

Aquilegia

Newsletter of the Colorado Native Plant Society



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Volume 40 No. 3 Spring/Summer 2016

Aquilegia: Newsletter of the Colorado Native Plant Society

Dedicated to furthering the knowledge, appreciation, and conservation of native plants and habitats of Colorado through education, stewardship, and advocacy

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All contributions are subject to editing for brevity, grammar, and consistency, with final approval of substantive changes by the author. Articles from Aquilegia may be used by other native plant societies or non-profit groups, if fully cited to the author and attributed to Aquilegia.

The deadline for the Fall issue is October 30.

Announcements, news, articles, book reviews, poems, botanical illustrations, photographs, and other contributions should be sent to the editor.

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Botanicum absurdum by Rob Pudim



Your Support of CoNPS

Members support the Colorado Native Plant Society in a number of ways. This serves to fulfill the mission of CoNPS, furthering the knowledge, appreciation, and conservation of native plants and habitats of Colorado through education, stewardship, and advocacy.

Your service as volunteers makes a direct contribution to CoNPS' programs, whether it is promoting native plant gardening by offering your yard for a native plant garden tour, presenting programs for children at a nature center or library, helping pull weeds to reduce invasive plants in an area, organizing or leading a field trip so that others can learn about native plants and areas that need to be conserved, organizing or teaching a workshop or field seminar so members and non-members receive in-depth knowledge of a plant group or other subject, helping with the annual conference so information from a number of experts can be shared with a large group of people, giving input on plants or habitats that are being threatened, helping get information to readers through the website, social media, and *Aquilegia*, or volunteering on bioblitzes. CoNPS has a number of committees that organize members to make a difference in a specific area of education or conservation. We are divided into chapters that offer excellent educational opportunities including field trips, chapter programs, and service projects.

The bottom line is that it is all about you. You can make a difference. You can do it from home on your computer or out in the field. You will see volunteers making a difference at the CoNPS Annual Conference. You will see volunteers making a difference when you go on a field trip or attend a chapter meeting. There are so many ways you can help. On page 30, you can read about the contribution of two CoNPS volunteers, David and Kate, who have reached a large number of children and adults with their programs on plants and pollinators. We are grateful to David, Kate, and the many others who volunteer for CoNPS. You, too, can make a difference and have fun doing it! There is a "Volunteer" link on the CoNPS website menu that will lead you to descriptions of the CoNPS committees and what they do. The chapters can always use volunteers, too! At the Annual Conference at 6 p.m., attend the CoNPS Town Hall Meeting. Ask questions, give suggestions about the future of CoNPS, and find out about volunteer opportunities.

*Poetry by the Other Yeatts**

*(Not William Butler Yeats or Loraine Yeatts, but Dick Yeatts, PhD, physicist, poet, writer, musician, and mountaineer)

Dipsacus

Herbophyles are want to fuss about the genus *Dipsacus*.
A nasty weed, that is a fact; but teasel has a second act.
Dipsacus stands tall and proud, bristled heads above the crowd
Of lesser plants amassed below with little more than leaves to show.
In fields with hungry mouths to feed, teasels have abundant seed.
In all the shops that fuller wool, teasel is the perfect tool.
And to cure one's many ills, Dr. *Dipsa* has the pills:
Should you have a broken bone, no need to sit around and moan;
Or if you have a stomach ache, here's the medicine to take;
For liver, kidney, brain or skin, *Dipsacus* is sure to win;
And to put your mind at ease, teasel cures Lyme disease.
Now to brighten up your day, try teasel in a floral bouquet.
Need a pet about the house? Make yourself a teasel mouse!
Dipsa, here, is Greek for thirst, so let us keep first what's first:
Lift a glass, you have the knack, become a dipsamaniac.

Dick Yeatts



Photos by Loraine Yeatts

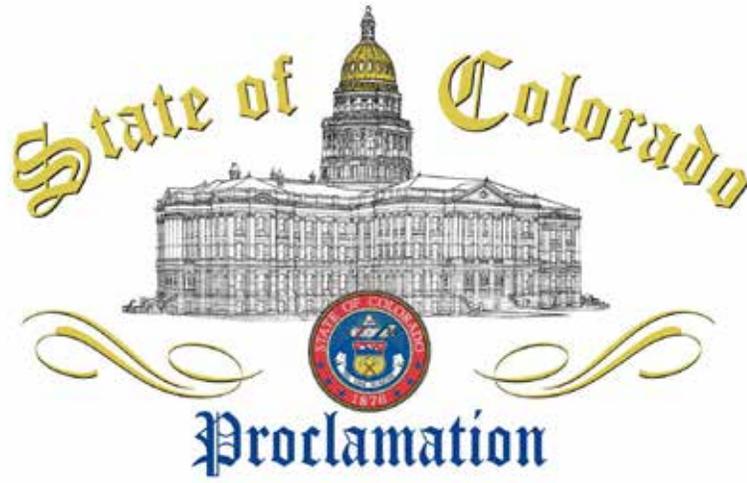
Colorado Native Plant Appreciation Week Proclamation Signed by Gov. John Hickenlooper

Thanks to the efforts of Colorado Native Plant Society members, Governor John Hickenlooper signed a proclamation designating June 10 through June 16 as Colorado Native Plant Appreciation Week. Some other states have Native Plant Days or Weeks including New Mexico, Texas, and California, but this year is the first time that Native Plant Appreciation Week has been celebrated in Colorado. The proclamation is significant because it is a recognition by the State of the importance of native plants and habitats to the citizens of Colorado and the many reasons to cherish and protect the plants. Special thanks go to Jennifer Bousset, CoNPS Membership and Marketing Coordinator, who made the establishment of a Colorado Native Plant Week a goal when she started her job with CoNPS in July, 2015.

Cecily Mui, CoNPS Board member, was instrumental in bringing CoNPS' request for a Colorado Native Plant Appreciation Day to the attention of the Colorado legislature after helping Jen draft a request in writing. The proclamation itself was the collaborative effort of a number of CoNPS members but it never would have come to be without the efforts of these two dynamic women, Jen Bousset and Cecily Mui.

The proclamation became effective on June 10, 2016, the anniversary of the founding of the Colorado Native Plant Society. A party was held at the Audubon Society of Denver Amphitheater at Chatfield State Park to celebrate the 40th anniversary of CoNPS and the first Colorado Native Plant Appreciation Week. Board members including Cecily Mui, Jen Bousset, Jan Loechell Turner, Charlie Turner, Jessica Smith, Mo Ewing, Amy Yarger, and Denise Wilson took turns reading the statements from the proclamation.

CoNPS members were delighted that Jen Bousset organized the party celebrating this historic event.



WHEREAS, Colorado is known for its beautiful scenery of colorful native wildflowers and diverse native plant communities which transition over 10,000 feet of elevation from grasslands, riparian areas with ribbons of cottonwood and willow, sagebrush semi-desert shrublands, piñon-juniper pygmy forests, scrub oak and mountain mahogany montane shrublands, montane forests of Douglas-fir, ponderosa pine, lodgepole pines, and aspen groves that reach into the subalpine forests of Engelmann spruce, subalpine fir, limber pine, and bristlecone pine, and to the delicate plants of the alpine tundra; and

*WHEREAS, our state flower, the Rocky Mountain columbine (*Aquilegia coerlea*), our state grass, blue grama, (*Bouteloua gracilis*), and our state tree, the Colorado blue spruce (*Picea pungens*) all serve as beautiful symbols for Colorado; and*

WHEREAS, the native plants of Colorado, such as the ancient bristlecone pine that is 2,500 years old, a limber pine 1,600 years old, and an aspen grove with a root system over 80,000 years old, are some of the most ancient residents of Colorado; and

WHEREAS, native plant ecosystems with riparian, wetlands, and fens are important to keeping Colorado's watersheds healthy; and

WHEREAS, Colorado has over 3,000 native plant species, 132 of those species being endemic, and their habitats are in danger of being crowded out by invasive, non-native plants; and

WHEREAS, Colorado's native plants are a critical part of our state's natural heritage, and over 500 native plant species are recognized as rare; and

WHEREAS, the native ecosystems provide necessary food and habitat for the smallest to largest of creatures: pollinators, birds, pika, marmot, pronghorn, bighorn sheep, elk, bears, and other wildlife of the state; and

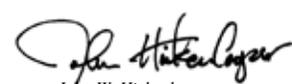
WHEREAS, native plants incorporated into the landscaping in our yards and communities helps increase the amount of habitat available to our native wildlife displaced by human development and necessary for biodiversity and a healthy ecosystem, and helps decrease the amount of resources, such as water and chemicals, used in our yards; and

Therefore, I, John W. Hickenlooper, Governor of the entire State of Colorado, do hereby proclaim, forever after, the period between June 10, 2016 and June 16, 2016, as

NATIVE PLANTS WEEK

in the State of Colorado.

GIVEN under my hand and the Executive Seal of the State of Colorado, this tenth day of June, 2016



John W. Hickenlooper
Governor




Jen Bousset looks on as Cecily Mui reads from the proclamation. Photos by Loraine Yeatts.



Jen Bousset, Charlie Turner, and Jessica Smith



Amy Yarger and Mo Ewing

CoNPS 40th Anniversary & Native Plant Week Celebration

The CoNPS 40th Anniversary Party & Native Plant Appreciation Week celebration at the Audubon Society of Greater Denver's Amphitheater at Chatfield State Park on June 10, featured a potluck, the presentation by Cecily Mui of the Native Plants Appreciation Week proclamation signed by Governor Hickenlooper, talks by Dr. Jack Carter and Dr. Bill Weber, and music by Mikl Brawner and Eve Reshetnik Brawner of Harlequin's Gardens. The Colorado Native Plant Society was incorporated on June 10, 1976 so June 10, 2016 was the perfect date to celebrate the anniversary and Colorado Native Plant Appreciation Week.

The founding of CoNPS was prompted by a 1976 workshop on threatened and endangered plants sponsored by the Denver Audubon Society and the U.S. Forest Service. Therefore, it was quite appropriate that the celebration was held at the Audubon Society of Greater Denver's facility and that USFS Regional Botanist, Tyler Johnson, and Executive Director of the Audubon Society of Greater Denver, Karl Brummert, were present.

The evening started with a delicious potluck (CoNPS members are excellent cooks) that members enjoyed on the deck outside the Audubon Nature Center. Pat Murphy staffed the Book Sales table and members brought seeds and plants to swap. Rick Brune's contribution of seeds and plants was spectacular!

Following a reading of the statements in the proclamation by CoNPS Board members, Jack Carter gave an interesting talk and slide presentation on important botanists in Colorado botany including the contributions of amateur botanists. Jack also announced that Tass Kelso, one of the botanists featured in his presentation, had passed away just days before. Jack and Tass were friends and colleagues at Colorado College. Jack successfully battled the bright setting sun and strong winds (Charlie Turner held the screen to prevent it from blowing away) while giving his PowerPoint presentation.

Next, long-time Boulder Chapter members and owners of Harlequin's Gardens, Mikl and Eve Brawner, entertained the audience with their songs. Harlequin's Gardens in Boulder is well-known for its excellent selection of native plants.

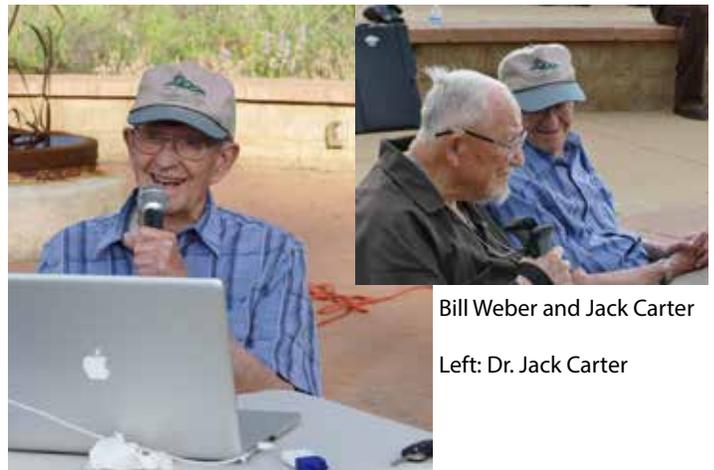
The evening concluded with a fascinating talk by Bill Weber about the reason for the strange distribution of a species of moss. Bill Weber was a founding member of CoNPS and the first elected president of CoNPS.



Dr. Bill Weber



From left to right: Tyler Johnson, Jessica Smith, Amy Yarger, Mo Ewing, Jen Boussetot (behind Mo), Cecily Mui, Denise Wilson, Jan Loechell Turner, Karl Brummert, Executive Director, Audubon Society of Greater Denver. Photo by Loraine Yeatts.



Bill Weber and Jack Carter

Left: Dr. Jack Carter



Above: Mikl and Eve Brawner performing.

Below: Potluck dinner; In foreground, Rick Brune, Charlie and Jan Turner.



Tributes to a Beloved Colorado Botanist: Tass Kelso

Botanist and professor Tass Kelso, passed away in June. Tass was a remarkable botanist and a remarkable person, whose friendship, research, and fine teaching skills touched the lives of many people. Below are some tributes from her friends and colleagues.

Tass Kelso: The Loss of a Dear Friend by Jack Carter

On June 8th we lost Sylvia "Tass" Kelso to pancreatic cancer, and what a terrible loss it was for so many reasons. Beyond being an outstanding teacher and distinguished scholar and investigator in the plant sciences, Tass had a personality and demeanor that made it a real joy to work with her. She had a gentle and quiet attitude towards learning that enticed students and faculty alike to want to join her in the study of plants and the conservation of the natural world. She also had the disposition and presence, plus an academic background, that fit into the liberal arts and science college campus.

Her undergraduate degree from Dartmouth College, a Master's Degree from the University of Colorado, (where she studied under Bill Weber), and a PhD from the University of Alaska prepared her for the Colorado College setting. In 1987, when she arrived on campus, she brought with her an enthusiasm for the alpine and arctic flora of the Rocky Mountains, and she had a deep interest in maintaining and contributing to the Jack L. Carter Herbarium. Tass was a member of the Botanical Society of America, the American Society of Plant Taxonomy, and the Colorado Native Plant Society.

She devoted many years to the study of systematics and reproductive biology of the Primulaceae, and published several important papers addressing the variation and evolution within the taxon. Throughout her tenure at Colorado College she continued to study the vascular flora of the Pikes Peak region, recently publishing *Peak to Prairie: Botanical Landscapes of the Pikes Peak Region*, and *Flora of the Pikes Peak Region*, which are publications that will stand the test of time. The quality of the written word, the illustrations, and the photos in these papers reflect the knowledge and skills of Tass Kelso at her best.



Tass Kelso
Photo © Loraine Yeatts, 2006

Tass is survived by her wonderful partner and husband, George Maentz, who has joined with her through the years to form a powerful team.

Memorial gifts in her memory may be made to the Tass Kelso Fund for the Study of Plant Diversity in the Pikes Peak Region at Colorado College (Colorado College Advancement, 14 East Cache La Poudre St., Colorado Springs, CO 80903-3294) or to a conservation organization

of the donor's choice.

I have always been pleased that the faculty at Colorado College selected Tass to replace me in my retirement, for ours has been a wonderful friendship.

Jack Carter is professor emeritus, Colorado College, and author of the Trees & Shrubs of Colorado.



Tass Kelso
Photo courtesy of George Maentz



Tass Kelso leading a CoNPS field trip
Photo © Loraine Yeatts, 2006

Tribute to Tass Kelso, Botanist, Master Teacher, Mentor, and Friend

by M. Shane Heschel and Candace Galen

Sylvia "Tass" Kelso, Professor Emerita of Organismal Biology & Ecology (OBE) at Colorado College, died in June 2016. Tass was a member of the Biology/OBE Departments for 29 years, where as a teacher, scholar, and advisor she helped hundreds of students over the course of her career to become better scholars and stewards of the Earth through the study of botany.

The geography of her life spanned the breadth of the U.S., ranging from coastal New England to the Alaskan tundra to the mountains and prairies of Colorado. After graduating from Dartmouth College,



Photo by George Maentz

she began sharing her love of learning with elementary school students in New Hampshire. Eventually, her interest in plant diversity and the habitats sustaining it led to a Master's Degree from the University of Colorado and PhD in Botany at the University of Alaska. There, her investigations of arctic and alpine flora took shape, launching a research program that eventually led to more than 50 publications and professional reports. Her research largely focused on the biogeography of alpine flora, including habitat requirements, plant-pollinator relationships, species distributions, and phylogenetics. Tass' expertise in the genus *Primula* encompassed detailed studies of its ecology, breeding systems and taxonomy that spanned three continents and drew upon morphological and genetic studies. Moving beyond the "true" primroses, Tass' interest in edaphic specialization drew her attention to a rare evening primrose, *Oenothera harringtonii*, endemic to the silty prairies of southeastern Colorado. Through the medium of this plant, Tass established a large collaborative team ("Dimensions of Biodiversity") whose comparative studies of *Oenothera* have stretched across western North America.



Photo by Candace Galen 2006

Tass' love of evolutionary biology and systematics was further expressed in her work with herbaria, which she began as a graduate student at the University of Colorado Museum in Boulder. Tass was a champion for herbaria and trained dozens of students in the finer points of plant collections. At Colorado College, Tass' curatorial work with the Jack Carter Herbarium was instrumental in establishing it as a national resource for studies of Southwestern flora.

As a botanist, evolutionary biologist, and conservation scientist, Tass was deeply committed to preserving the biodiversity of alpine, grassland, and riparian systems in Colorado. For this work she was recognized as an Outstanding Volunteer by the Colorado Natural Heritage Program. In addition to training botanists who have continued in their educations as graduate students and practicing conservation stewards, Tass, her husband George Maentz, and her students have developed detailed management plans for many parks and open spaces in Colorado. In Colorado Springs alone, Tass and George's efforts led to the preservation of several parks and open spaces, such as the land adjoining the University of Colorado and Red Rock Canyon. Their work continues to conserve important and amazingly diverse habitats. Her efforts as a teacher-scholar will richly benefit generations of botanists and lovers of plant biodiversity.

Tass and George welcomed botanists from afar into their home and accompanied them in exploring the Rocky Mountain flora. Visitors were rewarded with evening pollination performances by hawk moths and yucca moths, followed by morning con-



Photo by Candace Galen

versation over hearty cups of espresso and walks that revealed glimpses of rare and elusive plants hidden in the wetlands, fens, meadows and alpine habitats of Colorado.

Tass' passion for teaching was infectious and her students and colleagues richly benefited from their interactions with Tass. A John D. and Catherine T. MacArthur Professor at Colorado College, Tass was a master teacher who regularly taught courses in botany, evolution, and conservation biology, and was able to inspire every student in the room with a quiet confidence and a respect for learning styles that was superseded only by her love of plants. Tass' influence as a mentor has been long lasting and transformative. She was a demanding but gentle advisor who modeled hard work, attention to detail, and thoughtfulness for generations of students. Her love of the natural world, her enthusiasm for botany, and her great talents and generosity shaped many lives and careers.



Tass Kelso Photo by George Maentz 2002

The botany community has lost a master teacher/scholar, a champion for biodiversity, and a wonderful person who saw great beauty in the world.

Contributions in Tass's memory can be made to the Kelso Fund for the Study of Plant Diversity in the Pikes Peak Region at Colorado College, PO Box 1117, Colorado Springs, CO 80901. This fund will support student research in botany and especially, fund projects making use of the herbarium to study biodiversity.

M. Shane Heschel, Associate Professor and Associate Chair, Organismal Biology and Ecology Department, Colorado College; Robert Raguso, Professor and Chair, Department of Neurobiology and Behavior, Cornell University; Jill S. Miller, Professor of Biology and Environmental Studies, Amherst College; Candace Galen, Professor of Biological Sciences, University of Missouri.

Remembering Dr. Sylvia “Tass” Kelso

by Denise Culver

Sylvia “Tass” Kelso, Professor Emeritus at Colorado College, passed away on June 8, 2016 after an 18-month struggle with pancreatic cancer.

Since 1987 she was a member of the faculty at Colorado College, teaching courses in botany, conservation, and evolutionary biology, among others, and was Curator of the Carter Herbarium (COCO). She was dedicated to sharing her enthusiasm and teaching about plants with students and with the public.

Awards and honors include the Colorado College Burlington Northern Award for Faculty Achievement in Teaching (1992); the John D. and Catherine T. MacArthur Professor at Colorado College (1992--1994); the Verner Z. Reed Professor of Natural Sciences endowed position (2004--2007); and she was recognized as Outstanding Volunteer by the Colorado Natural Heritage Program.

Tass’ botanical specialties included the systematics and reproductive biology of the Primulaceae, on which she authored numerous papers.

She also studied and published papers on the arctic and alpine flora and its phytogeography, the floras of southeastern Colorado and the Pikes Peak region, edaphic endemism, grasslands, the influence of Quaternary environments on plant distributions, plant reproductive biology, and the continuing importance of floristic exploration. Her research on Primulaceae has resulted in most of her contributions, culminating most recently in treatments of *Primula*, *Androsace*, and *Douglasia* in Volume 8 of *Flora of North America* and *Dodecatheon* and *Primula* in the revision of the *Jepson Manual* of the flora of California.

Tass and her husband George Maentz have been wonderful supporters of CNHP for over 20 years. The “Bed and Breakfast on Mesa Road” in Colorado Springs is a favorite with staff. Several CNHP staff have been students of Tass over the years, so Tass’s legacy continues. On a personal note, one of my favorite memories is of Tass running through the short willows (*Salix glauca*) on the South slope of Pikes Peak with her plant collection bag bouncing along her side!

Tass’ botanical expertise, intellect, and friendship will be greatly missed.

Denise Culver is a Wetland Ecologist with the Colorado Natural Heritage Program (CNHP) and co-author with Joanna Lemly of Field Guide to Colorado Wetland Plants (available from the CoNPS Bookstore). Denise teaches workshops and field seminars for CoNPS. This article is printed with permission from the Colorado Natural Heritage Program Blog, <http://cnhpblog.blogspot.com/2016/07/remembering-dr-sylvia-tass-kelso.html> (July 13, 2016).

(Cont. from page 10)



Platyschuhria integrifolia (Desert Daisy) covered the meadows with waving, golden yellow flowers when we arrived on May 4. They were just beginning to unfurl buds and only got better and more floriferous as the days passed.

I returned home with 1,400 photos from a two-week trip. That’s an average of 100 photos per day! It may be another 6 or 7 years before a display of this magnitude returns to those barren shale hills. In the meantime, I will have my photos and my memories to remind me of that flowerland paradise.

Jane Hendrix is a member of the Gore Range Chapter. She and her husband, Klaus, lead willdflower hikes in the Breckenridge area and give tours of their Mountain View Experimental Gardens. Jane is a talented botanist, writer, and photographer. Visit her websites at <http://www.picturetrail.com/snowtrekker7> and <http://www.picturetrail.com/hendrix>. Photos in this article © Jane Hendrix.

David Goulson, British Bumblebee Expert & Author Speaks in Boulder/Westminster Sept.25 and 26

Dave Goulson is a British scientist and conservationist who is a leading authority on bumble bees. He will speak publicly in Colorado on Sunday, September 25th at the Jaipur Literature Festival in Boulder (the last time is 4-5 p.m.) <http://www.bouldercoloradousa.com/events/jaipur-literature-festival/> and on Monday, September 26th at the Butterfly Pavilion. <https://bouldercolorado.gov/planning/connecting-the-dots> CoNPS ENews will have more information.



Tass Kelso (right) and Denise Culver (left) collecting cut-leaved groundsel (*Senecio eremophilus*) on the south slope of Pikes Peak.

DR. ARTHUR R. KRUCKEBERG
(MARCH 21, 1920 – MAY 25, 2016)
by Richard Olmstead



Two giants of the PNW botany: A.R. Kruckeberg and C.L. Hitchcock

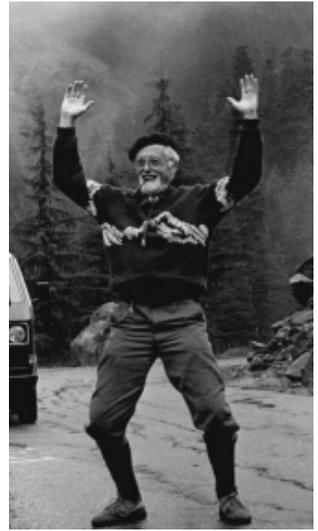
Art Kruckeberg, Emeritus Professor of Botany, University of Washington, died on May 25, 2016, at age 96. Art left a legacy as a scholar, teacher, promoter of gardening with native plants, and conservation activist.

Art joined the Botany Department as an Assistant Professor in 1950 after completing his Ph.D. at UC Berkeley. He grew up in California and was imbued with all things botanical from an early age; his family owned a publishing house called Kruckeberg Press, which published gardening and horticultural publications. He began grad school in 1941 at Stanford, where he spent the previous summer as a field assistant for the famous botanical research team of Jens Clausen, David Keck, and William Heisey (Clausen, Keck, and Heisey rolls off the tongue of most botanists the way Tinker, Evers, and Chance does baseball aficionados).

Due to forces beyond his control, graduate study would have to wait. After the attack on Pearl Harbor, Art enlisted in the Navy and was recruited into their language program, where he learned Japanese. He spent the rest of the war years and a year of postwar occupation, translating Japanese documents and interpreting interrogations of captured Japanese prisoners. To the very end of his life, Art was proud of his mastery of Japanese. I had the occasion to spend a week at a conference in Japan with Art in 1989; he could still speak the language AND remembered the plants he had seen there even though it had been over 40 years since he had left Japan.

After the war, he returned to California to start grad school again, this time at Berkeley. He completed his Ph.D. under the supervision of Herbert Mason, with Hans Jenny and G. Ledyard Stebbins on his committee. Mason had recently begun studying the unique flora found on serpentine soils in California. Art's dissertation (*An Experimental Inquiry into the Nature of Endemism on Serpentine Soils*) helped bring the descriptive work on serpentine endemism into the realm of experimental science. Art maintained a research program on serpentine plants throughout his career, writing several books for both academic and lay audiences, in addition to a significant body of scientific publications.

Once Art's academic bona fides were well established, he increasingly devoted his attention to public outreach through his writings, promotion of conservation activism, and pushing for the establishment of environmental legislation to preserve lands for their value to biodiversity. In 1972, he led the movement to create the Washington Natural Area Preserves Act, in 1973, he developed the first list of rare and endangered plants in Washington. In 1976 he helped found the Washington Native Plant Society, and in 1982 he helped create the Washington Natural Heritage Program within the Department of Natural Resources to oversee management of natural area preserves and endangered species, and during those years also served on the US Forest Service commission to identify parcels of federal land to preserve as Research Natural Areas. Art was awarded the prestigious Peter Raven Award for public outreach in botany by the American Society of Plant Taxonomists in 2006.



Siskiyou collecting trip

Art leaves a living legacy in the form of the 4-acre garden he and his wife Mareen developed over the course of 50 years in Shoreline. This is the "type garden" for his most widely known book, *Gardening with Native Plants in the Pacific Northwest*. This book has turned on generations of gardeners to the joy and conservation value of using our native flora in home gardens. When the book was first published, it won the "Governor's Award" for outstanding books published by Washington authors. The Kruckeberg Botanic Garden is now a public garden owned by the City of Shoreline and managed by the Kruckeberg Botanic Garden Foundation.

Art served on my Ph.D. committee and I have a debt of gratitude for Art's support over the years. During the last few weeks, I have been sorting through the detritus of a career left behind in Art's last office in the Plant Lab. With news of his passing, the many memories into the man who influenced me so, take on additional meaning. A legion of friends, colleagues, and many who never met him, but were influenced by his work, will mourn his passing.

Gifts in honor of Art can be directed to the Kruckeberg Foundation or to the endowment he created in the Department of Biology for Plant Biology. Please make checks out to the University of Washington, with "Kruckeberg endowment" on the memo line. Questions? Contact Lisa at <lisa-tran@uw.edu> or 206.685.2185.

Plates accompanying this BEN obituary are posted at http://mpb.ou.edu/ben/507/ben507_plates.pdf

This article reprinted with permission from Richard Olmstead, Professor, Dept. of Biology, University of Washington. Photos are from the Kruckeberg family collection.

The Desert is Blooming: Rabbit Valley Super-Bloom Dazzles Plant Lovers

by Jane Hendrix

I-70 is the fast track from Grand Junction to the stunning red rock country of eastern Utah. Not much to see. Just endless, barren shale hills. But when the rains come in late winter, those shale hills burst forth with a palette of colorful wildflowers so numerous one can hardly find a bare spot to put down a foot. Hiking slows to a walk and then to a shuffle with many stops to find the next spot to step upon without damaging a gorgeous flower. The last time we witnessed such an explosion of color was in May 2009. To our delight, May 2016 was even more floriferous. Here are just a few of dozens of species that delighted us at every turn.



Calochortus nuttallii (Sego Lily) were in bloom by the hundreds of thousands -- mabe millions. Looking closer at each blooming plant, I saw one or two additional buds waiting to join the chorus of this incredible bloom. The Se-go Lily ranges in color from snow white through soft pink to deep rose-fuchsia. No two flowers have exactly the same color which prompts the photographer to try to capture each different hue. When the bloom is done, nothing remains. The stalks become dry and brittle and the strong winds break them off at the surface, sweeping clean those shale hills.

About 20 minutes after I photographed this one and only clump of deep rose Se-go Lilies and was out of sight in another area, a returning hiker picked the whole group for her wildflower bouquet. My heart was broken. Those happy, smiling flowers were now corpses. I was so glad I had not delayed in capturing their essence while they were still alive. The moral of this story: Never put off photographing a flower you encounter until the light is better, the rain has stopped, the wind is calmer, you go to the bathroom or get a snack.



Sphaeralcea coccinea (Scarlet Globemallow)

took our breath away! So numerous were they that they streaked the hillsides orange. I hiked down from the road to get closeup photos of this lovely species and discovered it also emits a delightful fragrance.



Eriogonum ovalifolium (Ovalleaf Buckwheat) grows in a tight mound of small, gray-green leaves with perfectly round clusters of creamy white flowers dancing 6 inches above its foliage.



Lygodesmia grandiflora (Showy Rush Pink) took me by surprise the first time I encountered it -- just a solitary blossom topping spidery-looking foliage. It is a large flower for the height of the plant, which is only about 6 inches, and perfectly designed with its soft pinkish-lilac ray flowers. I look for it every time we are in this area in May.



Mirabilis multiflora (Colorado Four O'Clock) teased me for days. It is unmistakable with its huge, rounded leaves and sprawling habit. Festooned with tightly closed buds, I tried to catch it in full bloom. Contrary to its common name, it does not bloom at 4 p.m. (not even correcting for Daylight Saving Time). It also doesn't bloom at night or at first light. On our last day in western Colorado, Klaus found this specimen in its full glory. The time was 12 noon MDT.



Oenothera caespitosa (Tufted Evening Primrose) dotted the landscape like lingering patches of snow. Its large, white flowers are equally showy when they fade to deep pink and close in the light of midday.

(cont. on bottom of page 8)

CoNPS 2016 Annual Conference

1976 – 2016: Forty Years of Change: Plants, People, Places

MacAllister Building, 4001 Discovery Dr., University of Colorado, Boulder



Above: *Monarda fistulosa* and Flatirons Photo by Jan L Turner

CoNPS Annual Conference & 40th Anniversary Celebration

Please join us in Boulder, CO, on Sept. 24-25, to celebrate the founding of CoNPS 40 years ago, honor our founders, and learn about changes in botany, plant ecology, native plant gardening, and pollination biology from 1976 to the present.

The schedules for Friday, Saturday, and Sunday are listed in brief in this issue. For complete details, see the Annual Conference issue of *Aquilegia* that came out last month. It can be found on the CoNPS website on the menu under "Resources" --> "Aquilegia Newsletter."

The next few pages contain some updates about the Annual Conference. Already, over 200 people have registered for the conference.

Parking at the MacAllister Bldg. Lot

Parking lot attendants will be selling parking permits for \$10 per day in the morning until 9:00 a.m. **Cash only.**

Reporters & Photographers Needed for Annual Conference

Would you be willing to take photos at the Rare Plant Symposium, CoNPS Conference, or on your field trip for *Aquilegia*? Would you be willing to write a summary of a talk or field trip for *Aquilegia*? If so, please contact Jan L Turner at JLTurner@regis.edu.

PHOTO CONTEST DEADLINE EXTENDED - Please send in electronic submissions ASAP. Must receive 8 x 10" prints by Sept. 22.

Lodging & Campgrounds

Some Boulder Chapter members have offered their spare bedrooms for Conference attendees in need of lodging. Please contact Jan Turner for info. JLTurner@regis.edu. Other options will be posted on the CoNPS website.

Charge cards will be accepted at the Bookstore and Silent Auction. CoNPS book prices are discounted and usually lower than that of Amazon. To participate in the drawing for door prizes, cash is needed.

Silent Auction & Book Sale (Cont. from page 14)

Door Prize Too!

Bring some **dollar bills** with you to the Saturday Conference because there will be a cash donation box. For each donated \$1 you will receive 1 door prize ticket. A \$5 donation will receive 6 door prize tickets. The winner of the door prize will receive half of the door prize donations!

Lightning Talks About Current Research

The Botany Track on Saturday afternoon will feature a number of Colorado graduate and undergraduate students reporting on their research. Most of the speakers giving lightning talks have been selected.

Jessie Condon. Floristic Inventory of McInnis Canyons National Conservation Area. Undergraduate of Environmental Sciences and Technology. Colorado Mesa University. Grand Junction. Advisor: Dr. Stephen Stern.

Carla DeMasters. How Do Native Annual and Biennial Species Affect Cheatgrass Abundance?"

Dyan Harden. Strategic Precaution: *Mimulus gemmiparus* Moisture Content Thresholds for Cold Storage. MS Horticulture & Landscape Architecture. Colorado State University. Advisor: Dr. Jim Klett

James Cooper. Measuring Rates of Vegetative Response to Riparian Restoration in the Gunnison Valley. Graduate Student. Western State University. Gunnison. Advisor: Dr. Tom Grant III.

Mat Sharples. Vascular Flora of the South San Juan Mountains: A Natural History Inventory of Two Southern Rockies Slopes. Graduate student. University of Colorado, Boulder.

Joe Statwick. *Astragalus linifolius*: When the Loss of a Rare Species is a Win for Conservation. Recent PhD graduate from the Department of Biological Sciences, University of Denver. Advised by Anna Sher at DU and Jennifer Ramp Neale at Denver Botanic Gardens, Department of Research and Conservation.

13th Annual Colorado Rare Plant Symposium Fri., Sept. 23 MacAllister Bldg.

8:30 Registration

9:00 Introduction and ground rules – Jennifer Neale, DBG

9:15 Review of Southwest Colorado G2 plant species: status review, current conservation efforts and priority conservation action needs - Jill Handwerk, CNHP

10:30 Break

10:45 Breakout Session : Group input for T&E, G1, and remaining G2 & G3 plant species of Colorado: status review, survey results, threats and current conservation efforts

11:30 Lunch (on your own; the cafe in the McAllister Bldg. may be open on Friday; it is closed on weekends)

1:00 Breakout Session: highlights and priority conservation action needs for the coming year

2:00 Demonstration of interactive county map of rare plants

2:15 Demonstration of regional interactive herbaria

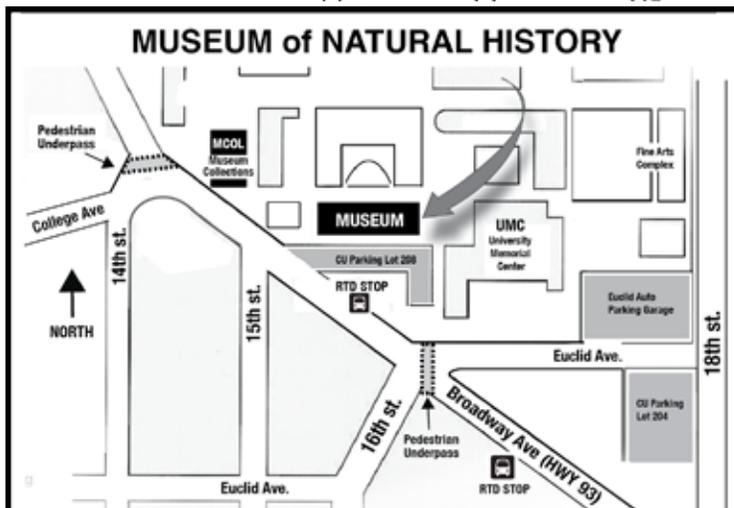
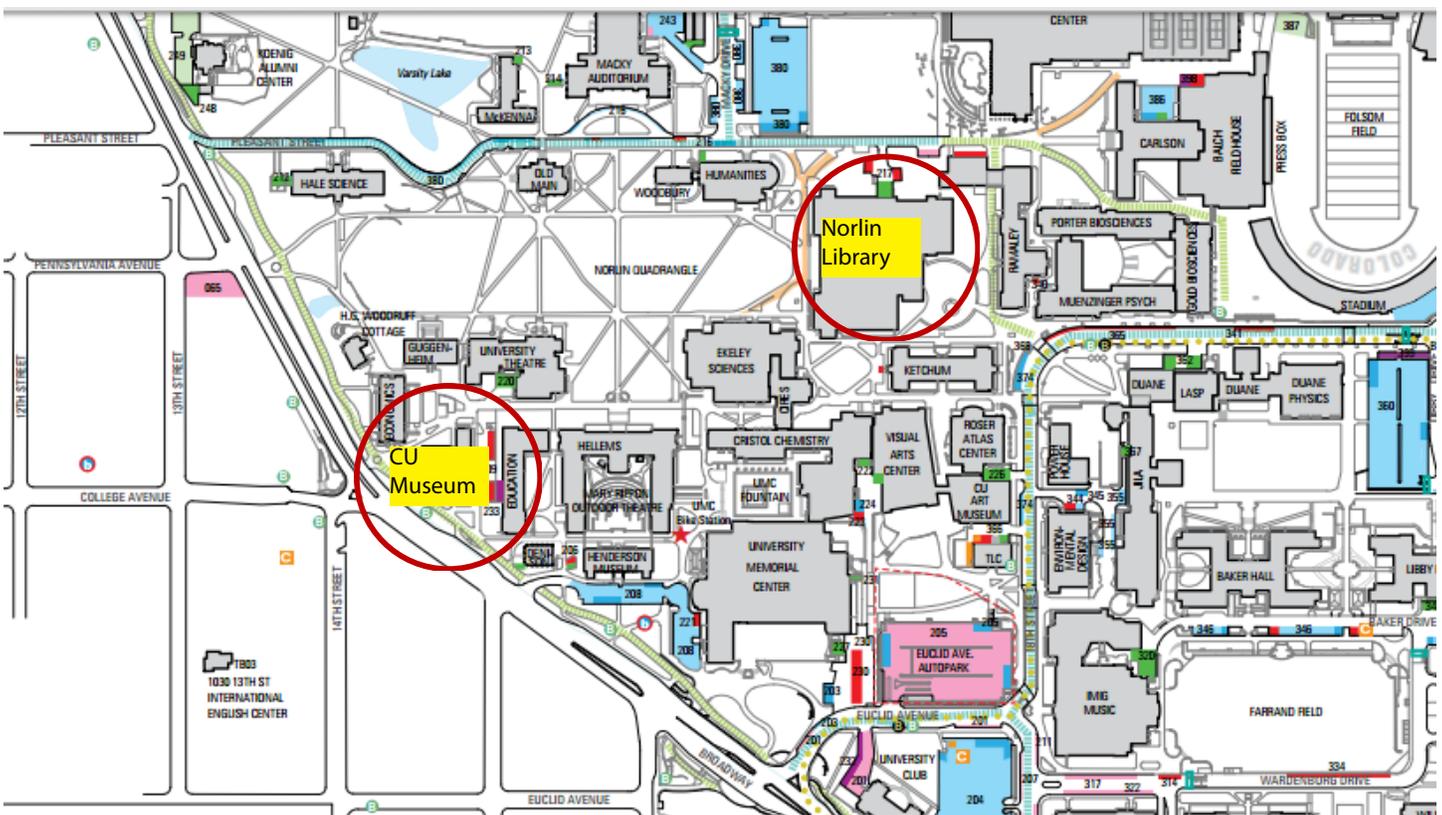
2:30 Break

2:45 Field Season Highlights: 1) *Mimulus gemmiparus* surveys and reintroduction; 2) Browns Canyon BioBlitz

3:00 Conservation Success: *Ipomopsis polyantha*

4:30 Adjourn

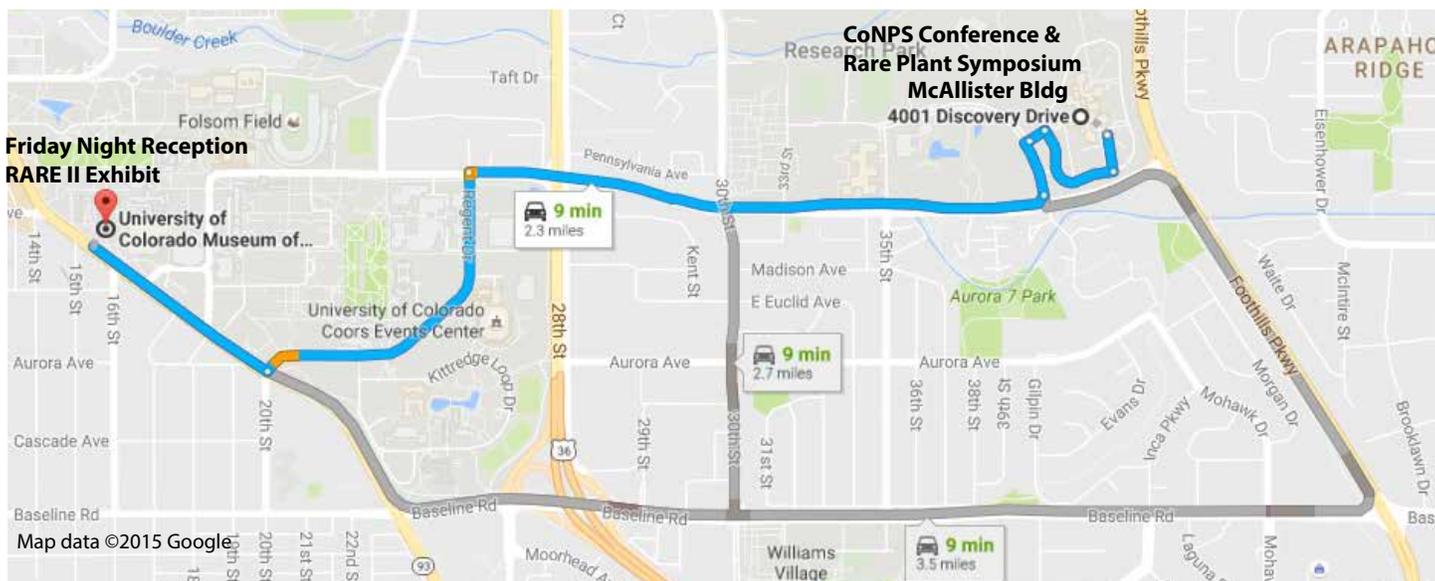
5- 7 p.m. Friday Night Reception and Tours of the CU Museum (RARE II) and CU Norlin Library (Weber) (Meet at Museum)



Parking near the CU Museum

There is "The Stampede" a RTD bus service from the CU Research Park to Main Campus that runs 7 AM-7 PM www.colorado.edu/pts/stampede.

There are two on-campus options to park after 5 PM which offer easy access to Norlin Library and CUMNH. The closest public parking is Euclid Autopark (the garage portion is currently under construction) but they have opened a public lot due south of that Autopark in lot #204. (see attached map) There is also lot #208, right next to our Museum which is usually empty after 5 PM. Payment can be made online, with credit card or coins at Pay stations in the parking lot.



2016 CoNPS ANNUAL CONFERENCE SCHEDULE SAT., SEPT. 24

Please join us in celebrating the 40th anniversary of the Colorado Native Plant Society and Governor Hickenlooper's proclamation of June 10 to June 16, 2016, as Colorado Native Plant Appreciation Week. Our theme focuses on change in the environment and the disciplines of botany, ecology, conservation, and horticulture with emphasis on native plants over the past 4 decades.

8:15 - 8:55 Registration, Booksale, Silent Auction, Photo Contest

- 9:00 - 9:05 Welcome to the University of Colorado - Bill Bowman
- 9:05 - 9:10 Welcome to CoNPS Annual Conference 40th Anniversary - Charlie Turner
- 9:10 - 9:30 40 Years of Change in Bioinformatics - Dieter Wilken
- 9:35 - 9:45 Recognition of the Founders and Early Members
- 9:45 - 10:05 How and Why CoNPS Came to Be- Discussion by Founders
- 10:10 - 10:30 Colorado and the World - Bill Weber

10:35 - 11:00 Break - Booksale, Silent Auction, Poster Session, Vendors, Photo Contest

- 11:00 - 11:30 The Flies, Birds, and Bees That Pollinate Our Wildflowers - David Inouye
- 11:35 - 11:55 Alpine Plants and the Changing Environment - Bill Bowman
- 12:00 - 12:10 Tass Kelso: A Remarkable Life - Dave Anderson and Jill Handwerk
- 12:10 - 12:15 CoNPS Special Merit Award - Jill Handwerk, recipient

12:15 - 1:15 Lunch (bring your own) or Buffet (pre-purchased available for \$10), Book Sale, Silent Auction (Bids close at 12:55), Poster Sessions, Vendors, Photo Contest

- 1:15 - 1:35 Return of the Native - Panayoti Kelaidis
- 1:40 - 2:10 Forty Years of Progress in Pollination Biology, and What It Means for Citizen Scientists - Nick Waser and Mary Price
- 2:15 - 2:35 Forty Years of Change at Rocky Mountain National Park - John Emerick
- 2:40 - 3:00 Where has Plant Ecology Gone since 1976? - David Buckner
- 3:05-3:25 Botany Is Not Dead But This Plant Is: The Importance of Herbaria and Regional Floras for the 21st Century and Beyond - Jennifer Ackerfield

3:30 - 3:50 Break - Booksale, Vendors, Photo Contest (Voting ends at 3:40 p.m.),

Pay For and Pick Up Silent Auction Items

3:50 - 5:00 Botany Track and Horticulture Track (running concurrently)

Botany Track

- 3:50 - 4:10 Who We Are Is What We Leave Behind - Jack Carter
- 4:15 - 4:35 Using Course - Based Research Experiences to Advance Our Understanding of the Flora of Colorado - Leo Bruederle
- 4:40 - 5:00 Lightning talks - Student research (see page 11 for details)

Horticulture Track

- 3:50 - 4:10 Benefits of Native Plants in the Garden - Irene Shonle
- 4:15 - 4:35 Conservation of Colorado Flora on Rooftops - Jen Boussetot
- 4:40 - 5:00 Installing Colorado Native Plants in the Landscape - Alison Peck

Pizza, Appetizers, and Cake will be served at the social!

5:00 - 7:00 CoNPS 40th Anniversary Social & Celebration of Colorado Native Plant Appreciation Week (in MacAllister Bldg.)

6:00 - 7:00 CoNPS Town Hall Meeting - Let's discuss what we would like for the next 40 years...or even just next year!

CoNPS Conference FIELD TRIPS Sun., Sept. 25th

Morning Choices (9 a.m. - noon) - Choose one

Bee-Watching at Denver Botanic Gardens (DBG) at Chatfield, Littleton - Carol Kearns and Diana Oliveras
Rabbit Mountain Open Space, Boulder - Susan Spackman Panjabi
Ranson/Edwards Homestead Open Space - Tom Schweich
Exploring the Foothills Forest - Shortgrass Prairie Transition: A Visit to Boulder Mountain - John Emerick
University of Colorado Herbarium Tour - Tim Hogan
Location TBD - Jennifer Ackerfield
Fall Colors and Tallgrass Prairie Biodiversity - Lynn Riedel & Lynn Sullivan
Ancient Big Bluestem Grasslands of the South Boulder Area - David Buckner

Afternoon - Tours (Can go to both) or Working Field Trip

Tour of Harlequin's Gardens & Fall Plant Sale, Boulder - Mikl Brawner (2-4 p.m.)
Tour of High Plains Environmental Center & Plant Sale, Loveland- Jim Tolstrup (1-4 p.m.)
Tallgrass & Wildflower Seed Collection in Boulder's Prairies: A Working Field Trip - Lynn Riedel & Amy Ansari (1-4 p.m.)

Full Day Field Trip (9 a.m. - 5 p.m.)

Secrets of Castlewood Canyon - Jeanne Willson

Help the Colorado Native Plant Society Launch Our New Scholarship Program and Release a \$2,300 Matching Pledge!

The Colorado Native Plant Society is excited to launch a scholarship program to broaden educational opportunities. Scholarship funds are available for CoNPS workshops, seminars, field trips, and our annual conference (September 23-25). Applications are available on our website, and should be submitted at least two weeks prior to the requested event.

CoNPS Board Member Cecily Mui wants to share with you a special message and she hopes that you will join her to get the Scholarship Program off the ground with up to \$2,300 in matching funds:



Cecily Mui

The African proverb, "It takes a village to raise a child," couldn't be more true in my life. My brother, sister and I are grateful for the numerous sacrifices our hard working immigrant parents made in order for the three of us to experience opportunities that they didn't have. Friends of our family and caring people in our community exposed us to new experiences and expanded our idea as to the possibilities in our new world. While my family lived in a large metropolitan city, each of us were drawn to the refuge of nature, whether it was my parents growing their favorite flowers, school field trips or friends introducing us to camping and bonfires, or for myself, the realization that I could have a career in natural areas management. Lifelong learning is a core value that the Mui family would like to pay forward in honor of those who have contributed to our success and broadened our knowledge.

My family and I are pledging up to \$2,300 in matching funds for donations made to the scholarship program between now and the CoNPS annual conference. It is our vision to see everyone donating at least a dollar to represent the importance of the gift of learning and expanding the mission of the Colorado Native Plant Society. Please join us and donate to make learning possible for everyone seeking to grow.

Silent Auction & Book Sale - Get Ready for Some Exciting Buys!

The CoNPS Annual Meeting Book Sale and Silent Auction are highly anticipated events! CoNPS has a tremendous selection of new and used books available at very good prices. Pat Murphy always does a great job running the Book Sale with help from Linda Smith and Denise Wilson.

This year the Silent Auction, run by BethAnne Bane, will be larger than usual. Jen Boussetot helped find corporate donations. REI will be donating a half dome tent. Plan Jeffco is donating an In Plain Sight art experience and Susan Tweit is donating autographed copies of her Colorado Scenic Byways, Taking the Other Road book set. CoNPS co-president, Charlie Turner, will be donating more of his handmade bee block houses, and Jan and Charlie Turner will be offering to cook and serve a dinner at their house and will also offer a Red Rocks field trip along with an autographed copy of their Wildflowers of Red Rocks Park book. There will also be original art work.



Proceeds from the conference support CoNPS' wide-ranging projects including education, conservation, native plant gardening, and botanical and horticultural publications and activities.

We are grateful for the support of all our sponsors and we cannot thank them enough for making this year's 40th Anniversary Conference a huge success! If you or your business are interested in donating an item for the silent auction please contact BethAnne Bane: bethannebane@gmail.com (Cont. on page 11)



Forty Years of CoNPS History

by Bob Henry

CoNPS is celebrating its 40th Anniversary with a variety of events and a proclamation from the Governor. The upcoming Annual Conference will continue the celebration with the theme of "Forty Years of Change: Plants, People, Places."

Several of the Society's founders will attend the conference and offer perspectives on its origins and accomplishments. As a preview, this article is a look back at our beginnings.

For many of the factual details of the founding, I am indebted to Dieter Wilkin's article of the founding of CoNPS, written on the 10th anniversary and published in Aquilegia in Jan. 1987 (Vol. 11, no 1).

BEGINNINGS

In the 1970's, increasing concern with environmental trends led to the enactment of several landmark Federal and State laws. At the Federal level, the Environmental Protection Act, the Clean Water Act, and the Clean Air Act were enacted. At the same time, the Federal Land Policy Management Act codified long-term Federal policy of retention of public lands in public ownership, and provided a land-use planning process along the lines of the Forest Service.

In one fashion or another, each of these laws increased the need for objective data and more science in environmental and land-use decisions.

It was the enactment of the Endangered Species Act in 1973, however, that provided the opportunity and sparked much activity to protect animal and plant populations from increasing threats.

Interest in conservation issues was also rising within the states, exemplified by the creation of the Colorado Natural Areas Program near the end of the decade. Local jurisdictions added to this trend; examples include the city and county of Boulder's open spaces, Jefferson County's open spaces, Larimer County's open spaces, and Fort Collins' natural areas.

Scientific and citizen interest both fostered the enactment of these laws and spurred activities in support of the laws. Nearly a decade before, the California Native Plant Society had been founded. Colorado would soon follow, and others later, until every state would have a native plant society or similar organization.

FOUNDING AND EARLY ACTIVITIES

In the spring of 1976, largely through the efforts of Jerry Martinez and Bob Buttery of the U.S. Forest Service and Lois Webster and Bob Turner of the Audubon Society, a Threatened and Endangered Species Workshop was held at the Denver Botanic Gardens. The purpose of the workshop was to organize efforts to protect rare plants in Colorado. Participants were from the two organizations above, as well as universities and several Federal agencies. Among the ideas discussed at the workshop was the establishment of a Colorado native plant society that would raise public awareness of native plants and the need for their protection.

As a result, an organizing committee was established. Jon Halverson, a lawyer and member of the Audubon Society, drafted the bylaws, prepared the Society's articles of incorporation and secured non-profit status for the Society, and CoNPS was officially established on June 10, 1976.

The principal aim of the new organization was summarized in its first newsletter: "to encourage the appreciation and conservation of the native plants and ecosystems of Colorado."

The remainder of 1976 and early 1977 were especially busy as the new organization went to work on several fronts.

Ten committees were established to focus on different aspects of the mission. These included committees addressed to the outreach activities of the Society including: Endangered Species, Environmental Documents, Legislation, Education, Horticulture and Rehabilitation, and Publicity. Membership and Funding committees were set up to deal with operational needs. The Publications committee addressed both internal and external needs. Finally, a Field Trip committee was established to organize member outings. (The first Society field trip took place in July 1976, just six weeks after the formal establishment of CoNPS. Seventeen people joined the trip to Niwot Ridge, near Boulder, led by Chuck Feddema and Kim Vories.)

The Publications Committee was charged with producing a regular newsletter, as well as a future bulletin or journal for lengthier material.

The Society's first general meeting was held at the Denver Botanic Gardens in October 1976, with 170 attendees. Actual membership was 110 by the end of the year. Another meeting was held in Fort Collins in January 1977, by which time the membership list had grown to 150.

In addition to the committees, the organization envisioned the establishment of local chapters throughout the state. The first chapter organized was the Fort Collins chapter (later Northern Colorado) in November 1976. It was soon followed by the Boulder, Yampa Valley, and Denver chapters.

THROUGH THE YEARS TO TODAY

Through the years, CoNPS has expanded both its activities and its membership (now over 1,000).

In the early eighties, the Society sponsored its first workshop. It was a great success, and led to the many workshops that have been held since, providing a unique opportunity to explore native plants in times other than "field season".

In addition to the newsletter, CoNPS has produced a number of publications and products, ranging from the two editions of Rare Plants of Colorado to t-shirts and posters, and a variety of smaller publications. CoNPS has also provided financial support to publication of Colorado floras.

The awarding of research grants was made possible by bequests in memory of Dr. John Marr, Charter President of CoNPS,

and Myrna Steinkamp, who served as Membership Committee Chair and in other capacities for many years.

Both the statewide organization and local chapters have been involved in issues affecting native plants. From huge impacts such as the proposed oil shale production in the Piceance Basin to more localized issues like preservation of rare alpine habitat at Mt. Evans, CoNPS and its members have been and continue to be involved.

Members have played key roles as officers, committee chairs, editors, field trip and workshop leaders, and in all CoNPS activities. Numerous Federal and State agencies, as well as city and county government agencies, have been frequent partners (and occasional adversaries), while other organizations such as The Nature Conservancy, the Denver Botanic Gardens, the universities, and many others have partnered in a myriad of field projects, education programs, and advocacy efforts.

Today, CoNPS continues to pursue its goals with dozens of field trips each year, the ever-popular workshops (usually announced with reminders that those who are interested should sign up early, lest all the spaces be filled before they do), the CoNPS online Store, chapter meetings throughout the state, summer field seminars, an annual conference (that includes the very popular book sale and the silent auction), plant sales, a large, full-color newsletter (*Aquilegia*), an E-Newsletter produced using MailChimp software, and a website with a wealth of information about the Colorado flora and CoNPS activities.

CoNPS HISTORY COMING SOON!

A history of CoNPS is now in preparation, using the newsletter archive and other CoNPS archive material as the primary sources. The first working draft will be completed by the time of the annual conference, and the final version this winter.

The objectives of the history are to tell the CoNPS story in an interesting and readable way, and to provide a record or reference tool for information about the Society.

The history will include a narrative, along with compilations of historical information such as officers, annual meetings and their themes, honorary life members and their contributions, research grants and reports, newsletter editors, and a brief historical chronology. Selected illustrations from the newsletter will also be included.

Decisions on the publication and distribution of the history have yet to be made, but members will be kept apprised.

THE NEWSLETTER ARCHIVE AND INDEX (IN PREPARATION)

Hundreds of issues of the "Newsletter" and "Aquilegia" have been published under the eyes of at least 14 editors. Through 2015, they total over 2,300 pages, typewritten and then printed in the early days on a mimeograph, in the early 80's with a Radio Shack TRS80 computer with a dot matrix printer, and now in color with Adobe InDesign desktop publishing software.

Most are archived in the online collections of Regis University. (More recent issues are also available online at the CoNPS website).

The material gives us insight into the early activities of the Society (announcements of meetings, field trips, Board minutes, etc.) and there is much material of academic use. This includes innumerable articles about finding and identifying native plants, habitats and locales, growing native plants, and more. Book reviews and announcements of publications by members abound. There are discussions of numerous conservation issues -- representing almost a catalog of threats to the native plant, ranging from cactus theft to the placement of ICBM missiles and associated access roads. Sometimes non-native plants and uses found their way into the pages, such as a recipe for dandelion wine.

Biographical information abounds -- founders, awardees, notables in the botanical world, and the inevitable humor of editors and contributors, some of it quite groan-worthy. (In the unlikely event you haven't heard the one about Fred E. Fungus and Alice Algae taking a lichen to each other, and their marriage ending up on the rocks, you can find a version of it in Vol. 7 (1983), No.1, courtesy of the *Northern Nevada Native Plant Society Newsletter*).

The print version of the newsletter archive is housed in the Regis University Library Archives. But while it contains much information -- some useful, some merely entertaining - its usefulness has been limited by the lack of an index to locate useful material deeply buried in the 2,300 pages.

When the index is complete, researchers will be able to readily find information by subject (especially plant taxa, habitats and locales), author, and title. Major biographical information, book reviews and announcements, and more will also be indexed.

Bob Henry, editor of Aquilegia from 2009 to 2013, lives in Cheyenne, Wyoming and is the author of the yet-to-be-published Too Short to Bind: Homesteading at Rawhide Butte, a history of eleven homesteaders and their families, who left Iowa and took up "dry farming" in Wyoming under the Enlarged Homestead Act of 1909.

From CoNPS ENews (check ENews for details)

Eriogonum Society Annual Meeting Sept. 16-19
Desert Studies Institute, Baker, California

(My)Great Night in Denver! by the National Wildlife Federation
Thursday, September 29, 2016, 5-7pm in downtown Denver

Exploring Rocky Mountain National Park with CO Biology
Teachers Association, Oct. 1, 2016, 8:30am-5:15pm, at RMNP

California's third Salvia Summit (Salvia Summit III)
Friday, October 7 through Sunday, October 9, 2016 in Berkeley

Boulder County Seed Collection with Wildland Restoration
Volunteers, Sat. Oct. 22, 2016 in Boulder County

Colorado Science Conference
Fri. Nov.18, 2016, 8am-4pm at Denver Mart

Southern Rockies Seed Network Annual Meeting
Wednesday, December 7, 2016, 8am-5pm in Loveland

Conservation Corner:

Agencies and Organizations in Colorado Conserving Native Plants

by Jessica Smith

This article is intended as a guide to some of the agencies and organizations which conserve Colorado's native plants and landscapes. The list of participants in conservation in Colorado is large and diverse, and covering the full range is not possible in this article. Native plants are preserved on undeveloped lands, held by private individuals and public agencies, with management for conservation. Agencies may acquire open space through fee-title acquisition (the purchase of land) or through conservation easements (land-use restrictions, accepted by an owner for financial reward, on private land). Additionally, there are many organizations that do not hold property, but support conservation through research, education, advocacy, regulation and recognition. Many of these agencies and organizations rely on volunteers to execute their missions or on public input to shape policy. This article includes websites and suggestions on ways to get involved.

The U.S. Forest Service (USFS) and the Bureau of Land Management (BLM)

Two federal agencies combined are entrusted with the management of approximately 23 million acres of public land in Colorado: the US Forest Service (USFS) (almost 15 million acres) and the Bureau of Land Management (BLM) (over 8 million). Both agencies have either a regional or state botanist, as well as a list of sensitive species, the conservation of which must be considered in management actions. The USFS administers eleven national forests and two grasslands in Colorado, grouped into seven administrative units (with one unit based in Wyoming). Two of the six units in Colorado currently employ a forest botanist. The BLM administers land in Colorado through ten field offices, with two of the ten offices currently employing a botanist, along with ecologist and natural resource specialists. Representatives from the USFS and BLM, along with many other partners discussed below, are members of the Rare Plant Technical Committee (RPTC), a group of agency, academic and NGO botanists working to advance rare plant conservation in Colorado. As part of the Annual Meeting, the Colorado Native Plant Society includes the Rare Plant Symposium, a meeting place for the RPTC and other botanists to exchange information about Colorado's rarest plants. 2015 was the 12th annual meeting of the Symposium. Information about past symposia can be found here: <http://www.cnhp.colostate.edu/teams/botany.asp#symposia>. Both the BLM and USFS have special designations for lands, which recognize areas with unique values and confer special management prescriptions. On BLM lands, Wilderness Study Areas (WSA) identify areas which may be suitable for wilderness designation.

A second common designation is an Area of Critical Environmental Concern (ACEC). This designation is made by administrative action in a Resource Management Plan (RMP) to protect and prevent irreparable damage to sensitive resources. The USFS may designate land as Research Natural Areas (RNA); these are lands which are permanently protected and maintained in natural conditions to preserve biodiversity or serve as reference ecosystem. Both agencies rely on public input to direct their planning efforts. The BLM posts the status of RMP updates, with information on how to comment here: http://www.blm.gov/co/st/en/BLM_Programs/and_use_planning/rmp.html and the USFS here: <http://www.fs.usda.gov/main/r2/landmanagement/planning>.

The U.S. Fish and Wildlife Service (USFWS)

The US Fish and Wildlife Service (USFWS) is the federal agency charged with protecting endangered species, working to conserve fish and wildlife, but also plants and their habitats. There are currently 16 plant species in Colorado which are listed as federally threatened or endangered under the Endangered Species Act (ESA). In the case of plants, the Act only affords protections to these species on federal lands or if there is a federal nexus with the property. Many states have laws which create a state list of endangered plants, providing more protections, but Colorado has no such law. The CoNPS Board of Directors voted in October of 2015 to sign on to the Native Plant Conservation Campaign to call for equal protections for plants under the ESA.

The Colorado State Land Board (SLB)

The Colorado State Land Board (SLB), established in 1876, holds and manages more than three million acres of land in Colorado, given to the state by the federal government to generate revenue for public schools and institutions. Properties owned by SLB are not open for public visitation, but are treated as private property and managed for profit, with land being leased to individuals or agencies. Land uses include grazing, crop lands, mineral withdrawal, commercial development, and recreation. In 1996, Colorado voters approved an amendment to the constitution to designate 10% (300,000 acres) of SLB holdings into a Stewardship Trust. Lands in this trust have outstanding beauty, high natural values, and/or critically important wildlife habitat and open space. Stewardship Trust designation does not preclude any land uses, even mineral withdrawal; however, development is under greater scrutiny. The SLB has recently completed a revision of the trust holdings. CoNPS Board of Directors met with SLB representatives at their December 2014 meeting, and the Board was able to comment on the realignment. Stay up to date with the ongoings of the SLB on their News and Media page: <http://trustlands.state.co.us/NewsandMedia/Pages/NewsandNotices.aspx>.

Colorado Parks and Wildlife (CPS)

Along with the State Land Board, Colorado Parks and Wildlife (CPW) is a division under Colorado's Department of Natural Resources within state government. Colorado Parks and Wildlife was formed in 2011 from a merger of the Colorado Division of Wildlife

(DOW) and Colorado State Parks. CPW has total land holdings of over 1 million acres. Of these lands, 45% are owned outright and another 44% are in conservation easement. Only 0.2% of CPW's budget comes from Colorado's general fund (state budget). The bulk of CPW funding comes from license sales and other wildlife fees. Despite a merged agency, wildlife related revenue must still be used for wildlife related expenditures, as required by federal law (Pittman-Robertson Act). CPW has recently made a large contribution to rare plant conservation in Colorado with the addition of a Rare Plant Addendum in the State Wildlife Action Plan (<http://cpw.state.co.us/Documents/CNAP/Rare-Plant-SWAP-2015.pdf>). The Addendum, authored by the Colorado Natural Heritage Program (CNHP, discussed below) with input from many stakeholders, includes a statewide strategic direction for the conservation of Colorado's 117 Plant Species of Greatest Conservation Need.

The Colorado Natural Areas Program (CNAP)

The Colorado Natural Areas Program (CNAP) is a small program under Colorado Parks and Wildlife which works cooperatively with landowners through voluntary agreements to recognize areas with natural features of statewide or global significance. The Program designates lands as state Natural Areas, working with all types of landowners. The landowner retains ownership and management of the property. Over its almost 40 year tenure, CNAP has supported the conservation of more than 250 rare, threatened or endangered species or communities and built a registry of 93 designated Natural Areas with over 175,000 acres. Additionally, CNAP is the only state government program with an emphasis on rare plant conservation. Learn more about the Colorado Natural Areas Program, and ways to get involved, here: <http://cpw.state.co.us/aboutus/Pages/CNAP.aspx>.

The Colorado Natural Heritage Program (CNHP)

The Colorado Natural Heritage Program (CNHP) is a non-profit scientific organization affiliated with the Warner College of Natural Resources at Colorado State University. The CNHP Botany Team tracks and ranks over 500 rare plant species and many more plant communities in Colorado, using a standardized natural heritage methodology. CNHP also maintains a database with the location and status of populations of these species. Along with tracking rare species, CNHP also offers many conservation tools, such as climate change vulnerability assessments and the identification of Primary Conservation Areas (PCA), areas across the state which harbor high biodiversity. The Biodiversity Scorecard is a project developed in partnership with The Nature Conservancy (TNC), which provides the conservation status of biological features in the state. TNC has been a leader in the science of conservation and over the past 50 years has protected one million acres in Colorado. For more information about these organizations, see their websites: <http://www.cnhp.colostate.edu/> and <http://www.nature.org>.

Other Organizations Performing Botanical Research

Scientific research on native and rare plant species is critical in directing appropriate conservation measures, and Colorado has many outstanding academic researchers and many herbaria to document and study the flora of Colorado. The three largest herbaria in the state, the University Herbarium at the University of Colorado, Boulder (COLO), the Kathryn Kalmbach Herbarium at the Denver Botanic Gardens (KHD), and the Colorado State University Herbarium (CS) have roughly 300,000 collections combined, with most collections searchable online (COLO: <http://cumuseum-archive.colorado.edu/Research/Botany/Databases/search.php> and KHD, CSU: <http://swbiodiversity.org/seinet/index.php>). The herbaria are also open to the public by appointment for self-study and research. The Denver Botanic Gardens Research and Conservation department supports a large group of scientists conducting long-term monitoring studies, conservation genetics work, seed collections, and ex-situ conservation for some of Colorado's most rare plant species.

Vast acreage of land is also held by local city and county open space agencies, which balance management goals of recreation and conservation. These agencies seek public input to direct management goals. Over the past year, CoNPS has offered several volunteer opportunities to influence conservation on local open space properties. The Boulder CoNPS chapter offered a volunteer position to represent CoNPS interests in preserving native habitats in the City of Boulder OSMP (Open Space and Mountain Parks) North Trail Study Area plan (<https://conps.org/volunteer-needed-to-work-on-osmp-north-tsa-plan/>). In the summer of 2015, CoNPS participated in two bioblitz events, along with other conservationists, at the Pineries El Paso County Open Space, to inventory state-rare plant species. By knowing the locations of these rare species, land managers will be able to protect these sensitive plants during salvage logging from the Black Forest Fire of 2013.

(Continued on page 21)



Left: *Krigia biflora*
Photo by
Audrey Boag



Pineries Bioblitz August 2015 Photo by Audrey Boag

Steinkamp Research Grant Report: Resolving DeBeque Phacelia's Taxonomic Synonymy by Brandee Wills

Phacelia submutica is a rare desert wildflower, endemic to a specific soil type found only within a 12-mile radius of the town of DeBeque, from which the plant gets its common name, DeBeque Phacelia (Fig. 1). This diminutive spring annual is a federally protected species, listed as threatened under the Endangered Species Act in August of 2011 primarily due to oil and gas development occurring in its already limited range, resulting in the modification or destruction of the unique desert ecosystem that this plant needs to survive.

Interestingly, DeBeque Phacelia hasn't always had the scientific name *Phacelia submutica*. When the type specimen was collected from DeBeque in May of 1911 by George E. Osterhout (a name I'm sure many of you are familiar with, as numerous Coloradoan endemics such as *Astragalus osterhoutii*, *Oreocarya osterhoutii*, and *Penstemon osterhoutii* bear his name), it was identified as *Emmenanthe scopulina*, or *Phacelia scopulina*. It wasn't until 30 years later that this specimen was formally described as a new and distinct species, *Phacelia submutica* (DeBeque Phacelia), by John T. Howell (1944). Howell felt that DeBeque Phacelia was a distinct species because of the plant's hairless style and rounded seed capsule, for which the scientific name of the plant is derived (the prefix sub- meaning "almost" or "nearly" and muticus meaning "without a point").

However, DeBeque Phacelia's taxonomic woes do not end there. In 1981 Robert Halse reduced DeBeque Phacelia to a variety of *P. scopulina* (the species that Osterhout had initially identified the plant as in 1911). Halse felt that the diagnostic characters described previously were too variable among the two plant species for DeBeque Phacelia to be considered distinct from *P. scopulina*. Despite Halse's valid publication, DeBeque Phacelia still has two names. The U.S. Fish and Wildlife Service and the Bureau of Land Management consider the plant a distinct species (*P. submutica*), while the Forest Service treats it as variety (*P. scopulina* var. *submutica*) of the more widespread species *P. scopulina*.



But, "What's in a name? That which we call a *Phacelia* by any other name would smell as sweet," would it not? Actually taxonomy, and how we delineate species, is incredibly important for the conservation and management of rare plants. The listing of subspecies and varieties under the Endangered Species Act can be controversial, as they may not always represent distinct genetic entities. Although morphological variation may be present in a subspecies or variety of plant, this variation may just be due to site specific ecological differences, such as soil type, and not genetics, a phenomenon called phenotypic plasticity. Over half of the species protected under the Endangered Species Act in the United States are plants, though they receive less than 5% of total funding allocated to threatened and endangered species (Negrón-Ortiz 2013). Because DeBeque Phacelia is protected under the Endangered Species Act it is important to determine if this species is a distinct genetic entity or just a morphological variant of a more widespread species in order to justify continued resource allocation to its conservation.

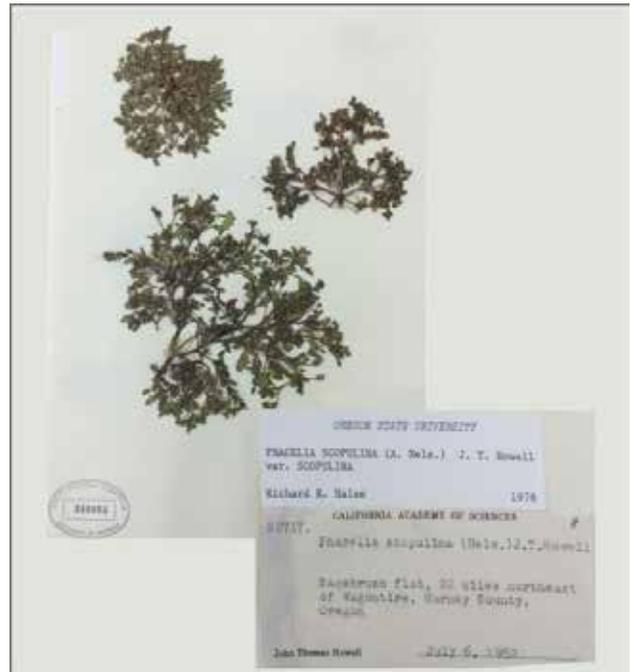
To determine if DeBeque Phacelia was a distinct species I collected molecular data from three gene regions, the nuclear ITS region and the chloroplast regions *ndhF* and *aptH-aptI*, for DeBeque Phacelia and all of its closest relatives, the species in *Phacelia* sections *Miltitzia* and *Euglypta* (*Phacelia* is a large genus, so taxonomists have broken it down into subgenera and then into sections). I used the data collected from those three gene regions to construct phylogenetic trees to infer evolutionary relationships between DeBeque Phacelia and the other species in these sections. Collecting molecular data is an excellent way to delineate species in sections such as these. There are twenty species in these two sections, and like DeBeque Phacelia, they are all mostly small, desert annuals found on unique soils throughout the western United States. The morphology of these plants is highly variable within and among the species of these sections. Because of that, taxonomists have defined these plant species based on minute and esoteric morphological characteristics, making the correct identification of these plants difficult and resulting in their complicated taxonomic history.

The majority of my samples came from herbarium specimen tissue, which 1) allowed us to cost effectively increase sample size and collect species from throughout their known distributions and 2) identify mistakes in herbarium specimen identification versus actual phylogenetic inconsistencies (i.e., ask the question, are these "good" species?). Although I was unable to go out into the field and collect these specimens myself, I feel as though I lived vicariously through all of the collectors whose specimens I sampled. I visited the University of Wyoming's Rocky Mountain Herbarium, Colorado State University's Herbarium, and the University of Colorado's Herbarium with my advisor and three undergraduate students assisting on this project. We combed the collections for any of the species in *Phacelia* sections *Miltitzia* and *Euglypta*, specifically focused on finding those specimens collected or annotated by the experts, due to the difficulty of correctly identifying species in these sections. It was a great feeling to come across a specimen collected or annotated by Howell or Halse. Holding one of their specimens was to hold a small piece of *Phace-*

lia's taxonomic history in my hands.

Analyzing the data revealed some interesting results. I had hypothesized based on Howell and Halse's work that DeBeque Phacelia's closest relative would be *P. scopulina* (and here I must admit some subterfuge, for my true hypothesis was that none of these plants were "good" species, how could they be when they all looked so similar!?). However, what we found was that DeBeque Phacelia's closest relative isn't *P. scopulina* at all, but is actually a different species, *P. salina*. This was a surprise! Although, in retrospect it shouldn't have been considering that DeBeque Phacelia and *P. salina* both have similar morphologies and soil preferences. Really, a number of the species we collected could have easily been DeBeque Phacelia's closest relative because they all are so morphologically similar. However, things get more complicated than that.

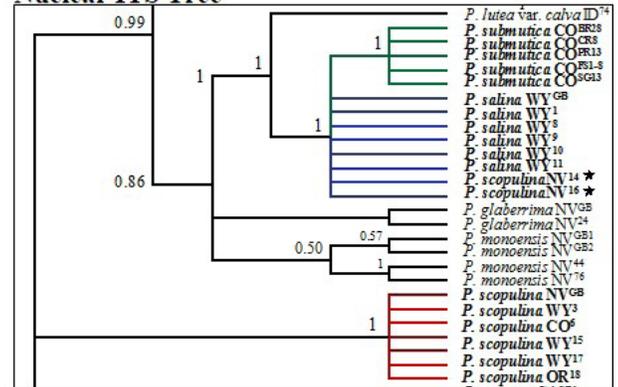
Have you ever thought about how we define a species? I assure you, the debate is often more philosophical in nature than scientific. Unfortunately, I didn't take my advisor's "Species and Speciation" class until this project was well underway, and so therefore was blissfully unaware of that fact when I initially wrote my proposal and applied for the Steinkamp Fund. I thought using molecular genetic data to identify whether DeBeque Phacelia was a distinct species would be easy. Collect the data, analyze the data, and all of a sudden you know whether or not it's a species, right? However, the term species, which describes discrete taxonomic entities, is just but one snapshot of a longer evolutionary timescale, and is in direct conflict with the ongoing evolutionary processes which ultimately lead to speciation. While you might think I'm just philosophizing here, this became evident when I looked at the topology of my phylogenetic trees.



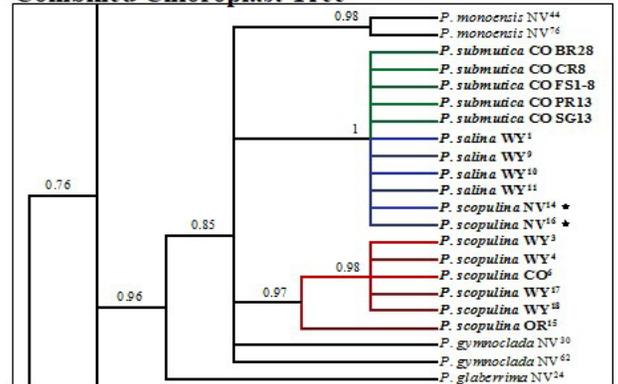
The nuclear ITS tree resolved DeBeque Phacelia as a monophyletic group nested within *P. salina* (Bayesian posterior probability=0.99) (Fig. 3), while DeBeque Phacelia was found to be unresolved with *P. salina* in the chloroplast trees (Bayesian posterior probability=1 in the combined ndhF and atpH-atpI tree) (Fig. 4). However, it is important to remember when interpreting phylogenetic trees that gene trees do not always equal species trees. As lineages split, genes naturally go through phases of polyphyly (like what we see in the nuclear ITS tree) before monophyly (the topology we look for to indicate a "good" species, for example, *P. scopulina* in the nuclear ITS tree) is reached as ancestral genetic variation is sorted. Though *P. salina* is not resolved as monophyletic and sister to DeBeque Phacelia in the ITS tree, with time, this lineage will sort out into a monophyletic group. While DeBeque Phacelia and *P. salina* were paraphyletic in the chloroplast trees, this can be attributed to 1) the recent divergence of these two species and 2) the slow mutation rate of these regions. But what does this all mean? Is DeBeque Phacelia a "good" species? The answer is yes. DeBeque Phacelia is a distinct species because of its monophyly in the ITS tree, as well as its diagnosable geographical (DeBeque, Colorado), ecological (strict soil requirements), and morphological (rounded capsule) characters. So with the application of the phylogenetic species concept, which defines a species as the smallest group with diagnosable characters, DeBeque Phacelia should be restored to full species status.

Those of you who have looked closely at Figures 3 and 4 may have noticed that two of my *Phacelia scopulina* specimens are not located in the phylogenetic tree where they should be (i.e., with the other *P. scopulina*'s), but rather associate with *P. salina*. These specimens consistently grouped with the wrong species in every analysis (including other genetic analyses not discussed here), indicating that these two specimens are misidentified *P. salina* specimens. These specimens were collected by very skilled botanists, and this is pointed out not to shame these botanists, but rather to illustrate how difficult it is to correctly identify species in these sections based on morphology alone. Additionally, this justifies our thorough sampling. Phylogenetic trees created from misidentified specimens skew true evolutionary relationships, but by sampling numerous individuals, we were able to discover mistakes in identification.

Nuclear ITS Tree



Combined Chloroplast Tree



Although biologists have always struggled with the “species problem”, taxonomy remains integral to conservation biology, which is primarily concerned with protecting these discrete taxonomic entities. The purpose of this study was to determine if DeBeque *Phacelia* is a distinct genetic entity, and with thorough species sampling across numerous gene regions this was confirmed, even with a lack of monophyly in our phylogenetic trees. If the goal of conservation biology is to maintain biodiversity, then in theory how we define biodiversity is arbitrary. However, the legislation protecting biodiversity is focused on conserving biodiversity at the species level, and because funding for plants is limited, correctly delineating taxa becomes important in the justification of funds. Not only did this study restore DeBeque *Phacelia* to full species status, it also provided me an opportunity to explore this plant’s complex evolutionary history, providing an important evolutionary context to the conservation of this species.

I’d like to sincerely thank: the Colorado Native Plant Society for the Steinkamp Fund, without which I would not have been able to learn about this plant’s unique evolutionary history; Ronald Hartman from the Rocky Mountain Herbarium, Tim Hogan from the University of Colorado Herbarium, and Jen Ackerfeld from the Colorado State University Herbarium (sorry Jen, you’re going to have to revise *Phacelia* in your second edition) for being so kind and allowing me to destructively sample their specimens; Maddie, Brennan, and Hannah for their help on this project; and my advisor Dr. Mitchell McLaughlin for teaching this field botanist some new tricks (everything I know about genetics!).

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Brandee Wills received her Bachelor’s degree in Biology from Western State Colorado University in 2010. Upon graduating she spent her summers surveying and monitoring rare plants for the Bureau of Land Management and her winters as a ski bum. She recently received her Master’s degree in Plant Conservation Genetics from the University of Northern Colorado. She can be contacted at wills.brandee@gmail.com. Photos in this article by Brandee Wills.

Conservation Corner (Cont. from page 18)

Several organizations in Colorado partner with land management agencies to offer work projects on public land to restore native plant habitat. Two of these are Wildlands Restoration Volunteers (<http://www.wlr.org/>) and Volunteers for Outdoor Colorado (<http://www.voc.org/>). Other organizations, such as the Southern Rockies Seed Network (<http://www.synergy3.org/seed.php>), specialize in opportunities to collect native seed to be used in restoration. Additionally, CoNPS has many opportunities to get involved with on-the-ground conservation listed on our website on our Conservation Projects page: (<https://conps.org/conservation-projects/>). The diversity and number of organizations and people working towards the conservation of Colorado’s native plants and landscapes is truly staggering. CoNPS is proud to be a partner in the Colorado conservation community.

Jessica Smith has worked as a field technician surveying rare plants and plant communities for the Colorado Natural Areas Program since 2013. She is a member of the CoNPS Board and the Conservation Committee.

Jeffco Open Space In Plain Sight (Cont. from page 31)

along the Clear Creek Trail in Golden. The public is invited to take a hike or stroll to observe the painters as they work.

This incredible week of painting will culminate in a gallery exhibit October 8 – 9, featuring all of the works created during the preceding week. These works will be on display and available for purchase at the Golden Community Center, 1470 10th Street, Golden, CO.

“We expect to have hundreds of pieces available at the final gallery exhibit, in a range of affordable prices,” says Margot Zallen, PLAN Jeffco President. “In addition to providing a unique

cultural experience for the entire Metro Denver community, these events will allow attendees to bring the beauty of Jeffco’s Open Space parks into their homes and offices as a reminder of why we live in Colorado.”

<http://jeffco.us/public-engagement/news/2016/in-plain-sight-outdoor-painting-event-features-27-artists/>

The Urban Prairies Project

The Urban Prairies Project is recruiting individuals to be a cadre of long-term, committed open space “restoration master” volunteers who assist with leading restoration work days, collect data about the plants and wildlife at the site and engage the public with information about their local open spaces through presentations or publications. Contact Amy Yarger at ayarger@butterflies.org for details.

Webinar: Meet the Monarchs! (for youth, but anyone welcome)

Register now. <https://goo.gl/forms/pjXQH7eJQODktoH22>

Date and Time: **Tuesday, October 4th, 2 PM Eastern Time.**

Join Dr. Karen Oberhauser, a scientist from the University of Minnesota, and Cathy Downs, a natural science educator from central Texas for this interactive webinar (for youth audiences). You will learn about the amazing monarch butterflies and their unique long-distance migration. From their milkweed host plants to parasitoids that ail them, we will explore the complex life history of the species. In addition, you will learn how to get involved in your own school or backyard to help monarchs, and benefit many other wildlife species at the same time! Listen carefully, and don’t forget to take notes; we will have a few pop quiz questions throughout the webinar! Tracy McCleaf, USFWS, Email: tracy_mccleaf@fws.gov

Zen and the Art of Wildflower Science

by Krista Langlois



Over his 40 year tenure at the Rocky Mountain Biological Lab near Crested Butte, Colorado, biologist David Inouye has discovered that wildflower season has increased by 35 days since the 1970s.

Photo by Andrew Cullen

This article was reprinted with permission from *The High Country News*. Sept. 2, 2014. <https://www.hcn.org/issues/46.15/zen-and-the-art-of-wildflower-science>

Outside David Inouye's Colorado cabin at 9,600 feet, the morning air still smells like yesterday's rain. Bumblebees, drunk on pollen, drone from one flower to the next, while hummingbirds zip back and forth like tiny fighter pilots to the sugar water Inouye puts out for them. Inouye, a research ecologist from the University of Maryland, stands stock-still on a deck, one hand holding the red plastic hummingbird feeder, the other moving slowly toward it. The iridescent birds ignore him. One hovers at the cusp of the feeder.

Inouye's hand creeps closer.

Without a sound, he closes it. His grip is firm but not constricting, and the male broad-tailed hummingbird that against all odds finds itself enclosed in a human fist doesn't seem alarmed. As Inouye carries it through his creaky cabin door, its head peeks out from between his thumb and pointer finger, its black eyes curious, alert.

In his four decades at the Rocky Mountain Biological Laboratory in Gothic, Colorado, Inouye has captured and banded some 500 hummingbirds in an effort to understand their niche in the meadows surrounding his cabin. When he started, he had no intention of documenting climate change. But lately, as its effects have begun rejiggering alpine communities worldwide, Inouye's research is emerging as one of the strongest indicators that mountain ecosystems are changing more quickly — and more dramatically — than previously suspected. The most compelling evidence comes not from hummingbirds, but from another, unexpected byproduct of Inouye's patient research: A massive data set on the plants they and other pollinators visit.

Back in the early 1970s, Inouye realized that to understand hummingbirds, he also had to learn about wildflowers. So he and a group of colleagues each plotted out a few patches of meadow in the West Elk Mountains and spent the summer counting the number of blooms there. After a few years, his colleagues had the data they wanted and abandoned their plots. But Inouye, then a Ph.D. candidate at the University of North Carolina, kept plugging away.

Every summer, he returned to the same high-altitude meadows, meticulously recording how many of each species of flowers there were, when they blossomed and when they died back. By 2013, he and his grad students had amassed an unparalleled data set, covering some 2 million individual flowers from 121 species. It was enough to conclude that, since the 1970s, Rocky Mountain wildflower season has lengthened by an average of 35 days.

The implications of that finding — published earlier this year in the Proceedings of the National Academy of Sciences — reach past these particular alpine meadows, to the rest of the Rockies and beyond. "Across the globe, one of the strongest indicators of climate change is the timing of biological events," says the study's lead author Paul CaraDonna, a 26-year-old Ph.D. student at the University of Arizona. Other studies have focused just on the date of first flowering, which offers only a half-formed picture of the changes taking place.

To the wildflower enthusiasts who gather each year in the nearby mountain town of Crested Butte — the official wildflower capital of Colorado — an extra month of blooms may seem like the bright side of climate change. But because most alpine species are perennials that can live up to 30 years, “flowering longer could actually have a counterintuitive effect,” CaraDonna explains. “They’re investing so much energy in reproduction that they may actually be growing less.”

Plus, a longer flowering season doesn’t always mean more flowers, because while snowfall tends to melt earlier, the date of winter’s last hard frost hasn’t changed. Many plants are budding sooner, but a solid frost in May or June will still kill them, resulting in years with very few flowers. (Colorado fruit growers face a similar problem: False springs cause orchards to bud too soon, only to have the burgeoning apricots and cherries killed off when wintry weather returns.)

In the alpine zone, that kind of die-off affects bees, butterflies, hummingbirds and other flower-reliant creatures. Broad-tailed hummingbirds like those summering outside Inouye’s cabin, for example, migrate from Southern Mexico to the Colorado Rockies every spring. Their cue to head north seems to come from the lengthening daylight, which means they’ll continue to arrive at roughly the same time regardless of how climate change affects conditions at the northern end of their route. Some years, they may arrive to find hardly any flowers at all. Other years, they may find that peak flowering of the species they depend on has already come and gone.

“The floral landscape is being reshuffled,” CaraDonna says. “It’s like going to a grocery store and getting used to all the food items being in the same aisles, and then you go back and everything’s in a different place.”

With the hummingbird still peering out from his left hand, Inouye uses his right to pour himself a cup of tea. He sips it gingerly before fitting the hummingbird’s leg with a metal band no bigger than a grain of rice and jotting its ID in a handwritten log.

Tall and lanky, with black hair just beginning to go gray, Inouye, now 64, moves with a Zen-like patience. His demeanor is well-suited to the Rocky Mountain Biological Lab, a rustic field station in an old mining camp where some of the country’s longest-running ecology studies take place. Scientists here tend to return year after year, and their pursuits are the stuff of bio-nerd lore: The lab’s only permanent resident, Billy Barr, has turned decades of lonely winter nights into one of the most comprehensive avalanche and snowfall records anywhere, and a project documenting yellow-bellied marmots is so long-lived it’s been handed down from one scientist to the next, like an heirloom. The desire to understand this one place has surpassed science and become a kind of love.

“As humans, we live 60 to 100 years if we’re lucky,” CaraDonna says. “But ecosystems operate on such a different scale. We’ve gotten amazing insight into how natural systems work because we’ve been paying attention to them for so long, and from so many different perspectives.”

Inouye’s own family history at Gothic spans four generations: his father, a physician, volunteered here in the ’70s; Inouye’s son, Brian, has been coming since he was a year old. Now 44, Brian and his wife — fellow biologist Nora Underwood — bring along their daughter, Miyoko, who spends her days catching bugs with the lab’s day camp. If Miyoko returns as an adult, the landscape she’ll see may be hardly recognizable. But thanks to her family’s work, she’ll have access to a detailed record that will help her, and us, understand what’s been lost.

At the cabin, Inouye pads back out to the front porch. He unfurls his hand. A moment later, the emerald bird, weighing about the same as a penny, is sucking nectar from a nearby patch of larkspur. Then it lifts up into the sky, a dark speck against a blue canvas, plummets, and is gone.

David Inouye will be a speaker at the 2016 CoNPS Annual Conference in Boulder, Colorado, on September 24.

High Country News

From their website: *High Country News* is a 501(c)3 Colorado-based nonprofit media organization that covers the important issues and stories that define the American West. Our mission is to inform and inspire people – through in-depth journalism – to act on behalf of the West’s diverse natural and human communities. *High Country News* publishes an award-winning magazine, a popular website and a weekly op-ed column service, along with special reports and books. Through in-depth reporting, *High Country News* covers the American West’s public lands, water, natural resources, grazing, wilderness, wildlife, logging, politics, communities, growth and other issues now changing the face of the West. From Alaska and the Northern Rockies to the desert Southwest, from the Great Plains to the West Coast, *High Country News’* coverage spans 12 Western states and is the leading source for regional environmental news, analysis and commentary -- an essential resource for those who care about this region. *The Los Angeles Times* describes *High Country News* as “the most influential environmental journal in the Mountain West.” *High Country News’* independent research and unique voice are supported largely by our devoted readership through subscriptions and contributions to the Research Fund. Grant support, advertising and syndication sales make up the rest.” <https://www.hcn.org/about>

CoNPS is sad to report that HCN founder, Tom Bell, who was a Wyoming rancher and environmentalist, passed away on August 30. http://www.hcn.org/articles/tom-bell-High-Country-News-founder-passes?utm_source=wcn1&utm_medium=email

From JLT: Please consider subscribing to *HCN* or giving a donation to their Research Fund to support this unique and important resource. You might also consider donating to *HCN* in honor of Tom Bell. www.hcn.org

Crowded Parks: Are You Part of the Monoculture?

by Mary Ann Bonnell

School is back in session, weekend I-70 corridor traffic is congested, people are pressed for time and want to save money and enjoy Colorado's outdoors. Colorado's population growth will continue to add pressure to close-in, easily accessible areas. These factors have more and more Denver Metro Area residents staying closer to home and visiting the parks and trails in Jefferson County that are convenient and fun for hiking, mountain biking, climbing, trail running, fishing and horseback riding. With so many people so close to Jeffco Open Space Parks, finding a parking spot at peak times can be a struggle for visitors. The popularity of our parks creates parking and crowding challenges at peak times and there's no simple solution to the overflowing parking lots. We want to get people outdoors and we want them want them to be safe and sane while doing so.

Are you part of the park crowding monoculture? If you want to experience congested conditions, here are some simple metrics to follow:

1. Plan to visit on a weekend or holiday
2. Plan to arrive at the park sometime between 9 a.m. and 3 p.m.
3. Plan your visit on a perfect weather day in spring, summer or fall

Combining one or more of these metrics assures you will experience congested conditions. Apply all three and you have the perfect storm for a crazy, congested open space experience. Diversify your visit and avoid the monoculture with these suggestions:

1. Plan your visit on a weekday.
2. If the weekend is your only option, plan to arrive before 9 a.m. or after 3 p.m. I worked the evening curfew shift in our parks this summer, and I can tell you that our parks are absolutely wonderful after 6 p.m. on weekends.
3. Plan your visit for before or after work. Most Jeffco Open Space parks are open from one hour before sunrise to one hour after sunset. Around the summer solstice, you have from 4:30 a.m. to 9:30 p.m. to enjoy a park visit.
4. Consider a winter visit or a walk in the rain. With proper safety gear and weather precautions, a visit during less than ideal weather conditions can be refreshing and allow you to see our parks in a quieter light.

Please consider these additional monoculture avoidance tips:

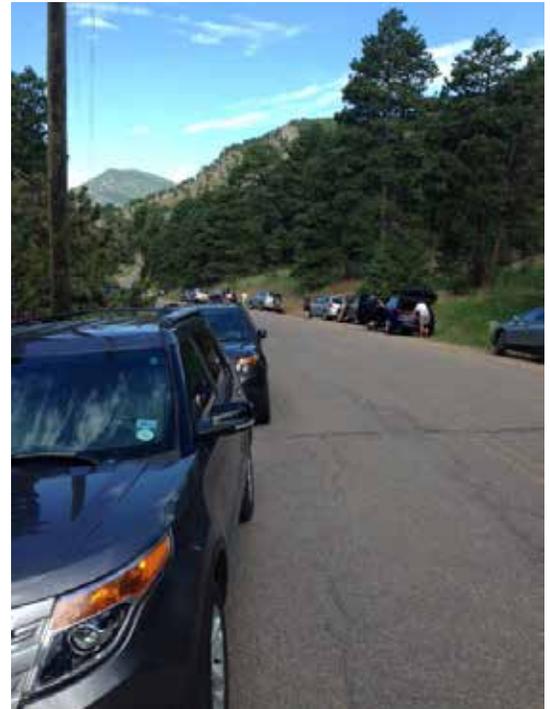
A parking spot is not an entitlement. Parking is first come, first served. If you arrive and find all of the designated spots are full, the safest and most resource conscious choice is to change your plans. Many visitors endanger themselves, their children, their pets and fragile park resources by creatively parking in undesignated areas such as along busy highways or in grassy areas next to park access roads. Colorado Native Plant Society members should know better than anyone about the long-term, negative impacts of improvised parking on native vegetation. Don't do it.

Never park in a NO PARKING area or in front of a NO PARKING sign and hope you "will get away with it". Areas are designated NO PARKING for important safety reasons such as emergency access, traffic flow and/or sight lines for park ingress and egress. Jeffco Open Space Rangers ticket folks who park in designated no parking areas because they are often creating a safety hazard by doing so.

Planning a group visit? Avoid contributing to the monoculture. Jeffco Open Space monitors and permits group activities in our parks. A Saturday Wildflower Hike MeetUp for 20 people at 10 a.m. at West Mount Falcon may seem like no big deal, but scheduling activities like this amplifies crowding and frustration on several levels, including parking and trail user conflict. When hosting a group activity, keep numbers small, emphasize carpooling and choose a day of the week and time that is outside of the perfect storm for the crowding monoculture. We encourage Colorado Native Plant Society members to avoid the crowding monoculture by actively and thoughtfully diffusing and diversifying your park use schedule. We believe you will have a safer and more enjoyable experience by doing so.

Jeffco Open Space was founded as a land conservation organization in 1972 to preserve land, protect park and natural resources and provide healthy nature-based experiences. We are funded with a one-half of one percent sales tax that has preserved over 54,680 acres and created 28 regional parks and 230 miles of trails in Jefferson County.

Mary Ann Bonnell is Visitor Services Supervisor and Canyon Regions Supervisor for Jefferson County Open Space.



Cars parked along the road at Elk Meadow Park
Photo by Mary Ann Bonnell

CoNPS June 11 Garden Tour: Boulder Area

Colorado Native Plant Appreciation Week Event

by Jan Turner

The Sunday after the 40th anniversary party, CoNPS members continued celebrating the first Colorado Native Plant Appreciation Day with a tour of native gardens in the Boulder area. Participants had a choice of 3 residential yards, the garden at the Chautauqua Ranger's Cottage, and the garden at Harlequin's Gardens. What a wonderful way to get ideas for your own yard! Charlie and I can't resist an interesting garden, so we headed to Boulder with a garden tour map and camera in hand. Unfortunately, we ran out of time to visit the beautiful native gardens at Boulder's Harlequin's Gardens and the Rangers' Cottage.

Linda Boley's Yard: Plants, Art, and Bees

First we visited the yard of Linda Boley and we were impressed with the lovely design, the variety of plants, and the many artistic touches. Linda has a background in graphic design and it shows. Before she retired, Linda worked at the University of Colorado Museum. Although Linda's emphasis is more on rock gardening than native plant gardening, her design ideas would work well with native plants. A picture is worth a thousand words, so here is a photo tour of Linda's yard.



Nothing goes to waste. When a tree died, Linda turned it into a piece of artwork: A blue wind tree.



The front yard is striking with curving paths meandering through a variety of plants with different colors and textures. Behind the garden is a "lawn" of low-growing thyme with bulbs that add color in the spring.



Linda participates in the Bee's Needs program. Her cedar fence came alive with some green paint and Linda's talent. Another beautiful piece of art, Linda created a bee house of a variety of materials providing different sized holes to attract a variety of bees. The entire time we were there, the bee apartment was buzzing with activity.



Kitty Brighton's LEED Platinum-Rated House & Native Yard

To help make sure her house received the LEED platinum status (the highest rating), Kitty Brighton employed the services of Alison Peck of Matrix Gardens to design a low-water garden consisting almost entirely of native plants. In the front of the house, attached planters in the same style as the house contain a colorful array of natives including prickly pear cactus, red penstemons, and sulphur flower. *Note: Alison Peck, who designed this garden, will be a speaker at the CoNPS Annual Conference on September 24th.*



Photos in this article by Jan Loechell Turner



The front yard contains a variety of native grasses interspersed with wildflowers. The backyard is terraced with a meadow of blue grama on each level and a line of flowers that will likely spread among the clumps of blue grama grass. Rabbitbrush growing toward the back of the property helps to conceal a utilities box. The landscape is drought-tolerant and the biodiversity should attract a number of native pollinators and other wildlife. On Kitty's rooftop patio, there are potted plants that receive some shade from the solar panels that are active on both sides and are arranged in an interesting pattern. LEED (Leadership in Energy and Design) is a green building certification program used throughout the world.

Jean Morgan's Cottage Garden showcases many native species that support urban wildlife, making her yard a National Wildlife Federation Backyard Wildlife Habitat. Her garden features many less common natives as well as unique xeric plants and two successful hell strips. Jean's house is on the historic register and her yard is filled with her inventive art including a hippopotamus made out of a bathtub with a head made out of shovels, ladder latches, railroad pins, faucet handles, and trailer lights. It serves as a giant flower pot for sedums. Photos from left to right: Jean Morgan and Charlie Turner behind Jean's homemade pond surrounded by blanket flower (*Gaillardia*) and a handsome crane. Hippo planter/yard art. Jean and the large and beautiful native, prince's plume (*Stanleya pinnata*).



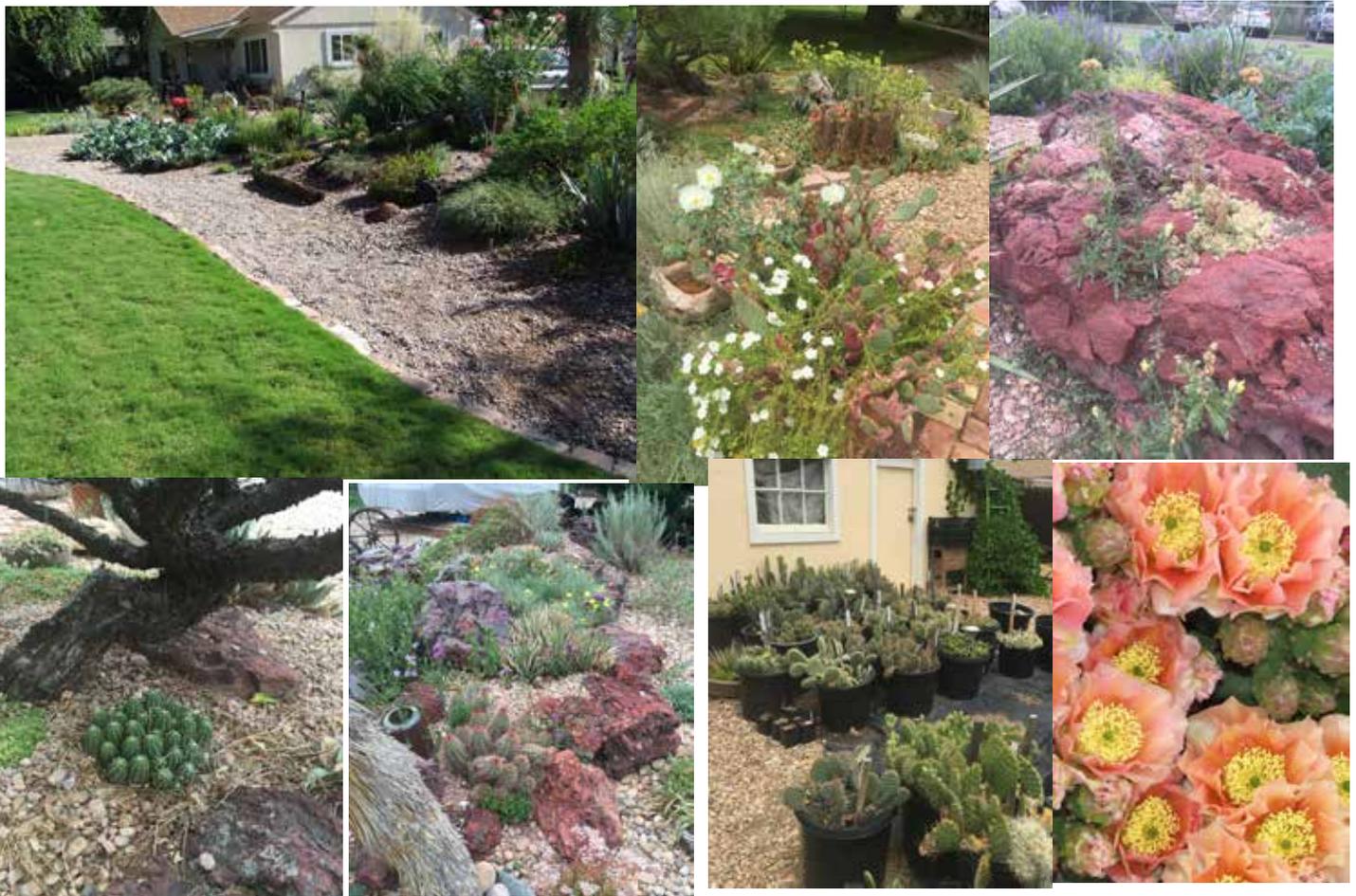
CoNPS July 31 Garden Tour: Denver Area

On July 31, CoNPS held a native plant garden tour in the Denver area. Five gardens were toured, each with its own unique style. Garden Tour participants were especially enthralled by tours of the yards of two well-known Denver-area horticulturists, Kelly Grummons (formerly of Timberline Gardens) and Jim Borland, Co-host of the "Ask the Garden Pros" radio show, former Denver Botanic Gardens horticulturist, and former CoNPS President. Visitors also enjoyed the yards of three other native plant gardeners: Kit Cohan's beautiful Garden in the Rocks in the Golden area, Jan & Charlie Turner's native plant yard in Golden, and Brian Kurzel's lovely native hell-strip in Denver. Seventy-seven people attended the tour despite the cloudy weather and occasional rain.

The yard owners were concerned about showing their yards in late July when not much was blooming. It seemed to be during the "dry spell" between the spring/summer blooms and the late summer/early fall blooms, but visitors still found much to enjoy. Some flowers were blooming in each of the yards and each yard had a different style with different ideas that might be adapted to the yards of other CoNPS members. Pollinators were in abundance on the plants that were blooming and many people were photographing the pollinators as well as the native plants.

The CoNPS Fall Native Plant Sale ends September 15. If the deadline isn't over, you can go to the CoNPS website to browse through the online catalog to select some plants for your native plant garden to support native pollinators, create habitat for birds and other wildlife, reduce mowing and the consumption of fossil fuels, water, and pesticides and give your yard a sense of place. There will be another online plant sale in the spring.

Kelly Grummon's Amazing Yard



First photo and last photo by Kelly Grummons. The rest of the photos are by Jen Boussetot.

Kelly's garden is a testing ground for new varieties of xeric plants: trees, shrubs, perennials, grasses and annuals. You'll see numerous *Arctostaphylos* species in evaluation, over 100 species of western, native cacti, agaves and yuccas and many of Kelly's hybrids and horticultural selections of native and exotic perennials. The garden is dominated at this time by Dog Tuff™ African dogtooth grass which is under evaluation and going through maintenance protocols for commercial production. This location is also the home of the mail order website coldhardycactus.com. Kelly has three (soon to be four) greenhouses for the production of cacti for the mail order operation. Kelly Grummon

Jim and Dorothy Borland's Ultimate Native Plant Garden

This primarily Colorado native plant garden was installed in the summer of 1997 and immediately decimated by hail. The entire garden has been watered only once since that time. Perennials and annuals move of their own free will even though they were originally planted where it was thought they would do best. The major theme of the garden has evolved somewhat by including plants from similar climates around the world, including 4,000+ *Tulipa*, *Allium*, *Calochortus* and *Colchicum* species. Jim Borland

Photos by Jen Boussetot



Kit Cohan's Garden in the Rocks



Photos by Kit Cohan



This yard was converted from a poor lawn area attempting to grow in native mudstone in the front yard, and weeds in the back yard with a few typical English garden plants suffering in the sandy, dry soil. The non-xeric plants were given away in order to convert this to an entirely xeric yard. The lawn sprinkler system was converted to a drip irrigation system for both the front and back yards. The dominant plant in the front yard is a hardy manzanita native to the Uncompahgre plateau of western Colorado; the back yard is heavily slanted towards native and non-native plants for the benefit of hummingbirds, butterflies and native pollinators. The yard contains plenty of agastaches, salvia species, milkweed, a variety of xeric native and non-native shrubs, penstemons, lavender, varieties of Missouri primrose, sulfur buckwheat, ornamental native grasses, and plenty of smaller plants, including a few enjoying their first year in the ground after being purchased at this year's CoNPS plant sale. Kit Cohan

Brian Kurzel's Yard: Native Hellstrip in the City



Apache Plume



Rocky Mountain Bee Plant



Ten years ago, two areas that were a lawn and a dog run were converted into mostly-native gardens that don't use supplemental water and allow the fittest species to 'fight it out'. These gardens won a blue ribbon in the 2013 Denver County Fair for 'Best Lawn Conversions' and they received 'Certified Wildlife Habitat' status from the National Wildlife Federation in 2015. They also provide examples of some native plants that do well in the Denver climate, provide some habitat for pollinators and add some texture and beauty to the neighborhood. Brian Kurzel

Charlie and Jan Turner's Native Plants Yard in Golden



June 2016

Many plants had finished blooming and others were getting ready to bloom in the Turner's yard, but the high point of the yard tour was a bush morning glory (*Ipomoea leptophylla*) with abundant large, pink-lavendar blooms. The plant grows from a large tuber and the plant stems and leaves cover an area about 4 feet wide. Another regional native of interest was the fernbush. The fragrant blooms were attracting many species of bees including bumblebees and some large spider wasps (shown in inset photos) that were the subject of much photography. The bottom middle photo was supplied by the Turners to show what the yard looked like the previous month, with the *Gaillardia aristata* and *Yucca glauca* in bloom. The yard is a National Wildlife Federation Certified Wildlife Habitat and sustains many pollinators and other local wildlife. Jan Turner

Photos by Jan Loechell Turner

Volunteers Make a Difference: David Julie and Kate Goes In Center Teach Pollination



Children at Louisville Public Library are captivated by the presentation by David and Kate.

Two CoNPS volunteers have made a tremendous impact on the pollinator knowledge of children and adults in the Denver Metro area and nearby communities.

David Julie and Kate Goes In Center have been giving presentations on pollination to children and adults in a number of locations. Their presentations are creative and involve role-playing and interaction to engage the children and adults attending their programs. They made a number of props to allow children to participate as pollinators and to understand how pollination occurs.

We owe our thanks to David and Kate for their wonderful work. Thanks is also due to Sara Copp, Chair of CoNPS Education & Outreach Committee, and Jen Boussetot, Membership & Marketing Coordinator, who helped arrange for David and Kate to present their programs.

David and Kate have taught at the Senior Naturalists Program at Bear Creek Lake State Park in Lakewood, Louisville Public Library, Longmont Public Library, and the Cal-Wood Education Center near Jamestown. They presented two programs at the Sandstone Ranch Visitor and Learning Center in Longmont.

Just think what an impact it would make if two members from every chapter did this!

The reports below are by David Julie.
Photos are by Kate Goes In Center.

Louisville Public Library: Monarchs, Milkweed, Wildflowers

Catherine Jepson, of the Louisville Department of Natural Resources, invited CoNPS to provide a program at the Louisville Library on monarchs, milkweed, and wildflowers on June 23rd. More than 100 people attended, including scores of children of all ages and a few dozen adults, including many seniors.

Longmont Public Library Celebrates Pollinators

Elektra Greer, Head of Children's and Teen Services at Longmont Public Library, invited CoNPS to participate in the library's "Celebrate Our Pollinators! Storytime" events for children and families on June 8th and 14th. About eighty enthusiastic,

attentive young people attended one of the four sessions with their parents.

CoNPS members, David Julie and Kate Goes In Center, offered a program on plant pollination by wind and animals, including hummingbirds, bats, flies, butterflies, and especially bees. Children learned about photosynthesis, the parts of a flower, nectar, pollen, and seeds. Most animal pollinators unintentionally move pollen among flowers as they feed on nectar. However, bees intentionally gather pollen, and nectar, to feed their young. A leafcutter bee female stores a provision of pollen and nectar in a nest, then lays an egg on it, and closes the cell. The egg hatches, the larva grows and molts several times as it eats, then spins a silken cocoon in which it remains throughout the winter. The following spring, the young pupates and emerges as an adult. The children were also briefly introduced to bumble bees, honey bees, and monarch butterflies.

The program incorporated lots of role-playing and participation including gathering pollen and nectar from models of huge anthers and nectaries.

Each child received a postcard they chose of either a female monarch butterfly, a male monarch butterfly, or a female leafcutter bee.

Bear Creek Lake Park's Senior Naturalists Program

This letter from Bear Creek Lake Park Naturalist Supervisor, Jody Morse, says it all:

I would like to take this moment and thank you for sending David Julie our way. He gave his presentation on Pollinators/ Bees today for my Sr. Naturalist program! He had 13 people that were totally captivated by his every word!

We conduct our program from 9-11 am. We usually have class time the first hour then head out. David spoke for 2 and ½ hours and it felt like 20 minutes. Everyone had questions and were fascinated by David's knowledge and passion!!

Thanks you for sending such a great resource our way!!

Jody Morse, Park Naturalist Supervisor, Bear Creek Lake Park



Left: Naturalists holding the CoNPS handouts, bee nesting blocks, and *Asclepias speciosa* and *Ratibida columnifera* seeds that David provided.

Sandstone Ranch Visitor & Learning Center

Robin Boden, the Volunteer Coordinator at Sandstone Ranch Visitor and Learning Center in Longmont, invited CoNPS to participate in her Bee Amazed evening education for children and families on August 16th. About twenty young people and twenty adults attended on the beautiful Learning Center grounds.

(Cont. on page 43)

NEWS & ANNOUNCEMENTS

New Southeast Chapter President and Field Trip Coordinator

Jeff Jones, the new Southeast Chapter President, has been involved in the computer industry for 36+ years as a business owner and otherwise. His passions are all things Science related. Jeff has a Bachelor's degrees in Mathematics, Philosophy and Computer Science. His interests in ornithology and botany are probably more active than others these days. He has been studying and practicing botany since his childhood years in Asheville, NC. It has been a passion and process for him since then. In the past two decades Jeff



Jeff Jones

has attended several CoNPS field trips throughout the state as well as leading a couple each year. He has lived in Woodland Park, CO (Teller County) at 8,500' for the past 28 years with his wife, Connie. They raised their daughter there and she now lives and works in Denver.

Doris Drisgill, the new field trip coordinator for the SE Chapter, is an amateur botanizer who has been leading flower walks in the Pikes Peak region since 1993, first with El Paso County Parks, then with Colorado Springs City Parks, and the last decade or more with CoNPS SE Chapter. She has been an active member since the SE Chapter got started back in the mid-90's, and was co-president for several years with George Cameron and also with Liz Klein. Doris hopes the chapter will live long and prosper.



Doris Drisgill

The Board thanks **Richard Bunn** for serving as the SE Chapter president for the past year. Richard kept Board meetings lively with his keen sense of humor (wise cracks) and intelligent, thoughtful input. Richard stepped down because of time constraints.

Jeffco Open Space In Plain Sight

Hosted by PLAN Jeffco, "In Plain Sight," October 4-9, is the first First Ever Live Painting Event to be Held in Jefferson County Open Space Parks. PLAN Jeffco is a nonprofit, volunteer-led organization of open space advocates based in Jefferson County.

Featuring more than two dozen professional artists painting from dawn to dusk October 4 – 8, 2016 at one Jeffco Open Space location each day, In Plain Sight is a free, public exhibition for all ages to enjoy. Artists will be located in South Valley Park, Mount Falcon Park, Crown Hill Park, White Ranch Park and

(Continued on page 21)

New Northern Chapter President

Renee Galeano-Popp is the new president of the Northern Chapter. She received her undergraduate degree in Botany followed by graduate work in Forest Ecology, both at Northern Arizona University.



Renee Galeano-Popp

She spent 20 years in the USDA Forest Service serving as District, Forest and ultimately Regional Botanist in Albuquerque, N.M.

Her longest tenure was as Assistant Director of Fish, Wildlife and Rare Plants at the Lincoln National Forest in New Mexico. In Colorado, she spent 10 years in private consulting mainly working on environmental impact studies in over a dozen states before retiring.

She has been a member of Arizona, New Mexico and Colorado Native Plant Societies throughout her time in each state. Renee believes strongly that our organization should be active in education as well as advocacy in these times of environmental crisis.

Many thanks to **Ronda Koski** for her service as the Northern Chapter President. Now that Renee has assumed the chapter presidency, Ronda will have more time for her job as a Research Associate, Landscape Architecture, with CSU, her job as CoNPS Workshop Coordinator, and her many other activities.



Harlequin's Gardens Expansion: Natives for Wholesale

Harlequin's Gardens in Boulder is expanding. We have purchased an adjacent acre of land for growing more plants. Our goal is to build a greenhouse that does not use fossil fuels, to grow plants free of toxic pesticides.

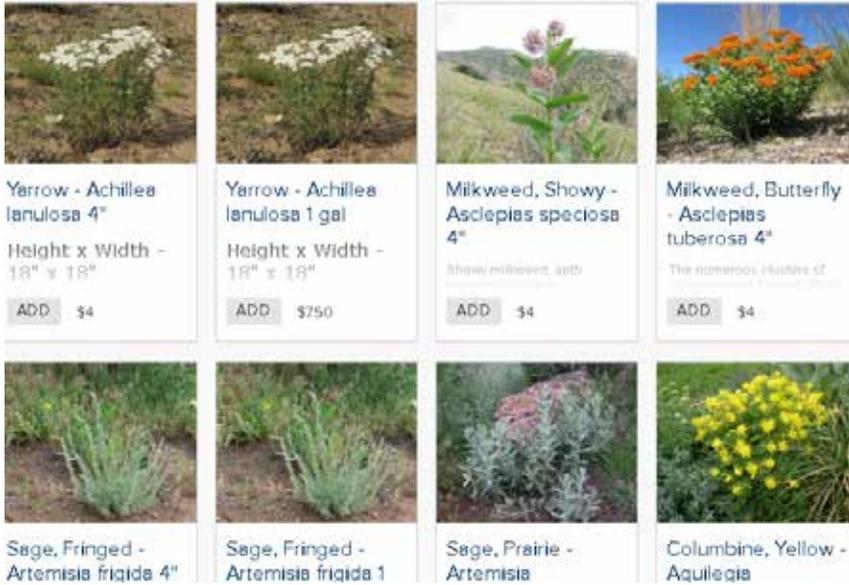
We will grow even more native plants and native shrubs from local seed when possible. Besides supplying Harlequin's Gardens, we will be selling wholesale to local landscaping companies. This could be significant in strengthening our native communities.

Our new propagation manager, Gary Meis, loves to grow natives. Email him at Wholesale@HarlequinsGardens.com

Harlequin's Gardens will be getting collection permits from Boulder Open Space and Mt. Parks. We also welcome suggestions of what to grow, where to collect and donations of seeds that are accurately identified.

CoNPS Fall Online Native Plant Sale Now in Progress! Order by Sept. 15th!

Fall is a great time to plant and you may now place your order for native plants on the CoNPS website. More than 45 different species of Colorado native plants are being offered for sale, primarily in 4" and one gallon pots. Perennials, grasses, and shrubs are available.



You can order up until September 15th. The pick up will be Saturday, September 24, at the CoNPS Annual Conference. The native plants are guaranteed "Neonicotinodia Free" by the native plant supplier, High Plains Environmental Center (HPEC). HPEC is a non-profit focused on "restoring nature where we live, work, and play." In order to improve the availability of native plants for landscaping and restoration, thereby creating habitat in the communities that we design and build, we grow native plants from seed at our Loveland, CO facility. Many of our offerings are grown from seed collected within Larimer and Boulder Counties.. Our plants are grown, mostly outdoors, without the use of pesticides or fossil fuels. All proceeds go toward funding our environmental outreach and education programs. Visit our website www.suburbitat.org.

If you would like assistance in selecting and/or planting instructions please contact Charles Turner at conpscturner@gmail.com or Jim Tolstrup at jim@suburbitat.org.

HPEC Educational Visitor Center Collaboration with City of Loveland

This autumn, High Plains Environmental Center (HPEC) will break ground on a new building located on the shores of Houts Reservoir, within The Lakes at Centerra neighborhood, in Loveland. The 2800 square foot building will be roughly half administrative offices and half public space including a classroom and library.



The HPEC educational visitor center will focus on conserving and restoring Colorado's unique native biodiversity in the midst of development. The center will demonstrate, through extensive gardens and exhibits, the benefits to wildlife and water conservation derived from the use of native plants in landscaping, open space, and urban stormwater ponds.

The High Plains School (Pre-K through 8) currently under construction is a 10 minute walk from HPEC through a 10 acre constructed watershed restored with native vegetation. The school will have a collaborative relationship with HPEC and a STEM curriculum with a heightened focus on science and environmental sustainability.

Funding for the one million dollar HPEC construction will come from the sale of the current HPEC offices. McWhinney, the developer of Centerra, has committed \$250,000 to the project. An additional \$400,000 will come from the City of Loveland through a collaborative partnership with the Parks and Open Space Department. The HPEC project is expected to be completed in late 2016 or early 2017.

Article courtesy Jim Tolstrup and HPEC

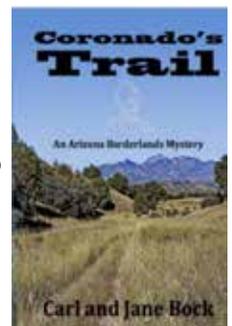
High Plains Environmental Center (HPEC) Selling Native Plants at Whole Foods

Native plants for pollinators are being sold at the Fort Collins Whole Foods thanks to the effort of High Plains Environmental Center Executive Director, Jim Tolstrup. As Chair of the CoNPS Horticulture & Restoration Committee, Jim spearheaded the Spring Online Native Plant Sale, that was an overwhelming success with over \$9,000 of plants sold. The Fall Online Native Plant Sale end September 15.



Bocks Publish a Mystery

"Carl Bock and I have just published our first fiction book, a mystery set on the Arizona-Mexico boundary where we have done science for over 4 decades. We are so happy about this. We have published it as an ebook and paperback because we are in a hurry due to our age. Tomorrow I am going to post a picture of the cover. This book is called *Coronado's Trail*. Carl won a prize with his manuscript in a contest he entered. We have roared through getting it into reality form." Jane Bock



Jane and Carl Bock are professors emerita/emeritus from the University of Colorado, Boulder.

Note: To order this book, go to smile.amazon.com. Be sure and select CoNPS as your charity before you order.

High Country Apps Designates CoNPS as a Conservation Partner



High Country Apps and AI Schneider have designated CoNPS as their “conservation partner”, and 5% of worldwide sales of the “Colorado Rocky Mountain Wildflowers” will go to CoNPS.

Colorado Rocky Mountain Wildflowers presents more than 500 wildflowers, shrubs, trees, and ferns of the Colorado Rockies and Greater Rocky Mountain Area. Designed for expert and beginner alike, this guide presents each species in a clear, informative format that provides photos and illustrations of the plant, an easily understood description, distinctive field marks, preferred habitats, and tidbits on the plant’s ecology and cultural use. An innovative, easy-to-use key allows the user to select flower color, leaf type, and other characteristics to quickly identify unknown plants. You are on a hike, look down and see a flower with yellow petals and opposite leaves but don’t know its name. It could be tall and thorny, sticky with black berries, sweet-smelling with square stems. Just select what you do know on the app and all plants matching your description will be shown. Photographs and information used by the app are stored locally, making the app available to use with or without a data connection. There is an Apple iOS version and Google Play Android version. The price is \$9.99.

Go to the CoNPS Book Store under Apps to link to High Country Apps to purchase *Colorado Rocky Mountain Wildflowers* at <https://conps.org/co-rocky-mountain-wildflowers-app/>

CoNPS Sponsors Awards at 2016 Colorado Science & Engineering Fair

For the first time ever, CoNPS sponsored two \$50 awards for the Colorado Science & Engineering Fair held in April 2016 at the Lory Student Center at Colorado State University in Fort Collins.

1st Place Winner:

Kathryn T Kummel (7th Grade).

“All Spruced Up: The Causes and Consequences of Spruce Invasion into Aspen Canopies.”



Photo by Jen Boussetot

2nd Place Winner:

Ruby Stith (6th Grade). “Type of Seed vs. Distance Dispersed.”

Congratulations to the budding plant scientists! And thank you to Renee Galeano-Popp and Jen Boussetot for teaming up to judge the special awards. CoNPS will be back again next year for the 62nd annual Colorado Science and Engineering Fair.

City of Fort Collins Installs Green Wall

On July 18th the City of Fort Collins installed the first outdoor perennial green wall (also known as a living wall) in Colorado on a new municipal building being constructed at Mason and LaPorte Ave.



Photo by Jen Boussetot

This effort was managed by a program called Nature in the City and involved City staff from Natural Areas, Parks Department and several other groups including funding in part from the Stormwater Department. The City of Fort Collins brought in several outside partners including the Institute for the Built Environment, a landscape architect and horticulturist, Jen Boussetot (CoNPS’ Membership and Marketing Coordinator) from CSU. This Sempergreen modular green wall was grown at Gulley’s greenhouse from mid-May until the day it was installed. The green wall will be maintained by City of Fort Collins Parks Department staff. Data will be captured and published on performance and plant cover as it is one of the few outdoor perennial green walls in a cold and dry climate. Kudos to Jen Boussetot for her involvement in this project.

The Colorado Pollinators Summit

The first annual Colorado Pollinator Summit took place at the University of Colorado Sustainability, Energy, & Environment Complex (SEEC) on June 16, 2016.

The purpose of the summit was to bring together representatives from a number of organizations that are interested in the conservation of pollinators. Members from non-profits, education, business, and government agencies participated in the summit.



After a talk by Michele Colopy of Pollinator Stewardship Council, the participants broke into groups for discussion of collaboration and networking. CoNPS was one of the groups represented at the Summit and other members expressed an interest in CoNPS’ native plant sales. The summit was organized by Butterfly Pavilion, Colorado State Beekeepers Association, and People and Pollinators Action Network.

Native Plant Master® Program Webinar: Design a Native Plant Garden

Have you ever wanted someone to help you plan a design a native plant garden or help in expanding an existing one? If so, you won’t want to miss our last special class of the season, Webinar – Designing a Native Plant Garden, scheduled for Thursday, November 3 from noon to 1 p.m.

This online class will be taught by Deryn Davidson, Horticulture Agent CSU Extension in Boulder County. From the comfort of your home or office, you’ll learn how to design and develop your very own native plant garden.

For questions or to receive notices of future classes, please contact npmassistant@jeffco.us.

CoNPS Goes International: *Aquilegia* is in United Nations Database, AGRIS

That's right! *Aquilegia: Newsletter of the Colorado Native Plant Society* is one of the journals indexed and included full-text in the database of the Food and Agriculture Organization of the United Nations, AGRIS: International Information System of the Agricultural Science & Technology.



Of course, CoNPS members can find full text issues of *Aquilegia* on the CoNPS website (<https://conps.org>) under Resources --> Newsletter. < <https://conps.org/resources/aquilegia-newsletters/>> That page includes our recent newsletters and a link to the older issues of the newsletters (the archives) on the Regis University website in their ePublications at Regis University: a digital repository provided by the Regis University Library.

CNHP Releases New Rare Plants by County Interactive Map

Check out CNHP's new interactive map for rare plants! The map displays the number of rare plant species in each Colorado county documented by CNHP and partner agencies, organizations, and individuals. Users can access pdf lists of rare plant species for each county by clicking a county, then clicking More Info on the pop up box. The plant lists contain species names, as well as conservation status, wetland and riparian dependent status, links to Rare Plant Guide profiles, and much more. The data used to create the map are from the CNHP Biotics 5 database. This article was reprinted with permission from the CNHP Blogspot <http://cnhpblog.blogspot.com/>

The url for the map is <http://csurams.maps.arcgis.com/apps/webappviewer/index.html?id=8d7dce7734be48d-3a780b9514a1332e3>



CNHP Undergraduate Researcher Discovers New Relationship Between Rare Butterfly and Ants

Myrmecophily is a mouthful of a word that refers to positive interactions between ants and other species. Such relationships are well known among the ant and butterfly specialists of the world. CNHP undergraduate researcher Tristan Kubik is a bit of a prodigal ant expert, spending time as a high school student collecting and cataloging ants, and mapping ant colonies. Kubik teamed up with Rob Schorr, a CNHP zoologist, to assist Schorr in studying populations of the rare hops blue butterfly (*Celastrina humulus*). For his part, Kubik has focused on determining if myrmecophily plays a role in the hops blue butterfly life history. Kubik recently spent weeks monitoring eggs and larvae of the hops blue butterfly and has documented that ants tend larvae. Kubik has observed larger ants, such as carpenter ants, defending the larvae from predation. The caterpillars dissuade the ants from eating them by using pheromones and providing protein and sugar-rich secretions. This marks the first documentation that myrmecophily exists for hops blue butterflies and ants. It is theorized that ants provide defense for the larvae in exchange for the nutritional benefits from the nectar that the larva can excrete (mutualistic symbiosis). Alternately, some believe that the nectar is simply a calming agent that minimizes ant aggression (commensalism). Kubik and Schorr are excited about identifying what the advantages may be and how this discovery can play a role in butterfly conservation.

Printed with permission from CNHP blog: <http://cnhpblog.blogspot.com/> (July 28, 2016).

CoNPS Members Donate to Publication of Erin Tripp's book on Lichens of White Rocks

Linda Smith reports that CoNPS members have donated a total of \$730 toward the printing costs of Erin Tripp's book that will be published by the University Press of Colorado.

Thank you to Colorado Native Plant Society members for helping make the publication of *Field Guide to the Lichens of White Rocks* possible.

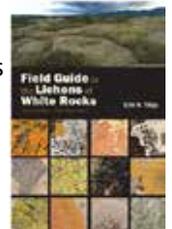
As soon as it is in print, it will be available from the CoNPS Book store at a discounted price. The University Press is offering it for pre-order. It is expected out in 2017.



Hops blue butterfly larva (*Celastrina humulus*) on a hops leaf. (*Humulus neomexicanus*).



Ant crawling on larvae



WHAT CONPS MEMBERS DID THIS SUMMER:

Here is a small sampling of photos from a few of the many field trips, field seminars, and a workshop!

From the Eastern Slope

Steve Yarbrough's High Creek Fen Field Trip



High Creek Fen Field trip (above)
Sisyrrinchium pallidum (left)
Photos by Kelly Ambler

Carol English's Penstemon Workshop and Field Trips



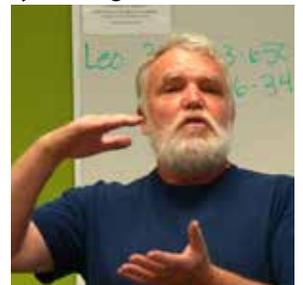
Carol English

Penstemon workshop

Carol English, Botanist with the Colorado State Land Board, taught a two-day workshop on Penstemons. The first day of the workshop focused on the taxonomy of the genus and the second day was on ecology, horticulture, and pollination.

During the second day of the workshop, attendees were treated to a guest appearance and talk by Bob Nold, author of *Penstemons*.

Two field trips were associated with the workshop.



Bob Nold



Photos by Jan Turner

Left: Penstemon field trip at Mt. Falcon West

Phenology Class: Nature's Notebook

"Phenology refers to key seasonal changes in plants and animals from year to year—such as flowering, emergence of insects and migration of birds—especially their timing and relationship with weather and climate. The US National Phenology Network (NPN) brings together citizen scientists, government agencies, non-profit groups, educators, and students to monitor the impacts of climate change on plants and animals in the U.S." (National Phenology Network website, <https://www.usanpn.org/>).

At a joint CoNPS/DBG class held at the Denver Botanic Gardens, Mary Goshorn (DBG) and Mo Ewing (CoNPS) presented a classroom session on the Nature's Notebook program of the NPN.



Phenology students in classroom

They demonstrated the website and how citizen scientists can record information about the time of the first leaf, first flower, first fruit, etc., of a number of species of plants that are being monitored in Colorado. The data gathered in the database can be used to ascertain changes over time that relate to climate change.



DBG has a phenology trail where members can record their observations on data sheets. The classroom session was followed by a tour of the DBG

phenology trail and a demonstration of traits to look for when filling out the data forms.

Mo Ewing encourages CoNPS members to participate in Nature's Notebook and record their observations of plants at locations of interest to them such as open space parks.

Mo and Mary will be offering programs on this citizen science project in the future.

Photos by Jan Turner



Mary Goshorn leads tour of DBG's Phenology Trail

Browns Canyon National Monument Bioblitz by Steve Olson



Dave Anderson (left) and Pam Smith (black shirt) of CNHP. Irene Shonle, CNHP student interns, Photo by Loraine Yeatts (DBG)

The bioblitz held at Browns Canyon National Monument was on June 1 to 3. We had nearly 70 participants during the event. About 20 of those were CoNPS members (thanks to Mo Ewing for helping coordinate these folks). Other people came from the Forest Service, BLM, CNHP, DBG, along with several independent folks. Aside from the botanically oriented people, there were bird, herptile, mammal, and spider specialists.

Browns Canyon was established as a national monument in February of 2015. It is located near the head of the Rio Grande Rift Valley between Buena Vista and Salida.

There is a diverse geology underlying the area, leading to an interesting diversity of habitat types such as pinyon-juniper woodlands, ponderosa pine woodlands, aspen stands, and meadows. It is an area that is generally not too well known, but now, thanks to the efforts of everyone who was able to join us, we have a much better idea of what is present in the area.

Although the numbers of species observed isn't fully completed yet, we can say that we now know that at least 175 species of vascular plants are present, along with 17 mammals, 82 birds and 3 herps. There were people exploring several corners of the monument including Bassam Spring, Cottonwood Creek, Hecla Junction, Ruby Mountain, and Spring Gulch. Among the highlights are records of Fendler's Townsend-Daisy (*Townsendia fendleri*), Front Range Alumroot (*Heuchera hallii*), and Rocky Mountain Indian Parsley (*Cymopterus anisatus*). The Pasqueflowers (*Anemone patens*) seemed a bit late to still be in bloom.

At Browns Canyon, six interns, Lydia Fahrenkrug, Alyssa Meier, Blaise Newman, Gary Olds, Tyler Stratman, and Brandi Thomas, along with Director Dave Anderson, Pam Smith, and Scott Kellman, had an amazing time surveying the diverse landscapes and using the opportunity to work together with many different organizations and professionals. Students gained hands-on experience in a variety of disciplines, such as small mammal trapping, plant identifying and collecting, birding, insect collecting, and bat surveying. It was exciting to collaborate with different professionals while students were introduced and helped to achieve the goals of a Bioblitz. (CNHP Blog).

Ute Prayer Trees Field Seminar Surprise by John Anderson



Catface Tree (L-R): Penny Bieber, Chuck Ernst, John Anderson, Christine Guzy, Scott Ellis, Brad Klafehn and Ron Moore. Photo by Stella Barrett

Something amazing and unexpected happened during the Ute Prayer Tree Field Seminar: Toward the end of the class, the students discovered a previously unknown Ute Indian Prayer Tree located in Fox Run Regional Park!

The instructor, John Anderson, shared some of the research for his book *Ute Indian Prayer Trees of the Pikes Peak Region*, then discussed the three primary objectives for this 8-hour seminar:

- 1) Learn the five generally accepted types of Ute Indian Prayer Trees (Trailmarker, Burial, Story, Medicine and Prophecy Trees),
- 2) Identify characteristics of typical man-made modifications to trees (e.g., unnatural bends, distortions, scars and peeled bark patterns or distinctive ligature or tie-down marks),
- 3) Recognize natural causes of tree scarring or disfigurement (lightning strike, disease, heavy-snowfall, animal interaction, etc.).

Anderson invited the students to experience a traditional Ute Talking Circle, where a Talking Stick is passed around the Circle so everyone has an opportunity to speak and it is considered unacceptably rude to interrupt the person who is in possession of the Talking Stick.



Grandfather Tree(L-R): Ron Moore, Scott Ellis, Penny Bieber, Christine Guzy, Stella Barrett, Brad Klafehn and Chuck Ernst. Photo by John Anderson

The majority, if not all, of the Culturally Modified Trees (CMTs) discovered thus far in the Black Forest of El Paso County, are believed attributable to the indigenous people of present-day Colorado, the Ute. Although there were certainly other Native American tribes who had a presence in the Pikes Peak Region (e.g., Cheyenne, Arapahoe, Kiowa, Cherokee), only the Ute are known to have both a culture which included the tradition of modifying trees and a sustained presence in the region dating back hundreds if not thousands of years.

Paul Opler and Evi Buckner Opler's Butterfly Natural History Field Seminar

By mid-morning the students found themselves in the field along the right bank of Burgess Creek near La Foret's Taylor Chapel, examining what is referred to by Ute visitors to La Foret some thirty years ago as the Grandfather Tree. The Grandfather Tree, classified as a Ute Trailmarker Tree, displays a classic Ute Peeled Bark Pattern and is pointing directly towards what the Ute knew as Tava (Pikes Peak), the most sacred of all the Ute's Shining Mountains.

As the field trip progressed west behind the Taylor Chapel, students were introduced to several other Ute Prayer Tree types in an alignment along Burgess Creek, including a Burial Tree (honoring a Ute Tribal member) before coming upon a rare Cat-face Tree (see top photo, previous page) created when fire was ceremonially introduced to scar the heartwood of a ponderosa pine after the outer bark had been peeled away.

As the students made their way back to the Carriage House to retrieve their sack lunches, they stopped to view the native plants growing alongside these living 150-350 year old Native American artifacts. The students and instructor ate lunch at a picnic table surrounded by ponderosa pine trees lining a lush green spring-fed meadow offering a majestic view of Tava, the mountain that inspired Katherine Lee Bates to pen the words to "America the Beautiful" while teaching a summer session in 1893 at Colorado College.

After lunch the students followed the instructor to another of his favorite field classrooms at Fox Run Regional Park. The afternoon session was spent examining dozens of other Ute Prayer Trees (Trailmarker, Burial, Medicine and Story Trees) including what may be one of the oldest Ute Prayer Trees in the Black Forest located along an ancient trail where the Ute had gathered in prayer around this tree some hundreds of years ago.



Trailmarker tree
Photo by John Anderson

As the afternoon drew to an end, the students found they had all learned how to identifying CMTs and a few had wandered off the trail a short distance, then excitedly got the instructor's attention with, "We think you're going to want to see this!" Reluctantly the instructor, who had thought he had seen every CMT in the park, stood staring in amazement at a magnificent previously unknown Ute Prayer Tree.



(L-R) – Stella Barrett and Penny Bieber Photo by John Anderson

As the students and instructor debriefed at the trailhead, there was discussion that perhaps CoNPS might be well positioned to help locate other CMTs just waiting yet to be discovered across what the Ute knew as the Shining Mountains of present-day Colorado.

To contact John W. Anderson or learn about future CMT events, go to www.JWAnder.com or email John at: jwa122@comcast.net



The Opler's Butterfly Natural History Field Seminar was a huge success! In the morning, participants enjoyed a beautiful Power-Point lecture about the various groups of butterflies.

After the lecture, with butterfly nets in hand, the merry group set out in search of butterflies - and they certainly found a lot of them! It was a perfect late-summer day for both butterfly-lovers and butterflies!

Right: Evi Buckner Opler caught a butterfly and deposited it on Charlie Turner's nose! Photo by Jan Turner.



Butterfly field seminar participants. Paul Opler is standing on far right. Photo © Evi Buckner Opler, 2016.

Jessica Smith's Popular Grasses Classes

This year, Jessica Smith offered her very popular annual half-day grasses field trip at Green Mountain in Lake-wood and also offered a full-day summer field seminar at Golden Gate Canyon State Park. Both were well-attended and participants were delighted with Jessica's teaching style and handouts.



Photo by Jan Turner

From the Western Slope

Bioblitz in the West 2016 Plateau Chapter by Bob Clarke

Volunteers and natural area enthusiasts gathered on Friday, May 20, 2016, to participate in what has become an annual event related to the BLM sponsored monitoring program for the threatened *Phacelia submutica* (De Beque Phacelia, aka *P. scopulina* var. *submutica*). The species was first described by George F. Osterhout in 1911. Taxonomically and ecologically on slippery (when wet) and hilly ground.

Endemic to Mesa and Garfield Counties in Western Colorado, *P. submutica* (abbr. PHSU) has in the past been described as occurring north and west of De Beque. In 2013 Alicia Langton, with the Grand Junction BLM and responsible for the monitoring program, met Lee



Phacelia submutica Photo by Bob Clarke

Cassin and Dave Tolen and found out that they lived in an area that was in PHSU and hookless cactus country. A single, small population of PHSU was soon noted on a saddle above their house.

This year our volunteers traveled to the Cassin/Tolen home off of what is locally known as the De Beque Cut-off Road

between De Beque and Plateau Creek. The *Phacelia* is found at around 5700 feet at this location. A query of the Natural Resource Conservation Service soils database refers to the soil type as Badland and morphologically described as rough and rocky terrain with steep slopes composed of parent material consisting of "highly calcareous residuum weathered from sandstone". The clayey soil, which suits PHSU, appears gray or brown and has a characteristic shrink-swell nature and cracks when dried. PHSU thrives in this terrain when others do not.

In addition to visiting the known PHSU site, the group spread out a few miles east of this location after lunch, looking for additional populations of PHSU. No new populations were identified, but we certainly did confirm the rough and hilly nature of the countryside.

Both *P. submutica* and *Astragalus debequaeus*, which was also found during the bioblitz, are listed as G2S2 by the Colorado Natural Heritage Program. Also encountered was *Pediomelum megalanthum* var. *megalanthum*, which is listed as "present and rare" in Mesa and Garfield Counties.

Alicia Langton provided this reference for readers who would like more taxonomic and ecological details.

Ladyman, J.A.R. (2003, December 19). *Phacelia scopulina* (A. Nels) J.T. Howell var. *submutica* (J.T. Howell) Halse



Bioblitz participants: Front- Lee Cassin; Tiffany (BLM), Mandy (BLM); Van Graham (Westwater Engineering). Back- Delia Malone (CNHP); Sam from UNC; Mit McGlaughlin (UNC); Lonnie Renner (Westwater Engineering); David Varner; Dave Tolen; Larry Allison (CoNPS); Bob Clarke (CoNPS)



Astragalus debequaeus and *Pediomelum megalanthum* var. *megalanthum*
Photos by Bob Clarke

(*Debeque Phacelia*): A Technical Conservation Assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stel-prdb5206879.pdf

Bob Clarke, M.A., is a biologist who has lived in Grand Junction and been a CONPS member since 1995. He began studying the local native flora under the guidance of Joanne Young and Peggy Lyon. He is cataloging and photographing the native plants of Mesa County and Eastern Utah including the Uncompaghre Plateau and Grand Mesa.

Grizzly Peak Research Natural Area by Bob Powell

The San Juan National Forest just designated a newly protected area in the eastern San Miguel Mountains, a group within the western San Juan Mountain Range– Grizzly Peak Research Natural Area (RNA). Its northern and eastern border is the ridge-line from Sheep Mt. east of Lizard Head Pass, to San Miguel Mt. and then south to Grizzly Peak, that is at the head of Lime Creek, a tributary of the Animas River. The eastern border is also the border between Dolores and San Juan Counties. The western boundary is a jagged line south from the western edge of Sheep Mt. The southern border is along the upper reaches of the Eastern Fork of the Dolores River, upstream of the aban-

(Cont. on page 39, column 2)

Learning Field Techniques in Sagebrush County Ecological Diversity in Sagebrush Steppe within the Gunnison Basin Field Seminar taught by Dr. Barb Frase by Larry Allison



Photo by Charlie Turner

On June 23, eight members of CoNPS met with Dr. Barb Frase at the City of Gunnison Legion Park to learn about the ecological diversity of the Gunnison Basin sagebrush steppes. Following introductions, Barb outlined a definition of diversity based on the evenness of species and species richness. As both evenness and richness increase, so does diversity. Landscape diversity was also discussed for its geographic scale. The problem then becomes how diversity can be measured simply to avoid the pitfalls of any biases.

Barb's solution to this question was a modified application of John Cairns' procedure published in 1962, "The Sequential Comparison Index: A Simplified Method for Non-Biologists to Estimate Relative Differences in Biological Diversity in Stream Pollution Studies." Using regular, linear intervals only the previous plant is compared to the next plant and evaluated as the "same" or "different". All consecutive "sames" are grouped into runs, all "differents" are counted as runs, and the runs are totaled. The total runs are then divided by the total number of samples giving a diversity index somewhere between 0 and 1. The greater the index, the greater the diversity for the data collected.

This tool was then applied to three different sites near Gunnison. Curecanti National Recreation Area Beaver Creek Picnic area was visited first. Barb probed our thoughts about the different factors influencing the sagebrush habitat and asked for "eyeball" estimates of diversity. Then we split into 2 teams to measure the diversity using the sequential method. Curacanti lola Picnic/Boat Launch was surveyed next using the same method. "Eyeball" estimates were evaluated against the diversity indices determined. Diversity indices for the first two sites clustered around 0.50. The last site visited was the Gunnison Mountain Park in Taylor Canyon at a higher elevation. Working quickly to beat the thunderstorms, data were collected for this area producing consistently high indices of 0.90. Our "eyeball" estimates proved to say little about the diversity of the sites when compared to calculated indices.

Barb discussed the importance of sagebrush steppes for four large ungulates: deer, elk, bighorn sheep, and pronghorn. Also discussed was the absolute importance of the sagebrush for the survival of the Gunnison sage-grouse, a listed species. Sage-grouse are totally dependent on large tracts of sagebrush for feed, cover, reproduction, and the healthy diversity of grasses and forbs. Loss of sage habitat and corridors is responsible for declining sage-grouse populations.

Sagebrush steppes remain an important diverse habitat. The sequential comparison index was found to be a useful and simple tool to measure diversity. Barb's enthusiasm and joy of teaching, along with the wonderful CoNPS collegiality, made this a very educational and meaningful field seminar.

Larry Allison is a retired middle school science teacher, naturalist, and DBG/CNAP volunteer. He is a member of the Plateau Chapter.

Grizzly Peak (cont. from previous page)

done railroad grade. The western San Juan Mountains have had two new large protected areas in two years.

The designation is an excellent example of the importance of local action to conserve natural areas. In 1988 the Sheep Mountain Alliance was formed in Telluride to successfully block new timber sales on the slopes of Sheep Mountain by Lizard Head Pass. For many years they have advocated special protection of the area that is covered in the new RNA. Finally, success. They have also been successful in protecting the valley floor below Telluride. Their actions have been very important in protecting natural areas in eastern San Miguel County and northern Dolores County.

The total area of the RNA is 3,254 acres. Elevations range from 10,141 ft to 13,752 ft.. The area has never been timbered, has never had a road or designated trail, and was only lightly grazed. The upper treeline varies from 11,500 ft to 11,600 ft. Below treeline is a dense spruce/fir forest with only one large meadow. The average annual precipitation is 31"; the maximum snow depth on April 1 is 39". Access to the upper portions of the area during the summer is difficult; but it is a good area for cross-country skiing in the winter.

Thistles Field Seminar in Gunnison

Thistle-lovers congregated in Gunnison for ecology professor, Barb Frase's thistle field seminar. The class visited the Cold Harbor Institute, where a riparian bioblitz was occurring. A number of interesting plants were found on a walk through the fields. The class then traveled to Crested Butte to a private area where some exciting thistles were observed.



Jane Hendrix's Field Trip on West Hoosier Ridge



Jane Hendrix is Queen of the Mountain Wildflowers. Don't miss her hikes! Jane has created color wildflower guide booklets for the hikes.

Amazing Weekend at RMBL: Osha, Ants, Aphids, and Pollinators by Jan Turner



L to R: Front row: Janis Huggins, Jane Bunin, Quinn Farrington, Nikki Ernst, Back row: Jan Turner, Emily Mooney, Charlie Turner, Linda Boley, Chuck Ernst, Cheryl Ernst, Sarah Ernst, Dave Ernst. Photos © Jan Turner

Our weekend of field seminars at the Rocky Mountain Biological Lab (RMBL) was truly wonderful! The lab is located in Gothic, next to Crested Butte, the Wildflower Capital of Colorado, and the wildflowers were gorgeous! The seminars were both extremely enjoyable and educational.

Emily pours warm *Arnica* salve into small jars. Inset: Osha root.

On Saturday, we attended **Medicine on the Wild Side taught by Dr. Emily Mooney**, a researcher with RMBL and faculty member at University of Colorado in Colorado Springs. We had a morning session in the classroom where we learned about plant secondary compounds and their importance in medicine and defending plants from herbivory. This was followed by a wildflower hike where we learned the medicinal value of a number of the native plants (the sweet cicely had a delicious anise-flavor) and observed the ants tending the aphids on osha (*Ligusticum porteri*), one of Emily's subjects of research. Apparently, aphids on osha growing in the shade don't produce as desirable "nectar" as ants on osha in the sun. The ants protect the aphids on osha growing in the sun so they can "milk" the aphids.

After lunch, we gathered in the kitchen where Emily taught us to prepare Osha root tea. It tasted pretty good (a slight bit like root beer) and has immune-boosting, anti-viral properties. After that, Emily mixed bees wax flakes and *Arnica* that had been steeped in olive oil and heated the mixture under low heat to produce arnica salve for sore muscles.

Sunday the enjoyment and education continued with **Dr. Jane Ogilvie's Natural History of Rocky Mountain Pollinators**. Jane, a bumblebee expert, was mentored by Dr. Carol Kearns of University of Colorado, Boulder, who is leading a bumblebee field trip at the CoNPS Annual Conference. There are so many species of bumblebees and we observed a number of them in the field. Jane captured some with a net and placed them in a tube where we could view them before she released them and they flew off to pollinate the beautiful mountain wildflowers.

After lunch, when the afternoon heat moved in, we entered the herbarium where the insect collections and plant collections are housed. Jane showed us many species of insects found in RMBL, and we learned that little if any research has been done on a number of bees, flies, and other insects so research opportunities abound. We also met Dr. Rick Williams, who curates the herbarium collection. Rick gave us a demonstration of SEINet, a database used by RMBL and many other herbaria in the West. We were all sad that our weekend at RMBL was over but we took the opportunity to visit the quaint Gothic store that sells a great collection of books and t-shirts. Charlie purchased a bumper sticker, "I Brake for Native Bees," and I purchased *RuMBLings: A History and Highlights of the Rocky Mountain Biological Laboratory* by Ellen F. Dobbin.





Left: Jane Ogilvie demonstrated how to mark bumblebees with a colored marker. This way, bumblebees can be tracked. Once the bumblebees were marked or examined, they were set free. We observed a number of species of bees through the mesh. Photos by Charlie Turner



Right: The class visited David Inouye outside his cabin. He demonstrated his technique for catching and banding hummingbirds.



Photos by Charlie Turner

John Fielder's Photography Field Seminar in Steamboat Springs



People in photo, clockwise from left: John Fielder, Joe Leahy, Deb Pace, Connie Heginbotham, Stanley Heginbotham, Lucy Ginley. Photos courtesy of Stan Heginbotham.



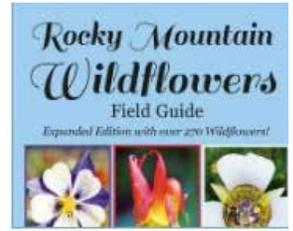
The feedback from the participants of John Fielder's photography seminar was enthusiastic and positive! CoNPS is grateful to John Fielder for donating \$1,000 to CoNPS. John is a strong supporter of environmental organizations. CoNPS has some of his books in the CoNPS book store.

BOOK REVIEW

Rocky Mountain Wildflowers: Field Guide

Review by Jack Carter

Linda Nagy and husband, Bernie Nagy (photographer), are truly flowering plant enthusiasts and they want to encourage others to enjoy the beautiful flora of the central and southern Rocky Mountains. Their small pocket guide (4 x 6 inches) is exactly what they describe in the introduction. Just about everything first time travelers to the Rocky Mountains need to know, to start to identify a small part of the extensive floristic beauty that surrounds them, can be found in this publication.



The 270 species are described first with a photograph, then with a common name, followed by a scientific name, the habitat, life zone, and flowering date. Two pages in the front of the book are devoted to descriptive terminology including flower parts, inflorescences, leaf shapes and their arrangements on the stem. The key to locating the species in the book is the flower color, as is true in similar field guides, and beginners commonly will be attracted to the plants by the flowers.

However, flower color can be very confusing, especially when we can identify so many red (65 species included), yellow (61 species included) or green flowers (just eight species included) that are omitted from this attractive book. There are several hundred species with yellow flowers in the Rocky Mountains. And as we work our way through this small book we will start to see so many species in which flowers may be identified by one, two or more colors. At the same time, there is additional information that could be added to many of the descriptions, to assist the reader in identifying some species, but the space is limited.

These are the kinds of problems we encounter in the study of plants, versus say birds or reptiles. If you recognize 100 species of Colorado birds or reptiles you are a knowledgeable student of ornithology or herpetology. But this just doesn't work very well when we recognize there are more than 3,000 species of flowering plants in the state.

My best guess is that as this couple continues to travel throughout the Rocky Mountains they will observe and photograph additional plant species. In another two or three growing seasons, they will be producing a new edition of their book with perhaps 400 or 500 species. Of course, they may identify species in which they disagree on the flower color, and their marriage may end in a divorce. I hope not, but I have known professional botanists who stopped speaking to each other over similar variations in the characteristics of vascular plants.

I like this attractive little book, and many thousands of people should take a copy with them as they travel throughout the Rocky Mountains. Of course, I just enjoy looking at good photographs of plants. This wildflower guide is carried in the CoNPS bookstore. \$10.50

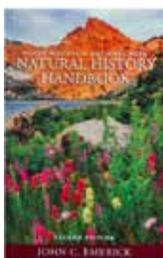
Jack Carter is Professor Emeritus, Biology, Colorado College.

New Books Available at the CoNPS Annual Conference Book Sale

Rocky Mountain National Park Natural History Handbook

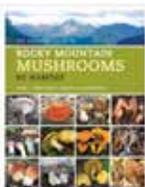
by John Emerick, 2015, 2nd ed. \$13.50.

From its geological origins to today's inspiring landscapes, a seasoned naturalist reveals the wonder of Rocky Mountain National Park in this natural history handbook. Striking images enhance the author's comprehensive descriptions of the park's ecosystems and the flora and fauna found in each. Discover the life in and around rivers and lakes, explore the alpine tundra, and learn about some of the issues facing Rocky.



The Essential Guide to Rocky Mountain Mushrooms by Habitat

by Cathy Cripps, Vera Evenson, Michael Kuo, 2016. \$24. Dazzling full-color photos highlight the beauty of hundreds of species. Easy-to-navigate entries offer essential descriptions and tips for identifying mushrooms, including each species' edibility, odor, taste, and rumored medicinal properties. The authors organize the mushrooms according to habitat zone. This ecology-centered approach places each species among surrounding flora and fauna.



Flora Neomexicana III: An Illustrated Identification Manual

by Kelly W. Allred and Robert DeWitt Ivey, 2013. \$64.50.

This is a flora of the state of New Mexico. It is a key with illustrations primarily by Robert DeWitt Ivey, taken from his latest edition of *Flowering Plants of New Mexico* (Ivey 2008).



Flowering Plants of New Mexico, by Robert DeWitt Ivey, 5th ed. 2008. \$34.

This book presents a brief introduction into the botany and ecology of the plants of New Mexico in conjunction with more than 1,600 beautifully crafted and scientifically accurate line drawings of individual species



Ponderosa; Big Pine of the Southwest by Sylvester Allred, 2015. \$10.50.

Provides an introduction to the natural and human histories of the ponderosa pine forests of the Southwest that is accessible to all who wish to enjoy the forests. Included are discussions of biogeography, ecology, and human and natural history, the structure of the trees, as well as theoretical perspectives on issues such as climate change.



The Best Front Range Wildflower Hikes by Marlene Borneman, 2016. \$11.50.

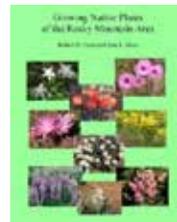
This book showcases 20 trails filled with native wildflower species across five life zones. Trail descriptions include habitats and interesting tidbits about the plants, along with a listing of native flora with both common and scientific names.



Growing Native Plants of the Rocky Mountain Area

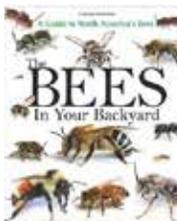
by Robert Dorn. \$76.50. Available in print! Also available as a CD.

This large, full-color book serves as an encyclopedia (arranged alphabetically) of native plants and how to grow them. There are color illustrations of each plant. This book is an excellent resource for native plant gardeners in Colorado.



The Bees in Your Backyard by Joseph S. Wilson and Olivia Messinger Carril, 2016. \$23.50.

An engaging introduction to the roughly 4,000 different bee species found in the U.S. and Canada, offering essential tips for telling them apart in the field. Ideal for amateur naturalists and experts alike, it gives detailed accounts of every bee family and genus in North America with color photos, describing key identification features, distributions, diets, and nesting habits.



Gardening for the Birds; How to Create a Bird-friendly Backyard by George Adams, 2013. \$19.

With hundreds of native plants, extensive seasonal bloom and fruiting charts, and the techniques for creating a balanced ecosystem, this book helps you turn any space from a small, urban terrace to a large suburban yard into a home for a fascinating variety of birds. Close-up profiles of birds from across all regions of North America teach you their nesting, breeding, and feeding habits.



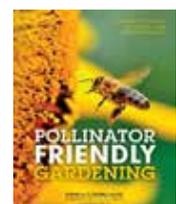
Jewels of the Plains by Claude Barr (reprinted in 2015). \$22.50.

From *Abronia* to *Zinnia*, *Jewels of the Plains* describes the natural history and garden merits of more than five hundred Great Plains wildflowers. Considered the authoritative guide by native plant enthusiasts and horticulturists, it captures the unique beauty, resilience, and variety of wildflowers in the Great Plains. Finally this classic is back in print.



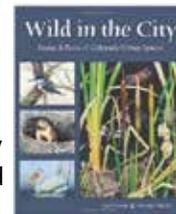
Pollinator Friendly Gardening; Gardening for Bees, Butterflies and Other Pollinators by Rhonda Fleming Hayes, 2015. \$18.

This book explains the intriguing synergy between plants and pollinators, making it a unique sourcebook so anyone can make a yard a more friendly place for pollinators.



Wild in the City; Fauna and Flora of Colorado Urban Spaces. DePaulo & Snyder, 2015. \$20.

Join artists Dorothy DePaulo and Heidi Snyder on an inspirational journey of discovery as they explore the plants and animals in the parks and open spaces in the Front Range of Colorado.



Note: These book descriptions adapted from Amazon.

(Cont. from p. 30)

CoNPS members, David Julie and Kate Goes In Center, offered a program on plants, pollination, and bees. Attendees learned about parts of a flower, nectar, pollen, and seeds. Children then helped demonstrate the pollen-carrying structures of different bees - pollen baskets (corbiculae) on honey bees and bumble bees, hair (scopa) on the legs of halictid bees and sunflower bees, and hair on abdomens of leafcutter bees. The program then introduced the life cycle of solitary bees like leafcutter bees, the annual colony cycle of bumble bees, and the perennial colony cycle of honey bees.

The program incorporated lots of role-playing and participation. Children especially enjoyed gathering pollen and nectar from models of a huge anther and nectary.

Each child and several adults received a postcard they chose of either a bumble bee or a leafcutter bee. Most adult attendees received seeds of Prairie Coneflower (*Ratibida columnifera*) - a favorite of leafcutter bees, Rocky Mountain Bee Plant (*Cleome serrulata*) - a magnet for all bees, and Showy Milkweed (*Asclepias speciosa*) - a host plant for monarch caterpillars.



Child reaching her butterfly proboscis into flower's nectaries

A second program at Sandstone Ranch focused on Monarch butterflies. Fifteen children (mostly quite young) and 20 parents attended. David and Kate's part was 30 minutes of experiential learning about Monarchs, milkweed, and flowers. By the end of the program, all of the children understood that Monarch caterpillars eat only milkweed (the children used scissors to cut paper leaves as a caterpillar's jaws do), that they molt their exoskeleton as they grow (the children held up 5 shirts from tiny to large), that plants provide nectar (Juicy Juice) to attract pollinators to move pollen from flower to flower and use bright petals to advertise, and that butterflies have long, coiled tongues to access the nectaries. We also learned about how Monarchs store bad tasting chemicals from milkweed, migration, and other interesting subjects.

Cal-Wood Education Center

Angie Busby and Jamie Preira, Program Coordinators at the Cal-Wood Education Center near Jamestown, invited CoNPS to provide plant and pollinator training to their staff of about ten on August 22nd. Cal-Wood offers nature education and experiences for children on class trips and overnight outings. David Julie provided education on plants, pollination, and pollinators, especially bees, using methods that the Cal-Wood staff could employ with 5th grade visitors. There were lots of models, props, role-playing, and participatory activities.

Grow Native PRUNING NATIVE SHRUBS by Jim Borland

Not long ago, the diversity and age of the plants in our natural landscape depended upon fire to periodically destroy the old and prepare the ground for the germination of a new crop of forest and meadow plants. Since we obviously can no longer afford nature that luxury, native shrubs in mountain communities are not being renewed as before but getting old and dying. Native shrubs in the urban landscape may also be getting old and dying.



Are your shrubs among the old? Look for bark peeling from stems, short, stubby annual growth increments only at the ends of stems, dead stems still attached but lying on the ground and few young, vigorous stems from the center of the bush. Shrubs in this stage of age are on their way out, progressively supporting fewer and fewer blossoms, fruits or browse for deer, elk and other wildlife.

All is not lost, however, for most of our wild shrubs can be given a new lease on life through selective techniques known as thinning or rejuvenation pruning.

The selection of the pruning technique depends somewhat on the aims of the pruner and somewhat on the condition of the shrub. Thinning, sometimes referred to as renewal pruning, is practiced by selecting up to 1/2 of the oldest stems and removing them by cutting them to the ground in late winter or spring. Aside from allowing more light into the center of the shrub, this practice forces all new growth to emerge from the shrub's crown-growth that is usually quite vigorous. This new growth usually blooms and fruits the following year. A smaller percentage of the oldest stems can be pruned, but some are left in this technique to provide some sense of a shrub occupying the space. The oldest stems are usually the largest in diameter, darkest in color and often shredding bark. Dead stems are, of course, removed in the process.

A variation on this theme is rejuvenation pruning which merely means that all stems are removed to the ground at the same time. Again, regrowth is usually rapid and vigorous.

Do not leave stubs with either approach and do not attempt to tip or top prune shrubs whose names appear in the following list. Tip pruning results only in new growth appearing immediately behind the cut, giving the shrub a top-heavy, lollipop appearance.

Practice Thinning or Rejuvenation Pruning on These Shrubs

Boulder raspberry	Snowberry or Buckbrush
Mountain mahogany	Threeleaf sumac
Ninebark	Wax currant
Rabbitbrush	Waxflower or Cliff Jamesia
Rock spirea	Woods rose

Jim Borland is co-host of the "Ask the Garden Pros" radio show, and former CoNPS President.



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Harlequin's Gardens



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Soil is teaching us that Soil Life supports Plant Life;
Our Birds and Bees are teaching us that Native Plant Life matters;**

**Common Sense is showing us that the oil brand
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