encourage you to do so (carefully).

Other important updates to the law includes the addition of *Scorzonera laciniata* which has spread relatively quickly throughout Utah (under class 1B, the second highest category of concern) and *Linaria dalmatica* is now in class 2. They are more species that need to be added to the Utah Noxious Weed Act list, but these were all very welcome changes and additions, and that we have advocated.

Massive algal blooms during the summer of 2016 on Utah Lake (and elsewhere) were a signal to the general public that not all is well with respect to how we are treating our riparian, lacustrine and aquatic ecosystems, and were somewhat misleadingly portrayed in the media, at least initially. Indicating that it is simply a "nutrient" problem that Mother Nature will take care of in due course (implying also that She caused it in the first place simply due to to high summer temperatures with little precipitation) was aggravating. We urged the Utah DEQ in August 2016 to take immediate action rather than continue prolonged studies that have delayed the implementation of TMDL (total maximum daily load) standards for both Utah Lake and Farmington Bay. In addition, we recommended that it was essential that Utah (and Davis) County sewage treatment plants to remove nitrogen and phosphorous out of sewage water (and this is something that needs to happen throughout the Wasatch Front, and soon). The technology exists and the costs will have to be paid. Finally we indicated to the Utah DEQ that they cannot sit on the sidelines as the current massive road construction projects continue around Utah Lake (and as proposed, and also for the Great Salt Lake). The TransPlan40 project in particular around Utah Lake is a stunning example of a lack of foresight and a misunderstanding of the importance of toxic run-offs, and a lack of

understanding of the importance of wetlands. These new highways will be highly disruptive to wetland habitats and will fuel toxic runoffs exacerbating attempts to return the lake to some minimum level of health, and without which improved water quality and safer conditions for people, pets and wildlife will be unobtainable.

We have a population that is expected to double by 2050. How many roads will ever be enough? We will need different creative solutions that don't involve simply building more roads. And, in an ever more crowded world, something we could use less of are the exceptionally large vehicles that we now tend to drive, which has been a very disturbing trend that one might have assumed would have led to us to exactly the opposite choices in 2016.

Despite having the West's (a) largest freshwater lake (Utah Lake) as well as (b) the largest lake (Great Salt Lake), we are the second driest state. We, and wildlife, depend on these critical resources. As a state that is said to be running out of water (a problem which the Lake Powell pipeline project will not solve), these resources are extremely important, as are all of our remaining wetlands. The Great Salt Lake has dropped over 10 feet in the last 170 years and if not protected and better managed, it could become a dust bowl with utterly disastrous consequences for migratory birds, butterflies and other wildlife. And us.

We are encouraged by the work of the Native Plant Conservation Campaign and their renewed efforts to reach out and help to support native plant societies and related organizations throughout the country, and who now has 46 member organizations. UNPS has long been a member. We are grateful to have had the help and support of Dr. Emily Roberson of NPCC in 2016.

And we are extremely grateful to our conservation partners and their exceptional and diligent efforts in 2016.

Locally and nationally, we do find ourselves in dark times, and seem to be increasingly living closer to that demon-haunted world described aptly by the late Carl Sagan. We simply "believe" that science and making decisions based on the best available information is paramount, and that as stated by Sagan, "Science is a candle in the dark." Our leadership at every level needs to be guided by truth, facts, intelligence, civility and transparency. And the people should always have a full and powerful voice.

As we approach our 40th anniversary in 2018, we will work harder then ever going forward in carrying on the mission of UNPS which includes the conservation of the native plant and plant communities found in the Intermountain West, not only because it is the right thing to do but also because it is completely self-serving. It is essential for the pursuit of the happiness and well-being for future generations, as well as for the species that share this planet with us. America's greatness has always relied to a great extent on its vast, unspoiled resources, from sea to shining sea. We cannot ever make America great "again" by continuing to excessively despoil those resources.

Call for Applications: *Ann Kelsey Student Botanical Project Fund*

The Natural History Museum of Utah is pleased to invite University of Utah undergraduate and graduate students to apply for research funding from the newly established Ann Kelsey Student Botanical Project Fund.

Created to honor the memory of Ann Kelsey, the fund will award one gift annually of approximately $500 to support a student conducting field- or lab-based botanical research that is linked to the Museum's Garrett Herbarium collections. Eligible projects can involve study of existing specimens in the NHMU collection or the contribution of new specimens.

Ann served the Natural History Museum of Utah for 23 years as the Collections Manager of the Garrett Herbarium. She was passionate about the importance of botanical collections, an inspirational colleague, and a tremendous resource for the botanical community. When she passed away in 2013, this fund was established with the many gifts made to the Museum in her memory.

Deadline: Applications for 2017 funding are due by 5 p.m. MST on February 24, 2017. The selection committee will then review applications. The recipient will be notified by March 1, 2017.

For additional details and instructions on how to apply please visit:
https://nhmu.utah.edu/kelseyfund

A Rare Opportunity You Won't Want To Miss...

The 2017 Annual Meeting of the American Penstemon Society, co-sponsored this year by the Utah Native Plant Society, is being held in Vernal June 2-5. The principal organizers are Pat and Noel Holmgren, who have recruited an impressive array of speakers and field trip guides. The field trips, which will explore areas of the Uinta Basin surrounding Vernal, offer the opportunity to see a wide variety of Penstemons, including four species from the UNPS Rare Plant List (no guarantees, but a chance to see them). Snowpack in the Uinta Basin is currently at 195% of normal, which bodes well for plants this summer.

Don't wait to register, spaces may run out fast. http://penstemons.org/index.php/annual-meetings. The latest issue of *The Penstemaniac* has details as well and can be accessed under top menu item 'Library' and then choose 'Newsletters' at the left of the library page.

A Personal Discovery

shared by Tom Wuenschell, Perry, Utah

I would like to share with you my personal discovery of an interesting little native cactus that I encountered while hiking a trail in June of 2016. I was on the Eagle Rise trail, which originates at the southeast corner of Mantua Reservoir in eastern Box Elder county. One of the forks in the trail goes uphill to the top of a ridge overlooking the Mantua basin. I found that a small cactus segment was clinging to my hiking boot and found these small cactus plants to be quite common on this ridge. Very rocky soils with Utah juniper and mountain mahogany and little or no woody understory plants in this area at about 5800 feet elevation.

I collected 3 small segments in a Copenhagen can I carry for collecting Gambel oak acorns or other interesting seeds. I planted them in a 3" peat pot and brought them inside and placed them on a window sill. One of the segments immediately grew another small segment on top of it. See attached picture. I am no botanist but I tentatively guessed it as *Grusonia pulchella* (GRPU3), formerly known as *Opuntia pulchella*. I am recently retired from the Forest Service where I used to manage and edit vegetation data collected by field crews in our FIA (Forest Inventory and Analysis) program.

Anyone wishing to confirm Tom's identification or suggest an alternative, please write a note to me and I will convey your idea to Tom. I am sure Marv Poulson's article on *Grusonia pulchella* in this newsletter will prove helpful. - editor: jstireman@outlook.com

I would be interested to hear of any other possible IDs of the little cactus in my picture.

Utah Rare Plant Meeting 2017

by Elizabeth Johnson

Please join us for the annual Utah Rare Plant Meeting on March 7th, 2017, co-sponsored by the Utah Native Plant Society and the Garrett Herbarium at the Natural History Museum of Utah. This year's meeting will be held in Salt Lake City and we encourage our members from all chapters to attend.

The meeting will be held in the Swaner Forum at the Natural History Museum of Utah on Tuesday, March 7th, 2017 from 8am to 4pm. Presentations focusing on Utah's rare plants will be offered throughout the day along with several posters. You can expect to hear from a variety of presenters sharing information on topics such as: species of conservation concern in the Manti La Sal National Forest; pollinators and the dwarf bear-poppy; the genetics of Utah's *Astragalus rafaelensis* from our neighbors in Colorado; as well as how the California Native Plant Society undertakes the difficult task of determining and updating the status of rare plants in the digital age. Presentation topics continue to roll in and we encourage everyone to share their rare plant related research.

Everyone is encouraged to join us including researchers, students, federal, state, and local agencies, consultants, and the public. All are welcome to participate and present as it is our goal to cultivate collaboration and partnership among all those that care about Utah's plants.

Registration

You can register for the meeting at the Utah Native Plant Society website, unps.org. The cost to attend is $25 ($15 for students and presenters). Along with the many presentation offerings, your registration also includes morning snacks, coffee, and lunch. Vegetarian and gluten-free options will be available within the buffet-style lunch.

Presentations

Submitting Presentations: Please submit your topic to Elizabeth as soon as possible to ensure a spot.

Presentation: 20 minutes in length in standard PowerPoint format. Submit abstracts to Elizabeth by **Tuesday, February 21**. Bring the presentation on a flash drive to be loaded the morning of the meeting.

Posters: Posters are being accepted for anyone who may be unable to attend or present. Submit your abstract to Elizabeth by **Tuesday, February 21**, and include poster dimensions.

Contacts

For presentation questions - Elizabeth Johnson: johnson@nhmu.utah.edu, (801) 587-5745

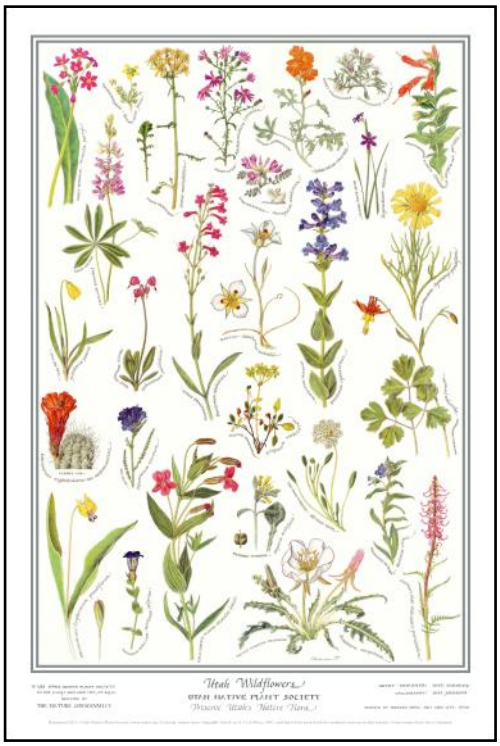
For registration/payment questions - Tony Frates: unps@unps.org, (801) 277-9240

The "New" UNPS Wildflower Poster

The UNPS Board of Directors took action when our supply of the popular *Utah Wildflowers* posters was running out. Now we have a sizeable inventory of high-quality posters, but it wasn't easy.

Mindy Wheeler went to the printer only to learn that we needed new digital artwork since the earlier analog-based material had become obsolete. The Board considered Mindy's findings and accepted the printer's offer to digitize and print our posters. Dave Wallace was assigned to take over the project, and, with the help of proofs provided by the artist, the printer was able to produce a great product. Future reprints should be easier and less costly now that everything is digital.

Except for a few details, the "new" poster is identical to the original 1988 version. We kept Pam Johnson's calligraphy and, of course, it still features 28 of our favorite Utah wildflowers. It's printed on heavy-weight paper as before, but the colors are slightly brighter and the ink is more fade-



resistant. We made it ¾ inch taller to accommodate an additional line of text explaining concerns over scientific names that have changed over the years.

Dave enjoyed working on the poster reprinting effort, in part because he was involved with the original poster project in 1987-88. Back then, Jo Stolhand led the poster committee, UNPS members submitted names of their favorite flowers, Dave Gardner did the artwork and Paragon Press printed it. UNPS didn't have much money in those days so we covered the printing costs with a loan from the Nature Conservancy.

You may wish to give one as a gift, to enjoy for its artistic qualities, or to replace an old faded copy. At 22 inches wide and 34 inches tall, it fits nicely in a standard 2'x3' poster frame. It's a bargain, too. The UNPS member cost is $10, the same as the original member price. Contact a UNPS Board Member or Chapter Officer if you want a copy, or get it online at www.unps.org (select the "store" option). You also may be able to find one for sale in a visitor center or museum.

David Wallace

Utah Native Plant Society

Utah Native Plant Society
PO Box 520041
Salt Lake City, UT, 84152-0041.

To contact an officer or committee chair write to Webmaster: unps@unps.org

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Website: For late-breaking news, the UNPS store, the *Sego Lily archives, Chapter events, sources of native plants,* the digital Utah Rare Plant Field Guide at unps.org.
Webmaster inquiries at unps@unps.org

Many thanks to Xmission for sponsoring our web-site.

Sego Lily Editor: John Stireman
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The *Sego Lily is a quarterly publication of the Utah Native Plant Society, a 501(c)(3) not-for-profit organization dedicated to conserving and promoting stewardship of our native plants.*

At the UNPS website you can access the Sego Lily in color, download past issues, read late breaking UNPS news, renew your membership, or buy wildflower posters, CDs, and other stuff at the UNPS store. unps.org

Utah Native Plant Society

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