



Sego Lily

Newsletter of the Utah Native Plant Society

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|--|----|---------------------------|----|
| Weird Trees | 2 | News from the North | 12 |
| Plight of <i>Eriogonum tiehmii</i> | 7 | The Big Tree | 14 |
| UT Rare Plant Virtual Meeting | 7 | Tree Story | 15 |
| UNPS Membership 2021..... | 9 | Western Monarch Dive..... | 16 |
| Vesper bulbosus..... | 10 | | |

Weird Trees: Encountering the Bristlecone Pines of Indian Canyon

by Chad Hamblin

The Ashley National Forest is renowned for its High Uintas Wilderness, with its glacially formed valleys and high mountain lakes, but the forest is less known for its southern unit, found on the south side of the Uinta Basin. As someone who grew up in the Uinta Basin (I'm a fifth-generation resident) I've always enjoyed spending time in the north unit of the Ashley, in the Uinta Mountains – but it wasn't until several years ago, when the Forest Service proposed to allow hundreds of new oil wells in the south unit of the Ashley and I got involved in the issue, that I realized I really didn't know the south unit very well. The south unit includes places like Indian Canyon, Anthro Mountain, and Avintaquin.

For many of us Basin residents, as well as for others, the south unit has just been something we drive through as we drive up over Indian Canyon on our way to Price, Moab, or other lands to the south. I think we all probably appreciate the beauty of Indian Canyon, but I really don't think many of us actually stop and look at the area. I was guilty of this myself – until the summer of 2019, when I decided it was time for me to start spending more time in Indian Canyon and other parts of the south Ashley.

There were two reasons for this decision, one being the proposed Uinta Basin Railway and its potential route up over Indian Canyon, and the other being the Forest Service's evaluation of potential wilderness areas on the

Ashley (being conducted as part of the forest plan revision), which included the lands on either side of Highway 191 in Indian Canyon. I decided it would be nice to familiarize myself with these areas and get photographs so that I could better advocate for their protection.

Several years ago I took a couple of Utah State University botany classes taught by botanist Sherel Goodrich, co-author of *Uinta Basin Flora* (Goodrich and Neese, 1986) and *Uinta Flora* (Goodrich and Huber, 2020). Learning from Goodrich was an amazing experience that deepened my knowledge of, and interest in, the plants of the mountains and deserts of the Uinta Basin. When Goodrich, while teaching about conifers, pointed out that there are bristlecone pines on the steep slopes in Indian Canyon I knew I must have seen them in the distance while driving in the canyon – but I had never seen them up close.

So one day this past summer, as I set off on an adventure to explore one of Indian Canyon's many side canyons, with the hopes of finally seeing some bristlecone pines along the way. In my hand was a topo map on which I had penciled in the location of a stand of bristlecone pines, copied from an online GIS map posted by BYU's Geospatial Habitat Analysis Lab.

I walked up a dry wash, then headed up a steep slope to where my map showed the edge of the bristlecone stand. I soon found a tree with a potential sign of being a



View looking south from the top of the ridge separating Left Fork Indian Canyon and Right Fork Indian Canyon. Right Fork Indian Canyon is seen in the right half of the photo.

Cover photo: The author standing with an old bristlecone snag. Photo by Kristina Hamblin. All other photos in this article are by Chad Hamblin.



View looking south from the top of the ridge separating Left Fork Indian Canyon (left side of photo) and Right Fork Indian Canyon (right side of photo). The prominent trees to the left of center are limber pines.

bristlecone pine - needles in bundles of five. The only other five-needled pine it could be was limber pine, a species seen here and there in some of the places where I hike. I had most recently seen some in May while hiking in the Wide Hollow area, where the proposed railroad would head south from Indian Canyon, go over Argyle Ridge, and continue downslope to the south. But I thought this tree looked different than the trees I had seen there.

Before long I was pulling my old flip phone out of my pack and texting my wife, Kristina, to let her know that "I just took selfies with a bristlecone pine."



My first bristlecone pine. It's hard to capture the effect of the weepy limbs with a photo, but it's amazing in person.

Happy with my great accomplishment, I continued hiking across and up the slope, looking for more bristlecone pines. There were quite a few Douglas firs in the area. And then, up ahead, what had to be one of the weirdest-looking trees I had ever seen came into view. It was a conifer with pendulous, weeping limbs. It reminded me of trees I had seen at Red Butte Gardens in Salt Lake City, which I believe were weeping spruces. When I got up close to this tree, I could see that it was definitely a pine – with needles in bundles of five. Now I was confused – if the tree I had posed by earlier was a bristlecone then what was this? It didn't look to me like a limber pine, and it certainly didn't look like the photos I had seen of bristlecone pines. If you do an internet search of bristlecone pine images what you see are a bunch of big, rustic, weathered, half-dead-looking trees – not a wispy, weepy, fairy-land tree like this.

I like to follow the Boy Scout motto of "be prepared" when I hike, and my backpack was full of everything I might possibly need – everything, that is, but my little *Rocky Mountain Tree Finder* book (Watts, 1972). I don't often need it, but I was wishing I had it now. I couldn't remember what length the needles were supposed to be on a bristlecone pine, or a limber pine. I wondered if this tree I was looking at might be some unusual variant of limber pine. And this was not a lone tree – there were other strange-looking pines all around it.

I hiked down into the canyon and made my way up the canyon bottom – no easy task thanks to the thick growth of red-osier dogwoods and other vegetation – until I came to a high, impassable pour-off. A little waterfall was flowing over the cliffs. What a beautiful little hideaway, a Shangri-La of sorts! As I ate my lunch there, I heard the calls of Clark's nutcrackers and caught the occasional glimpse of them flying over. On a ledge on the other side of the canyon I watched squirrels gracefully running and jumping high in the limbs of more weird-looking trees. These trees were well-beyond where my map showed the bristlecone stand ending – so I thought they must be limber pines.



The tree on the left and the trees on the ledge below are bristlecone pines. The limbs in the lower right of the photo are pinyon pine.



Kristina sitting in the stand of bristlecone pines. Note how the bristlecone limbs look like bottlebrushes, or fox tails.

I went home and searched the internet for photos of limber pines and bristlecone pines and couldn't find any photos of either that looked quite like what I had seen. I read about both species in the book *Trees of the Great Basin: A Natural History*, by Ronald M. Lanner (1984), which gives a beautiful description of the mutualistic relationship of limber pines and Clark's nutcrackers.

A few weeks later I returned to the area with my wife, this time armed with multiple tree ID books. We hiked up to my first "bristlecone," took some measurements, and found that the needles fell in the 1.53-inch range, which meant it wasn't a bristlecone after all, but a limber pine. Bristlecone needles are shorter, at 0.75-1.5-inches long.

Kristina and I then worked our way further up the steep slope to a weepy-looking tree like the ones I'd seen on the previous trip. We measured the needles and saw that they fit nicely into the bristlecone range, and they also perfectly matched the life-size drawing of needles in Francis H. Elmore's *Shrubs and Trees of the Southwest Uplands* (Elmore, 1976). We also looked at the cones lying on the ground under the tree, because you can easily tell the difference between bristlecones and limber pines by looking at the cones. As the name suggests, the bristlecone

has "a fine, sharp bristle on each cone scale" (Lanner, 2007). The cones of Limber pines tend to be larger and are thick at the tip, with no bristles.

There's also another easy way to tell a bristlecone from a limber pine, even from a distance.

Bristlecones belong to a group called the Foxtail Pines, and Elmore (1976) states that the name for this group comes from "the fact that the twigs are densely clothed with needles and resemble a fox's bushy tail." He goes on to say that the limber pine "can be differentiated from the bristlecone pine by its needles which are bunched at the ends of the twigs rather than growing all along the length of the branchlets as in bristlecone." Lanner (2007) states that the bristlecone pine has "deep green needles densely massed on the last foot or two of the branchlets, giving the impression of tassels or bottlebrushes." Now that I've spent more time around bristlecones and limber pines it seems quite easy to tell them apart.

The Foxtail Pines belong to *Pinus*, subsection *Balfourianae*, and the group contains three species – the foxtail pine (*Pinus balfouriana*), the Rocky Mountain bristlecone pine (*Pinus aristata*), and the species we have



This bristlecone pine hardly looks like it could be related to the tall slender ones. The proposed railroad would be built in the canyon below (Left Fork Indian Canyon).

here in Utah, the Great Basin bristlecone pine (*Pinus longaeva*). I was quite surprised at the amount of variation I saw in the Great Basin bristlecone pines in the stand I visited. I noticed that one particular tree was tall and skinny and almost had the appearance of a lodgepole pine.

Later in the summer I returned to the same area for another solo adventure, and as I hiked along the steep slope on one side of the canyon, I spotted an amazing tree up ahead. This tree is dead, but I have to say it's one of the most beautiful trees I have ever seen. It no longer has needles or cones with which to identify it, but it does look like the trees you see in those bristlecone photos on the internet. And a tree that is similar looking (this one not as large and still partially alive), found not far from it is definitely a bristlecone pine.

The species part of the scientific name for the Great Basin bristlecone, *longaeva*, is a reference to the fact that some members of the species are extremely long-lived (reaching ages of well over 4,000 years). In *The Bristlecone* book (2007) Lanner states that "unlike most living things, they show no signs of senescence, or degeneration over time. These trees do not die of old age; they die when something kills them." As I continued my

hike, I saw evidence of what may have been the killer of the large tree I'd just observed – fire. I saw some char marks on old stumps and logs in the vicinity, and it appeared to me that a fire had burned in the area a long, long time ago.

Lanner talks about how the longevity of bristlecones can be affected by their habitat. He says:

"Because these trees live in a tough environment – cold, dry, and windy at high elevations – they escape many of their predators, which are eliminated or reduced in the harsher climate. Because there is very little undergrowth, fire is not carried into the rocky places where the trees grow. And fungi that rot wood are very slow growing in the dry climate."

The trees I was looking at live at a lower elevation than most Great Basin bristlecone pines. According to Lanner most stands are found between 9,000 and 11,500 feet, whereas the stand I was looking at extends from about 7,200 feet to about 8,000 feet. Lanner talks about a study he did where he compared bristlecone pines living here in Utah in the Dixie national forest, at 8,000 feet, to trees living at 10,500 feet on Wheeler Peak in Nevada. Among the Utah trees he found one that was 1,500 years old; and in contrast several of the Nevada trees were 3,000 years old or older (at least twice as old as the oldest tree in the Utah group). In the Utah trees he found evidence of attack by bark beetles, and also evidence of fire, whereas in the higher-elevation Nevada trees he didn't see evidence of beetles or fire.

I continued hiking up the side of the ridge, through the bristlecones, limber pines, and Doug firs; and then another pine joined the mix – ponderosas. At this point the deeply cut canyon opens into more of an open valley – bounded by pines on one side, with chokecherries and a few aspens in the bottom, and open brushy habitat on the other side. Somewhere around this point the bristlecone pine stand seems to end, at least a third of a mile beyond where the map shows the stand ending (the stand appears to be two or three times bigger than what is shown on the map).

I hiked on up the valley to the top of the ridge that divides Left Fork Indian Canyon (the one I'd come from) from the canyon to the east – Right Fork Indian Canyon. The expansive view to the south and east, in the late afternoon light, was incredible – and almost all of that viewshed is potential wilderness. Sadly, the Ashley National Forest recently announced which areas have made their final cut for wilderness evaluation – and they have deemed this area, along with the vast majority of other wild acreage they evaluated on the Ashley, unfit for further wilderness consideration. I am adding my voice to the voices of the Grand Canyon Trust, the Wilderness Society, and other organizations that are still pushing for the protection of

all of the wild acreage on the Ashley that warrants protection through wilderness designation.

After enjoying the views from the top of the ridge I started my way back down. I hiked through a mystical stand of curlleaf mountain-mahogany, large enough to be considered trees instead of shrubs. I love their exotic look, and their resinous smell. I was in a bit of a hurry to get past the scary parts of the hike before it got dark. In the very scariest part, the forested slope drops steeply down from one side of the ridge top to the pour-off I'd previously visited – and on the other side cliffs drop off into the canyon below, with its tiny-looking road being traversed by the occasional tiny-looking vehicle.

As I looked down into the canyon below, I couldn't help thinking about the proposed railroad and the impacts it would have – not only on this beautiful canyon, but also on the other areas of the Uinta Basin that would be impacted by increased drilling for oil and gas. There are direct effects caused by the construction of roads, well pads, and pipelines. And there are also the indirect consequences that come from reliance on fossil fuels.

The warming and drying of the climate is putting additional stress on trees, making them more vulnerable to bark beetles that thrive in milder winters, and putting trees at more risk of being burned in unnaturally large, destructive wildfires. As Lanner states in *The Bristlecone Book* (2007), "global warming could be very dangerous for the trees."

Drilling in the Basin is not only bad for the health of forests, but also for human health. Several years ago I was shocked when I learned that during winter-time inversions the ozone levels get so high here in the Basin that my fellow Basin residents and I breathe some of the most polluted air in the nation. The oil and gas industry is required to put money into a Community Impact Fund, and that money is supposed to go toward mitigating the negative effects of drilling in the Basin. Instead the Community Impact Board has largely chosen to give that money right back into more drilling – by doing things like putting millions of dollars toward the development of a railroad that would serve the oil and gas industry.

I'm adding my voice to the voices of the many organizations that are opposing the railway, and you can add your voice too by commenting using the information found at <http://uintabasinrailwayeis.com/PublicInvolvement.aspx>, or by using the online comment form found at <https://public.commentworks.com/stb/UintaBasinRailDEISCommentForm/>. The comment period has been extended and comments are now due by February 12.

My experiences in Indian Canyon have helped me appreciate not only the diversity of species that can be

found within an ecosystem – but also the diversity of individuals that can be found within a species. My experiences have also helped me appreciate the importance of protecting individuals, species, and ecosystems from the threats that face them.

I hope you can get out and see some of the bristlecone pines found here in Utah. The stand I visited is just one of many in the state. If you do go visit them, please be considerate of the trees you encounter. In his wonderful book Ronald Lanner (2007) dedicates one entire page to "Trail Etiquette." He says, "even the less-famous populations of these trees may assume great importance in future research" and he insists people follow practices which include: "Remove no specimens of branches, roots, or bark... Do not take dead wood for use as firewood or souvenirs...[and] Walk on trails wherever provided."

I would add one more request of my own, and that is: get involved and do whatever you can to protect bristlecone pines and their habitat. Bristlecone pines really are amazing trees, and they are beautiful in all of their many forms. As Lanner (2007) says, "they add beauty, grace, mystery, and charm to their rugged surroundings." Amen to that! I am so glad I finally took the time to stop and get out and get to know these magnificent trees. I hope you will too.

Chad teaches high school biology and he enjoys hiking, cross-country skiing, and photographing nature while exploring wild country. He calls his forays into the wild "Chadventures."

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The Plight of *Eriogonum tiehmii*

by Bill King

On May 18, 1983 Arnold (Jerry) Tiehm discovered what would be later known as *Eriogonum tiehmii*. It was located in Esmeralda County, Nevada on Rhyolite Ridge in the Silver Peak Range about 36 miles southwest of Tonopah, Nevada.

Jerry Tiehm grew up in Reno, got his BS in wildlife management and a MS in botany in the fall of 1978 at the University of Nevada Reno. He did contract work on geothermal and potential MX missile sites for the next few years.

On May 31, 1984 Jerry took James Reveal, Margaret Williams and Jack Reveal to Rhyolite Ridge to see his new eriogonum. Dr. James L. Reveal (1941-2015), from the University of Maryland, was the foremost expert on *Eriogonum* in the country. Margaret Williams was an early mentor of Jerry's and a renowned rock gardener and founder of the Northern Nevada Native Plant Society. The group collected the holotype and isotypes of the eriogonum which were subsequently distributed to major herbariums across the country. In 1985, James L. Reveal, in *The Great Basin Naturalist* (BYU) described the new species of eriogonum and named it *Eriogonum tiehmii* after Jerry.

Annual Utah Native Plant Society Utah Rare Plant Virtual Meeting

Tuesday, March 2, 2021 9 am to 4 pm

Meeting/presentations will begin at **9am**. Registrants will be sent the Zoom link the week prior to the meeting.

Registration cost for the virtual meeting is **\$5** which includes about 15 presentations and break-out discussion sessions.

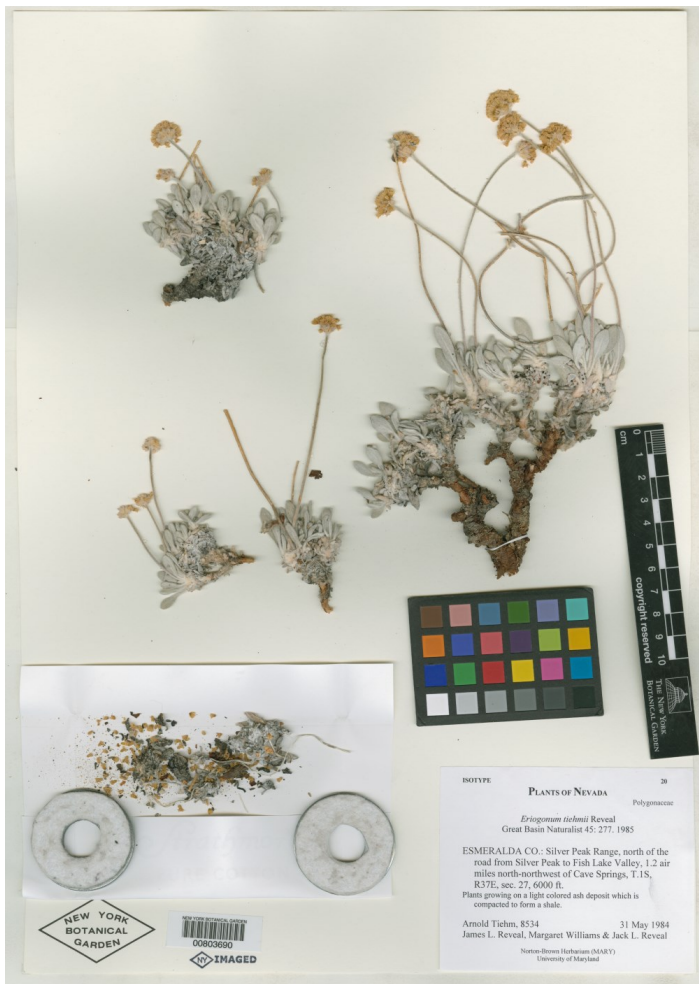
Register at <https://www.unps.org/urpm2021.html>

For special registration/payment or other questions: Tony Frates (801) 277-9240.

This was early in the career of Jerry Tiehm. He is now recognized as "Nevada's premier modern botanist and plant explorer," according to Jim Morefield, supervisory botanist of the Nevada Naturalist Heritage Program. Jerry is currently herbarium curator at the University of Nevada Reno.

The uniquely endemic buckwheat only grows in light colored, barren, rock clay and silt near 6,000' elevation. Two different studies have estimated the population at 37,000 to 44,000 plants spread over six patches on about ten acres.

The Center for Biological Diversity filed an Emergency Petition to the US Fish and Wildlife Service on October 7, 2019 "to list Tiehm's buckwheat (*Eriogonum tiehmii*) under the Endangered Species Act as an endangered or threatened species and to concurrently designate critical habitat." The USFWS, on 7/22/2020, found that "action may be warranted for Tiehm's buckwheat due to the potential destruction of habitat from mining." And that "We will fully evaluate these potential threats during our 12-month status review..."



C. V. Starr Virtual Herbarium, New York Botanical Garden.



Eriogonum tiehmii missing plants. Photo by Patrick Donnelly.



Eriogonum tiehmii in habitat. Photo by Patrick Donnelly.

Unfortunately, Tiehm's buckwheat sits on top of a large deposit of lithium and boron controlled by the Australian firm Ioneer. On September 8, 2020, lab technicians from the University of Nevada Reno visited the *Eriogonum tiehmii* population and noticed that a large number of mature plants were missing. A subsequent survey found that as many as 17,000 plants had disappeared over the summer of 2020. There are two different camps of speculation about the cause of the disappearance of the plants. Some felt that it was caused by animal disturbance, such as thirsty antelope squirrels, whereas others are convinced that it was human caused. The end result is it is now even more endangered with over a 42% reduction in population.

Jackie Grant, professor of biology and director of the Natural History Museum at Southern Utah University, with a doctorate in neurobiology and behavior from Cornell University, was asked to research the loss of the 17,000 *Eriogonum tiehmii* plants on Rhyolite Ridge.

She will be presenting her findings at the Utah Native Plant Society Virtual Rare Plant Meeting on Tuesday, March 2, 2021. All are invited to attend, registration is required, details at unps.org.

Editor's Note: Even though *Eriogonum tiehmii* is a rare, narrow endemic located only in Nevada, the mission statement of the Utah Native Plant Society broadly includes the conservation of native plant and plant communities found in the state of Utah and the Intermountain West.

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Center for Biological Diversity: Tiehm's Buckwheat Emergency Listing
<https://www.biologicaldiversity.org/species/plants/pdfs/Tiehms-buckwheat-petition-to-FWS.pdf>

C. V. Starr Virtual Herbarium, New York Botanical Garden, *Eriogonum tiehmii* sheet.

<http://sweetgum.nybg.org/science/vh/specimen-details/?irn=811446>. Reproduced under Fair Use clause.

Federal Register: the Daily Register of United States Government

<https://www.federalregister.gov/documents/2020/07/22/2020-15154/endangered-and-threatened-wildlife-and-plants-90-day-findings-for-two-species>

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Eriogonum tiehmii in habitat. Photos by Patrick Donnelly.

UNPS Membership 2021

Diane Ackerman, UNPS Membership Chair

I have recently become a member of the state board of the Utah Native Plant Society. I am grateful for this opportunity to serve with Tony Stireman on the membership committee. Tony maintains the list of memberships and if you have questions about your membership, don't hesitate to contact Tony at tstireman@gmail.com.

My emphasis will be to open a conversation about how chapters can become and remain resilient over time. Some chapters have become inactive. Canyonlands chapter, of which I am chairperson, was inactive until a few years ago. I feel there are strategies and ideas we might share when thinking about forming a chapter. Who will join you to provide leadership and encouragement?

The UNPS by-laws state chapters can form with a minimum of ten (10) names. Canyonlands chapter maintains a list of sixty (60) names. Impressive as this may sound, we average around 15 paying members. There are various professional botanists and geologists on this list. But many of us, me included, are native plant enthusiasts and love nothing better than a spring wildflower hike or to share stories and a dish at a potluck meeting. Some of us are not paying members of UNPS. While we encourage folks to become a paying member, it is not a requirement. Folks on our list receive news and invites to all chapter activities.

We know planning and coordinating is essential for any organization. You don't have to do it alone. Canyonlands chapter has been on the receiving end of many gifts and we are grateful for the generous support of the UNPS state board, Grand County library and many others. This support has enabled us to offer local workshops in plant and grasses I.D. and even a butterfly workshop. With the help of our field trip leaders, we have a greater appreciation of our local flora and fauna, our red rock country and high mountain meadows. We have salvaged native plants, collected seeds and are growing native plants in our landscapes. Sound like a dream come true?

My hope is to hear from anyone who dreams of having a chapter of UNPS in their area. Let's talk. I'll be happy to share my past experience at establishing and growing a chapter. Contact me at: dianeackerman13@yahoo.com.

Vesper bulbosus

by Steve Hegji

Volume 3, part A of *Intermountain Flora* covers the Apiaceae Family (aka Umbelliferae). The beginning of the first couplet in the key for the genus *Cymopterus* states "1 Bractlets of the involucre large, showy...more or less connate...tending to form a cup around the umbellet...". That description leads you to just three species in our area. Two of those species, *Cymopterus purpurascens* and *Cymopterus bulbosus*, are distinguished by having bractlets "...mainly white or whitish, each generally with a single unbranched midvein...". Figure 1 illustrates a compound umbel, with each separate umbel (aka involucre) surrounded and cupped by the white bractlets. This picture of *Cymopterus bulbosus* was taken in late March at Cottonwood Wash north of Bluff, Utah. In NW Utah, where I live, the early spring brings *Cymopterus purpurascens*, which just at a glance is shorter, with a tighter inflorescence and flowers more purple.

In October 2012 R.L. Hartmann and G.L. Nesom published an article in *Phytoneuron* titled "Taxonomy of the Genus *Vesper*." They named a new genus, *Vesper*, and moved six of the *Cymopterus* into that genus – including our *C. bulbosus* and *C. purpurascens*, now known as *V. bulbosus* and *V. purpurascens*. The authors state their study confirms a strong "morphological and phyletic integrity" within the six species. Thus the consistent outward physical characteristics and genetic characteristics led them to create the new genus. In the abstract the authors indicate the most distinguishing characteristic is "...particularly by its involucre bracts basally connate, prominently nerved, and totally white to purplish-scarious, or with broad white scarious margins."

The article gives the following explanation for the new name:

The new name of the genus is from Latin, vesper, evening or west, sometimes referring to the "evening star" (usually Venus) seen at sunset in the western sky. The name alludes to the team of Sun and Downie, who have provided molecular analyses (Feng-Jie Sun and Stephen R. Downie 2004, 2010; and including Downie et al. 2002) indicating that evolutionary relationships among many of the currently and historically recognized genera of western North American Apioideae are complex, apparently reticulate.

Intermountain Flora states the origin of the name



Figure 1. *Vesper bulbosus* compound umbel.



Figure 2. *Vesper bulbosus* winged fruits.

Cymopterus is "from *kyma*, wave, and *pteron*, wing, referring to the fruits." Figure 2, borrowed with permission from Al Schneider's *swcoloradowildflowers* website shows the winged nature of the fruits of *V. bulbosus*.

Well, I can appreciate this kind of information, but I consider my very amateur botanist status takes second place to my amateur photographer status. The photographer in me finds the bright green compound leaves and red purple flowers surrounded by the white bractlets a striking contrast to the red sand substrate found in southeast Utah (see Figure 3). Over the fourteen



Figure 3. *Vesper bulbosus*.



Figure 4. *Vesper bulbosus*.

years I've been photographing wild plants I feel a profound sense of gratitude and of suspense and anticipation. And then I come across a plant like *Vesper bulbosus* (see Figure 4), feeling excited and joyful that I encountered something so beautiful, and confirming

my faith that if I keep looking, it'll happen again.

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swcoloradowildflowers.com, Al Schneider

The botanical key for the new *Vesper* genus published by Hartman and Nesom is:

1. Fruiting peduncles shorter than or equalling the leaves; mericarp wings conspicuously enlarged at the base
4. *Vesper montanus*
1. Fruiting peduncles equalling or longer than the leaves; mericarp wings not conspicuously enlarged at the base.
 2. Involucel bractlets with lacerate-fringed distal margins **3. *Vesper macrorhizus***
 2. Involucel bractlets with entire or irregularly toothed or lobed margins.
 3. Involucre mostly a low hyaline sheath; involucel bractlets commonly purplish to rosy, 5-8-nerved; pedicels 0-1 mm long **5. *Vesper multinervatus***
 3. Involucre of 1-8, oblong to obovate, often variously lobed bracts; involucel bracts greenish white to white, 1-3(-5)-nerved; pedicels 1-12 mm long.
 4. Umbels in fruit tightly globose, rays 1-4(-8) mm long, pedicels 1-4 mm long; carpophores absent; fruit orbicular, 10-12 mm long. **6. *Vesper purpurascens***
 4. Umbels in fruit relatively open, more or less flat-topped, rays 10-50 mm long, pedicels 5-12 mm long; carpophores well-developed; fruit oblong, 8 mm long.
 5. Involucel bractlets connate for 1/3-2/3 or more of length, the free portion usually abruptly enlarged distally, broadly ovate to orbicular, with mostly 1 vein, occasionally with 1-2 pairs of shorter lateral veins, parallel to divergent or branched. **1. *Vesper bulbosus***
 5. Involucel bractlets connate to 1/3 of length, the free portion gradually expanding distally, obovate to spatulate, with mostly 3 veins arising from the base, parallel below, gradually flaring distally, equal or nearly so. **2. *Vesper constancei***

News from the North

Text and photos by Leila Shultz except as noted.

A number of botanically-related events have happened in Logan since the beginning of 2020. Without going into a great deal of detail, here are a few things going on at Utah State University that may be of interest to devoted readers of the *Sego Lily*.

Herbarium Remodeling

New signage makes finding the [Intermountain Herbarium](#) a little easier. The collections remain safely tucked in the basement of the building called “The Junction” but the demolition of surrounding buildings makes the location feel unfamiliar. The entrance to the herbarium and surrounding landscape have changed. Those of you who know the place will see some differences in these photos. If you go to the website, you will find a map, hours of operation, and contact information.



Fieldwork in Logan Canyon

Most of you devoted UNPS members know that Logan Canyon holds a treasure trove of rare and endemic plants – about a dozen by our latest count. Thanks to a concerted effort this year by Mindy Wheeler, the Utah Heritage Program sent a number of botanists into the field to verify, document, and map the distributions of these plants. Several new locations were found, but none of the ranges of our rare species was significantly increased. You may recognize some of the most photogenic of these species – including the Maguire primrose (*Primula maguirei*), Buddy’s violet (*Viola frank-smithii*), Bear River Range beardtongue (*Penstemon compactus*), and Cronquist’s daisy (*Erigeron cronquistii*).

The “rarest of the rare” of our endemic species grow on cliff faces, and all may face a new threat due to the pos-

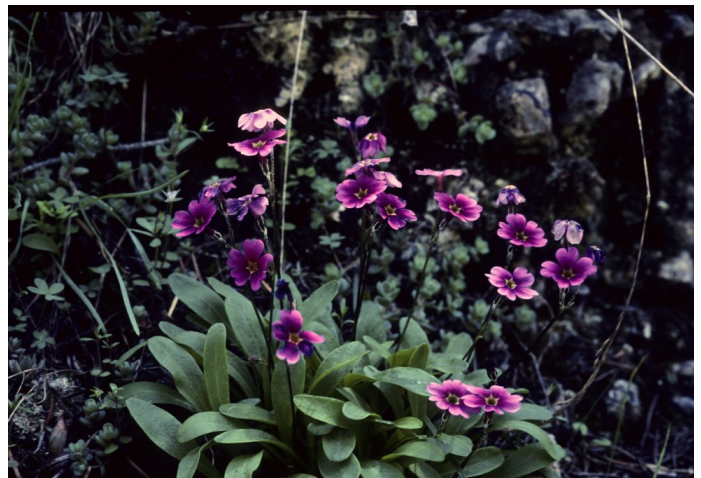


Mindy Wheeler, Logan Canyon work.

sible introduction of mountain goats. I plan to talk more about the goat introduction for this year’s UNPS Rare Plant meetings in March and hope to have the latest plans from the Utah Division of Wildlife Resources.

Personnel changes in the [Intermountain Herbarium](#)

Kristian Valles took over as collections manager in July. His formal training in botany and herbarium management was at Weber State University, studying with Dr. Steve Clark with a major in Botany and minor in Geology. He also worked for several years with the Utah



Primula maguirei in Logan Canyon.



Penstemon compactus and *Erigeron cronquistii*.

Heritage Program, exploring the Intermountain Region for rare plants and sharpening his taxonomic skills. His research interests are the genus *Eriogonum* and family Poaceae. Kris was born in El Paso, Texas, and has lived in New Mexico, Oregon, and Utah. He faces challenges connected to herbarium remodeling, visiting restrictions related to the Covid virus, and the work that accumulated after Michael Piep's departure. Michael Piep is greatly missed, but we are assured he will continue his contributions in the 'fungi' world. We hope he will be able to lead a field trip for UNPS in the near future.

A new director of the herbarium should be taking over



Kris Valles in his office.

sometime this year. The position was advertised last fall through the Department of Biology and finalists for the position are being interviewed. If timing works as planned, a new director will be taking over teaching assignments and administrative duties by this fall.

The herbarium advisory committee (Drs. Noel and Pat

Holmgren, Mary Barkworth, Nancy Huntly--Director of the Ecology Center, and yours truly) has helped the transitions in a number of ways. We have offered curatorial assistance as well as administrative advice to Diane Alston, the Head of Biology Department. Diane served as interim director after Paul Wolf took a position with the University of Alabama in Huntsville. Even though we committee members are officially retired from prior positions (New York Botanical Garden for Noel and Pat), we will continue to help in the herbarium on an 'as needed' basis. Noel and Pat will be helping with the [American Penstemon Society](#) meetings held this year in Logan and I will be teaching another field class this summer through the Department of Watershed Science – this time focusing on riparian and wetland communities. Mary Barkworth will continue her research in Poaceae, her involvement with [Intermountain Biota network](#), and, travel permitting, will continue fieldwork in other countries. We can be seen haunting the aisles of herbarium cases almost any hour of the day or evening, and most of us will be attending the [Botanical Society of America](#) meetings held in Boise the end of July. It seems we old botanists never quit!



Leila Shultz, Ph.D., Professor Emerita, Utah State University Department of Wildland Resources and former Curator, Intermountain Herbarium. Photo by Leila's husband, John McReynolds.

The Big Tree

by Bruce Mooers

At the corner of 800 South and 900 East stands a tall conical conifer. Quite tall actually, it reaches above the adjacent high-voltage power lines. It tapers to a point unlike the pine next to it or the other trees running up and down the parkway. The bark differs as well; stringy, fibrous, red-brown like a juniper and not brown-gray and flakey like a pine. Sources describe the leaves as scale-like which I don't find accurate. Small, flat, soft-ish, yes, but larger and longer than other trees with scale-like leaves. It forms a tall symmetrical cone in overall shape, but the branches form rounded clumps that look almost orderly. Mostly orderly, the utility company trimmed back the northern side away from the power lines. Some of the lower branches look stressed and struggling.



Sequoiadendron giganteum at 8th South and 9th East, Salt Lake City, UT. Photo by Bruce Mooer.

This tree comes with many names. In the 19th century the British proclaimed it *Wellingtonia giganteum*, referring both to the death of the Duke of Wellington and the tree's size. The Duke died a year before a Cornish plant hunter, William Lobb, brought seed to England in 1853. Early American explorers and writers such as John Muir, in contrast, referred to it merely as "Big Tree." Other names: *Americus giganteus*, *Sequoia gigantea*, Sierra redwood, giant sequoia, or just plain sequoia. The current botanical name is *Sequoiadendron giganteum*. Sequoia refers to a native American of the Cherokee Nation who developed a written language for his people. He was born in Tuskegee, later moved to Alabama and died around 1843. We have kept up the British tradition of naming things after the dead.

These trees do live up to their species name, gigantic. An

average native tree may grow to 250-275 feet high and have a trunk diameter of 20 feet. Truly impressive when up close and personal! Long lived as well. If we should believe the National Park Service, the oldest known sequoia may be 3,200 years old. Those trees that fall may send off new shoots and grow new trees off their trunks, a candelabra tree.

The sequoia is native to California, west of the Sierra Nevada crest and has naturalized in the San Gabriel and San Jacinto Mountains. Given the tree's unique look and humongous size, it became an extremely popular ornamental plant. As expected, large specimens can be found in Great Britain, but also in France, and Switzerland as well as New Zealand and Australia. In the US large specimens are in the Pacific Northwest – Seattle, Portland, Eugene. But we can find them here in Utah as well. Check out the University of Utah campus, Washington Square Park (west side of Salt Lake City building), and the Kimball-Whitney Cemetery east of the LDS Temple. Small, younger trees can be found in neighborhoods and parks. Near me, a tall and stressed tree lives at 2600 East on 1300 South. Another is in Donner Park just north of Kennedy Drive. Keep an eye out when doing errands, you may find more. Why the sequoias haven't naturalized outside of California isn't clear. Perhaps fire is needed for the cones and seeds to germinate. Perhaps the Big Tree needs the Douglas squirrel to carry and cache the seeds as the pinyon pine needs the pinyon jay (Clark's nutcracker) for dispersion of seeds.

Taxonomy, like a lot of things, confuses me. This tree was once called *Sequoia gigantea* placing it in the same genus with *Sequoia sempervirens*, the coastal redwood. In 1939 Buchholz felt the Big Tree should be in its own genus and renamed it *Sequoiadendron giganteum*. Dendron meaning "tree" in ancient Greek. A majority of California botanists and the National Park Service at the time didn't care for that name. At the time, the NPS formally adopted the name *Sequoia giganteum*. Eventually everyone settled on having two separate genera: *Sequoia sempervirens* for the Coastal Redwood and *Sequoiadendron giganteum* for the Giant Sequoia. Those that organize things lump the tree into the Cypress family, Cupressaceae. So, the sequoia is related to the junipers and the cedars. It is hard to imagine but that tall, gorgeous tree next to Smith's at 800 South and 900 East is a long-lost cousin of that half-buried juniper out in the west desert. You've got to love Mother Nature.

Editor's note: Richard (Dick) Hildreth, co-founder of UNPS and the first director of Red Butte Garden, used to talk about this tree in the tree classes he taught at RBG. He and Pam Poulson along with a community group were involved in saving the tree from being cut down when the grocery store was being built.

Book Review

by Bill King

Tree Story: The History of the World Written in Rings

By Valerie M. Trouet

Johns Hopkins University Press, Baltimore

April 2020 Hardcover, 246 pp.

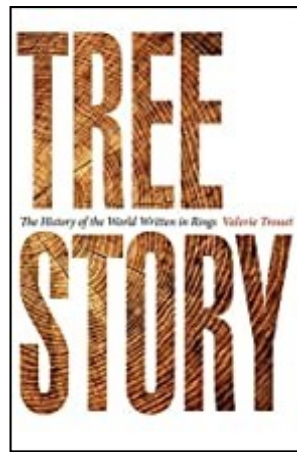
Prologue, Musical Playlist, Tree species conversion name list, Common name to scientific name, Recommended readings, Glossary, Bibliography by chapter, Acknowledgements, Index

The front endpaper of the book has a finely illustrated world map of “trees and stories.” The back endpaper is an illustrated chronology of “history ingrained.” Both endpapers are informative in and of themselves and are an illustrated index of the book. The front endpaper is a summary of the chapters and the back endpaper is a chronology of relevant time periods.

Valerie M. Trouet is a world class scientist and thinker. She grew up and was educated in Belgium where she earned her PhD in Bioscience Engineering at KU Leuven, Leuven, Belgium. She has worked at Pennsylvania State University, the Swiss Federal Research Institute for Forest, Snow and Landscape WSL and the University of Arizona where she is currently a Professor of Dendrochronology and also holds Associate Professorships in Watershed Management, Geosciences, Arid Lands Resources Sciences, Global Change, and Hydrology/Atmospheric Sciences. Valerie also has a flair for publicity and telling stories.

There are dozens of different case studies throughout the book to illustrate the usefulness of dendrochronology to exactly date meteorological or climatological events. As the stories unfold, you learn the fundamentals of the process of tree ring research; for instance just the simple process of how to locate the oldest trees, how to core, what size sandpaper to use, and how to count the rings.

Andrew E. Douglass (1867-1962) is generally considered the father of modern day tree ring research (dendrochronology). Douglass was an astronomer trying to figure out the effect of sunspots on the world's climate. Others had previously speculated on the effect of weather on tree rings even as far back as Leonardo da Vinci. In 1906, when Douglass moved to the University of Arizona in Tucson, he started collecting tree ring



samples. Today, the University of Arizona is considered the “mother ship” of tree ring research.

Valerie Trouet, after doing tree ring research at Pennsylvania State University and the Swiss Federal Institute, joined the faculty of the University of Arizona in 2011 and the adventures continued. In *Tree Story* she relates her stories and those of her associates in global research

expeditions. The book is written in a personal and charming style which makes you feel as though you are accompanying her on these trips. Along the way, Valerie sprinkles in the fundamentals of tree ring research into an exciting educational travelogue.

After collecting samples consisting of cut slabs or core samples they would return to the laboratory and would “visually” compare the tree rings looking for patterns of varying widths of rings. These samples are compared to other samples and a chronology of hundreds of years is established. This chronology is then compared to historical data to time date events and draw conclusions.

It is intriguing to discover the usefulness of dendrochronology such as dating violins, buildings, wooden artifacts, even ancient cultures, and of course the most obvious, trees or timbers. Tree rings are sensitive to volcanoes, earthquakes, hurricanes, floods and other natural disasters as well as temperature and precipitation. There is discussion about the use of other proxies for time dating such as Carbon 14, ice cores, and coral. The use of tree rings to date the habitation of Chaco Canyon seems convincing and useful. On the other hand, the use of tree rings to chronicle the fall of the Roman Empire seems a stretch too far.

I was surprised that most tree ring analysis is still done by eyeballing the width of the tree rings, a process used by Douglass many years before. Some graduate students that Valerie knows are now actually measuring the tree rings by hand but it is very time consuming. One would think that laser scanners and artificial intelligence could be applied fruitfully to counting tree rings.

Tree Story is fun and intellectually stimulating and I read it twice back to back because it was so thought provoking and full of information. I would recommend it to anyone who is looking for a good read that is both educational and entertaining. The hardcover sells for about \$22 online.



With Fewer than 2,000 Butterflies Counted So Far, Western Monarch Takes an Astonishing Step Closer to Extinction

by Eric Simons

Reprinted with permission from baynature.org.

December 4, 2020

Update, Dec. 15, 2020: The US Fish and Wildlife Service announced that after a four-year assessment it has found the monarch butterfly deserves protection under the Endangered Species Act, but that listing is not a priority right now. The monarchs will not receive any protection for the moment, and the agency will review the decision again next year. “We must focus resources on our higher-priority listing actions,” USFWS Director Aurelia Skipwith said in a press release.

Two years ago, when volunteers counted only 27,212 monarch butterflies in the Xerces Society’s annual **Western Monarch Thanksgiving Count**, it meant the butterflies had crossed a threshold identified by scientists as the point past which western migratory monarchs were likely to become extinct.

Still, after holding steady through 2019, the numbers trickling out of the count so far this fall have stunned even scientists who expected the worst. A week after Thanksgiving, with more than half of monitored overwintering sites — including all the largest ones — reporting their numbers, the 2020 count is below 2,000 butterflies. The number represents an astonishing continuation of the near-total collapse of the western migratory population of the species over the last few decades. Scientists estimate that between **three and 10 million monarchs overwintered** in California in the 1980s; in the late 1990s volunteers counted millions of them; more recently they counted **192,624 in 2017 and**

298,464 in 2016.

“I sort of thought I was prepared for anything in terms of monarch bad news,” said **Matt Forister**, an entomologist at the University of Nevada-Reno. “But I did a double take.”

“We were expecting it to come in low, but not that low,” said **Cheryl Schultz**, an entomologist at Washington State University. “If I had to make a guess three months ago, I think we would all have been talking about less than 10,000. But coming in at less than 3,000. That’s ... unexpected.”

“The big question is will they bounce back, and certainly we hope they will,” Xerces Society Endangered Species Program Director **Sarina Jepsen** said. “But the preliminary information we have from midway through the midwinter count is not promising at all. We really need to think about a Western United States and California that doesn’t have monarch butterflies. Because we’re getting pretty close to that.”

How to Help Monarchs Now

The Xerces Society needs volunteers for citizen science projects to **monitor monarch populations**, and the **milkweed habitat** they depend on. You can also add pictures of monarchs or monarch caterpillars anywhere you find them to **iNaturalist**.

While planting milkweed isn’t appropriate in much of the Bay Area, you can help by planting recommended nectar plants. Find out more about California pollinator conservation, including region-specific plant lists, from **Xerces here**.

The North American monarch butterfly species *Danaus plexippus plexippus* has two major migratory populations, an eastern population that migrates from overwintering sites in Mexico through the states east of the Rocky Mountains, and a western population that breeds west of the Rockies and mostly spends winters in coastal California. Non-migrating monarchs are also scattered throughout the state,

country and world. Both migratory populations have declined, and the US Fish and Wildlife Service expects to decide whether to protect all monarchs under the Endangered Species Act **in December 2020**, after considering the matter for six years. In the meantime there are coastal areas throughout California whose monarch groves are matters of identity — Natural Bridges, Pacific Grove, Pismo Beach, Ellwood Mesa — who now face “monarchs on all their



Monarch art on signs outside the Pismo Beach monarch grove. (Photo by Ashley Spratt, US Fish and Wildlife Service)

signs, but no monarchs,” Jepsen said.

Schultz, Jepsen, and several colleagues wrote in a 2019 paper in *Frontiers in Ecology and Evolution* that the monarch might have entered a “textbook extinction vortex.” Like all insects, monarch populations fluctuate dramatically, but once a population reaches a certain low point, it becomes more and more difficult for them to recover on their own from a down year. Schultz was the lead author on the 2017 paper that suggested the threshold for western monarchs might be 30,000. When scientists gathered to talk about that number in 2016, the count had just come back at nearly 300,000. The risk of extinction seemed high then, but not necessarily imminent. When it dropped below 30,000 the next year, the question became, as they wrote in the 2019 paper, “if the experts were correct.”

“We did not expect to be here,” she said. “We didn’t want to be right.”

Western monarchs face problems at almost every stage of their lives. Habitat loss has reduced their food sources, breeding sites, and overwintering sites. Habitat degradation has made once-hospitable overwintering sites no longer a place where a butterfly can survive the winter. Climate change has dialed up heat and drought, shifting the timing of the butterflies’ emergence and migration. Wildfires, smoke, and unusual weather might directly harm them. Pesticide use has increased everywhere. In a **study led by biologists from Xerces and Forister’s lab**

and published earlier this year in *Frontiers in Ecology and Evolution*, scientists took 227 milkweed leaf samples from 19 different locations in the Central Valley — agricultural lands, public parks, wildlife refuges, even gardening stores — and found pesticides on all of them. Separately in a **2016 paper in the journal *Biology Letters***, Forister correlated the rapid rise in California’s use of neonicotinoid pesticides with declines in numerous butterfly species in the late 1990s and early 2000s.

“Insects have an *almost* unending capacity to bounce back from small numbers,” Forister said. “But one thing we’re going to learn in the next 30-40 years is [the limits of] that almost. At what point don’t they bounce back?”

“We’re still losing overwintering sites every year, including this year. They’re getting cut down, they lack protection completely, or the limited protection they have there’s a lack of awareness about.”

Jepsen said it will take a “wake up call” and dramatic action for the monarchs at this point. One high priority should be protecting overwintering groves, she said. Though some groves, like the **Pismo Beach site**, are on State Parks land, there’s no restrictions on what neighbors might do. Jepsen said they watched in horror this year as a neighbor cut down critical trees adjacent to one monarch grove.

“We’re still losing overwintering sites every year, including this year,” she said. “They’re getting cut down, they lack protection completely, or the limited protection they have there’s a lack of awareness about.”

Jepsen said the state might make an effort to better protect overwintering groves, perhaps requiring a monarch specialist to consult before trees are cut down within a certain distance of a grove. She said people who live near monarch groves can also help by keeping an eye on them — going to city council meetings when development is proposed, or helping local authorities reduce pesticide use in their communities. Even people who don’t live near monarch overwintering sites can help by joining **monarch and milkweed** monitoring programs, finding ways to decrease pesticide use, and planting nectar plants or, if locally appropriate, native milkweed. Schultz said posting monarch sightings to iNaturalist or **emailing them to her lab**, from any life stage and any location in the western United States, will help researchers better understand where the butterflies go after leaving their overwintering groves, and could inform better protections.

The monarch isn’t alone in its decline, and Forister said several other California butterfly species are in an even more perilous spot. Between pesticides and rapidly warming temperatures, it’s just been a bad decade for

butterflies, with even common species like cabbage whites suffering massive declines. Most alarming, Forister said, is that scientists see declines in butterflies with extremely different lifestyles and habitats, from widespread species like the West Coast lady to local specialists like the California hairstreak

Sign Up!

Forister said he thought off-the-charts warm and dry falls might be particularly challenging to Western butterflies.

“Over the next couple of years we’re going to learn that climate change is having a far more pervasive impact on the West than other places,” he said.

While conservationists wait for a decision from the USFWS on listing the monarch, it would also help, Jepsen said, to list the species as endangered under the California Endangered Species Act — except that in a bizarre case in late November, a Sacramento Superior Court judge found that the state’s Endangered Species Act, as it was written, cannot be used to protect insects.

The **text of the law** defines “endangered species” as “a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes.”

When the state Fish and Game Commission decided in 2019 to consider four rare bumblebees as candidates for endangered species listing, a consortium of agricultural groups sued, saying that since the law doesn’t specifically name insects, it can’t be used to protect them. This left the state arguing, supported by Xerces and other conservation groups, a somewhat absurdist position, that insects are, in fact, fish under the law. The **Fish and Game Code** defines a “fish” as “a wild fish, mollusk, crustacean, invertebrate, amphibian, or part, spawn, or ovum of any of those animals.”

Traditionally regulators have determined that since the definition of “fish” includes “invertebrates,” that terrestrial insects can be listed as endangered. But Judge James Arguelles, who was appointed to the superior court in 2010 by then-Governor Arnold Schwarzenegger and was nominated in June for a seat on the eastern district court by President Donald Trump, wrote that the legislators clearly meant only to include “invertebrates connected to a marine habitat” under the definition of “fish,” leaving terrestrial insects out of the law entirely.

“I don’t believe the Legislature intended to leave insects out,” Jepsen said. “I believe they were working with this odd definition of fish when they passed and amended the Endangered Species Act. It’s hard to believe that a law that was passed to broadly protect wildlife in California

would leave out 80 percent of all animal biodiversity.”

Schultz said it’s another rare butterfly, the **Fender’s blue**, that gives her hope for the monarch. When she first started working in the late 1990s, there were 1,500 Fender’s blues flying in Oregon’s Willamette Valley. They had been thought extinct through the 1980s, and were listed as endangered by the federal government in 2000. Since then, she said, public-private partners, scientists, and land managers have worked together to save the butterfly — and its numbers now bounce between 15,000-30,000.

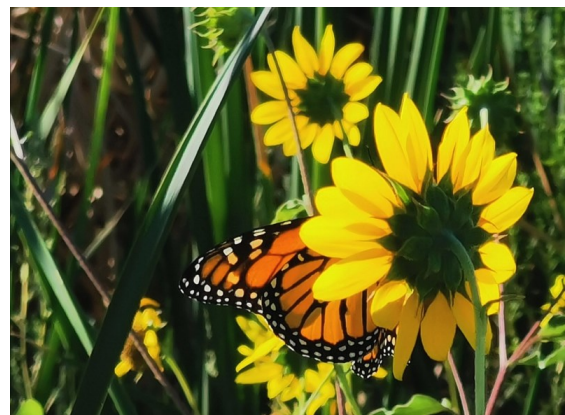
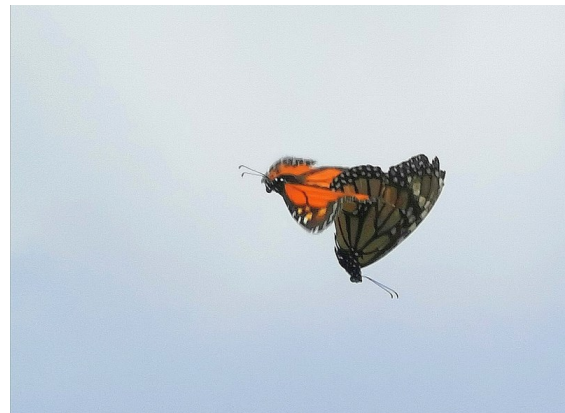
“It takes time, and science, and partnerships, and commitment,” Schultz said. “But it’s possible.”

Clarification: *This story has been updated with a clarification of the November court ruling, which states that the California Endangered Species Act allows protection of only invertebrates “connected to marine habitats.”*

About the Author

Eric Simons

Eric Simons is the digital editor at Bay Nature and author of The Secret Lives of Sports Fans and Darwin Slept Here.



Mating Monarch Butterflies (above) at Fish Springs Wildlife Refuge. Photos by Jonathan Barth.

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 coming soon... 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 (**PDF is 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

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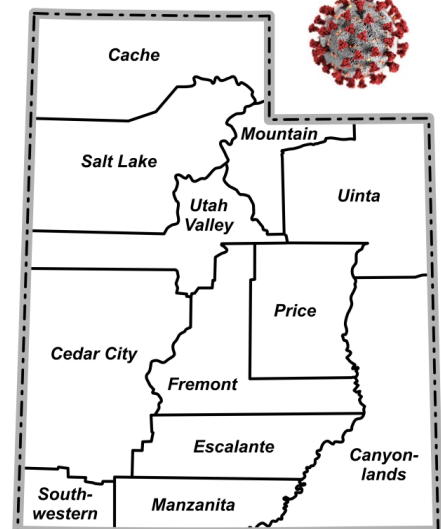
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