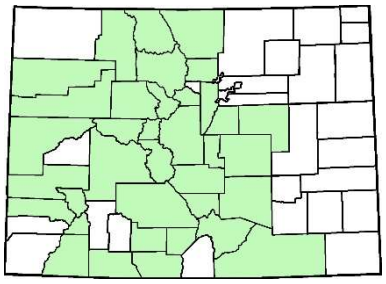
# Aquilegia

**Newsletter of the Colorado Native Plant Society**
Volume 42 No. 2 Spring 2018

**Pasqueflower or Prairie Crocus, *Anemone patens* L. var. *multifida* (Ranunculaceae).** A circumboreal plant and one of the earliest bloomers, emerging soon after the snows retreat. The leaves are heavily dissected. The flower consists of 5-8 purplish to white tepals surrounding many bright yellow stamens and white pistils. The flowers close at night and on cloudy days. The entire plant is usually covered with soft plumose hairs and is often found in undisturbed, gravelly soils, from prairie to alpine regions. As the plant matures, the peduncle lengthens and the styles elongate to long silky tails, which eventually carry the many achenes away on the wind. One Native American name for *A. patens* is 'Ears of the Earth'. It had a variety of medicinal usages in most tribes. However, it can be toxic to humans and livestock when ingested. *Kelly Ambler*



Map adapted from Ackerfield, J. *Flora of Colorado*, p. 706 (2015).

## *Botanicum absurdum* by Rob Pudim

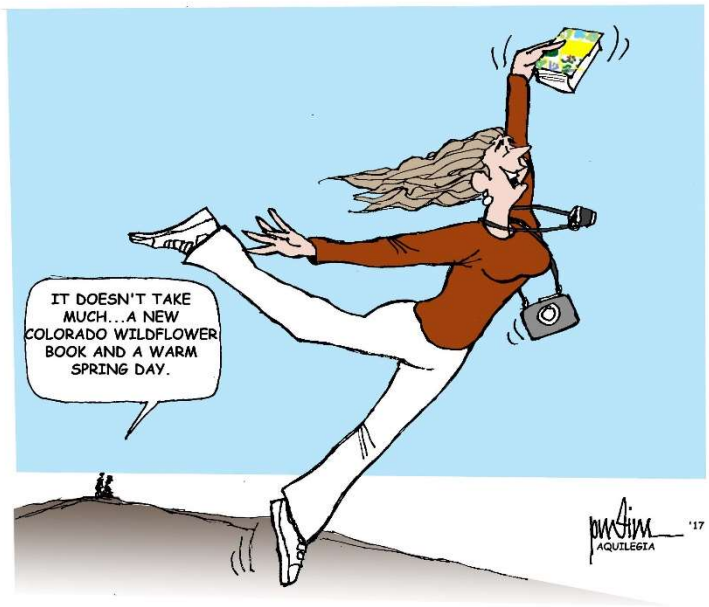





**PHOTO CREDITS**: FRONT COVER and PAGE 2: Pasqueflower, *Anemone patens* var. *multifida.* Front cover photograph from Jefferson County Open Space Lair o' the Bear, April 24, 2014. Page 2 photograph from Jefferson County Open Space, Mount Galbraith Trail, Golden, CO on June 3, 2015. © Loraine Yeatts. All photos used with permission.

# *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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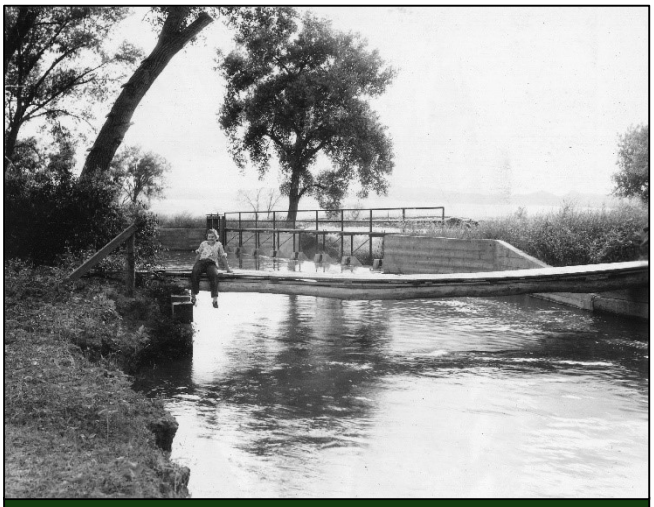
# Featured Story

## The High Line Canal Trail: Some History and Botanical Mystery

### By Christina Alba

Water means life everywhere on Earth. But people in semi-arid regions understand this with a clarity born of living in time-step with the rhythmic greening and re-greening of the landscape around them. Anyone who has experienced the sepia-toned end to a Colorado winter has marveled that any flush of life could regenerate from such a hunkered-down thirst. And while our native plants are typically drought-tolerant, the human need of food, fiber, and an inviting shade tree, is less so.

To meet these needs, early settlers in many parts of our state tamed the waterways with canals, moving water from mountain to plain, shortening the beat of time during which crops, street trees, and lawns had to go without water. Over time, plants, animals, and people have coalesced along these canals; these ramifying arteries that literally, and in many ways spiritually, sustain life along their banks.



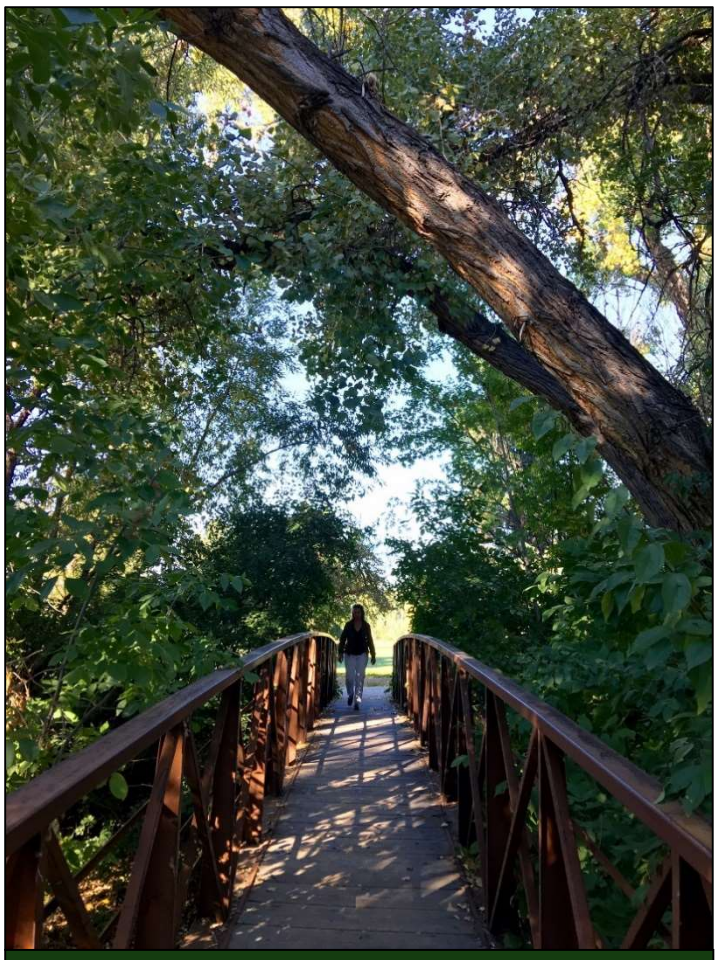
***In 1935, a young girl sits on a bridge that crosses the High Line Canal at Big Dry Creek. © Denver Water***

The 130-year-old High Line Canal is one such artery, spanning 71 miles from the foothills to the plains, traveling through urban and suburban areas in Denver and the surrounding region. The Canal draws water from the South Platte River, beginning at a diversion dam in Waterton Canyon near Littleton and running northeast to Green Valley Ranch. It is named for an engineering principle that capitalizes on the land's natural contours to efficiently move water downhill by gravity. The Canal traces the highest line of natural terrain, incorporating many twists and turns to minimize elevation drop per mile. What results is a connective corridor that wends itself through various habitat types, from rugged and wild riparian stretches in the western canyon, to areas reminiscent of native shortgrass prairie in the east. The Canal corridor also passes through many highly developed areas, providing easily accessible green space to thousands of people.

Since its completion in 1883, the Canal has been a part of the fabric of the region. Its original purpose as an irrigation ditch was not fully realized for many reasons. The earthen Canal lost up to 80% of its water to seepage and evaporation, as well as to the thirsty trees and shrubs that took root along its banks. Before long a menagerie of wildlife, including beaver, prairie dogs, gophers, and crayfish, took up residence along the lush Canal, weakening its banks and requiring near-constant repair.

The already-inefficient Canal was also subject to junior water rights, meaning that in dry years it received no water at all. Still, the Canal was reinvented many times through infrastructure improvements and an evolving group of owners and users.

While falling short of its original purpose to supply water for crops and livestock throughout the region, the Canal has served residential developments, golf courses, and cemeteries, building its importance as a green corridor that connects rural, urban, and suburban neighborhoods to this day. The Canal is well-loved, as many Coloradans spent their childhood summers on its banks, nurturing great appreciation for this greener and wilder version of their backyards. For example, Jon Lehmann, now of Golden, spent summer days in the mid-80s along the Canal banks, catching crayfish by the dozens to bestow upon his neighbor, who would boil and serve the critters at his yearly party. Lehmann also remembers bat colonies in the trees that lined the Canal in the Bible Park neighborhood of Denver. The bats feasted on the cornucopia of insects that thrived along the watery corridor. Topping off his special (but not unique) connection to the Canal, Lehmann remembers journeying with a gang of friends to a quiet spot near Fairmount Cemetery, one of the Canal's last remaining customers, to watch Halley's Comet pass overhead. ►



***The towering trunk of a cottonwood provides a shady bridge-crossing in Bible Park. © Connie Brown***

◄ A pivotal point in the history of the Canal occurred in the 1970s, when Denver Water opened its maintenance roads, previously patrolled by early "ditch-riders," to the public. The face of the public using the Canal for refuge and recreation transformed, expanding from kids searching out crayfish and snakes along the Canal margins to people of all ages and backgrounds walking, running, and biking their way to a peaceful stretch of time in nature. This original act of Denver Water is now entering a new era as several entities will work together to sustainably manage the High Line Canal Trail as a connective corridor sustaining plants, animals, and people in the region.

From a botanical perspective, the High Line Canal presents an interesting puzzle. Human settlement along the Canal has led to conversion of the surrounding native ecosystems to other land uses. Most of the Canal's stretch runs through what was historically flat to rolling plains underlain by sandy to silty soils. The grasslands supported native shortgrasses such as blue grama (*Bouteloua gracilis*) and buffalo grass (*Buchloe dactyloides*), the abundant sub-shrub fringed sage (*Artemisia frigida*), and a diversity of forbs such as sand lily (*Leucocrinum montanum*), gay feather (*Liatris punctata*), and scarlet globe mallow (*Sphaeralcea coccinea*), to name a few. However, increasingly, the Canal's greenway is surrounded by a built landscape of housing, businesses, and roads. And while there are often pockets of green space that punctuate the built landscape in the form of parks and gardens, these areas may be planted in monocultures (think Kentucky Bluegrass lawns) or contain cultivated plants that are not representative of the region.

Given the Canal corridor's storied use and the altered matrix that surrounds it, the species that occur along its stretch likely represent a blend of remnant natives, non-native "weeds" that may or may not be ecologically problematic (i.e., aggressively spreading or otherwise transformative), and escaped agricultural and horticultural plantings. The question then becomes, what exactly greens this greenway?

Determining species identity is the key first step in understanding the ecological function of those species (e.g., How many nitrogen-fixing species occur on the Canal? Which tree species are deep- versus shallow-rooted? What kind of wildlife food and nesting habitat is provided by various species?). Scientists and land managers are exploring the ecological functioning of these novel species amalgams as they are increasingly swirled together by the fingerprint of urbanization. (And granted, not all users of the Canal or other green spaces need to know which particular plant species provide that universally craved green, because no matter their identity, the plants provide a place of respite and regeneration.) ►

***The High Line Canal Trail hugs the Canal proper along much of its length. Before Denver Water opened the Trail to the public in the 1970s, it was traversed by early "ditch riders" who maintained the Canal from the late 1800s. © John Fielder***

◄ Excitingly, the time is now ripe for a full botanical and ecological assessment of this well-loved greenway, as the High Line Canal Conservancy, Denver Water, and several jurisdictional partners, begin implementing a vision for its sustainable long-term management. Some botanical characterization has been done along parts of the corridor, for example by botanists and CoNPS members Mo Ewing, Janet Wingate, and Loraine Yeatts. Species lists generated from their work hint at the hypothesized mish-mash of plants of different origins and habitat affinities. One telling example is that of corn growing in "flood deposited sand on [a] narrow stream bank flood plain" in Arapahoe County, located just a few hundred feet from the now-busy intersection of South Chambers Road and East Alameda Parkway. Native coyote willow and cattails grew nearby this lone agricultural escapee, providing a glimpse into the complex botanical story that may unfold.

To build on such intriguing botanical beginnings, Denver Botanic Gardens will undertake a strategically designed sampling effort to document plant communities along the Canal's entire length from May-September 2018. The Gardens is working on behalf of their funding partner, the High Line Canal Conservancy, which will use data from the survey to help inform their management decisions (see the Conservancy's website, www.highlinecanal.org, for more information on the Vision Plan for the Canal).

The botanical and ecological assessment will have two components. First, representative specimens of all plants encountered within botanical transects will be collected and housed in the Kathryn Kalmbach Herbarium at the Gardens. This includes natives, wild non-natives, and cultivars alike, so that an accurate description of these complex plant assemblages can be established. The specimens and their associated data will be curated in perpetuity and will be made digitally and publicly available, representing a permanent record of the Canal's condition at this given point in time and space. The established baseline can be revisited 10, 20 or 100 years from now. Second, ecological plots will be paired with the botanical transects. Within these plots, researchers will estimate plant species abundances and will link abundance to variation in environmental variables such as soil moisture and light availability. Taken together, the botanical and ecological data will be a first step in unlocking the botanical mystery of the Canal, and will provide a straight line of sight into its future.

**Literature**

Reconnaissance survey and prioritized survey plan: High Line Canal corridor. 2016. Written and published for the High Line Canal Conservancy. Prepared by Square Moon Consultants Inc. Principal Barbara Stocklin-Steeley.

*Christina (Chrissy) Alba, PhD, is a Research Associate at Denver Botanic Gardens. She fuses her background in plant ecology and botany to bring an ecological perspective to plant biodiversity surveys undertaken to grow the Gardens' vascular plant collection. Chrissy will be leading a CoNPS field trip along the High Line in September. To learn more about research and other happenings at the Gardens, visit https://www.botanicgardens.org/york-street/blog.*

# In Memoriam

Emily L. Hartman (December 19, 1932 - April 4, 2018) was a Benedictine Oblate affiliated with the Benedictine Sisters of Chicago. Em was born in Kansas City, Missouri. She graduated from the University of Kansas earning a PhD in Botany. She also earned a Master's degree in Library Science and spent several years delivering books to residents of Appalachia in Tennessee.

For 37 years she served as a professor of botany at universities in Kansas and California and completed her professional career in 1993 after 27 years of teaching at the University of Colorado Denver. Her research area was the flora of the alpine tundra of the Colorado Rockies where she was always accompanied by a furry companion, the last of which and most beloved was Annie, and often by the numerous students whose careers she nurtured.

For nearly ten years, Em led Elderhostels at St. Scholastica Academy in Canon City and later taught Elderhostels at Shadowcliff in Grand Lake, Colorado. Upon retiring to Grand Junction, she served for 18 years as a volunteer at the Catholic Outreach Day Center. And the gifts she received she generously shared or gave to others.

# Ethics and Protocols of Plant Collecting

## By Steve Popovich

As we enter the growing season, it is a good time to revisit ethics and procedures regarding plant collecting on public and private lands. How many plants can I collect from a population? Should I avoid collecting if the species is rare? Do I need a permit to collect if I am on public land? Can I collect on private land? These are among the typical questions pondered by those who wish to collect. That is a good thing, because these questions SHOULD be asked.

The concepts of making sure one does not harm a plant population and securing permission for access to property seems straightforward, but the details can be complicated. Unfortunately, there are no clear-cut guidelines regarding the collecting of rare plants. Ethics dictate that we should not cause a plant population to lose viability or be adversely impacted by collecting specimens. The often-employed rule of thumb of harvesting one in twenty plants is, in fact, not based (as far as we know) on scientific data, and should not be blindly applied.

*Ethics dictate that we should not cause a plant population to lose viability or be adversely impacted by collecting specimens.*

Justification for collecting a rare plant should be based on purpose and need, and the decision should always include good judgment. If a rare plant were to be collected to document a new site, or for research resulting in increased knowledge of how to conserve that species, or because the population would be destroyed by an imminent project such as a new highway, and the plant is salvaged for transplantation or to make herbarium collections for scientific posterity, these reasons may be justified. If someone desires to add a rare plant to a personal collection or collects to seek notoriety, those reasons may be unjustified. It is helpful to ask: Is the entire plant needed? Will photos work just as well? Good photographs and detailed field notes are increasingly acceptable for recording plant discoveries, although most herbaria managers in our area still prefer physical specimens.

A permit or formal authority is generally needed for collecting plants or plant parts on public lands, including lands managed by the Bureau of Land Management, Forest Service, National Parks and Monuments, and state or local parks and open space. Collecting threatened or endangered species, or collecting any plants within an area closed to public access or in a National Park or Monument are highly regulated.

Before considering collecting of any kind, it's essential to check with the land administrator regarding permit requirements and conditions, which may vary substantially between agencies. Collecting permit conditions for National Forests in the Rocky Mountain Region generally preclude the collecting of rare plants, as well as collecting in a Wilderness Area or within 200 feet of a roadway. Unless specific authority is given, there may be separate sets of conditions for other agencies. Also, if collecting is for commercial gain rather than for research or personal use, then a different permit is often needed. There are scenarios where a permit is not needed on public lands—these include "incidental" small collections of common (never rare) plants—such as a bag of mushrooms for family consumption, top-snatched wildflowers to place in a vase, a grade school leaf collection, or a scouting pine cone identification project.

Judges like to use the phrase "ignorance is no excuse for the law." It is a collector's responsibility to 1) obtain and carry on one's person the appropriate collecting permit or permission from the land administrator or owner, 2) understand all restrictions, and 3) confirm permission for property access in advance (never trespass). Collecting from or entering private property—even if entering only to cross the property to get to the other side—is illegal without permission of the land owner. If you think you may be violating any of these responsibilities, or are unsure of property boundaries, it is far better to back away than to carry on. Failure to obtain proper permits and access permissions can result in stiff penalties, including fines, criminal restrictions, reduced employment possibilities, and restrictions on entering public lands. At the very least, one's personal reputation is tarnished.

In addition to the ethics and protocols discussed above, the Colorado Native Plant Society has published guidelines on ethics of collecting, which are posted on the Society's website.

Because the permitting process can be confusing and ethical principles vary, these topics were addressed in the 2013 Rare Plant Symposium in Canon City. Please inform yourself enough to feel confident that you have done your homework before collecting, and take advantage of the resources and guidance that CoNPS offers.

*A version of this article appeared in the Spring 2013 (Vol. 37, No. 1) issue of* Aquilegia. *Like Steve said at the start of this article, spring is a good time to review the ethics of plant collecting. He revised this article for this reprinting. Steve is the former chairperson of the field studies committee.* MM

# Botany Basics

## What's in a Name? By Lenore Mitchell

*CoNPS has a diverse membership — from professional botanists to hobbyists to beginning native plant lovers or gardeners. To meet the needs of members learning to identify native plants,* Aquilegia *will feature a regular column on basic botany.*

People have always needed to know what to call plants as well as animals and other organisms. It was a matter of survival to know which plants were poisonous, which were edible, and which were useful in other ways. In ancient Greece, a student of Aristotle named Theophrastus (317-287BC) reportedly provided the origins of botany with the first written work on plants. The very word botany is ancient Greek for pasture or grass.

Later, ancient Egyptians recorded knowledge about medicinal plants on papyrus. Throughout the years, more knowledge accumulated about plants and their names. Then, in the 1700s came the famous Carl Linnaeus, a Swedish doctor. While he did not invent the binomial (two-part) naming system, he perfected and expanded it into a system we still call the Kingdom Classification, which systematically groups plants, animals, and most living organisms.

THE PLANT KINGDOM *Plantae* (dates are approximate; MYA = million years ago)
PHYLUM OR DIVISION
CLASS
Ferns/Fern allies (oldest vascular land plants); began 350 MYA; spore reproduction
Gymnosperms (e.g, conifers, etc.); began 250 MYA; naked seed reproduction like cones
Angiosperms (e.g., true flowers, grasses, etc.); began 150 MYA; evolved w/pollinators; covered seed reproduction
SUBCLASS (monocots and dicots - now eudicots, true dicots, is more accurate)
ORDER (set of related families)
FAMILY (shares certain basic characteristics)
GENUS (more closely related; plural: genera)
SPECIES (even more similar; note: species is not capitalized)

Humans belong to the Animal Kingdom, and our scientific name is *Homo* (Genus) *sapiens* (species). The Kingdom Classification system was originally based more on morphology (form) and basic function. Since the late 1990s, scientists have been delving into DNA and genetics, which has resulted in increased knowledge about close relationships between species and families of plants and animals, humans included.

Plant studies have centered on angiosperms (covered seed plants which have the most complex reproductive systems). The Angiosperm Phylogeny Group (APG) studies covered-seed producing plants through DNA and that information combined with morphology and function provides even closer plant relationships, which is why some of the plant families have changed over time. For instance, the Scrophulariaceae (figwort family) has been separated into Plantaginaceae (plantain family), Orobanchaceae (broomrape family), and Phrymaceae (lopseed family). APG studies are still ongoing.

### About those tongue-twister names

While there are many cute and even useful common names, there's a reason why botanical Latin is more useful. For one thing, it's standardized through the ICBN (International Code of Botanical Nomenclature) so a plant that grows all over the northern hemisphere (circumboreal) has the same name in United States and Canada as it does in Europe or Asia.

Botanical Latin is also a neutral language, and is widely acceptable. Common names, on the other hand, often vary from one region to another. Botany is a branch of biology dealing with plant life from physiology and morphology to ecology. Taxonomy is the study of orderly classification of organisms, so the two are closely related. Keying a plant involves both disciplines. Keying a plant involves unfamiliar terminology and sometimes tongue-twister words. But don't give up!

### Putting knowledge to work

Kingdom classification is still in use along with DNA and genetic studies. Family, genus, and species are the most useful elements of plant identification. So, how to begin? First of all, relax and enjoy the plants. Almost every plant photo book (or the internet) has diagrams of the basic plant parts: flower structure, leaf arrangements, etc. Become familiar with this to start. Make it a habit to quickly scan any plant you see (in a garden, in a photo, out on the trail, online) and ask yourself: Is there a stamen (male reproductive part) or a pistil (female)? Are leaves opposite or alternate on the stem, and so on. These parts may or may not be easily seen, but try. ►

***Hiking and flower finding with like-minded individuals can make the sometimes-challenging keying process more enjoyable. © 2015 Mary Menz at Elk Park, Pikes Peak.***

◄ Always look closely with a hand lens, take photos or make sketches, and make detailed notes. Observe more than one specimen of the same plant and flower if possible to make sure your plant is a typical one.

**Basic steps to plant identification**

Colorado has approximately 3000 species and some 155 families of native and alien plants.

Sounds daunting, doesn't it? But 75% of species belong to the biggest families, meaning that once you're familiar with, say, a dozen common families, you're doing well. Take on the next dozen common families, and your confidence expands. Because most families share basic characteristics, it's fun and not all that difficult to learn about families. Along the way, your botanical vocabulary expands too.

In botanical Latin, all family names end with "aceae." Rosaceae is the rose family, Lamiaceae is the mint family, Fabaceae is the pea family, and so on.

You needn't formally key every single plant out there, unless you want to. Many plants are readily recognizable and, even better, plant families share characteristics. If you're familiar with the Rosaceae family, which generally has 5 petals and many stamens, you may come across an unfamiliar plant with these same characteristics, so you first consider whether or not the new plant might or might not be in the rose family.

Another unfamiliar plant with a square stem makes you say "ah ha!" because you know Lamiaceae (mint family) has square stems. So things start to fall in place, and, wow, you're having fun! Do remember, though, there are often exceptions. For instance, one plant with a square stem is *Scrophularia lanceolata* (bunny in the grass), but it is a Scrophulariaceae (figwort family) rather than a Lamiaceae (mint).

**Learn these families first**

Following are the easier-to-learn families.

**Apiaceae (parsley or carrot family):** Tiny 5 petal flowers in clusters; umbel shape; about 41 Colorado species; many edible; some poisonous; leaves compound/pinnate.

**Asteraceae (sunflower family):** Comprised of many tiny florets, both rays and disks; one of the world's largest families; nearly 400 Colorado species; not always easy to key, but easy to place in family; leaves variable.

**Boraginaceae (borage family):** 5 petals often fused forming a tube; usually stiff hairs on alternate leaves; 40 Colorado species; *Mertensia* (chiming bells) are exceptions.

*(continued on page 18)* ►

***Sitting down and carefully observing plant characteristics is critical to identifying a new-to-you species. An added benefit? You're closer to the plant for sketching and photographing your find. © 2015 Mary Menz at Elk Park, Pikes Peak.***

Conservation Corner

# Ute Lady's Tresses: Conservation in a Developing Environment

## By Crystal Bravo-Cogar

After 17 years working as an environmental consultant in the Mojave Desert, I had a pretty good grasp of the flora and fauna. Now as a new resident of Denver working in the world of environmental consulting, I am faced with the challenge of learning a whole new host of plants and animals. In the environmental consulting business, becoming familiar with protected species, their status, and mitigation requirements is vital. One species that has been continuously identified in my research to pinpoint potential protected species for proposed development projects in Colorado, Wyoming, and Washington is *Spiranthes diluvialis* (Ute Lady's Tresses).

The purpose of this article is to provide background on this species and discuss conservation actions that may be required for development projects through key agencies such as Bureau of Land Management and U.S. Fish and Wildlife Service (USFWS) (and hopefully help all of us learn more about local plants).

Ute Lady's Tresses is a perennial orchid species which grows from tuberous, thickened roots into one stem that reaches 20-50 centimeters (cm) tall. The leaves on this species are narrow, only 1 cm wide, but can reach up to 28 cm long. The few to many white or ivory flowers are clustered in a spike of 3-rank spirals at the top of the stem on the inflorescence. Ute Lady's Tresses grow along streams and open seepage areas among cottonwood trees, within moist meadows at moderate elevations (4,528 to 7,753 feet), and usually occur on floodplains near abandoned stream channels where the vegetation is not too dense or overgrown. It remains dormant in winter, although new growth can begin as early as October. Depending on the year, Ute Lady's Tresses are known to flower between July and September in Colorado (Colorado State University, 2014).

### Distribution

This species is distributed from north and south-central Utah, central to north-central and northwest Colorado, east-central and southeast Wyoming, east Idaho, southwestern Montana, eastern Nevada, western Nebraska, and central to north-central Washington. In Colorado, it is known from Boulder, El Paso, Weld, Jefferson, Larimer, and Moffat Counties. In 2007, The *Aspen Times* presented an article on discovery of this species near Carbondale in the Roaring Fork Valley on Colorado's western slope, where it was not previously known to occur (Condon, 2007).

### Legal Status and Threats

Ute Lady's Tresses is a USFWS threatened species under the Endangered Species Act of 1973, officially listed within its entire range in 1992. It is afforded no state protection, but has a Colorado Natural Heritage Program global ranking of G2G3 (imperiled and vulnerable) and state ranking of S2 (imperiled). There are multiple factors for species decline including noxious weeds, intense domestic livestock grazing, ►

Spiranthes diluvialis *near Golden, Colorado.*
*© Scott F. Smith*

► haying, loss of habitat, water development, loss of pollinators, and seed predation.

Recent invasions of weedy species are one of the largest threats to the Ute Lady's Tresses orchid. Aggressive exotic species such as purple loosestrife and reed canary grass can force the orchid out of many areas (Rocky Mountain Wild, 2018). Habitat loss resulting from fragmentation and urbanization as a result of agriculture and urban development is another major threat to the sustainability of this species. Water development also impacts this species as waterways are more controlled through diversions and dams, and the orchid's habitat becomes increasingly restricted.

In addition, this plant has a low reproductive rate and is dependent on pollinators such as bumblebees, hawkmoths, and anthophorid (long-tongued) bees for reproduction. The collapse of pollinator populations has significantly reduced the reproductive potential of this rare, beautiful orchid. (Rocky Mountain Wild, 2018). It has also become vulnerable in parts of its range due to seed predation by voles through herbivory of inflorescences.

**Conservation Efforts**

Lucky for Ute Lady's Tresses, it persists in wetland and riparian habitat with a variety of other species of concern, such as the endangered Preble's Meadow Jumping Mouse, migratory birds, a variety of shorebirds, and raptors. The sensitivity of riparian and wetland habitats and their importance for various forms of vegetation and wildlife requires developers follow special mitigation and conservation plans to construct in these areas due to direct and indirect impacts that can result from construction activity.

*Close-up of* S. diluvialis *inflorescence.*
*© Scott F. Smith*

Direct impacts to Ute Lady's Tresses from development includes destruction of plants by crushing, uprooting, or burial and impacts to the composition and chemistry of soils during ground-clearing and earth-moving activities.

Indirect impacts result from habitat alteration caused by changes in hydrology and drainage patterns in disturbance areas, long term loss of natural flow in creeks or irrigation ditches that would eliminate wetlands, increased human presence resulting in disturbance and crushing of plants, and introduction of noxious weeds.

Mitigation requirements in habitat for this species may force developers to relocate facilities and disturbance outside habitat areas, which is common due to county and local ordinances dictating that construction occur outside the floodplain and wetland or riparian areas. Additionally, should development in habitat of Ute Lady's Tresses be unavoidable, a detailed survey may be required prior to construction to map individual plants for monitoring and avoidance or other required mitigation.

Other required mitigation of Ute Lady's Tresses to offset direct impacts could be collection of seed for seed banking, transplanting plants on a mitigation site or to a botanical garden (although this species has never been successfully propagated), funding for conservation of the species in lieu of attempting to relocate plants, and stockpiling of topsoil to preserve the seedbank for use during reclamation efforts. Developers may also be required to maintain the hydrology and drainage patterns of the area during construction and/or post-construction reclamation actions.

Mitigation for indirect impacts to Ute Lady's Tresses include taking measures to avoid the introduction and spread of noxious weeds in the area by power washing equipment and vehicles prior to entry into the project site and after travel through weed infested areas, avoiding work in weed infested areas or pre-treatment of weed infested areas using mechanical or chemical means.

Another important component of addressing effects on Ute Lady's Tresses is post construction reclamation to re-contour and surface areas back to original slope and drainage patterns, redistribute the seed bank with topsoil, and allow areas to become revegetated with ►

◄ native species through natural succession or reseeding with a native seed mix. Fencing installed post-reclamation efforts would exclude humans from restored areas and allow reclamation to progress.

Other future conservation actions to be considered for this species should be inclusion of pollinators and pollen producing plants to preserve this rare orchid. The effects of pest management programs on bumblebees and the availability of suitable bee nesting habitat should be considered (St. John and Ogle, 2009).

### Interesting facts about Ute Lady's Tresses

- It is a showy, perennial flowering orchid, but has never been successfully propagated.
- It is pollinated mostly by bumblebees.
- It has a scientific significance in studies addressing evolutionary isolation, an important subject in conservation biology research.
- These plants got their name because the flowers appear braided around the stem (Condon, 2007).
- Flowers of Ute Lady's Tresses are faintly fragrant with a vanilla-like scent (St. John and Ogle, 2009 and Fertig et al., 2005).

More photos of this species can be found at: http://fremode.com/ute-ladiestresses-orchid.html

*Crystal Bravo-Cogar is a field biologist with 17 years of experience. Her background includes surveying for flora and fauna in the Mojave Desert of Nevada as an environmental consultant. Having recently relocated to Denver, she is enthusiastic about learning the flora and fauna of the Rocky Mountain region as part of her professional and personal goals.*

### References


California Academy of Sciences, iNaturalist. 2017. Ute Ladies' tresses (*Spiranthes diluvialis*), Blog submitted by Janel Johnson. February 23, 2017. Accessed 26 February 2017: https://www.inaturalist.org/observations/5163522.

Colorado Natural Heritage Program. 2013. Conservation Status Handbook (Tracking Lists). Colorado State University. Accessed 11 February 2018 at: http://www.cnhp.colostate.edu/download/list.asp.

Colorado State University. 2014. Colorado Rare Plant Guide: Plant List by Status-*Spiranthes diluvialis*. Accessed 11 February 2018 at: http://www.cnhp.colostate.edu/download/projects/rareplants/guide.asp?id=17998

Condon, Scott. (2007. 20 December). The Aspen Times: *Rare flower species found near Carbondale*. Accessed 27 February 2018 at: https://www.aspentimes.com/news/rare-flower-species-found-near-carbondale/.

Fertig, Walter, Black, R., and Wolken P. 2005. *Rangewide Status Review of Ute Ladies' tresses* (Spiranthes diluvialis). Prepared for the U.S. Fish and Wildlife Service and Central Utah Water Conservancy District. 30 September 2005. 101pp.

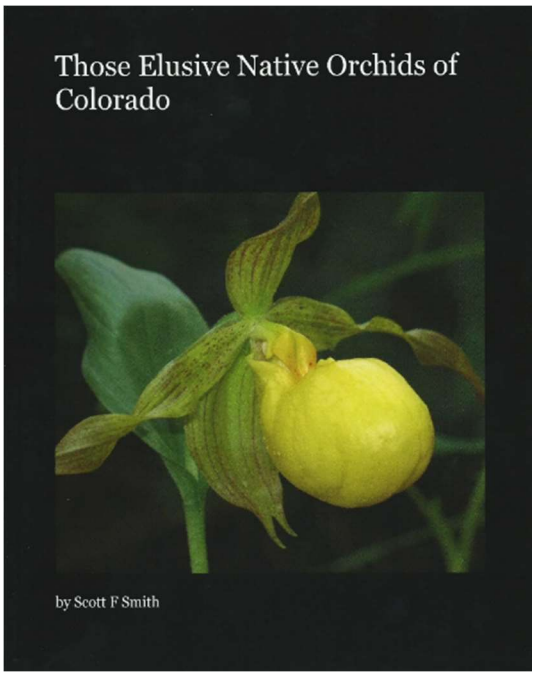
Rocky Mountain Wild. 2018. *Ute Ladies' tresses Orchid*. Accessed 27 February 2018 at: http://oldsite.rockymountainwild.org/species/plants/ute-ladiestresses-orchid.

St. John, Loren and Ogle, Dan. 2009. U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS). Plant Guide: Ute Ladys' Tresses (*Spiranthes diluvialis*) Plant Symbol = SPDI6. Accessed 26 February 2018 at: https://plants.usda.gov/plantguide/pdf/pg_spdi6.pdf.

United State Fish and Wildlife Service (USFWS). 2015. Endangered Species; Mountain Prairie Region: Plants - Ute-Ladies' tresses Orchid. Accessed 26 February 2018 at: https://www.fws.gov/mountain-prairie/es/uteLadiestress.php


### About the Photos

Photos to accompany this article were taken by Scott F. Smith. Smith is a Colorado botanist and plumber. His plumbing work has taken him across Colorado, Antarctica, Northern Alaska, and Greenland over the last 25 years. He has botanized in the US, New Zealand, Australia, Ireland, Greenland, and even managed to find lichens and mosses in Antarctica. He says his "plumbing career has paid for his botany addictions."




He is the author of the book, *Those Elusive Native Orchids of Colorado*.

*Spelling of the common name for* Spiranthes diluvialis *varies per source material.* Aquilegia's *preferred reference is* Flora of Colorado *by Jennifer Ackerfield (2015): Ute Lady's Tresses. MM*

# Winter's Warm Icy Grip

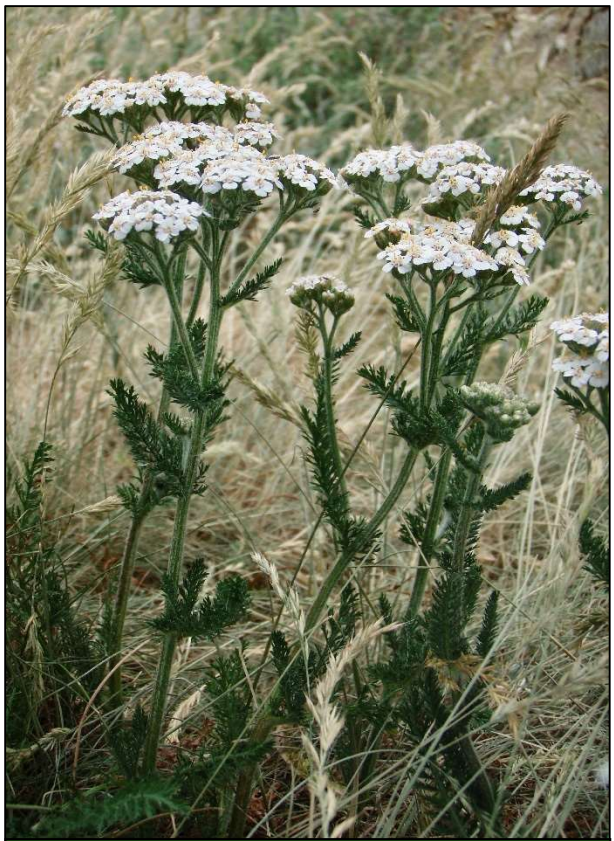
## By Jim Borland

Late spring and summer visitors to the high country are often surprised to see flowers blooming at the edge of a snow field or actually blooming out of the snow itself. While it is common to think that these colorful inhabitants of mountain meadow and tundra are sleeping during winter and waiting only for their release from snow before growth can even start, many have been quite active throughout the long cold months and have not been in a stilled state of dormancy.

During the studies of the possibility of extraterrestrial plant growth, it was revealed that a number of our own alpine plants are not held in an icy grip all winter but are quite active and actually growing beneath winter's deep mantel of white.

A typical high altitude scenario finds the corms of wild hyacinth (*Camassia* sp.), spring beauty (*Claytonia* sp.), woodland star (*Lithophragma* sp.) and snowdrops (*Galanthus* sp.) maturing by mid-July, then remaining dormant for the remainder of summer. By October or November, but before the first snows, these wild flowers have already begun growth underground in response to some as yet unknown ecological cue. Spring beauty may begin growth as early as mid-September.

*Fragaria vesca* has a serrated leaf with a terminal tooth equal to or longer than the two adjacent teeth. *© Marlene Borneman*



Achillea millefolium *is common in gravelly soils. © Marlene Borneman*

As air and soil temperatures gradually decrease to the freezing point, plants such as western yarrow (*Achillea* sp.), woodland strawberry (*Fragaria vesca*), virgate phacelia (*Phacelia heterophylla ssp. virgate*), western coneflower (*Rudbeckia occidentalis*) and opposite stonecrop (*Sedum debile*) stop growing. Here they wait suspended for the remainder of the winter, resuming growth only when temperatures once again rise and snow is melted.

Soon, temperatures become cold enough to freeze the ground to varying depths depending on altitude and exposure, and snow, which prior to this melted away, now sticks and begins accumulating to form an insulating layer. This is where the fun begins.

When the snow cover reaches a depth of about 8 inches, its insulating qualities become like that of glass wool used to insulate our houses. The insulating qualities of snow are so good that by the time it reaches a depth of 20 inches and the ground has frozen to only 15 inches deep, the natural heat of deeper soils thaws the soil above it right to the ►

Ranunculus adoneus *pushing up through the snow. Squaretop Mtn., June 24, 1984. © Loraine Yeatts*

◄ soil-snow line and keeps it this way for the rest of the winter. Even when the temperature of the air above the snow dips to tens of degrees below freezing for days or weeks, these temperatures are not felt by the insulated ground beneath. With non-frozen, water saturated soil and the snow immediately above it held at temperatures in the neighborhood of 32°F, many growth activities can and do take place.

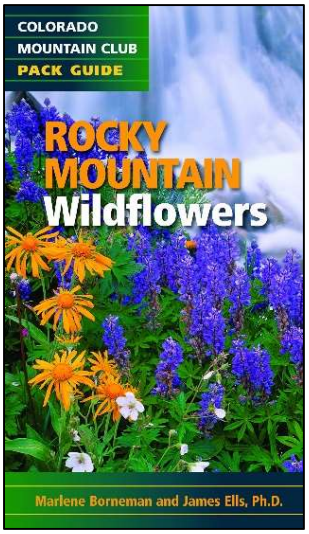
Further investigations have shown that the reason that plants emerging in spring have less food reserves than those entering winter is that wild hyacinth and dogtooth violet (*Erythronium* sp.), for example, actually begin growth beneath the snow, pushing through the ground until they reach the interface between snow and ground. Some, such as tapertip onion (*Allium acuminatum*) and spring beauty, grow up into the snow, complete with flower buds. Dogtooth violet, alpine buttercup (*Ranunculus* sp.) and Jupiter buttercup (*Ranunculus* sp.) actually open their blossoms under the snow. Although sunlight is severely depleted by snow, it is believed that certain plants can indeed manufacture foods beneath snow and at near freezing temperatures.

We shouldn't be too surprised when we find alpine plants blooming out of a snowbank. After all, our own garden crocus, snowdrops, tulips, hyacinths and daffodils often bloom through snow. These and other wild plants are supremely adapted to not only getting a head start on the growing season, but to capture and utilize the early and often copious spring moisture before other taller and larger plants have a chance to compete for these same resources or shade them out of existence. Conversely, these plants usually complete their growing, blooming and fruiting cycles and are well on their way towards dormancy before other plants in the same habitat have made much headway into the warm growing season.

In true alpine country, plants which grow, bloom and fruit quickly are well-adapted to a climate which allows for only a very short warm growing season and one which is actually shorter than realized due to a pattern of decreasing precipitation from mid to late summer.

While most gardeners make special notice of the Christmas and Lenten roses, witch hazels and the Easter daisies which normally bloom during cold and often snowy months, these are considered to be exceptions to a rule which declares that everything else in the plant world is dormant and waiting for warmer weather. The winter behavior of the described plants and probably many others yet to be investigated should help dispel that misconception.

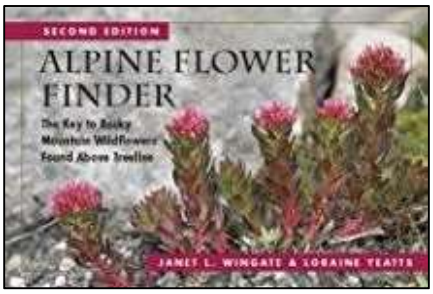
*Jim has been fooling around with native plants for more than 40 years in private, commercial and public venues. His home garden contains thousands of native plants, most grown from seed at home and now not supplementally watered for 20 years. Jim has written hundreds of articles, given talks too numerous to count and continues to grow and plant the two or three native plants not yet in his garden.*




**About the photos**

Marlene Borneman is author of *The Best Front Range Wildflower Hikes* pack guide and co-author of *Rocky Mountain Wildflowers* pack guide by CMC Press. She lives in Estes Park, CO.

Loraine Yeatts combines botanical expertise with a life-long interest in nature and macro photography. Fifty years of volunteer work in the Kathryn Kalmbach Herbarium at Denver Botanic Gardens and floristic surveys of Rocky Mountain National Park and other Colorado wildlands has nurtured a love affair with Colorado flora and a deep concern for disappearing habitat. With Janet Wingate she coauthored *Alpine Flower Finder*, a compact but relatively comprehensive field key to alpine plants of the Rocky Mountain region. Most recently she, with others, recognized and described a new plant species, *Packera mancosana* (*Packera werneriifolia*), discovered in Dolores, CO.



# Plant Profile

## *Claytonia* species of the Southern Rockies

**By Jen Toews**

Last winter I found myself hiking a narrow rugged path above Clear Creek Canyon, an area that seems remote for being so close to the burgeoning city of Denver. The sun was hidden behind an overcast sky and the temperature hovered around 40°F. The first day of spring was two weeks away and the forest still smelled of winter: a mixture of old snow and pine needles.

I took in the views of the canyon and watched matchbox-sized cars speed along Highway 6 far below, before the trail disappeared into a coniferous forest, a quiet ecosystem save for the onomatopoeic calls of black-capped chickadees and the soft beeping of red-breasted nuthatches as they traveled up and down conifers.

The trail continued through granite boulders, which held the chill of winter underneath a quilt of lichen, moss, and club moss. By and by, a non-wintry color caught my eye. Likely a piece of litter, I thought, but upon closer look I discovered it was the delicate wildflower, spring beauty. The plant stood alone on the forest floor, a mere three inches tall beneath towering pines. It signaled the end of a long winter.

The species was ***Claytonia rosea*** or Rocky Mountain spring beauty of the Montiaceae or miner's lettuce family. It's named so because several members of this family, which are rich in vitamin C, were reportedly eaten by miners during the California gold rush days to prevent and cure scurvy[1] (miner's and early settlers likely learned of these nutritional benefits from Native Americans).

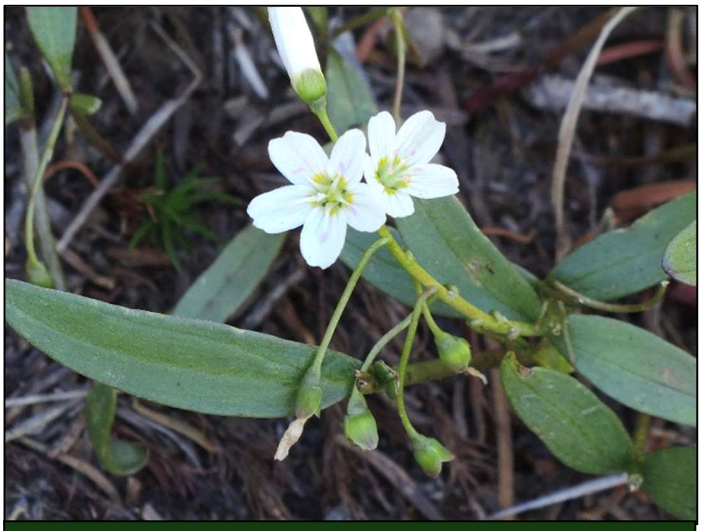
I knelt to examine the solitary plant, which was somewhat fleshy. A reddish-green stem held one pair of slender leaves and a basal pair poked through the pine duff. Atop the stem was the flower, its five pale-pink petals were lined with rose-colored veins and blushed yellow at their bases; five stamens with bubblegum-pink anthers protruded from the center, waiting for a pollinator undeterred by the cold temperatures.

This particular plant was in a foothills ponderosa pine and Douglas fir forest, but *C. rosea* also grows near Gambel oak (*Quercus gambelii*) groves, underneath mountain mahogany (*Cercocarpus montanus*), and along trails on up through the montane life zone in CO, NM, UT, NV, and WY. Look for this spring ephemeral from February through May alongside other early bloomers.

The closely-related ***Claytonia lanceolata***, or Western spring beauty, is much more prevalent on the Western Slope than in the Front Range.[2] This plant announces spring in the upper sagebrush steppe,[3] montane, and low alpine, often blooming next to snow banks.[4] This species and the above were once lumped; however, research published in 1966 by Halleck and Wiens[5] argues for their recognition as distinct species and provides useful ways to distinguish the two in the field.

►

Claytonia rosea, *Matthews Winters Park, JeffCo Open Space. © Jen Toews*



Claytonia lanceolata, *Sawtooth National Forest, Idaho. Photo by Sonya Anderson. © Denver Botanic Gardens*

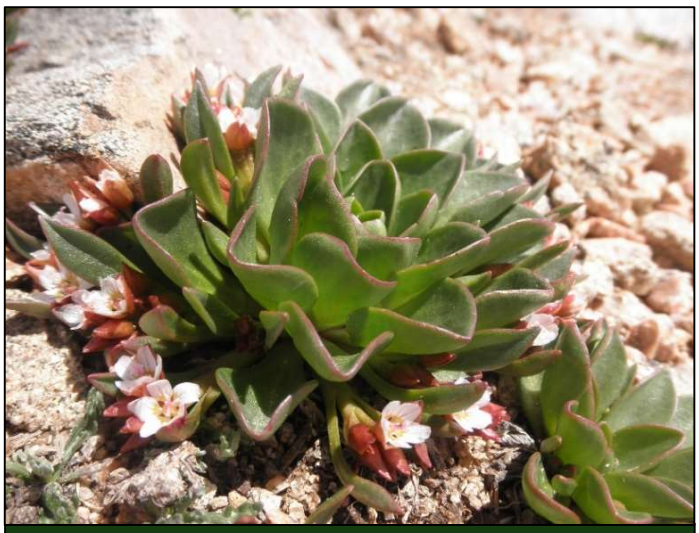
► First, examine the leaves. In *C. lanceolata,* the stem leaves are usually lance-ovate, whereas in *C. rosea* they are typically lance-linear; in addition, basal leaves are generally absent at flowering in *C. lanceolata*, whereas they are usually present at flowering in *C. rosea*. Finally, observe the flowers: while the apices of the petals of *C. lanceolata* are usually emarginate-retuse, they are typically rounded or acute in *C. rosea.*[5] Both species have edible tubers, which reportedly taste like potatoes once cooked, and edible leaves, which are rich in vitamins A and C.[6]

Two months after my wintry hike up Clear Creek Canyon, the spring sun had melted the remaining snow and the hillsides were ablaze in a hundred shades of green. The intoxicating honey-sweet scent of wild plum (*Prunus americana*) wafted through the canyon and spotted towhees rustled in the leaf litter of Gambel oaks, their buzzing calls piercing the morning silence.

Wildflowers lined the trail including *Collinsia parviflora* (maiden blue-eyed Mary), *Heuchera parvifolia* (littleleaf alumroot), *Viola canadensis* (Canada violet), *Hydrophyllum fendleri* (Fendler's waterleaf) and miner's lettuce, the latter which I had never seen before in Colorado. It reminded me of *Claytonia perfoliata*, a closely-related species I used to forage when I was a small child roaming the hills of Northern California (interestingly, a subspecies of this taxon, *C. perfoliata* ssp. *intermontana*, was recently discovered in southwestern Colorado).[7]

***Claytonia rubra*** is the miner's lettuce found in the Front Range and this western North American species has disjunct populations in Jefferson, Douglas, and Boulder Counties.[8] Also known as redstem spring beauty because the herbage often contains red pigmentation, this plant has flattened to suberect rosettes of rhombic leaves and ovate, distinct or perfoliate stem leaves. Flowers are small, ranging from white to pink. Look for this annual from April through August in canyons, moist ravines, and trail sides[9] in the aforementioned counties.

Clavtonia rubra. *Jefferson County*. *© Jen Toews*



Claytonia megarhiza, *Mt. Evans, Clear Creek County*. *Photo by Mike Kintgen. © Denver Botanic Gardens*

As peak wildflower season waned in the foothills last year, I, along with many other wildflower-lovers, ascended in elevation to celebrate the short and intense blooming season of the alpine. One of my hikes that summer was Mt. Audubon, a 13er in the Indian Peaks Wilderness. As the trail emerged above timberline, showy, reddish-green rosettes began to dot the rocky landscape. Pinkish-white flowers peeked through the succulent leaves of these plants. This was none other than the charming ***Claytonia megarhiza***, commonly known as big-rooted spring beauty.

The Greek words of the specific epithet, *mega* and *rhiza*, translate to big roots, and indeed, this species has long thick taproots, which function to store carbohydrates and also pull water from 5-6 feet below the soil surface.[10] To see this plant's mega roots, while supporting our national parks, head to the Alpine Visitor Center in Rocky Mountain N.P., where there is a pressed specimen decorating the wall. Look for *C. megarhiza* in bloom from late June through late August.

As I finish writing this article on March 5, I have yet to see my first *Claytonia* of 2018 in bloom. However, I would venture that somewhere in a shady forest or on a sunny hillside, a *Claytonia rosea* has already made its debut announcing that spring is just around the corner. Soon other wildflowers will join the chorus, and the foothills of the Southern Rockies will erupt in a symphony of color. The very thought makes me giddy.

*Jen Toews works in the Plant Records department at the Denver Botanic Gardens and is a Colorado Native Plant Master®. Her pastimes include hiking and backpacking, photographing Colorado's diverse flora, and blogging about nature-themed adventures.* (*continued on page 20*) ►

# Restoration Roundup

## Working Together to Restore Land

### By Taryn Contento

Spring has sprung and everyone is itching to get out and enjoy the sunshine. With so many organizations working to better this great state of Colorado, why not mix your hankering to stretch out your legs after winter by volunteering with some restoration projects around the state? As the CoNPS Restoration Committee also stretches its metaphoric legs, we want to encourage everyone to support the constant improvement projects that are being worked on around us.

As mentioned in the last issue of *Aquilegia*, many members have participated in the past with Wildlands Restoration Volunteers (WRV). There are other opportunities to get your hands dirty. Here is a list of projects, by organization, date, and activity that you can engage in for the next few months. Please refer to the CoNPS website for future updates on projects near you.

There are quite a few restoration events with the WRV working on the Apple Valley Stream Restoration. In September 2013 the St. Vrain Creek flooded, devastating multiple communities in the area. Five years later, federal disaster relief money is funding permanent repairs of the river. Projects fill up quickly so be sure to register as soon as possible.

**Apple Valley Stream Restoration VI**
April 22
Lyons, CO
One-day volunteer event where volunteers will plant native seed, spread soil amendments and wood straw, and plant native shrubs and trees.

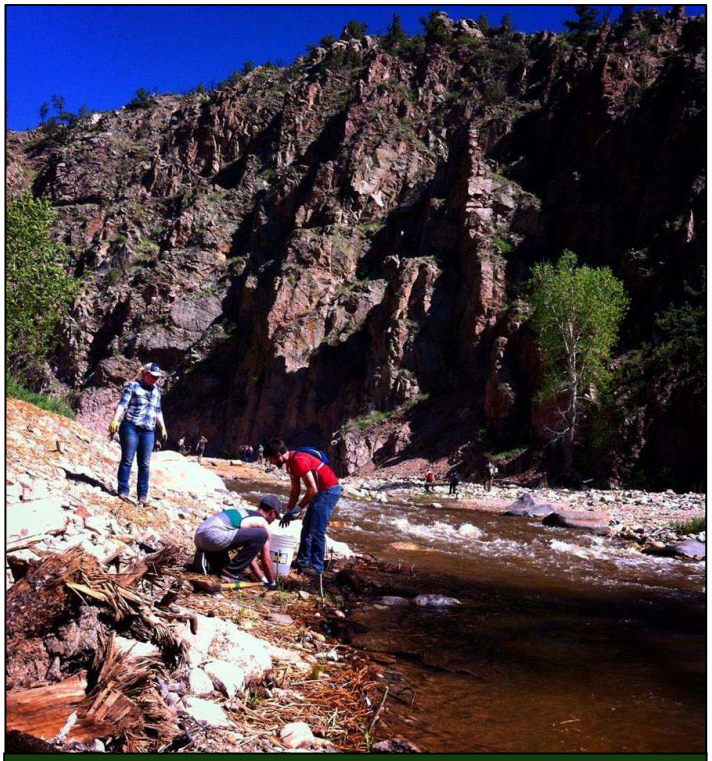
**Myrtle Spurge Purge IV (Evening Pull)**
May 8
Boulder, CO
At this evening event, volunteers will pull and dig myrtle spurge, a class A noxious weed that is a threat to native plants and communities. Our task is to prevent spread and eradicate at the source wherever found! Please sign up at www.wlrv.org.This event is in partnership with the Boulder Chapter of CoNPS. If prompted on the registration sheet, please specify your involvement with CoNPS.

**Daniels Park Restoration**
May 12
South of Denver
One-day event where volunteers will re-vegetate the area due to high volume use and complete some rock work to stabilize steep eroding slopes.

**Big Thompson - Forest Service Flood II**
May 12
Between Glen Haven and Drake
One-day event where volunteers will spread pre-staged piles of compost, broadcast native seed specially collected by the USFS, apply engineered wood straw mulch and plant native container plants grown out at WRV's own micro-nursery facility.

**Rocky Mountain National Park Habitat Restoration - Part 1**
June 16-17
Rocky Mountain National Park
Two-day event where volunteers will plant over 7,000 wetland plants, seed, rake, and mulch over seven acres.

►



*Restoration work on the Big Thompson River.*
*© Kiva Stevens*

◄ (Restoration Roundup *continued from page 16)*

**Trujillo Meadows Restoration with Volunteers for Outdoors Colorado**
June 23-24
Border of Colorado and New Mexico
Two-day event where volunteers will cut and roll wire, remove wooden fence posts, and pile materials for later removal to ensure the safety of humans and wildlife in the area.

**Coal Creek Youth and Family Stewardship Project**
June 30
Louisville
One-day event where volunteers will pull invasive teasel and lamb's quarters. Volunteers will also get the chance to plant native species to provide cover to restore these areas. This project is great for kids and families, with a minimum age of 5 years old.

**Summit and Echo Lakes-Mt. Evans Restoration**
July 21-22
Road up to Mt. Evans
Two-day event where volunteers will repair and restore shoreline at Echo Lake and plant small alpine plants to restore native tundra near Summit Lake.

The restoration committee is always looking for projects to highlight! If you, or the organization that you represent, would like us to help you spread the word on a restoration event, or would like to partner with the CoNPS Restoration Committee to complete a project, contact Erica Cooper at emcooper8@gmail.com. We would love to hear from you!

Sign up for events with the Wildlands Restoration Volunteers can be found at: https://www.wlrv.org/volunteer/. Signup for events with Volunteers for Outdoors Colorado can be found at: http://www.voc.org/volunteer.

*Taryn Contento, a member of the Metro-Denver Chapter, is an aspiring ecologist.*

**Are You Reading this in Black & White?**

The majority of CoNPS members read this newsletter as a downloadable PDF file sent directly to their email inboxes. All back issues are also available as downloadable PDF files from the CoNPS website.

It looks so much better in full color! Consider changing your newsletter preferences to online vs. a black and white printed copy. Need help? Contact the CoNPS office at conpsoffice@gmail.com.

◄ (Basic Botany *continued from page 8*)

**Brassicaceae (mustard family):** 4 petals; 6 stamens; 120 Colorado species; quick to seed; leaves usually alternate.

**Fabaceae (pea family):** 5 petals: 1-banner, 2-wings, 2-part keel (think sweet pea flower); 140 Colorado species; 10 stamens inside the keel; leaves usually compound; pinnate.

**Lamiaceae (mint family):** 5 petals, usually perfect; 34 Colorado species; often aromatic; square stem; leaves opposite, sometimes whorled.

**Plantaginaceae (plantain family)**: 5 petals; often fused, tubular; leaves variable; many species moved here (i.e., penstemons) from Scrophulariaceae (figwort) due to DNA studies; 90 Colorado species.

**Poaceae (grass family):** Challenging to ID, but many beautiful species; wind pollinated; special structures; no petals, but flower is present inside spikelet; 265 Colorado species.

**Rosaceae (rose family):** 5 petals; many stamens; includes herbs, shrubs, trees; 75 Colorado species; leaves usually alternate or basal; often have stipule; hypanthium.

*Lenore Mitchell is an avid amateur who has taught Native Plant Master® courses through CSU JeffCo for over twelve years and has presented courses for Osher Lifelong Learning Institute (OLLI) at Denver University, and other programs. She says teaching is a great way to keep learning. She's also the current Metro-Denver Chapter president.*

# Biological Soil Crusts

## By Charles Maurer

Native Plant Master students in the high desert lands of western Colorado and on the Colorado Plateau encounter more than just angiosperms and gymnosperms. There can be almost hidden flora underfoot on the apparently bare soil around the sparse flowering plants. If you look closely at the apparently bare soil you may notice patches of black, knobby, scruffy growth a few millimeters to a few centimeters high (photo 1). This biological soil crust is also known as cryptobiotic soil. Crypto comes from the Greek language meaning hidden or concealed.

### Characteristics of Biological Soil Crusts

Close inspection of these crusty patches will reveal that the soils and sands are bound together by sticky sheaths containing filaments of cyanobacteria (blue-green algae) usually in a symbiotic relation with some combination of lichens, mosses, green algae, and bacteria. The microfilaments of these organisms form a complex interlacing matrix through the top few millimeters of the soil or sandy surface, effectively binding the loose particles together. This stabilizes and protects the soil surface from wind and water erosion.

Cryptobiotic soils might be considered “living mulch,” contributing to soil moisture retention and infiltration, and fixing atmospheric nitrogen, thereby contributing to soil fertility and soil organic matter. Some portion of the crust must be in a position to receive sunlight since the organisms rely on photosynthesis as an energy source. The organisms partnering with cyanobacteria are dependent on available moisture and temperature. Cooler, moister conditions favor mosses and liverworts. Sunnier and drier conditions favor lichen and green and brown algae. The hottest and driest areas favor mostly cyanobacteria with perhaps some bacteria or fungi.

### Physiological Properties

All of the biological soil crust organisms are capable of drying out, temporarily suspending respiration without negative effects for extended periods. When favorable conditions return they quickly resume growth within a very short time without having to regrow new tissue (photo 2).

Higher plant forms usually have died or died back, and thereby are unable to take advantage of brief favorable growing conditions.

Cyanobacteria grow well on alkaline soils and soils with high salt content, characteristic of the desert regions of the western United States. Considerable research is being done by the United States Geological Society, the Bureau of Land Management, and universities on the effects of changing climatic conditions on soil biological crusts. These studies are looking at the biological make-up of the soil crusts with combinations of hotter and drier conditions all the way to wetter and colder conditions. ►

*Biological Soil Crust dried out in suspended state.*

*Biological Soil Crust after two inches of snow 3 days before previous photo.*

◀ (Biological Soil Crusts *continued from page 19)*

In revegetation trials, biological soil crusts grow quickly under greenhouse conditions; however, when transplanted into the field, success in establishing growth was only obtained during cooler months just before significant moisture arrived.

Although biological soil crusts are well adapted to severe growing conditions, they are poorly adapted to any crushing source and are increasingly being impacted by recreational activities such as hiking, biking, and off-road driving. Once disturbed, it can take one to five years for some recovery if conditions are really favorable and up to 50 years or more for complete recovery.

### Our Responsibility

Colorado Native Plant Society members and Native Plant Master trainers, especially those of us located on the western slope of Colorado and on the Colorado Plateau, should make it a goal to educate as many people as possible about the importance of respecting and preserving biological soil crust.

*Charlie Maurer is a member of the Plateau Chapter. He earned an MS in botany and plant pathology in 1963 from Colorado State University. After a career as a research agronomist, among other titles, Charlie reacquainted himself with plant identification and earned the Native Plant Master certificate from CSU Extension.*

*Charlie is a generous man who helped finance the completion of Jennifer Ackerfield's* Flora of Colorado*. He and his wife have also financed a CSU student's work over the past two years, which included a floristic study of their property in the Cimarron Mountains in far southwestern Gunnison County. This student is in the final stages of writing her thesis working with Ackerfield and Mark Simmons.* MM

◀ (Plant Profile *continued from page 16*)

### References

[1]Marc Schelstraete and Barbara Kennedy, "Composition of Miner's Lettuce (*Montia perfoliata*)," *Journal of the American Dietetic Association* 77 (July 1980): 21-25.
[2, 3] William Weber, *Colorado Flora Eastern Slope* (Boulder: University Press, 2012), 319.
[4] Jennifer Ackerfield, *Flora of Colorado* (Fort Worth: BRIT Press, 2017), 540.
[5] Diana Halleck and Delbert Weins, "Taxonomic Status of *Claytonia rosea* and *C. lanceolata* (Portulacaceae)," *Annals of the Missouri Botanical Garden* 53 (1966) 205-212. http://www.jstor.org/stable/pdf/2394942
[6] "Western Spring beauty, *Claytonia lanceolata*," *Montana Plant Life*, http://montana.plant-life.org/cgi-bin/species03.cgi?Portulacaceae_Claytonialanceolata.
[7-9] Ackerfield, 540.
[10] Joyce Gelhorn, *The Song of the Alpine* (Boulder: Johnson Printing, 2002), 52.

# Relevant Reading

**Botanists** have compiled a comprehensive, searchable checklist of 124,993 species, 6,227 genera and 355 families of vascular plants of the Americas. This list represents one third of all known vascular plants worldwide.
By Carmen Ulloa Ulloa, et al. Missouri Botanical Garden. "An integrated assessment of vascular plants species of the Americas." ScienceDaily, 21 December 2017.
www.sciencedaily.com/releases/2017/12/171221143151.htm

**CPC thanks** Denver Botanic Gardens for protecting more than 70 plant species in its national collection.
Center for Plant Conservation at San Diego Zoo Global. "North Park Phacelia at Denver Botanic Gardens." 01 January 2018.
www.saveplants.org/2018/01/18/north-park-phacelia-denver-botanic-gardens/

**Replanting** endless acres of forests devastated by fire with dogs.
By Desiree Kaplan
Greenmatters. "Dogs Are Rebuilding Chilean Forests Once Devastated By Fire." 19 February 2018.
www.greenmatters.com/living/2018/02/19/2m3wBf/border-collies-forest3

**Research** establishes causal link between climate warming and the localized extinction of a common Rocky Mountain flowering plant.
By Trent Knoss
University of Colorado Boulder. "Climate warming causes local extinction of Rocky Mountain wildflower species." CU Boulder Today. 21 February 2018.
www.colorado.edu/today/2018/02/21/climate-warming-causes-local-extinction-rocky-mountain-wildflower-species

**Replacing** the key culprits contributing to wildfires in the west (like cheatgrass) with native plant species.
By Jay Kirby and Lisa Feldkamp
Cool Green Science. "Fighting Fire with Native Plants." 27 February 2018.
blog.nature.org/science/2018/02/27/fighting-fire-with-native-plants/

**Plants** give off a floral volatile in response to insect pests to attract crab spiders.
University of Zurich. "How spiders can harm and help flowering plants." ScienceDaily, 10 April 2018
www.sciencedaily.com/releases/2018/04/180410100922.htm

# Marr and Steinkamp Awards

CoNPS annually funds several grants to support field and laboratory research on the biology and plant communities of Colorado. The grants are made possible by the John W. Marr fund and the Myrna P. Steinkamp fund, with the help of member donations.

The John W. Marr fund was established to honor the University of Colorado professor and first president of CoNPS. The Myrna P. Steinkamp honors a founding member of CoNPS. Recipients of the awards are asked to summarize their studies when completed for publication in *Aquilegia* and on the CoNPS website.

## Steinkamp Grant Recipients for 2018

**Ronald Abbott**, independent botanist
"Shoot Production in the Rare Alpine Calciphile *Saussurea weberi,*" awarded $1000.
A project to determine the number of vegetative and floral shoots of *S. weberi* (classified within three size classes based on number of leaves) that are produced each year inside a set of study plots located within a major population of the species as well as enable tests of general hypotheses about population stability and climate change responses.

**Jennifer Ackerfield**, Assistant curator and PhD candidate at Colorado State University
"The Evolution, Identification, and Protection of Colorado's Rare Thistles," awarded $1000.
This study will enable botanists and land managers to know which native species of *Cirsium* occur throughout this region and enable them to properly identify them for conservation and best management practices.

## Marr Fund Grant Recipients for 2018

**Liam Cullinane**, Graduate degree student at Denver Botanic Garden and the University of Colorado Denver
"Floristic and Ecological Inventory and Bee Faunal Survey of the High Line Canal in Denver, CO," awarded $500.
The purpose of this study is to provide a bee pollinator survey in conjunction with the ecological and botanical survey of the High Line Canal that will be conducted by DBG in collaboration with the HLC Conservancy.

**Anna Freundlich**, Graduate degree student at University of Northern Colorado
"Lichen and Vascular Plant Response to Bark Beetle Disturbance in the Roosevelt National Forest, Northwestern Colorado," awarded $1000.
A project to describe and compare lichen and vascular plant community structure, including both ephiphytic and terricolous lichens, in beetle-killed forests, along a chronological gradient of time since disturbance.

**Katherine Fu**, PhD student at University of Colorado Denver
"Implications of Local Adaptation on Seed Sourcing for Restoration under Climate Change," awarded $500.
The purpose of this project is to identify factors of seed populations that lead to long-term ecological restoration success under climate change.

**Rachel Kreb**, Graduate degree student at Regis University
"Restoration and Cushion Plant Facilitation on Alpine Trails," awarded $500.
To monitor the restoration efforts on the trail at Mt. Yale to assess the cushion plant's ability to establish and the species and abundance of plants that cushion plants facilitate.

**Maria Mullins**, Graduate degree student, University of Colorado-Colorado Springs
"Aphids on Osha: the Effect of Host-Plant Phenology Aphid Populations," awarded $500.
Manipulative experiments will predict the degree to which host-plant phenology drives aphid responses, using the process by which aphids locate and choose their host-plants.

**Laurel Sindewald**, PhD student at University of Colorado Denver
"A Survey of Limber Pine Abundance and Microhabitat at the Alpine Treeline Ecotone of Rainbow Curve Overlook, Rocky Mountain National Park, USA," awarded $960.
A pilot study to examine the presence and role of limber pine in the alpine treeline ecotone and to determine if its presence is predictable based on its presence in proximal subalpine forest (with 150 meters).

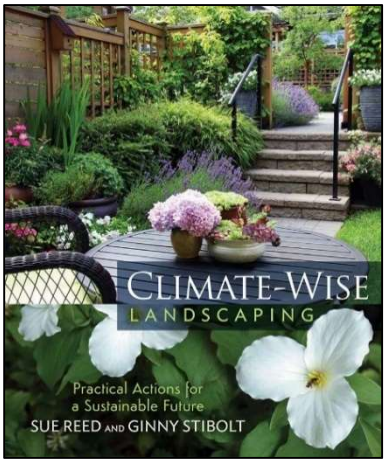
**Rachael Sitz**, Post-doctoral researcher Colorado State University
"Documenting the Insect and Microbial Communities that Utilize Gambel Oak (*Quercus gambelii* Nutt.) to Inform Conservation Management," awarded $500.
This study will document both native and non-native insects and microbes, screen for pathogens including the emergent invasive bacterium *Lonsdalea quercina*, the causal agent of drippy blight disease of oaks and other oak diseases and declines in the US.

# Book Review

## *Climate-Wise Landscaping, Practical Actions for a Sustainable Future* by Sue Reed and Ginny Stibolt

### Review by Sue Dingwell

Perfect! A book on climate-wise landscaping written by two authors who understand the vital role native plants must play in any future we can both envision and want to live in. What could be more important right now? We don't want to sit around wringing our hands, say the authors, we want to DO something about climate change; and their new book was written to empower all of its readers to do just that.




In an unusual act of endorsement, Dr. Doug Tallamy has written an eloquent two-page foreword to *Climate-Wise Landscaping, Practical Actions for a Sustainable Future.* He lists the challenges we face in mitigating climate change as one of the major drivers of the sixth great extinction of life on our planet, and concludes with this statement: "Read this book carefully. Everything you need to know to help heal our relationship with planet earth and empower you to make a much-needed difference is within these pages."

Beautifully designed, the book is user-friendly and attractive. The information is current and science-based, with end notes that give readers access to further research. It includes a comprehensive cross-reference system within the text that makes important connections available at a glance. Each chapter is formatted consistently with clearly marked subtitles:

- Overviews;
- Action Topics, with bulleted Action Items;
- Why this matters; and
- Last thoughts.

Several chapters of the book also include extremely useful Primer sections. These provide basic knowledge that might be needed before complex ideas can be fully understood. For instance, the section on water is prefaced with A Primer on Water Chemistry and Plants. Of course there is a Primer on Native Plants in the chapter on Ecosystems.

The book is peppered throughout with lively side-boxes that include advice, inspiration, and wisdom from such leading lights as E.O. Wilson, Darrell Morrison, Travis Beck, Thomas Rainer, and Claudia West, among others.

The authors, landscape architect Sue Reed and botanist/naturalist Ginny Stibolt, are not only advocates of native plants, but also experienced practitioners in their fields. Their special insight makes this book unique. Each chapter is filled with the kind of practical knowledge and step-by-step guidance that will inform the most casual of backyard gardeners, the experienced gardeners, and the professional landscapers and designers who want to make their efforts part of the solution rather than the detriment of our collective future.

Although the reasons for use of natives are emphasized throughout the book, the authors are careful to avoid the pitfall of overselling natives; explaining effects of soil depletion, water needs, transplanting problems. With the exception of edible foods and invasive plants, the plant photos feature natives. There are valuable explanations of how to search for natives, and of why the plant industry so often promotes the wrong kinds of plants.

Are you ready to DO something NOW? Need to start at the beginning of native plant gardening? Want to know how to repair forest edges? Need specifics on slope calculations? Want to know what materials are the most eco-friendly? You'll find answers in *Climate-Wise Landscaping*. This is a book that you will keep as a reference, and it is certainly one you will want to use in your advocacy efforts whenever you have the time and opportunity to educate others. Support the authors, it's available now from them at a price that beats the Big Sellers! http://susanreedla.com/books/climate-wise-landscaping.html

*Sue Dingwell started her native plant journey in Florida, where the revelation of what plants could do in the hot sand scrub was a transformative learning experience. She became a member of the Florida Native Plant Society and used her background in education to become a dedicated advocate of native plants and conservation. A Master Naturalist now in both Florida and Virginia, Sue is currently a member of both the Virginia and Colorado Native Plant Societies, and plans to be living in Colorado full time this spring.*

*This article is reprinted with permission from the Virginia Native Plant Society's blog March 18, 2018.*

# News and Announcements

## Chapter Reports

### Northern Chapter

Hugh Mackay, chapter president

The Northern Chapter has just elected a new president and vice president. The new president is Hugh Mackay, formerly vice president and manager of the chapter's field trip program for the last seven years. The new vice president is Madeline (Maddy) Maher, a CSU graduate student in botany just finishing up her master's degree. Maddy has also led field trips and given a presentation for the Northern Chapter. Nan Daniels continues as secretary.

## Committee Reports

### Conservation Committee

Submitted by Linda Smith

In early 2018, Conservation Chair, Mo Ewing, emailed individually over 50 CoNPS members who had expressed an interest in being on the Committee, to find out where their interests lie. Options included:

- Writing articles for Conservation Corner in *Aquilegia*;
- Monitoring, reviewing and possibly commenting on federal documents for USFS, BLM, etc.; and
- Tracking, monitoring, and commenting on local issues across the state.

Mo received a very good response from this group. He now has volunteers for Conservation Corner for the next year and beyond, and a cadre of volunteers for monitoring, reviewing and commenting on local, state and federal conservation issues.

In January, CoNPS reviewed and commented on the Grand Mesa, Uncompahgre & Gunnison Forest Plan Draft Assessment for Species-at-Risk. The final draft assessments for the Forest Plan Revision have been updated following their reviews and are available at GMUG's website. On April 3, the scoping period began and will remain open for comments for 45 days. CoNPS will be commenting, with the help of committee volunteers.

In March, Erica Cooper, as Boulder Chapter President, responded to the City of Boulder's Open Space Management Plan.

Our thanks go out to volunteers Anne Bensard, Kristi Gladem, and Heidi Gerstung who reviewed and sent us their well-researched comments for the BLM September 2018 Oil & Gas Lease Sale Environmental Assessment. Their comments were combined into one letter representing CoNPS, which was sent to BLM on the April 6 deadline.

Links to these three letters can be found on the CoNPS website, along with a link to keep up with the progress of Botany Bill Colorado H.R.1054 - Botanical Sciences and Native Plant Materials Research, Restoration, and Promotion Act.

The Conservation Committee will have many more opportunities for advocacy. Whether you have no experience, or quite a bit, this is an opportunity to learn, share, and make a difference. For more information, contact Mo Ewing, Conservation Committee Chair, at bayardewing@gmail.com.

### Field Studies Committee

Submitted by Lara Duran

The Field Studies Committee held a meeting early April at the Denver Botanic Gardens. The topics discussed touched on:

- Field studies and chapter-led field trips;
- Protecting sensitive species locations;
- Options for housing plant species lists from field studies events;
- Outreach to skilled field volunteers;
- Potential field locations and species of interest;
- Protocols and standardized data forms for FS surveys and monitoring;
- Developing a list of preferred botanical authorities for FS data;
- Signing up volunteers for FS committee participation (sign up via email versus sign up via calendar); and
- Planning two events for May or June. ►

◄ Since studies can range from plant surveys, monitoring, or investigations, the committee will coordinate with the Denver Botanic Gardens, Colorado Natural Heritage Program, and others to help fill in gaps.

Send ideas or suggestions to Lara Duran. If you're interested in participating on the committee, please be sure to fill out this Google Questionnaire so we understand your level of interest. Please use this link to access the survey: https://goo.gl/forms/g7Yf2pOrnonHAXwv2.

# 2018 Event Calendar

## Chapter Meetings

(Please check the Events Calendar at CoNPS.org for updated information)

**Boulder Chapter Meetings:** 2nd Tuesday of the month (usually), Boulder Rural Fire Station, Gunbarrel, 7–8:30 pm
May 8: Weed Pull

**Metro-Denver Chapter Meetings**: 2nd Tuesday of the month (usually), Denver Botanic Gardens, Plant Society Building; 6:30–8:30 pm
May 15: Scotty Smith, "Colorado Orchids"
July 17: Marcia Tatroe, "Gardening with Natives"
Sept 11: Cynthia Reiners, "Comparison of Tucson, AZ and Front Range Flora"
Oct 9: Carol English, "Moffat County Flora"
Nov 13: Tom Schweich, "Early CO Botanists and Colorado Flora"
Dec 11: Holiday Party, etc.

**Northern Chapter Meetings**: 1st Tuesday of the month (usually), Gardens on Spring Creek, Fort Collins, 6:30 social; 7-8:30 pm, presentations
May 1: Jennifer Ackerfield, "Colorado Alpine Thistles"
June 19: Ann Grant, "Flora of Sand Creek Pass"
Fall dates scheduled; subject TBD

**Plateau Chapter Meetings**
Events TBD

**Southeast Chapter Meetings**: Cheyenne Mountain Library, 1785 S. 8th St., Colorado Springs, 1:30 pm
Events TBD

**Southwest Chapter Meetings**: Lyceum in the Center for Southwest Studies, Ft. Lewis campus, 6:30-8:00pm
Events TBD

**CoNPS Board Meetings**: JeffCo Extension Office, 15200 W 6th Ave, Golden,
Sundays, 10 am to 1 pm; May 6, October 21, December 2

## CoNPS Workshops

(To register for the workshops listed below, please go to CoNPS Calendar of Events website at conps.org. All workshops are on Saturdays, from 9am to 3pm unless stated otherwise.)

**"Cacti, etcetera"** (Plateau Chapter Workshop)
May 12, 9:30 am to 3:30 pm
Presenter: Don Campbell
Location: CSU Extension Office, Grand Junction, CO

This workshop involves a morning power point presentation and tour of the Chinle Cactus Society Garden at the Extension Office, lunch on your own, then a hike on the Old Gordon Trail in the Colorado National Monument.

*Pricklypear Cactus,* Optunia ssp. *© Kelly Ambler*

**“Vegetation Mapping and the Influence of Soils on Vegetation”**
May 19
Presenters: David L. Buckner, PhD and Carla DeMasters, MA
Location: 1077 S Cherryvale Rd., Boulder, CO

The need to map vegetation may arise for purely descriptive purposes or it may provide the basis for long-term landscape management decisions or planning. The first half of the workshop will be an overview of the physical/technological approaches to vegetation mapping followed by discussion of alternative conceptual, philosophical, and ecological approaches that are important to consider in identifying vegetation mapping units.

The second half of the workshop will address the influence of soils on both the natural distribution of vegetation as well as the effects soil characteristics have in the process of rehabilitation or "restoration" efforts. Discussion will include explanation of the soil properties that have shown themselves to be particularly important to native and naturalized plant growth, the use of soil survey information, and the process and resources available for soil analysis.

*David Buckner is a plant ecologist with nearly 50 years of field experience during which vegetation mapping and the need to know and interpret soil characteristics as they affect the distribution of plants on landscapes have been nearly continuous parts of his work. He has conducted workshops for CoNPS since the early 1990s on subjects including Grass Identification, Sunflower Family Plant Identification, Soils, and Landscape Reconstruction. He is an Honorary Lifetime Member of CoNPS and has led many field trips for the society.*

*Carla DeMasters is a plant ecologist with 15+ years of field experience and advanced training and skills in GIS. She has given several workshops for CoNPS and is a Certified Ecological Restoration Practitioner.*

**“Full Day Willow (Salix) Identification Course”**
June 3 **(Sunday)**, **8am to 5pm**
Presenter: Gwen Kittel
Location: Golden Gate Canyon State Park, Columbine Room at the Visitor Center

Come learn to identify commonly seen Colorado willows. This unique workshop includes both indoor time with specimens and outdoor field time. Golden Gate Canyon State Park & environs is home to 16 species of willows. Please bring a notebook, hand lens, lunch, water, hat, sunscreen and waterproof boots. Be prepared for short walk at 8 am.

Golden Gate Canyon State Park charges $7 entry fee per vehicle entering the park. Carpooling is recommended. Refreshments will be provided. Please bring a bagged lunch.

*Gwen Kittel, a botanist and riparian ecologist, has 30+ years of field experience and has developed a vegetative key to willows. She has recently revised her key. Please come help her test it!*

**"Native Bees of Colorado"**
June 16
Presenter: Ryan Bartlett
Location: Rocky Mountain Arsenal National Wildlife Refuge Contact Station

Did you know Colorado has almost 1000 species of bees? This class will start with a presentation of where, when, and how our native bees contribute to pollination. We will discuss diversity, conservation efforts, the positive/negative ecological impacts of honey bees, and strategies to promote native habitat. Then we will dive into learning the basics of bee identification of our 946 recorded species by learning how to recognize traits and classify into families, genera and species when applicable. We will take our new learned skills outside and look for bees and bee habitats and identify in the field. Ending our time with a fun quiz game of "bee or not bee" to test your knowledge.

No particular tools are required for this class, however, a hand lens or magnifying glass and butterfly net may come in handy during the field exercise. Class is limited to 20 participants.

*Ryan Bartlett is the founder of the organization Colorado Native Bee. He is a certified arborist, western herbalist, and a hobbyist entomologist and apiarist. Ryan started Colorado Native Bee to teach and promote bee diversity and habitat conservation. He enjoys sharing his love for all things nature, especially with his wife and two daughters.*

## CoNPS Native Plant Garden Tours

(Register for these tours on the CoNPS website)

**Fort Collins Area**
Saturday June 9, 9am
Habitat Hero Garden Tour, in partnership with Audubon Rockies
$20 ($25 with CoNPS Gardening Guide)
CoNPS volunteers needed for 2.5 hour shifts. Fees waived for volunteers and volunteers receive a free gardening guide. To volunteer, email Jamie Weise at jweiss@audubon.org

**Boulder Area**
Saturday, June 16, 9am to 1pm
In partnership with the Boulder County Audubon Society (BCAS)
$20 CoNPS/BCAS members; $30 non-members
Sponsored by the Terra Foundation

**Metro-Denver Area**
Saturday, June 30, 9am to 1pm
$20 CoNPS members; $30 non-members
Sponsored by the Terra Foundation

## CoNPS Fieldtrips

*(Please check the CoNPS Event Calendar for details and up-to-date information.)*

### Boulder Chapter

May 29: Wandering Botanist Hike, Joder Ranch
Leader: Patricia Butler
June 9: Sandstone Ranch Nature Area
Leader: Nate Schipper
July 10: Wandering Botanist Hike, Hessie trailhead
Leader: Pat Butler
July 19: Duck Lake
Leaders: Erica Cooper and Graham Fowler
August 14: Wandering Botanist Hike, Caribou Ranch
Leaders: Linda Boley and Erica Cooper

### Metro-Denver Chapter

May 11: Green Mountain, Jefferson County
Leader: Judy King
May 12: Cacti etcetera. Mesa County
Leader: Susan Carter
May 13: Washington Ave. Open Space, Jefferson Cty
Leader: Tom Schweich
May 21: Roxborough State Park, Littleton.
Leader: Susan Dunn
May 26: South Valley Park, Jefferson County.
Leader: Carol English
June 9: Golden Gate Canyon State Park, Golden
Leader: Judy King
June 10: Hildebrand Ranch Park, Littleton
Leader: John Vickery
June 12: Staunton State Park, Pine.
Leader: Lenore Mitchell
June 14: Reynolds Park
Leader: Kelly Ambler
June 16: Ranson/Edwards Homestead Open Space
Leader: Tom Schweich ►

◄ (Metro-Denver Chapter Field Trips *continued)*

June 17: Washington Avenue Open Space, Golden
Leader: Tom Schweich
June 23: West White Ranch Park, Golden
Leader: Carol English
July 16: Staunton State Park, Pine
Leader: Lenore Mitchell
July 21: Washington Avenue Open Space, Golden
Leader: Tom Schweich
July 22: Ranson/Edwards Homestead Open Space
Leader: Tom Schweich
July 25: Lake Isabelle Wildflower Hike, Ward
Leader: Jen Toews
July 28: Mount Goliath, Mount Evans Rd.
Leader: Carol English
August 25: Mount Flora, Berthoud Pass
Leader: Carol English
September 8: High Line Canal, Denver area
Leader: Chrissy Alba
Sept 22: Pine Valley Ranch Open Space
Leader: Carol English

## Northern Chapter Field Trips

May 12: Timber Trail, Lory State Park
Leader: Hugh Mackay
May 26: Red Mountain Open Space
Leader: Hugh Mackay
June 2: Wetlands of the Pawnee Grasslands
Leader: Trevor Roberts
June 23: Sand Creek Pass, Larimer County
Leader: Ann Grant
July 8: Intriguing Vegetation of Middle Bald Mountain
Leader: Trevor Roberts
July 11: Pinewood Reservoir
Leader: Maddie Maher
August 4: Snowy Range, Wyoming
Leader: Steve Hauptli

## Southeast Chapter Field Trips

June 24: Wetland Plants of Escalante Canyon
Leaders: Denise Culver and Pam Smith

## Southeast Chapter Field Trips

May 31: Southern Shortgrass Prairie, Pueblo Chemical Depot.
Leaders: Rich Rhoades and Ben Berlinger
June 14: Elk Park on Pikes Peak
Leader: Doris Drisgill
June 23: Yellow Ladyslippers
Leader: Doris Drisgill
July 28: Red Rock Canyon Open Space, Colorado Springs
Leader: Curtis Nimz

## Southwest Chapter Field Trips

May 26: Durango Nature Trail
Leader: Travis Ward
July 7: Windy Gap and Sharkstooth Trailhead
Leader: Bob Powell
July 14: Sharkstooth Pass
Leader: Scott Craig
July 18-19: Dolly Varden Peak
Leader John Bregar
July 22: Cumberland Pass
Leader: Bob Powell
July 28-29: Woods Lake (two hikes)
Leader: Connie Colter
August 4: Black Bear Pass
Leader: Scott Craig

# Cross Pollination Events

## Learn about "Tiny Plants in Small Places" July 19-22

"Tiny Plants in Tall Places" is an alpine field course offered by Mike Kintgen (Curator of Alpine Collections at Denver Botanic Gardens) and Bryan Fischer (CoNPS member and horticulturist with the Gardens on Spring Creek and the City of Fort Collins).

Join them for four days of alpine plant immersion in the Southern Rockies. Sponsored by the University of California's Jepson Herbarium and hosted at the University of Colorado's Niwot Research Station, this field course will take an in-depth look into regional alpine plants and the communities they create. Learn about the plants of wet and dry meadows, seeps, fell-fields, screes and snowfields, as well as about the beautiful but harsh environment they inhabit. July 19-22. Visit http://ucjeps.berkeley.edu/workshops/#Jul19 for more information.

May 3-5
**National Meeting of the Center for Plant Conservation**
Botanical Research Institute of Texas Fort Worth, TX
https://saveplants.org/events/

May 9-11
**Partners in the Outdoors Conference**
Colorado Parks and Wildlife
Breckenridge, CO ►

◄(Cross Pollination Events continued)

May 10
**Wildscape Ambassador 201 Workshop**
Audubon Rockies and PPAN
Longmont, CO
https://www.brownpapertickets.com/event/3362103

May 11
**National Public Gardens Day**
https://publicgardens.org/programs/national-public-gardens-day/about-national-public-gardens-day

May 18
**Plant Conservation Day**
https://www.bgci.org/news-and-events/news/1121/

May 18
**Endangered Species Day**
https://www.fws.gov/endangered/esday/index.html
http://endangered.org/campaigns/endangered-species-day/

May 18
**Worldwide Day of Botanical Art**
https://www.botanicalartworldwide.info/

May 22
**International Day for Biodiversity**
https://www.cbd.int/idb/

May 29-June 1
**Society of Wetland Scientists Annual Meeting**
Hilton Denver City Center, Denver, CO
https://www.swsanualmeeting.org

May 30
**Wildscape Ambassador 201 Workshop**
Audubon Rockies and PPAN
Colorado Springs, CO
Call 719-574-8058 to register

May 31
**Habitat Hero: Wildscaping 101**
Lory State Park, Bellvue, CO
https://www.brownpapertickets.com/event/3373710

June 8-10
**Botany Washington 2018**
Ocean Park Conference Center, Ocean Park, WA
http://www.wnps.org/botany_wa/index.html

June 9
**Habitat Hero Garden Tour**
Fort Collins, CO
https://www.brownpapertickets.com/event/3333540

June 10-16
**Colorado Native Plant Appreciation Week**

June 26-28
**Wetland Plant Identification Workshop**
Colorado Natural Heritage Program
Montrose, CO
Denise.culver@colostate.edu

June 29-July1
**Montana Native Plant Society Annual Meeting**
Lincoln, MT
http://www.mtnativeplants.org/annual%20meeting

July 6-8
**North American Rock Garden Society Annual Meeting**
St. John's, Newfoundland, Canada
https://nargs.org/news/2017-07-27/annual-meeting-newfoundland-july-6-8-2018

July 15-20
**International Symbiosis Society Congress**
Oregon State University, Corvallis, OR
https://symbiosissociety2018.org

July 21-23 (optional field trip July 24)
**Eriogonum Society Annual Meeting**
College of the Siskiyous
Weed, CA
http://www.eriogonum.org

July 20-22
**Wyoming Native Plant Society Annual Meeting**
Hams Fork Campground, La Barge, WY
www.wynps.org/activities/2018-annual-meeting/

July 21 - 25, 2018
**Botanical Society of America Conference 2018**
Rochester Civic Center, Rochester, MN
http://www.2018.botanyconference.org/

July 28-29
**Arizona Botany Annual Meeting**
Cochise College
Sierra Vista, AZ
www.aznps.com

July 30-August 1
**ISSS Annual Seed Longevity Workshop**
Colorado State University, Fort Collins, CO
https://conferencereg.colostate.edu/SeedLongevity2018
**Note: Abstracts due May 15, June 15**

July 31-August 2
**Wetland Plant Identification Workshop**
Colorado Natural Heritage Program
Leadville, CO
Denise.culver@colostate.edu

August 5-10
**Ecological Society of America Annual Meeting**
New Orleans, LA
https://esa.org/neworleans

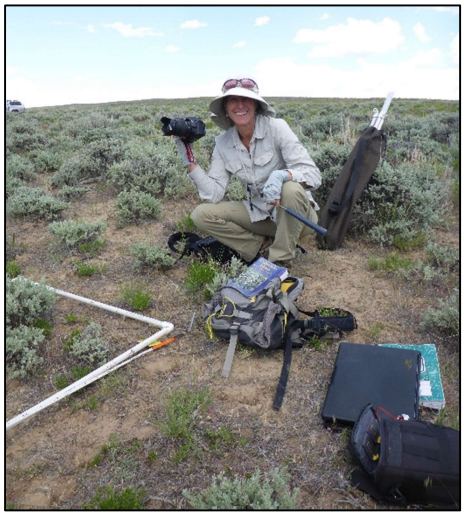
August 12-16
**American Bryological and Lichenological Society Conference**
Mountain Research Station, Nederland, CO
http://www.abls.org

# Member Profile: Carol English

## By Lenore Mitchell

Carol English grew up in the coastal mountain area of Saratoga, Northern California. A lucky little girl, she spent her days exploring redwood and oak forests in the mountains behind the family's big old 1910 house, accompanied by her Welsh pony or two goats and always by at least four dogs.

Her love of native plants began in earnest while backpacking in the Sierra Nevada every summer during high school years. Later, she lived in Steamboat Springs from 1985 to 1991 where more hiking increased her interest in wildflowers and their names. After moving back to Northern California, she worked for the Yosemite Institute teaching Environmental Education. While there, an ethnobotany class with Dr. Kat Anderson planted a seed for her love of flora deep in her heart and soul while she learned about the Miwok People of Yosemite Valley and how they used plants for food, but also for clothing, medicine, arrows, starting fire and much more.



Several years of evening classes in ethnobotany of Yosemite Valley followed, and then came additional botany classes. Carol holds a bachelor's degree in geology from UCSC as well as a secondary science teaching credential from San Jose State University, and also a master's in biology from University of Colorado, Denver where her thesis centered on the pollination biology of the rare endemic *Penstemon degeneri*. She spent three full summers in the mountains around Cañon City collecting data for her thesis.

Although Carol has always loved animals of all kinds, her current passion is Border Collies, and she has two in agility training. Conditioning is a crucial part of keeping her furry companions in shape, so she taught them to do push-ups, down dogs on command, back up onto a big ball with their back feet, walk sideways, and balance on inflated exercise peanuts. She admits you have to see them in action to believe it.

Carol, who began skiing at age four, remains active and loves to skate, ski, swim, mountain bike and road bike and she still loves hiking in the back country. Her only lament is lack of time to do it all.

A great day for this Colorado State Land Board botanist includes wandering around in the sagebrush of Moffat County in June with her border collies when *Penstemon yampaensis* is blooming. She'd be snapping a few photos and getting utterly lost in the beauty of the moment. After that, she and the dogs would head off somewhere around the Yampa River for a swim and some Frisbee (insert wagging tails here), then maybe she'd enjoy a dark beer and yummy dinner later on.

As for advice for amateur botanists and how to keep learning, she claims to often feel like an amateur herself because there's always more to learn. She's humbled by people like Loraine Yeatts, Janet Wingate, and Rick Brune. Carol says everyone should take lots of field classes all over the state if possible. She benefitted from all the Native Plant Master® classes she took with CSU and then subsequently taught herself after becoming a certified NPM.

She says teaching requires a person to really dig deep and have a thorough understanding, which is why she continually pushes herself to teach both evening lectures and field courses. She says teaching is a great way to keep learning, too. She encourages people to get comfortable using a plant key, be adventurous and head out with a friend or two and explore new places. So much of Colorado is made up of prairie habitat which is astoundingly beautiful and full of wonders.

She recommends exploring the prairies at Pawnee Buttes from late May to mid June Then, hit the foothills, for instance Jefferson County Open Space, which has dozens of parks to explore. Work your way up to montane, sub-alpine, then alpine. Use keys, but also become familiarized with botany books with photos and plant names. Good photos are great for beginners to use in confirming identifications.

"Once you think you know what a plant is," said Carol, "Work backwards in the key to help learn all the different characteristics." She suggests using the pocket-sized and simply illustrated books *Rocky Mountain Flower Finder* for treeline and below and the *Alpine Flower Finder* for above treeline (by Jan Wingate and Loraine Yeatts).

Carol's advice for life is to do what you love, and do it with all your heart and soul. If what you love is botany, then go for it. Talk to many other botanists and figure out what kind of work you'd like to do in relation to plants. She feels she lucked out and found a job that includes lots of fieldwork, which is what she truly loves. She notes that if she had life to do over, she'd become a botanist at a much earlier age.

Join Carol this spring and summer as she leads a series of field trips. Sign up online in the events calendar under Metro-Denver chapter headings.

*Lenore Mitchell, the current Metro-Denver Chapter president, is a long time member of CoNPS and an avid amateur who has taught Native Plant Master® courses for over a decade. Macro photography, hiking and gardening with natives also keeps her busy.*

# CoNPS Membership

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**CHAPTERS**: Boulder, Metro-Denver, Northern (Ft. Collins-Greeley), Plateau (Grand Junction & West Slope), Southeast (Colorado Springs-Pueblo), Southwest (Durango) or Unaffiliated

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□ **Check box to receive information on volunteer opportunities**

Most members receive the *Aquilegia* newsletter electronically.

□ Check the box if you would like to receive the printed copy of *Aquilegia*.

DUES include *Aquilegia* newsletter, published quarterly.

Membership dues cover a 12-month period.

□ New □ Renewal

□ Student $17 □ Senior (65+) $17 □ Individual $25
□ Family $35 □ Plant Lover $50 □ Supporting $100
□ Patron $250 □ Benefactor $500 □ Life Member $800

CONTRIBUTIONS to CoNPS are tax deductible:

**John Marr fund** for research on the biology and natural history of Colorado native plants $ _____

**Myrna P. Steinkamp Memorial fund** for research and other activities to benefit the rare plants of Colorado

$ _____

Total included: $ _____

Please make check payable to:
**Colorado Native Plant Society**

Send completed form and full remittance to:
CoNPS Office
PO Box 200
Fort Collins, CO 80522

## Help Inventory Native Plants at Sandstone Ranch

The Field Studies Committee is hosting a plant inventory event at Sandstone Ranch Open Space on May 20. Co-chairs Lara Duran and Steve Olson say that up to 15 slots are open for CoNPS members to participate.

The inventory will take place 8:30 AM to 12:30 PM and will include moderate cross-country walking (not on trails) up to three miles. CoNPS members with intermediate, advanced, or expert-level field botany skills are best suited to this activity. Registered participants should bring regular hiking gear with them as well as regular botanizing accoutrements.

CoNPS members are invited to join Douglas County staff and volunteers to conduct a plant inventory of this 2000-plus acre open space. Registered participants will divide up into small groups of nominally two to five people each. Each group will have an assigned area or section of Sandstone for which they will have primary responsibility. Some groups may be provided on-site transportation to their assigned area. Participants will be provided with a map of the site. It is possible that a preliminary plant list will be available. The ending time is flexible and expected to vary somewhat by group.

Everyone will meet at the same place and time before organizing into groups and receiving further instructions and background information on the site. All CoNPS participants will be accompanied at all times by Douglas Co. staff and/or volunteers. Because the event is on Douglas County property, participants must sign a Release and waiver of liability and assumption of risk agreement the day of the event. For more information, contact Lara at ld.ecowise@gmail.com. Register for the event on the CoNPS website.

# Can you ID these plants?

**By Lenore Mitchell**

(Answers below)











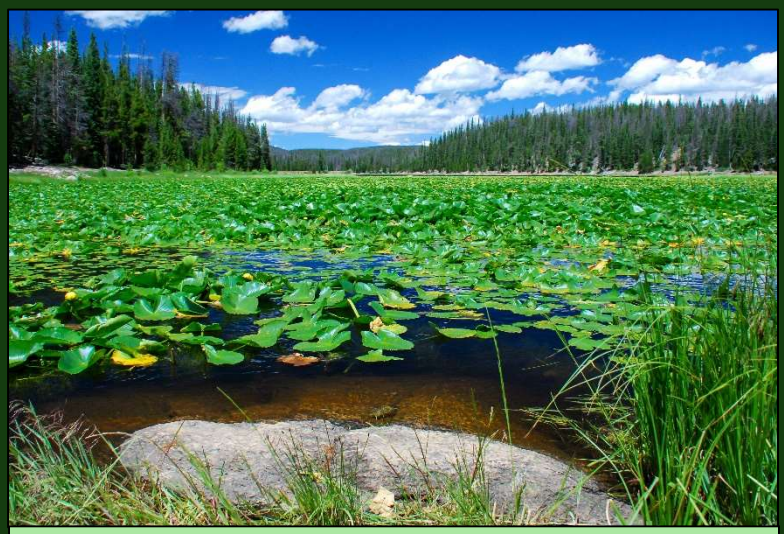


**Answers** (Clockwise from top left): ***Penstemon secundiflorus*** (side bells penstemon), Plantaginaceae (plantain) family. Can be found 4,800'-10,500' May - July. ***Thalictrum fendleri*** (meadow rue), Ranunculaceae (buttercup) family, staminate flower shown. Can be found 5,500'-12,700' June - August. ***Pyrola asarifolia*** (pink wintergreen), Ericaceae (heath) family. Can be found 7,000'-11,000' June - August. ***Castilleja rhexiifolia*** (spilleaf Indian paintbrush), Orobranchaceae (broomrape) family. Can be found 7,500'- 13,000' June - August. ***Chionophila jamesii*** (snowlover), Plantaginaceae (plantain) family. Can be found 11,000'-14,000'. ***Pedicularis groenlandica*** (little pink elephants, elephant's head), Orobanchaceae (broomrape) family. Can be found 7,500'-13,500'. Can be found June – August. 

Colorado Native Plant Society
P.O. Box 200
Fort Collins, Colorado 80522
http://www.conps.org

**Check out the Native Plant Garden Tours for this summer!**

**See page 26**



Lost Lake, 70 miles west of Fort Collins
© Laurie Paulik, CoNPS member, Northern Chapter

**September 14-16**

**CoNPS Annual Rare Plant Symposium and Conference**

**"Knowledge, Advocacy, and Change"**

Northside Aztlan Community Center
112 E. Willow Street
Fort Collins, CO 80524

**- Rare Plant Symposium -**
**- Annual Conference -**
**- Half-day Field Trips -**
**- Full-day Field Trips -**