



Sego Lily

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Invasive Great Hairy Willowherb Spreads to Utah

by Tony Frates

Epilobium hirsutum L. is a member of the Onagraceae (Evening Primrose or Willowherb family) and is indigenous to Africa, Asia and Europe. It was first collected by botanists in the United States as early as 1829 in Rhode Island (the oldest specimen on-line that I could find was in 1862, also in Rhode Island). It may have been introduced into the garden trade in the 1850's or arrived here via ship ballasts. It has since become naturalized over a large area in the northeastern and north-central portion of the country (and eastern Canada), but has been largely absent in the western US, except much more recently in northern-central Colorado along the Front Range, and in Washington and Oregon (to be expected in adjoining northern Idaho). As of at least 2014, it is now present in northern Utah; and as of 2022, known from at least two Utah counties (Wasatch and Davis).

E. hirsutum (known by various common names including Great Willowherb, Hairy Willowherb, Codlins and Cream, and other names) is not currently treated in any of our local nor regional floras. It is a tall, semi-aquatic, perennial species, that grows in moist soils, ditches, along streams or lakes, or in standing water. It spreads easily. Adults produce tens of thousands of seeds that, as with other plants in the same *Epilobium* taxonomic section, have a coma enabling dispersal by wind. These seeds can remain viable for several years. These plants also can spread vegetatively and quite aggressively. Thick stolons emerge from axillary buds at the base of its stems that can then develop into rhizomes of up to two feet in length. New plants can form from either the stolons



Photo: *Chamaenerion angustifolium* (syn. *Epilobium angustifolium*) T. Frates Millcreek Canyon, SL Co. UT7/11/12

(above ground) or the rhizomes (below ground). Ultimately that can lead to dense stands that choke out other native vegetation, and it has been found to disrupt wetland food chains in some areas. Frequently it grows with another invasive species, *Lythrum salicaria* (Purple Loosestrife, also a semi-aquatic perennial, and a Class II designated noxious weed in Utah).

Great Hairy Willowherb is found mainly in lower elevation areas. It may be confused with plants in the *Epilobium ciliatum* complex. It may also be superficially confused with *Chamaenerion angustifolium* (Fireweed, syn. *Epilobium angustifolium*) in the lower end its elevational range in the state. In Utah, it has been found in Wasatch County at an elevation range of 5,445 to 5,900 feet (1660 m to 1800 m). The upper

Cover photo: *Epilobium hirsutum* by iNaturalist user selauki Benzie Co. MI 9/29/22

elevation range where it has been so far observed in Utah was a September 2020 observation that I stumbled upon two years ago. The location was at Wasatch Mountain State Park, where it was a seemingly lower growing plant than expected, and where it appeared to have possibly been planted. Initially I did not know what species it belonged to. Of even greater concern however is an August 2020 observation that I only recently noticed where it was observed at the 5,445 ft. elevation level growing along the Provo River, also near Midway. The only two Utah herbarium collections were taken also in the Midway area by Dr. Robert Johnson in July and August of 2014, both in ditch banks at 5572 ft. (1698 m) and 5539 ft. (1688 m) respectively.

More recently however there have been two separate reports of this species at the same exact location near Layton in northern Davis County at an elevation of 4,210 ft. (1,285 m) within the Great Salt Shorelands Preserve (maintained by The Nature Conservancy), along a boardwalk that provides access to the area. These sightings were in late July and early October of 2022 by two different observers.

Botanically, hirsute (the basis for the specific epithet) means having rough, coarse, stiff, hairs usually covering all or most of a given surface area. In a very generic sense, it simply means “hairy.” In the case of *E. hirsutum*, it is often described as having hairs that are “soft-hirsute” or having stems and leaves that are densely villous (long and shaggy, but not matted; essentially “soft”). So the specific epithet given by Linnaeus is perhaps somewhat misleading. Touching the leaves of this plant would not be unpleasant to the casual observer.

Feature comparison:

A brief comparison of our native *E. ciliatum* subsp. *ciliatum* and *E. ciliatum* subsp. *glandulosum* (following the taxonomy in the *Flora of North America*) along with *E. hirsutum* follows. These species occur in the same *Epilobium* subsection and they could potentially hybridize but that has not been known to occur in North America. All are self-



Photo: *Epilobium ciliatum* subsp. *ciliatum* T. Frates
Millcreek, SL Co, UT 7/18/12

compatible. A key difference is in the stigma lobes (as well as the size and color of the flowers). *E. ciliatum* complex plants have capitate stigma lobes. *E. hirsutum* instead has four clearly differentiated lobes. Per Hoch (2021), the 4-lobed stigma plants tend to be more prone to outcrossing, the stigma tending to extend past the anthers. Plants in this genus all have 4 petals, 4 sepals and 8 stamens.

Epilobium ciliatum* subsp. *ciliatum

(common names for plants within this morphologically diverse complex generally include American Willowherb, Northern Willowherb, Fringed Willowherb and others)

- Overwinters via leafy basal rosettes that start to grow late in the season
- Leaf veins conspicuous
- Leaves reduced in inflorescence (inflorescence not leafy), open, branched inflorescence;
- Stems branched especially distally; stem hairs variable ranging from subglabrous to pubescent/strigillose (a regional variant in both California, and in at least one place in Utah, has densely sericeous pubescence throughout)

- Leaves lanceolate to ovate-lanceolate; typically mostly glabrous with fringed hairs but variable
- Leaves both opposite and alternate (similar to others in this subsection) with usually serrulate margins blades narrowly lanceolate to narrowly ovate or elliptic
- Stems: stems typically at least 15" tall (roughly 40 cm) but more often in the 3 to 4 foot tall range, but can be much taller, over six feet
- Erect inflorescence, in racemes or panicles
- Petals white or less often pink, 2-6 (9) mm
- Capitulate (clavate or cylindrical) stigma lobes
- Petals with an apical notch
- Ridged seeds
- Wide elevational range and flowering period
- Variety of habitats from mesic to the margins of water bodies and wetlands
- Locally native; the most widely distributed *Epilobium* with native range extending to Mexico, Guatemala and South America.
- Considered an obligate wetland species in EPA region 5 (MN WI IL IN OH and MI). Facultative in region 8 which includes Utah.

Epilobium ciliatum* subsp. *glandulosum (syn. *E. glandulosum*)

- Generally similar to subsp. *ciliatum* but less branched (simple to sparsely branched)
- Branches near apex rather than from the base of plant as in subsp. *ciliatum*
- Overwinters via turions (perennating structures near the base of the plant, underground and submerged by 1 to 4 inches below the base of the plant; frequently missing in specimens).
- Stem height similar to subsp. *ciliatum* but doesn't get quite as tall
- Leaves wider than subsp. *ciliatum* (ovate to narrow-

ly ovate)

- Leaves little reduced in inflorescence (i.e. having a "leafy inflorescence"); inflorescence crowded, long
- Stem and leaf hairs similar to subsp. *ciliatum*
- Flowers more often pink rather than white
- Capitulate stigma lobes, similar to subsp. *ciliatum*
- Flowers on average larger than subsp. *ciliatum*, 4.5-12 (15) mm
- Coarser than subsp. *ciliatum*
- Seeds rougher and larger than subsp. *ciliatum*
- Locally native, broadly distributed, but more restricted than subsp. *ciliatum* especially in the US where it is mainly occurs in the western, and north-central and northeastern portions of the country

Epilobium hirsutum

- Can be woody near base.
- Rope-like stolons from which thick rhizomes can emerge
- Stem height range similar to *E. ciliatum* subsp. *ciliatum* but can be taller (up to 8 feet or more).
- Leaves and stems villous (soft hairs cover the entire plant), serrulate
- Leaves somewhat clasping
- Inflorescence erect and similar but villous
- Petals often only shallowly notched at tips
- Petals usually bright pink to rose-purple and rarely white
- Larger flowers (3/4th inch across) that are showy from leaf axils near top of plant.
- Stigma deeply 4-lobed, the lobes recurved or spreading and exerted beyond anthers
- Produces long narrow capsules similar to subsp. *ciliatum*
- Wind dispersed, and spreads vegetatively via

rhizomes

- Habitat: Marshes, along water bodies
- Semi-aquatic, perennial, herbaceous
- Native to Africa, Asia and Europe

***E. hirsutum* status in other states:**

This is a tracked, invasive species by EDDMapS. Utah observations should be reported to EDDMapS so that this species will get on the radar of county weed managers. Currently EDDMapS reports that this species is included in the state noxious weed laws of Colorado, Washington state, Massachusetts, and New Hampshire; and is on state invasive species lists in Pennsylvania and West Virginia.

A Cause for Alarm

The presence of this species in Utah where it has now already spread into two counties (that are not adjacent to one another) should be the cause for



Photo: *Epilobium hirsutum* by iNaturalist user ttirbo Davis Co. UT 10/11/22

alarm. There is little doubt that there are other occurrences and that this species could spread all along the Wasatch Front. It will likely be very difficult to control.

Credits

iNaturalist user photo credits (used under a Creative Commons license):

ttirbo (Oct 11, 2022 observation in Davis Co., Utah, <https://www.inaturalist.org/observations/138409842>).

selakuki (Sep 29, 2022 observation in Benzie Co., Michigan, <https://www.inaturalist.org/observations/136953555>).

Other pictures: Tony Frates

Utah observations of *Epilobium hirsutum* on iNaturalist:

evolvulux (Aug 6, 2020, along Provo River, Midway, Wasatch Co., <https://www.inaturalist.org/observations/147720668>).

knbuchi (Sep 18, 2020, Wasatch Mountain State Park, Wasatch Co., <https://www.inaturalist.org/observations/59983428>).

sgalt22 (Jul 25, 2022, Great Salt Lake Shorelands Preserve, Davis County, same location as ttirbo above, <https://www.inaturalist.org/observations/127941109>).

ttirbo (Oct 11, 2022, Great Salt Lake Shorelands Preserve, Davis Co., same location as sgalt22, see link under iNaturalist user photos)

Utah herbarium collections of *Epilobium hirsutum* (both at BRY):

Robert L. Johnson, 3228, Jul 19, 2014, Midway, Wasatch Co. <https://www.intermountainbiota.org/portal/collections/individual/index.php?occid=4682299>.

Robert L. Johnson (with C. Frank Williams), 3383, Aug 8, 2014, Midway, Wasatch Co. <https://intermountainbiota.org/portal/collections/individual/index.php?occid=11263828>.

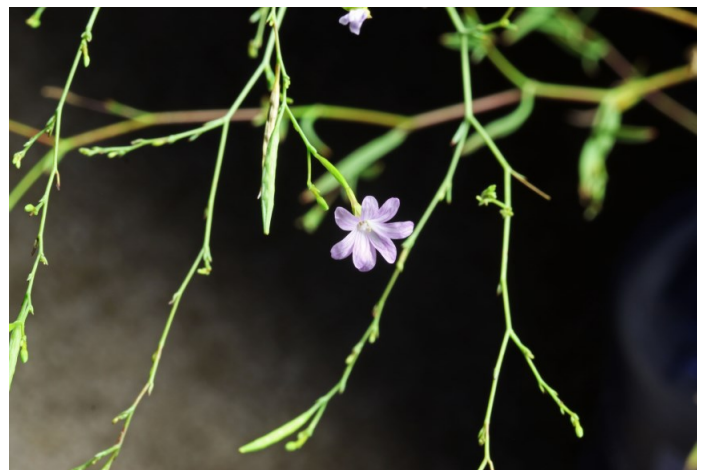
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Photos of two more *Epilobium* spp. by UNPS member, Andrey Zharkikh



Talus willowherb (*Epilobium clavatum* syn. *Epilobium alpinum* var. *clavatum*), Evening Primrose family (Onagraceae). Small seepage along the Mount Timpanogos Trail, Utah.



Tall annual willowherb (*Epilobium brachycarpum*), Evening Primrose family (Onagraceae). Slopes of Red Butte, Utah.

Utah Rare Plant Meeting

Sponsored by the **Utah Native Plant Society**

Tuesday, March 7, 2023

Via Zoom 9:00 a.m. - 4:00 pm

Registration: \$10* (\$5 students) for Zoom link which includes the ability to ask questions real time and to be included in the chat rooms.

Non-registered participants can watch free on Facebook Live.

[Register Here](#)

*All net proceeds will go to the Small Grants Fund, additional donations are welcome.



Photo: *Eriogonum tiemhii* in habitat by Patrick Donnelly

Climate Change and Land Use History Enflame a New Range War Over Public Lands

by Jason Andrew Alexander, Ph.D., past President of the Utah Native Plant Society

Editor's Note:

The article below was originally published in the August-October 2014 (volume 37 number 4) of the Sejo Lily. The author, Jason Alexander, is a former board member and past president of the Utah Native Plant Society and was curator of the Utah Valley University Herbarium until he was hired away to serve as the Biodiversity Informatics Manager for the Jepson Herbarium at the University of California Berkeley, much to our loss and their gain.

It has been almost nine years since it was first published and some of the information in the article may be dated, however most of it is as relevant today as ever if not even more so. The megadrought and resulting water crisis in the West has a long history and this gives an historical perspective and better understanding of the complexity of the issues and why it is so difficult to solve.

When Jason wrote the article, Lake Powell was projected to end the water year at 61% of capacity in 2014. In August of 2022 the lake was at 26% of capacity with the water level 166 feet below full pool. The political and ecological ramifications of the megadrought are coming to rest on the population of Utah. As the Utah Native Plant Society, it is imperative that we speak out for the preservation of the native plants that bring balance to our existence.

This past April, I was researching the widespread use of cultivars of exotic and native plants by the U.S.D.A Agricultural Research Service (ARS) in revegetation projects on disturbed rangelands in the western U.S. By coincidence, a "New Sagebrush Rebellion" was in its infancy in southern Nevada, instigated by rancher Cliven Bundy and his 20 year-long grazing fee dispute with the Bureau of Land Management (BLM). These events may seem, at

first, to be unrelated. But after studying the exploration, settlement, and establishment of public lands in Arizona, Nevada, and Utah for the past two decades I believe there are many obscure historical and modern links that forge them together.

My first serious investigation into the history of public lands grazing in this region started in 1997, while I was working for the National Park Service at Pipe Spring National Monument in northern Mohave County, Arizona. Through educational pamphlets and trail signs, visitors to Pipe Spring are told first-hand narratives of the explorers and ranchers finding a diverse, rich grassland across the Arizona Strip in the mid-19th century. In some accounts the grass was "as high as a horse's belly." The Arizona Strip today is very different ecologically. Decades of over-grazing have replaced these grasslands with a mixed desert shrubland, mostly dominated by species of *Atriplex* and *Chrysothamnus*. As part of my job with the park service, I was tasked with finding any first-hand accounts or photographs of the ranch prior to 1870 that would aid in the identification of the species composition of this vast grassland. In my travels that summer, I visited nearly every special collections photograph archive in Arizona and Utah. I never did find any pictures of the pre-settlement vegetation around Pipe Spring nor specific descriptions of the grasses that could aid identification. However, this was my first exposure to evidence of the extinction of an entire plant community in the modern era, something that I was taught last happened 8,000 - 10,000 years ago after the retreat of the last Ice Age. From that point, I was obsessed with finding the reason for this extinction. Was it just simply too many cattle grazing over a period of several decades? Did the weather patterns fluctuate erratically?

Until recently, data on the climate conditions prior to 1900 were non-existent, so attempting to correlate

Table 1. A summary table of the reconstructed water-year flows along the Colorado River at Lees Ferry, Coconino County, Arizona, adapted from Meko et al. 2007.

—Water-Year	Average reconstructed flow, billion cubic meters (BCM)	Highest Flows (Year, BCM)	Lowest Flows (Year, BCM)	Notes:
Data Summary				
762-2005	18.08	N/A	N/A	total mean flow over study period
1118-1179	14.16	1128, 22.92	1147, 11.26	longest sustained series of droughts on record, the Medieval Climate Anomaly (62 years)
1579-1592	14.62	1586, 20.73	1584, 6.25	longest, most severe drought between A.D. 1500 and 1999 (14 years)
1900-1999	18.70	N/A	N/A	mean reconstructed flow for the 20th century
2000-2013	12.79	2005, 20.59	2002, 5.51	current drought (13+ years)
1848-1876	19.00	1849, 28.80 1866, 27.78 1867, 28.89	1851, 4.97 1861, 9.22 1871, 10.56	above average precipitation; 19 of 29 years above 18 BCM
1877-1883	14.32	1880, 16.79	1879, 9.62	below average precipitation; ~7 year drought
1884-1898	17.61	1884, 22.12	1896, 11.16	average precipitation; 8 out of 15 years above 18 BCM
1899-1902	12.50	1899, 14.51	1902, 7.68	below average precipitation; ~4 year drought
1903-1930	20.43	1917, 26.78 1921, 27.09	1925, 13.97	above average precipitation; 22 of 28 years above 18 BCM
1931-1936	15.93	1932, 21.14	1934, 8.9	Dust Bowl event; below average precipitation; ~6 year drought
1937-1958	18.28	1941, 24.12 1942, 25.68	1946, 11.45	average precipitation; 7 of 10 years above 18 BCM
1959-1961	13.44	1962, 21.01	1959, 9.9	below average precipitation; ~3 year drought
1962-1987	19.60	1983, 28.93 1984, 26.3 1985, 26.68 1986, 26.91	1976, 12.74 1977, 4.44 1981, 12.17	above average precipitation; 17 of 26 years above 18 BCM
1988-1990	13.97	1988, 15.71	1990, 10.72	below average precipitation; ~3 year drought
1991-1999	19.60	1995, 21.39 1998, 21.43	1994, 14.34	above average precipitation; 8 of 9 years above 18 BCM
2000-2002	10.433	2000, 13.18 2001, 12.61	2002, 5.51	below average precipitation, ~3 year drought
2003-2005	18.78	2005, 20.59	2004, 17.44	average precipitation; 1 year of 3 above 18 bcm
2006-2013	11.42	2011, 19.71	2012, 6.04 2013, 6.31	below average precipitation, 7+ year drought

events with climate patterns was not possible. Over the past decade, tree ring analyses have made a resurgence following the increased scientific interest in historic and modern climate phenomena. By using sophisticated statistical analyses of tree ring data, Meko et al. (2007) reconstructed estimates of the amount of water flowing each year in the Colorado River at Lees Ferry from A.D. 782 until 2005. These data can be used to estimate the amount of precipitation across the region - a valuable tool for investigating the timing and intensity of historic droughts in the Great Basin and Colorado Plateau.

Table 1 (adapted from Meko et al. 2007) shows the water-year flow estimates for the period between 1848 and 2013. Water-years follow the period between October of the current year and September of the following year, not the typical calendar year. The estimates for the most recent drought, between 2006 and 2013, come from U.S. Bureau of Reclamation (USBR) reports of the unregulated inflows into Lake Powell (Bureau of Reclamation, 2014b). These inflows are used herein as an estimate of the most recent flows along the Colorado River, since the data from Meko et al. (2007) were calculated only up to 2005. Glen Canyon Dam regulates the flow of the Colorado River at a nearly constant rate year-round, therefore, monthly gauge readings from Lees Ferry (as reported by the USBR) cannot be used for climate estimates. Observed and historical Colorado River flows have to be calculated by other statistical methods. Over the entire period of the Meko et al. study, the water-year flows at Lees Ferry averaged 18 billion cubic meters (BCM). The average flow during the 20th century was not that much higher at 18.7 BCM per water-year. Therefore, a value of 18 BCM value was interpreted by Meko et al. (2007) as a year with average precipitation. Anything below that value is interpreted as a dry year, with values near or below 10 BCM being an extremely dry, drought year.

The history of the public lands in Arizona, Nevada, and Utah are intimately connected to the climate events shown in the tree ring analysis results in Table 1. In 1849, the first settlers to this region arrived to find a very grass-rich environment, prime for agricultural and ranching development. Between 1848 and 1876, the Colorado Plateau underwent a period of sustained above average precipitation, with 19 out of 29 years

with flow in the upper Colorado River Basin of 18 BCM or above. This extremely wet period coincided with the aforementioned observations of widespread grassland communities and the subsequent establishment of the majority of the first agricultural settlements and ranching homesteads across the Great Basin and Colorado Plateau.

In the mid-to-late 19th century, most of the large ranching operations in southwestern Utah and northwestern Arizona were owned by the Church of Jesus Christ of Latter-day Saints (LDS). In 1870, Brigham Young purchased the ranch at Pipe Spring, the largest ranch at the time on the western part of the Arizona Strip. He selected it to be the next ranch for the relocation of tithing cattle herds, since all of the pastures around St. George were stocked to capacity. In 1871, to assist with the increased demands for food and supplies for the building of the temple in St. George, Brigham Young incorporated the New Canaan Stock Company, with James Andrus as superintendent. A new headquarters was built at Canaan Ranch near Canaan Springs, 3 miles northwest of the present day towns of Hildale and Colorado City. The New Canaan Stock Company managed additional tithing herds being relocated to the Canaan Ranch. For a short time, while the demands for supplies for the building of the temple were highest, the herds and dairy operations at Pipe Spring were overseen by the newly formed Winsor Castle Stock Growing Company, owned by Anson Winsor, Brigham Young, and the LDS Church. By 1879, a couple years after the temple was finished, the church consolidated the two to form the Canaan Cooperative Cattle Company. Afterwards, the company established the Parashant Ranch and dairy at Oak Grove (north of Mount Dellenbaugh, Mohave County, Arizona). This ranch became a major purveyor of supplies and dairy products to the mines and sawmills operating on the Shivwits Plateau. By 1880, the Canaan Cooperative Cattle Company had acquired a majority of the regional water resources which allowed the Church to graze cattle throughout the western Arizona Strip (Fairley 1989).

The next large cattle company formed by the LDS Church, the United Order of Orderville, formed in 1874, was established by a cooperative of smaller ranches

established by John D. Lee, Levi Stewart, Lewis Allen, Jacob Hamblin, and David Udall. The primary headquarters of the United Order was located in communal settlements around Orderville in Kane County (located about 15 miles north of Kanab along present day U.S. Highway 89). As the United Order grew, so did the demand for cattle. By 1880, the United Order controlled the majority of the grazing resources from all of the family-owned ranches on the Kanab Plateau eastward across the Kaibab Plateau and onto the winter grazing pastures of House Rock Valley. Most of these ranching families joined with the United Order willingly, inspired by the success of the communal-living settlements in Orderville (Fairley 1989). The success of the United Order communal farms and ranches was short-lived, unfortunately.

By 1883, overgrazing had transformed the Arizona Strip. The grassland plant communities that were once widespread across the valleys and plateaus were nearly extinct. The rancher Jacob Hamblin, in an 1880 letter to John Wesley Powell, wrote that "... *the foothills that yielded hundreds of acres of sunflowers which produced quantities of rich seed, the grass also that grew so luxuriantly...the seed of which was gathered with little labor, and many other plants that produced food for the natives is all eat out [sic] by stock.*" (Pipe Spring National Monument 2014).

Clarence E. Dutton, an associate of John Wesley Powell and a geologist working for the United States Geological Survey, passed through this region multiple times during the 1870's and 1880's while studying the geology of this region for *A Tertiary History of the Grand Canyon District* (Dutton 1882). During his field research, he stopped at Pipe Spring in 1880 and observed: "*Ten years ago the desert spaces outspreading to the southward were covered with abundant grasses, affording rich pasturage to horses and cattle. Today hardly a blade of grass is to be found within ten miles of the spring, unless upon the crags and mesas of the Vermillion Cliffs behind it. The horses and cattle have disappeared, and the bones of many of the latter are bleached upon the plains in front of it. The cause of the failure of pasturage is twofold. There is little doubt that during the last ten or twelve years the climate of the surrounding country has grown more arid. The occasional summer showers which kept*

the grasses alive seldom come now, and through the long summer and autumn droughts the grasses perished even to their roots before they had time to seed. All of them belong to varieties which reproduce from seed, and whose roots live but three or four years. Even if there had been no drought the feeding of cattle would have impoverished and perhaps wholly destroyed the grass by cropping it clean before the seeds were mature, as has been the case very generally through-out Utah and Nevada" (Dutton 1882:78-79).

The drought Dutton observed was one of the most severe and prolonged in the region in over a century. The severity of this drought was similar to the droughts during the Medieval Climate Anomaly (1118-1179) and the 14 year long drought from 1579-1592 (Table 1).

In contrast, the Legislature of the Territory of Arizona largely ignored these observations of the degradation of the rangelands across Arizona. In a series of reports from 1880-1883 promoting the agricultural and mining re-sources of the Arizona Territory, Patrick Hamilton stated:

"Of the 114,000 square miles which constitute her area it is safe to say that 60,000, or more than one-half, are excellent grazing lands. From the borders of Utah to the boundary of Sonora, and from the line of New Mexico almost to the Colorado, Arizona is one vast grazing ground... On the Colorado plateau they attain a strong and vigorous growth. After the summer rains—which usually begin in July and end in August—valley, plain and hillside is a rolling sea of living green. The grass shoots up with wonderful luxuriance, and myriads of wild flowers lend a charm to the landscape... Here [the stockman] is not compelled to put up large quantities of feed to keep his stock during that period. Here he runs scarcely one of the many risks that attend the stockman's calling in less favored lands. Here the climate is almost perpetual spring, and even in the driest season the feed never fails... Nor need he have any fear about 'eating up' the range. After being grazed down to the roots, the sweet gramma grass shoots up next season with fresh vigor and luxuriance. Ranges over which cattle have roamed for years show no falling off in the quantity or quality of the feed. In fact, it is claimed by some that the ground is enriched by the cattle, and that the native grasses attain a

stronger growth after being pastured for a few years" (Hamilton 1883:169-172).

By 1884, weather patterns had started to shift. Although the years 1884-1898 were a period of average precipitation (17.61 BCM), only 3 consecutive years (1890-1892) had precipitation that was above average. The remaining wet years were followed by short cycles of 1 or 2 dry years, a pattern not seen during the previous above-average period between 1848 and 1876 (Meko et al. 2007). The cycles of average rainfall followed by short periods of drought apparently did not provide enough moisture for the grasslands to recover to their pre-settlement vigor, which greatly impacted the success of ranching and farming by small family-owned operations and large cattle companies alike.

In northern Arizona, both the United Order and the Canaan Cooperative Cattle Company started to sell off parts of their ranching operations to private buyers in the 1880's. John W. Young, a son of Brigham Young, purchased the United Order holdings on the eastern Arizona Strip and formed the Kaibab Cattle Company. The Canaan Cooperative Cattle Company divested itself of the majority of its ranching operation on the Shivwits Plateau by selling the Parashant Ranch to Benjamin F. Saunders, a wealthy non-Mormon businessman from northern Utah. The remaining ranches held by the United Order and the Canaan Cooperative Cattle Company were largely broken up and sold to private individuals after the passage of the Edmunds-Tucker Act in 1887. The act prohibited the practice of polygamy and forced the LDS Church to dis-incorporate and sell any commercial assets worth over \$50,000. In reality, the act only hastened the sale of assets already brought on by the previous drought and overgrazing. The breakup of the United Order and the Canaan Cooperative Cattle Company, the largest cattle companies in northern Arizona at the time, signaled the end to the dominance of LDS church and family-owned ranching operations in this region for several decades (Fairley 1989).

As a result, ranching on the Arizona Strip was moving toward a period of large-scale cattle ranches owned by wealthy cattle barons. Benjamin Saunders was the first of the cattle barons to occupy large tracts of rangeland on the Arizona Strip. After purchasing Pipe Spring, he



Above: West Cabin Spring (foreground) and West Cabin in Pipe Spring National Monument, Mohave County, Arizona, circa 2008. Photo by Walter Fertig.

proceeded to develop other water sources across the western Arizona Strip. Anthony Ivins purchased the Parashant Ranch and used it as the base of operations for his Mojave Land and Cattle Company. By 1892, Saunders and Ivins had bought out the majority of the pioneer ranches and church operations formerly managed by Canaan Cooperative Cattle Company (Fairley 1989).

The last wealthy cattle baron to dominate the rangelands of the Arizona Strip was Preston Nutter, an opportunistic businessman who moved to northern Utah to establish a cattle ranch. In 1893, Nutter purchased 5,000 cattle from various ranchers in Arizona who were desperate to sell due to the poor precipitation over the past year (1893 was the first drought year after a short, wet period between 1890 and 1892). His plan was to drive the cattle to central Utah by crossing the Colorado River by ferry and drive the herd north into Nevada and Utah along the Scanlon Ferry Road. His late-season arrival in Saint George forced him to overwinter his livestock on the Arizona Strip. However, very little precipitation fell on the Strip in late 1893 and early 1894. Since few of the water resources were legally owned by either Saunders or Ivins, Nutter was able to force his cattle onto the range and occupy the springs much like previous generations of ranchers did (Price & Darby 1964, Fairley 1989).

Since he had not suffered any significant losses in the region due to any of the previous drought years, Nutter had the asset and monetary advantage. The degradation of the rangelands due to overgrazing and the lack of a sustained wet period following the 1877-1883 severe drought was heavily impacting the profit margins of the two largest cattle companies on the Strip, owned and operated by Saunders and Ivins. By this time, Saunders was ready to divest himself of all his holdings and sold the ranch at Pipe Spring and his claims to springs throughout the western Arizona Strip to Nutter (Anonymous 1964, Price & Darby 1964, Fairley 1989). Ivins would have persisted through the droughts and continued ranching in this region, however, the LDS Church called him to service to establish new polygamist colonies in northern Mexico. This obligation

forced Ivins to sell all of the land and assets of the Mojave Land and Cattle Company to Nutter, including the Parashant Ranch. By 1895, Preston Nutter became the single largest land-holder and cattle rancher on the western Arizona Strip (Anonymous 1964, Price & Darby 1964, Fairley 1989).

Preston Nutter was not satisfied with just occupying the water resources of the strip, however. He became more interested in establishing a permanent winter grazing operation in the region by legally obtaining the ownership rights to all the water resources on the western Arizona Strip. Few ranchers prior to Nutter held legal ownership to the water resources used by their cattle (Anonymous 1964, Price & Darby 1964, Fairley 1989). Nutter took legal action under the "Forest Lieu



Above: Flats northeast of Winsor Castle in Pipe Spring National Monument are dominated by woody shrubs today, rather than the desert grasslands reported by early pioneers. Photo by W. Fertig.

Act" of 1897 to acquire legal rights to nearly every other water resource on the Strip. Although the act was originally written to allow Native Americans, homesteaders, and ranchers with private lands that were located within newly created Forest Preserves (the predecessor to modern National Forests) to swap their inholding for other public lands of equal value, the majority of land swaps were manipulated by large corporations and wealthy individuals in order to further their own acquisition of large tracts of public lands (McIntosh 1974). Nutter purchased private inholdings within Forest Preserves in several states, including Montana and California. Afterwards, he would exchange these lands for the legal ownership rights for lands surrounding springs and other water resources in western Arizona. Fraudulent land purchases were so pervasive as a result of this act that it was repealed in 1905. By that time, however, Nutter owned at least 21 springs and the majority of the best rangeland on the Strip (Anonymous 1964, Price & Darby 1964, Fairley 1989).

The first decades of Nutter's reign as the dominant cattle baron in northern Arizona was another period of widespread land-use and environmental change in this region. Dutton's observations in the early 1880's of the destruction of the Arizona grasslands were nearly forgotten by 1890. By 1900, the many reports of the endless grasslands of Arizona, such as those written by Hamilton (1883) and others, were replaced with widespread observations of the near complete destruction of the ranching industry. At a meeting of the American Forestry Association in Denver Colorado, R. H. Forbes, Director of the Arizona Agricultural Experiment Station, warned of the increasing degradation of the rangelands across the southwest:

"In seasons of scarcity, when feed was short, the cattle began to perish from starvation, devouring in their desperate struggle for existence, almost every vestige of growth upon the plains. Being compelled in their wanderings back and forth between the higher and lower grounds, to take twenty steps for a mouthful of food where formerly but one was necessary, they deepened their paths from place to place; the prevailing winds blew the dust from these paths until they lay inches below the general surface, and then, upon a country prepared for

destruction, came the rains. The water, collecting in the trails from the bared and devastated surface of the country, fell swiftly to lower levels, gulying the trails as it ran, and gathering in destructive freshets in the larger valleys. The bunch grasses, having been depleted by the starving cattle, were no longer able to withstand the rush of the floods, and the gulying process began on a large scale through the very heart of what were formerly - the most luxuriantly grassy regions... The ruinous methods which seem inevitable upon a public range... have so destroyed its value, and have so changed the original condition of the country that in many cases, in spite of the present high prices of cattle, the ranges now carry but a tithe of what they once did.. Based upon observation and conversation... with the stockmen of this depleted range... [the cattle industry has been] almost commercially destroyed. In the San Simon valley [Cochise and Graham counties, AZ] alone, it is judged, on these grounds, that within the past decade the number of cattle has fallen off from 75 to 90 per cent. In the Sulphur Spring valley [eastern Cochise County], it is stated that during the season of 1900, which was a very severe one, the losses of cattle by starvation were from 15 to 50 per cent... These instances represent the condition of the cattle industry in scores of great valleys, and from the stockman's point of view, indicates the urgent need of administrative measures planned for the salvation of this great industry." (Forbes 1901: 218-219).

By some estimates, Nutter alone was grazing over 25,000 head of cattle on the western Arizona Strip after 1900 (Grand-Canyon Parashant National Monument 2014). During the drought between 1899 and 1904, there was only a single year with flows along the Colorado River above 18 BCM (1903; Meko et al. 2007). It is not known how much his herds suffered from die-off during this time due to drought. Nutter was fortunate to have moved into dominance on the rangelands of northern Arizona and central Utah during this drought because it was followed by an extended, above average period of precipitation not seen since the mid-19th century. Between 1903 and 1930, the Colorado River had flows of 18 BCM or higher in 22 out of 28 years. With the high precipitation, new land-use changes to the region followed. The railroad companies started a leasing program to sheep herders throughout Utah and

Arizona. Herds of 10,000 sheep or more were frequently driven from railheads across the open range to the leased railroad-owned property. The sheep directly competed with the open range cattle for resources and were the cause of many resource-related range wars between cattle ranchers and sheepherders in the early 20th century (Price and Darby 1964, Fairley 1989).

The high precipitation and resulting re-growth of some of the region's grasslands also brought about changes in agriculture. Wetter conditions prompted the federal government to pass another series of homestead acts. In 1909, the Enlarged Homestead Act expanded the size of homesteads to 320 acres, a size at the time thought to be ideal for the establishment of "Campbell System" dry-farming communities across the western United States (Buffum 1909, Fairley 1989). The Campbell System was promoted for arid lands where precipitation was too low for typical farming techniques. The tilling or plowing methods developed for this system attempted to prevent moisture loss in the soil in preparation for crops of winter wheat to be planted (Buffum 1909).

Other amendments to the Homestead Act followed during the next 20 years. In 1912, the Three-year Homestead Act reduced the homestead time period from five to three years. The Stock Raising Homestead

Act followed in 1916 with the addition of cattle ranching to the land-use allowed for establishing homesteads and allowed homesteads to increase to a size of 640 acres (Fairley 1989, Bureau of Land Management 2014). It was not a coincidence that the legislature of the newly established State of Arizona took advantage of this wet period and, as their predecessors did by hiring Patrick Hamilton in 1883, funded another series of publications advertising the natural resource opportunities of Arizona. Field investigations in 1914 for northern Arizona were led by Dr. A. M. McOmie, the head of the Arizona Experimental Station. Pipe Spring Valley, once denuded of all vegetation by cattle by the late 1880's, was reported by McOmie to have *"as far as the eye can reach... a wonderful tract of excellent agricultural land, the best north of the [Grand] Canyon... and evidently enough rainfall, as indicated by a gauge at Kanab which for three years registered an average of 15 inches annually. These valleys running from Pipe Springs by the*

Short Creek country to Hurricane Ledge and thence southward through Antelope Valley must contain close to three-fourths of a million acres of fine agricultural land." (McOmie 1915: 13-14). The "three years" of rainfall reported by McOmie was the end of an extremely wet period between 1909-1913 when the flows along the Colorado River were between 20 and 23 BCM, with only a single year (1913) having a slightly lower than average 16.8 BCM. This was the wettest consecutive series of water-years in this region since the period from 1865 to 1869 (Meko et al. 2007). Between 1915 and 1930, homesteading communities were established throughout the Arizona strip from Short Creek south to the Shivwits Plateau and east to House Rock Valley. At its peak, Short Creek had over 50 residents. Bundyville, established by Cliven Bundy's ancestor Abraham Bundy, was the most successful and long-lived, dry-farming community on the Strip and at its peak had over 300 residents (Fairley 1989, Kelly 2002).

Unfortunately for the settlers who moved onto the Arizona Strip to establish farm and ranch homesteads, the weather patterns between 1903 and 1930 were an unusually wet climate event. If the wet period had persisted, perhaps McOmie's field investigation would have been a more accurate assessment of the water, agricultural and ranching resources in northern Arizona. Economic and environmental changes however forced the bankruptcy of many of the farm and ranch homesteads on the Arizona Strip established after 1915. Between 1931 and the end of the Dust Bowl Era in 1936, there were only two average precipitation years. During the remaining years, the Colorado River flow ranged between 8.9 and 16.7 BCM. Although the Arizona Strip was not hit as hard by the Dust Bowl Era as the mid-west, the impact of the drought forced most homesteaders to abandon their Arizona Strip farms and ranches by 1940 (Fairley 1989).

By 1934, the driest of the Dust Bowl years, the impacts of the severe droughts and the overgrazing in the western United States forced the Federal Government to develop a series of management plans for public lands in order to mitigate the losses and end the conflicts that were characteristics of the drought years. The Taylor Grazing Act in 1936 and a few years later, the

establishment of the Bureau of Land Management (BLM), effectively ended the open range overgrazing that was the cause of the loss of the grasslands throughout northern Arizona. On the Arizona Strip, where over 100,000 cattle were grazed on open rangelands at their peak, the BLM allowed only 117 permit holders to run a total of 15,000 head. That is 10,000 fewer head than Preston Nutter alone grazed on his lands during the peak of his ranching operations on the western Arizona Strip (Fairley 1989, Grand Canyon Parashant National Monument, 2014).

In the 19th and early 20th centuries, ranchers, farmers and sheepmen engaged each other in often violent conflicts for water and land during severe droughts. In the late 20th and early 21st century, drought conflicts have not subsided. Now, due to the management of the public lands by the BLM and Forest Service, ranchers have only one stakeholder to fight: the federal government.

The Federal Land Policy and Management Act of 1976 (FLPMA), brought an end to the homesteading era when the federal government actively promoted the sale of public lands to private individuals. The public lands agencies had to now manage lands with a "multiple-use" philosophy. The BLM has to contact permittees each year to develop grazing management plans for their allotments. Decisions on the number of stock allowed, on and off dates, and other management terms are made in light of drought conditions, whether an allotment is meeting rangeland health standards, impacts from recent wildfires or reseeding efforts, or demands for forage from wildlife or free-ranging horses and burros (Nevada State Office BLM 2014).

The lack of direct control over land use is the source of the public land conflicts that started in 1976 with the first "sagebrush rebellion" and have persisted until this day. The clash between Cliven Bundy and the BLM is not the first such conflict to have arisen, although it has been the only one in recent memory to include armed private militia organizations. Similar conflicts over grazing fees and the retirement of grazing allotments have happened many times. One of the first in Nevada was between the BLM and John J. Casey, owner of the Holland Livestock Ranch, who in the late 1970's grazed



Above: Fenced plot of replanted native perennial grasses outside the Pipe Spring National Monument Visitor Center. With the exception of the clumps of introduced cheatgrass, this grassland may be similar to what the 19th Century pioneers encountered on the Arizona Strip. Photo by W. Fertig.

his cattle on public lands surrounding his private in-holding without paying grazing fees. Raymond Yowell, a Shoshone Indian, had his cattle confiscated in 2002 after refusing to pay grazing fees for the past decade because he believes that his grazing allotment is owned by his tribe and not by the federal government. Pete and Lynn Tomera, ranchers from the Battle Mountain area, had their allotments rested and cannot graze their cattle in 2014 due to drought.

A repeal of FLPMA could result in the deeding of federal lands to the states. Ranchers like Cliven Bundy and Pete Tomera may regain a short-lived freedom to manage their livestock as they choose. The history of land ownership in the arid southwest is not characterized by the long-term ownership of farms and ranches by homesteaders, however. Far more farms and ranches have been abandoned than the number currently occupied by descendants of homesteaders. What might happen if federal lands are privatized? Consider the answer to the following question: Who now owns the Preston Nutter Ranch in central Utah, his headquarters after he established his winter ranch on the Arizona Strip?

The Nutter Ranch is currently owned by the Hoodoo Land and Cattle Company, a subsidiary of Hunt Consolidated, Inc. The lands owned by Hoodoo are

operated as ranches and farms only to mitigate the costs of holding the land until it becomes valuable for resale. From their website (<http://www.hoodoolandandcattle.com/OpsOverview.aspx>), this company "buys and holds large tracts of undeveloped land for future use in real estate development and/or mineral exploitation... Our properties are periodically evaluated to determine their part in Hunt's long-term strategy. Depending on the circumstances, the properties will either be kept until the market determines that there is an opportunity for real estate development or mineral exploitation, or scientists and representatives of state native plant societies, by conference call, will discuss the issue. Although the majority of native plant society representatives were still highly concerned with the research priorities of the ARS scientists and the impacts of restoration projects using non-natives and disturbance-tolerant cultivars have on rare plant populations, both sides were willing to continue the discussion, in an attempt to find common ground in the future. It may be necessary for us as concerned members of native plant societies to volunteer our time to manually restore sensitive plant communities that have been unintentionally impacted by disturbance-tolerant cultivars. Alternatively, it may be necessary for us to help reseed areas with natives that have been previously reclaimed using these cultivars, in order to nudge the natural process of plant succession back to native plant communities.

Contrast these methods with those used by the armed militia members who attended the protest demonstrations facilitated by Cliven Bundy in Bunkerville in April 2014. The rise of aggressive, politically-motivated people and organizations should be a warning to all of us seeking change in the policies of the federal agencies. Bundy's "New Sagebrush Rebellion" is only the extreme end of a spectrum of groups seeking quick ways to reverse over 60 years of federal legislation on public lands. Other similar actions include the Legislature of Utah passing laws in an attempt to force the Federal Government to effectively nullify the Federal Land Policy and Management Act of 1976, the coalition of Uinta County government and energy company representatives seeking to circumvent the listing of two *Penstemon* species under the

Endangered Species Act, and Iron County ranchers and elected county officials attempting to round-up wild horses in direct violation of the Wild Free-Roaming Horses and Burros Act of 1971. These groups are not interested in changing laws through the normal process of proposing new bills and lobbying for them across the country.

It is not a coincidence that all of these actions are happening during one of the most severe, prolonged droughts in the past 100 years. As of July 2014, Lake Powell (despite having a snowpack in the upper Colorado River Basin exceeding 111% in April) will end the water year at 61% of capacity (Bureau of Reclamation, 2014b). Lake Mead in the lower Colorado River Basin is at 39% capacity and is at the lowest level ever recorded since the dam was built in 1939 (Bureau of Reclamation, 2014a). The current drought is more severe than the longest drought recorded in the past 400 years (1579-1592, see table 1). More political conflicts are sure to arise before this drought ends as public lands become more heavily impacted. The methods used by these groups are a call for all people, whether you are passionate about the preservation of rare plants or are an active recreational user of public lands, to engage with the federal land management agencies and help them preserve and restore the public lands. Only by discussing our concerns with the land managers and negotiating with them to create alternative methods to mitigate against activities that cause chronic disturbance and uncontrolled invasions of exotic weeds will progress toward our long-term preservation goals be made. Sometimes the federal agencies will choose the least politically treacherous route to the detriment of the conservation of native species and ecosystems. At precisely that moment, we must voice our opinions, engage the people working for the federal agencies, and promote change.

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Zach Coury Photos

(more of them beginning page 25). Zach works for the Utah Rare Plant Team.



Allium macropetalum April 22. Cisco, Grand County.

Not a particularly rare plant but maybe my favorite plant photo I have taken. I love the detail in the cobblestone substrate, and it's clear how harsh the habitat is.



Astragalus chloodes May 1. Jensen, Uintah County.

I have a preference for the rushy Astragalus, and this one stands out among the group. Its grass-like appearance, vibrant flowers, and spreading calyx lobes make it unique to me.

WASATCH, the Flagship Garden of the Utah Heritage Garden Program

by Bitsy Shultz

Prologue

My first inkling about native plants came after I crossed the Mississippi River when I moved to Utah in 1985. On the west side of the river, I thought I had arrived on a different continent from where I grew up on the East Coast. The plants suddenly looked unfamiliar. Living with Susan Meyer gave me names for Utah natives (starting with rabbitbrush). Eventually I became a member of UNPS along with Susan, and tagged along as she got interested in promoting native plants in home landscapes as well as in rangeland restoration.



Susan Meyer and Bitsy Shultz

At a visit to the beautiful Ladybird Johnson Wildflower Research Center near Austin, TX, we talked with a staff member who suggested using workshops as a way to get people interested. That led to a series of propagation workshops, and eventually to the idea of demonstration gardens.

Birth of the Garden

Enter Darrin Johnson, a teacher at Wasatch Elementary School in Provo. At a meeting of the Utah Valley chapter of UNPS, he offered to facilitate the first Heritage Garden

at his school. He was already growing native plants with the students in his third grade classroom. He had the support of the principal, Kathryn Spencer. Institutional support became a crucial requirement for later Heritage Gardens. The school is at approximately 1100 North, across 900 East from the BYU campus, which turned out to be a mixed blessing.

The first step was killing the lawn, sprayed out in 1998 by our friend Phil Allen, a BYU professor. The original path design was by a BYU student, Ron Nash, who then moved on. Susan did much of the planting design, while I laid out the paths. Preparation of the beds was a joint effort between the Utah Valley UNPS chapter and the school.

Planting day was June 6, 1998. We initially tried 92 different species; some of them were the residue of Susan's seed research, some were from Darrin's third graders, some were donated by nurseries. We wanted to find out which ones would thrive in Provo and which ones would not. The garden was organized by watering zones, corresponding roughly to desert, valley and foothill/mountain areas of Utah. We installed drip irrigation in "high water" areas the following year.

Our first plant was a pinyon pine donated by Wildland Nursery, installed by students who won a poster contest. Though the garden was envisioned as a demonstration of plants that home owners could use in their yards, there was an educational element from the start. It didn't turn out exactly the way we expected.

The Garden Grows

Over the next 24 years, we tried new species and added seeds and transplants every few years. We filled in blank spots in the "color garden" and thinned out dense growth in the "sagebrush flat." One learning experience was the showy goldeneye debacle. That species looked charming on a roadside up in Santaquin Canyon. Adding those seeds to the garden early on, when other plants were sparse, let the showy goldeneye run rampant and become a weeding problem. Years later, when the garden was more established, showy goldeneye settled demurely into its niche.

In 2002 we expanded the garden eastward toward the school, using overspray from the adjacent lawn to support a mesic plant array. It included red osier dogwood and Basin wild rye as well as other shrubs and trees. Eventually this became a wall of greenery that needed a good deal of thinning and pruning.

The Garden Club

The origins of the Garden Club are lost in the mists of time (and my memory). Sometime between the east side extension in 2002 and the garden's tenth anniversary

event in 2008, Mrs. Spencer retired, replaced by Colleen Densley, and Darrin became the principal of a school in Orem. Except for Celeste Kennard, there was not much involvement by the Utah Valley chapter, and I felt responsible for maintaining the garden. I wanted some help, and since we were at a school, why not involve the students more? Thus the Garden Club was born, possibly around 2004.

Utah is the focus of the fourth grade curriculum, so I started meeting after school once a week with a small group of 9 year olds to “work” in the garden. I felt I could manage to keep up with about eight kids at a time. We generally started about two weeks after the start of the school year in the fall and went until the weather got too cold. In the spring a new group would start when the snow came off and go to the end of the school year in late May. We’d gather at the end of the school day, and while the kids had a snack provided by the school, I’d use the time for show and tell of anything I thought would be interesting. Then we’d walk out together, put on sunscreen and choose hats from my thrift store collection. Then off to the garden carrying tools and buckets.

I still have my attendance lists since the spring of 2013. Over the course of 13 spring and fall sessions, 82 students took part. Some quit after the first session; others came back regularly and inspired their younger siblings to join the Garden Club when they got to the 4th grade. I wanted the experience to be totally voluntary, so they could come or not, as they chose. I’m sure there was pressure from some parents (most of the ones I met were supportive), but kids could also miss sessions because of soccer practice, piano lessons, church activities, family trips, etc. I had the impression that the kids who were more involved had some gardening experience at home.

I learned that 9 and 10 year olds have an attention span of about 20 minutes, so our hour in the garden would be divided into two activities. The kids were generally lukewarm about weeding, more interested in pruning and deadheading, and enthusiastic about planting. One way I got them more interested in weeding was to spike the gravel mulch on the flower beds with fossils. I told them they could keep fossils they found. A perennial favorite activity was the “stomp.” We would clip ripe penstemon stalks, put them on a big piece of cardboard and get the seeds out of the capsules by stomping on them. And then, of course, plant the seeds.

I was startled by how few questions the kids asked; I always felt I had more I wanted to tell them than they were interested in hearing. What they often wanted was for me to listen to them. They were fascinated by fauna

much more than flora-snails, roly-polies, daddy longlegs, anything that moved. However, I have special memories of some of the children’s experiences. There was the little boy who was awestruck by (of all things!) the way bindweed twined around another plant’s stem. There was Luke, whose depression lifted during his season in the garden, or Katie, a natural leader. Meghan, in a wheelchair, was determined to take part as much as possible. There were many more.

Take-homes

The Garden Club was suspended for two years because of Covid. When we started again this fall I realized that our original aims, to educate passing adults and school children, were not what we achieved. Passers-by were occasionally complimentary, but few wanted to learn more. Seeing this year’s kids playing and exploring instead of “working” in the garden made me realize that the information I never could impart was not really the point. What they got out of the garden was the experience of being in a more interesting, “wilder” place than their yard or the park. And they experienced me, someone who was a bit different from their parents or teachers, someone from elsewhere. Hopefully I taught them something about sharing tools, giving themselves credit for accomplishments, cleaning up the debris at the end of a session, and using sunscreen. Being in the garden itself, and learning from the kids, is what kept me coming back.

Epilogue

Many people helped keep the garden going: the “office ladies” Tonja Roberts and Becky Robinson, who handled the logistics, the 4th grade teachers who recruited the kids, Jeanie Pratt, head custodian for the school, some other supportive teachers, occasional adult volunteers. Recently we had a lot of help from Eli Hartung, then a college student, and Hannah and Nev Macbeth, teenage Wasatch alumni.

There were some pitfalls along the way. This garden needed more attention than we really could provide. The school district grounds people were fixated on lawn mowing and seemed to not like the “messy” look of the garden. The city decided to widen the 900 East sidewalk in 2013, destroying a row of mature shrubs and introducing puncture vine seeds as they backfilled the sidewalk. We had an intractable bindweed problem to deal with every year.

The Wasatch Elementary School building is quite old. This past year the school board and BYU arranged a land swap so the district could build a new school building further up the hill. BYU is slated to take over the property at the start of the school year this fall. An attempt to

convince the BYU administration to maintain the garden, which has been used by their classes for plant ID, went nowhere. So this spring will be the last one for the Garden Club. Come visit in the spring or summer if you want to see Wasatch before it's gone. Since it is a public garden, you can collect seeds.

Resources

There is a scrapbook with pictures of the creation of the Wasatch Garden on the UNPS website—follow the links

under Programs. A set of coloring book pages for kids is also on the UNPS website - follow the links for Teachers/Color. A good deal of what we learned about species, garden design and techniques is in our book, *Landscaping on the New Frontier*, by Susan Meyer et al. It is available to download for free at https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1162&context=usupress_pubs

UNPS Book Club Report

by Morgan S Abbott

Desert Solitaire

Edward Abbey was many things, and we cannot limit him to just a writer or essayist. He was also a well-known avid naturalist, philanderer, eugenicist, racist, misogynist, and environmental advocate. He described the ineffable Utah experience in every aspect: the literal and immaterial juxtaposition of austere beauty instilled throughout occupied land and settler culture.

When I first read Edward Abbey's *Desert Solitaire*, I was an undergraduate at Utah Valley University, staying with the Botany Club at the Capitol Reef Field Station. Surrounded by varnished canyon walls, I devoured Abbey's descriptions of the desert. I committed his descriptions of plants to memory each night, then mindlessly recited as I hiked the following day.

In the past, I had skipped over the parts I didn't "like" and embraced the parts that I loved. Yet, I found myself struggling to even read my favorite chapters, knowing whiplash was imminent. Neapolitan-colored glasses completely removed—*Desert Solitaire* questioned every interaction I have had in my career. Did my mentors and peers see me as a rangerette? Did my colleagues regularly intrude on intimate moments in the field for their own sexual gratification? Do I think, speak and treat people this way? I kept picking up this book and putting it down, frustrated by my own newfound perception of the person I thought I knew.

Abbey's traits could fit any one of us "plant people"; we have met and lived with people like him, many of us are him. He wasn't my first teacher, and he won't be the last, but the way he wrote negatively about poverty, stewardship, Diné cultural ways of being, women, and everyone else who was and wasn't like him was repugnant. This book is a painfully well-written, physical reminder of ideas and beliefs that I had to unlearn within my own community in Central Utah.

While I'm relieved to think that I have grown as a person since my first read in canyon country, *Desert Solitaire's* final chapters ring hollow. Defenders state "he was a product of his time", but we carry on constructing products of Abbeys' time, nearly thirty-four years after his death. If he and his editors didn't include his soliloquies, if he would have only left indelible descriptions of color country and readers would have mindlessly idolized him and raced to emulate the desert rat lifestyle. Why trust a self-described philosopher to limit themselves?

Desert Solitaire: a reminder to embrace sharing our innermost thoughts and putting them on display to change ourselves and our communities or to embrace silent rot, fearing that making waves will damage what we have built. Take heed and domesticate yourself, desert dweller: beware of the empty embrace of solitude to shirk responsibility; community is made stronger through mundane discomfort, breaking bread 'round a campfire with boon companions.

2023 Meetings & Book List

February 16th 2023, 7pm via Zoom /
The Signature of All Things by Elizabeth Gilbert

March (TBD) | *Silent Spring* by Rachel Carson

April (TBD) | *An Immense World: How Animal Senses Reveal the Hidden Realms Around Us* by Ed Yong

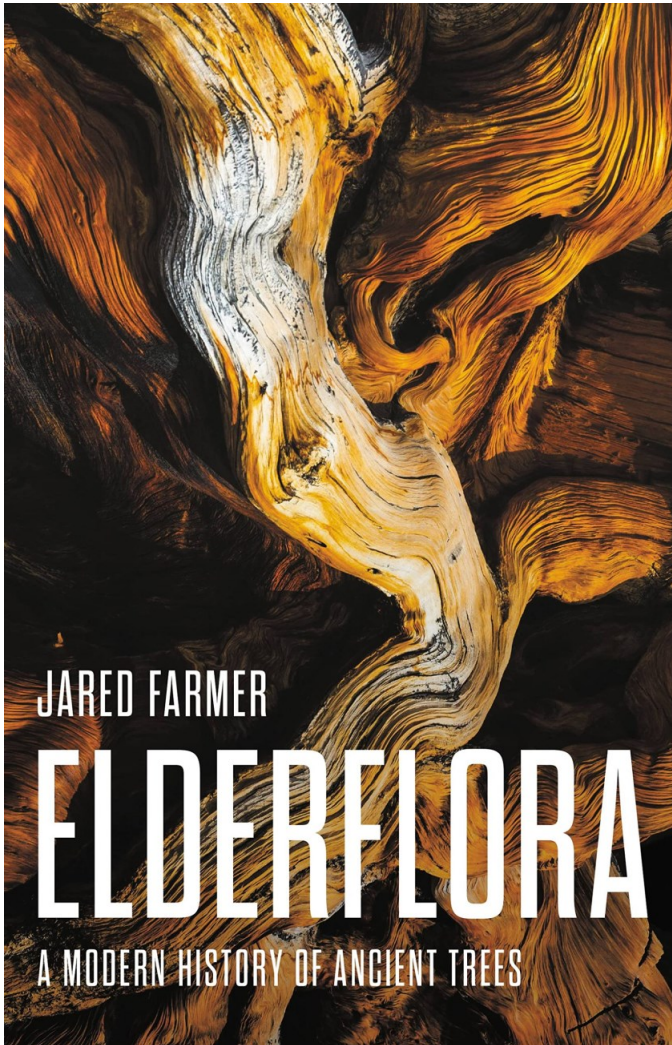
May (TBD) | *The Overstory* by Richard Powers

We highly encourage UNPS Book Club participants to utilize their public library and locally-owned bookstores, but if you choose to buy the text from Amazon Smile, please consider choosing the Utah Native Plant Society as your non-profit.

We're looking forward to seeing you all at the next meeting. Remember, if you don't end up reading the book, only reading a portion of it, or reading it in its entirety, we still want to see you there! Book Club is a great way to socialize with plant enthusiasts across the state.

A Book Review

by William H. King



Elderflora: A Modern History of Ancient Trees by Jared Farmer, Basic Books, October, 2022.

Dr. Farmer is a world class historian that grew up in Utah, his father was a BYU science teacher. He got his bachelor's degree from Utah State University, his masters from University of Montana and his doctorate from Stanford University. He has made a career writing the history of the western US especially about the relationship of man and trees. He has a five star resume and has won many awards and is now the Annenberg Professor of History at the University of Pennsylvania.

Farmer takes us on a comprehensive worldwide tour of all the known trees that have been considered ancient, some of which are new to me. He also writes about ancient clonal organisms such as Utah's "Pando" aspen stand. The book is loaded with historical information



A radial section of a Sequoias tree at the Santa Barbara Botanic Garden, showing its birth, life and its demise 950 years later, all written out in tree rings.

about the development of tree ring research, dendrochronology, at the University of Arizona. Farmer also writes some about other proxies for age dating trees, such as carbon 14. *Elderflora* is a coined name, an extension of the word megaflora.

The book is 432 pages long but the core of it is 360 pages including an introduction, eight long chapters and an epilogue. At the back of the book are acknowledgements, a bibliography and notes organized by chapter. He includes two indexes, a main one and a taxonomic one.

Farmer is a top notch researcher who likes to get to the bottom of everything, unfortunately he is not as good at writing as he is at researching. His new book, *Elderflora*, is full of minutia and extraneous explanations that sometimes make it difficult to see the point he is trying to make.

Farmer, at the beginning of the taxonomic index, complains about shifting plant names, both common and scientific, but he does his best to muddy the "name" water even more by not integrating scientific names into

the text at the same time that he starts talking about the common name of a tree. Also he sometimes writes at the genus level without telling us in the body of the book what species he is talking about.

Unlike Farmer's much acclaimed 2013 book *Trees in Paradise: A California History* which had a number of maps, photos and illustrations, *Elderflora* has none inside the book except for a picture of the author. While Farmer describes each ancient tree in words, a picture or line drawing of each one would have been greatly appreciated. There is an interesting Alamy stock photo of an old tree of an unknown species by Juan Carlos Munoz on the dust cover of the book. A glossary of unusual tree or dendrochronology terms would have also been useful.

Sometimes in the book the author seems to be acting like a game show host and asking if the reader knows who he is referring to without him telling us what their name is in the body of the book. Such is the case of Dana K. Bailey, the 1970 author who divided bristlecone pines into two different species: Rocky Mountain (*Pinus aristata*) and Great Basin (*Pinus longaeva*). Farmer describes the author in great detail but doesn't give his name in the body of the book or notes, but one can find it in the chapter bibliography. The chapter bibliographies are not indexed so if one were looking for Bailey or anyone else whose name ended up in the biographies, it might be better to buy the digital format which is searchable rather than a hardback. Another alternative is to make your own index of people or things that are of interest to you that are not indexed on the five blank pages at the end of the book.

There are many villains in this book including the lumber companies, politicians, promoters, media, tourists and even some researchers who overestimated the age of ancient trees to get more notoriety and grants. But the number one villain in the book seems to be Donald R. Currey, a graduate student in 1964, who talked the Forest Service in what is now Great Basin National Park into chopping down a bristlecone pine that turned out to be the oldest living tree anywhere, nearly 5,000 years old. While Currey did in fact commit an almost unforgivable sin, Farmer seems to belittle the rest of Currey's life. He did finish his PhD and spent over 30 years teaching geography at the University of Utah. He was beloved by many of his students and he conducted research on many inland lakes that had no outlet and were shrinking or disappearing like Utah's Great Salt Lake. Some researchers are now predicting that the Great Salt Lake may totally dry up in another 5 years of drought unless something is done. I'm sure Currey's research will be very useful to decision makers who hold the lake's future in the balance. Currey also became an environmentalist of sorts promoting a number of parks along the ancient Bonneville shoreline in northern Utah.

Farmer ends the book with a benediction to *Pinus longaeva* hoping that if there are older living things in this world, may they remain precisely unknown.

The hardback book lists at \$35 but sells for a deep discount at about \$23 on Amazon. Used hardbacks start at \$18 and Kindle \$20. As for me it's a keeper, I'm going to put it on my bookshelf and use it for reference.

Zach Coury photos continued from page 20 and onto page 25.



Townsendia mensana April 28. Starvation Reservoir, Duchesne County. I am obsessed with *Townsendia* and this species is a particularly good example. It's endemic to the Uinta Basin, and fairly distinctive in its very small size and linear leaves.



Astragalus vehiculus April 20. Grand County. A beautiful, unique and critically threatened *Astragalus*.



Abronia argillosa (now *A. glabrifolia*) April 20. Thompson Springs, Grand County.

The vibrant purple stems and snowball inflorescences seem at odds with the barren wasteland that is the Mancos Shale belt, but somehow they thrive. All photos by Zach Coury.



Hoffmenseggia repens May 21. Hanksville, Emery County
An odd, uncommon pea that thrives in sandy soils.



Your Membership

Your membership is vital to the Utah Native Plant Society. It is important that your information is correct and up to date for notifications and the delivery of The Sego Lily newsletter.

Any questions about your membership, Contact Tony Stireman, tstireman@gmail.com.

Spring is soon here... It is time to consider another issue of the Utah Native Plant Society *Sego Lily* which relies mostly upon articles from the society's membership. Please submit articles of your native plant stories and photos from hikes and field trips, conservation activities... whatever might be informative and interesting to fellow members.

The *Sego Lily* editors can use most any text format for articles (**PDFs can be troublesome**). Photos are always best submitted in original resolution and as individual files separate from text. You can indicate desired positioning within a document. We are looking forward to hearing from you. For submissions and/or questions: newsletter@unps.org or cathy.king@gmail.com.



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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Sego Lily Editors: John Stireman
jstireman@outlook.com

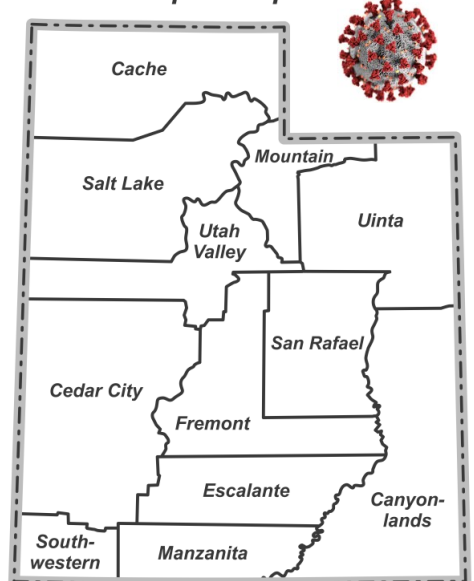
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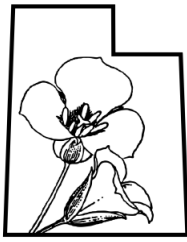
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