



Aquilegia



2014 CoNPS Photo Contest Winners
WORKSHOP ISSUE

Volume 38, No. 4 Fall 2014

CoNPS 2014 Photo Contest - Second and Third Place



Beehive Cactus
Native Plant Category, 2nd Place
Clair Postmus



Cottonwood on the S. Platte River
Native Plant Landscape 2nd Place
Skot Latona



Moss Sporophytes
Artistic Category, 2nd Place
Audrey Boag



Parmelia and *Xanthoparmelia* Lichens Repurposed
Native Plants & Wildlife Category, 2nd Place
Audrey Boag



Old-Man-of-the-Mountain
Native Plant Category, 3rd place
Skot Latona



Asters & Butterfly
Native Plants & Wildlife Category, 3rd Place
Linda Smith



Frasera speciosa Meadow
Native Plant Landscape Category, 3rd Place
Loraine Yeatts

Cover - First Place Winners

Upper row L to R: *Penstemon hallii* - Loraine Yeatts *Monarda fistulosa* with *Hyles lineata* - Audrey Boag
Lower row L to R: Mountain Mahogany swirls - Skot Latona *Saxifraga austromontana* - Tom Zeiner

Aquilegia: Newsletter of the Colorado Native Plant Society

The Colorado Native Plant Society is dedicated to furthering the knowledge, appreciation, and conservation of native plants and habitats of Colorado through education, stewardship, and advocacy.

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CoNPS was founded in 1976

Botanicum absurdum by Rob Pudim



Cartoon © Rob Pudim

News & Announcements

Message from the Editor

It has been an eventful summer and fall. A record number of field trips took place, the winners of the CoNPS 2014 Photo contest were selected, and the CoNPS 2014 Annual Meeting and Colorado Rare Plant Symposium took place October 3-5 in Fort Collins with more than 100 people in attendance. The meeting was filled with energy and enthusiasm. The keynote speech by Dan Gluesenkamp, Executive Director of the California Native Plant Society (CNPS) was informative and inspirational. A summary of the meeting is included in this issue (pages 15-20) with reporting by a number of CoNPS members. A big thanks to the conference committee of the Northern Chapter for putting together the conference and to sponsors for helping to fund the meeting (see pages 30 and 31).

This is the workshop issue of *Aquilegia* and CoNPS' new workshop chair, Ronda Koski, has done an excellent job of arranging a number of interesting workshops throughout the state. Please let Ronda know how much you appreciate her hard work. The Chapters have also been busy putting together their schedule of programs.

The news, workshops schedule, chapter program schedule, and CoNPS calendar are on pages 3-14, so you can print off these 12 pages and read the rest of the issue on your computer, if you wish.

Jan Loechell Turner, Editor, *Aquilegia*

CoNPS 2014 Photo Contest Winners

The competition was extremely fierce this year with 20 photographers entering the contest and with 108 photographs submitted. The photographers' names were removed from the photos to avoid bias and four CoNPS members who have never participated as judges for the photo contest did the judging this year. The quality of all of the participants' photos was outstanding and the judges had a very difficult time selecting the winners.

With such a vast number of excellent photographs entered in the contest, it was decided to add two additional categories: Artistic/Impressionistic and Native Plants & Wildlife.

The first place winners (photos displayed on the cover of this issue of *Aquilegia*) were:

Loraine Yeatts, *Penstemon hallii* (Native Plant Category) - Top left cover photo

Tom Zeiner, *Saxifraga austromontana* (Native Landscape Category) - Lower right cover photo

Skot Latona, Mountain Mahogany Swirls (Artistic Category) - Lower left cover photo

Audrey Boag, *Monarda fistulosa* with *Hyles lineata* (Native Plants & Wildlife Category) - Upper right cover photo

The cash awards (\$50 each) went only to the first place winners but it was decided to designate 2nd and 3rd place in each category in recognition of additional outstanding photos. The following photographers were recognized for their photos: Clair Postmus, Beehive cactus (Native Plant Category, 2nd Place); Skot Latona, Cottonwoods on the S. Platte R. (Native Plant Landscape Category, 2nd Place); Audrey Boag, Moss sporophytes (Artistic, 2nd Place); Audrey Boag, *Parmelia* and *Xanthoparmelia* lichens repurposed (Native Plants & Wildlife, 2nd Place); Skot Latona, Old Man of the Mountain (Native Plant Category, 3rd place); Loraine Yeatts, *Frasera speciosa* meadow (Native Plant Landscape Category, 3rd Place); and Linda Smith, Asters and butterflies (Native Plants & Wildlife Category, 3rd Place). The first place photos and many other photos entered in the contest will appear in this and future issues of *Aquilegia* and in the CoNPS 2015 Calendar.

Happy 96th Birthday Bill Weber!

William A. Weber was born November 16, 1918, in New York. He was 94 when the 4th edition of *Colorado Flora: Eastern Slope and Colorado Flora: Western Slope* by Bill Weber and Ron Wittmann was published in 2012.

The Naturalist: Honoring the Life and Work of William A. Weber

An exhibition about Weber's life and achievements is on display at the Norlin Library 2nd floor southwest through 2015. Dr. Weber will join the event in his honor on November 12th, which is free and open to the public, starting at 4:30 p.m. on the 5th floor of Norlin Library. Light refreshments will be served. The University Libraries selected Dr. Weber as a "CU Legend." Photo by Heather Harris



Board Meeting Scheduled for November 1, 2014

The next meeting of the CoNPS Board of Directors will be held Saturday, November 1, 2014, from 9 - 11 a.m. in the Tracy Room (Room 201) of Dayton Memorial Library, Regis University, Denver, CO 80221. The Library is located near the corner of Regis Blvd. and Lowell Blvd. in northwest Denver not far from Federal Blvd. and I-70. Members are invited but please RSVP (JLTurner@regis.edu) so we will know how many to expect. Space is limited.

City of Boulder Position Announcement: GIS Analyst/Database Developer - Natural Resources

<https://bouldercolorado.gov/human-resources/jobs-and-volunteer>

Under general supervision, provide innovative technical solutions that aid in the management of the natural resources and recreational opportunities found within the Open Space and Mountain Parks (OSMP). Use spatial data collection, Geographic Information System (GIS), and complex data analysis techniques to inform management decisions. Assist with database development, using a Relational Database Management System (RDBMS). Support organizational information needs and provide a coordinated data storage,

retrieval, analysis and archiving resource. Closing date 11/02/14.

WRV seeks a Senior Director of Projects and Partnerships

Wildlands Restoration Volunteers engages thousands of volunteers each year through over 100 restoration and stewardship projects across Colorado and southern Wyoming. This important position will build and maintain strategic partnerships with dozens of government land management agencies, community organizations, and funders with the purpose to identify and develop new ecological restoration projects, and raise funding for those projects, across WRV's entire geographical range.

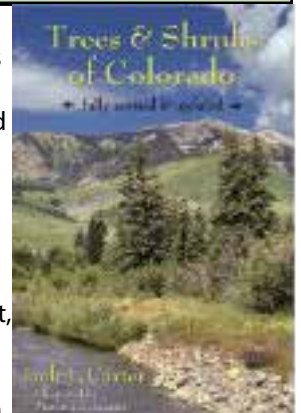
To apply and for more information: http://www.wrv.org/wrv_forms/WRV_SDPP_Announcement.doc

ATTENTION: COLORADO BIOLOGY AND BOTANY TEACHERS

Offer of Free Trees & Shrubs Books from Jack and Martha Carter



Over the past 100 years we have seen significant increases in the scientific knowledge of plants. Yet over the past half century it has become obvious that the United States is suffering from a severe case of plant blindness. Both children and adults know far less and have a much more limited understanding of the green plants that surround them than did their parents and grandparents.



It has been demonstrated that high school graduates have little knowledge of the flora that surrounds them and the plants that define the ecosystems in which they reside. Many students are simply not cognizant of the plants that occur in their immediate environment, providing the oxygen they breathe and removing the carbon dioxide from the atmosphere. It has also been suggested that there are limited numbers of teachers with a background in the plant sciences adequate for teaching basic botany in today's schools and colleges. In some cases it might be that even if the teachers were qualified, the curriculum includes little or no information concerning the native flora. In terms of the survival of most living systems, including humankind, it just might be that this information is as important as understanding the role of the cell, DNA, RNA and various aspects of human health.

Jack and Martha Carter, through Mimbres Publishing, have been searching for ways in which we might assist school biology teachers and college professors in strengthening the teaching of botany throughout Colorado. Although we have sold over 1500 copies of our *Trees & Shrubs of Colorado*, very few copies have gone into school and college classrooms. We seriously want to reach more students who will in the future be making important decisions concerning the protection of the flora of Colorado. In order to reach this objective we would like to provide some assistance to educational institutions that have a botanical education program, or wish to expand and strengthen their plant science program. For those who are interested, Mimbres Publishing would provide a classroom set (about 22 books) of their *Trees & Shrubs of Colorado* at no cost to the institution and the teachers responsible for the botany program.

Ideally we would like to reach 30 teachers who would be interested in preparing a proposal (not more than one page) describing their botany program or the program they would like to develop. For IRS purposes there should also be a letter from the principal or science supervisor approving the program. We would need some assurance that the teacher would set aside a block of time to teach a unit on plants, and/or would teach an intermittent program throughout the year. The program should be designed to fit the school schedule and curriculum.

Please send your proposal to Jack L. Carter, P. O. Box 1244, Silver City, NM 88062 or apacheplume29@gmail.com

Questions call 575-388-9221

Photo printed with permission from Jack Carter

California Native Plant Society (CNPS) Conservation Conference, Jan. 15-17 Workshops & Field Trips Jan. 13-14, San Jose, CA

Register by October 31 for Early Registration discount.
<http://www.cnps.org/cnps/conservation/conference/2015/>

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Welcome New Webmaster, Sally Dunphy!

CoNPS is delighted to welcome Sally Dunphy as the new CoNPS webmaster. We will have more information in the next issue.

Native Plant Rescue Makes Cover of Science News

The October 18, 2014 issue features rescue of *Dudleyas* in CA.

COLORADO NATIVE PLANT SOCIETY 2015 Calendar



The CoNPS 2015 Calendar made its debut at the Annual Meeting Book Sale. It will soon be available through the CoNPS online bookstore for \$12. This year's calendar was produced on heavy stock and features the photos of the CoNPS 2014 photo contest winners. CoNPS President, Charlie Turner, is responsible for the layout and design. The calendar has a spiral binding and it is beautiful! And this year it includes Thanksgiving!

High Altitude Restoration Science & Practice Conference

March 10-12, 2015, Colorado State University, Fort Collins

The High Altitude Revegetation Organization and the Central Rockies Chapter of the Society for Ecological Restoration will host a joint conference titled "High Altitude Restoration Science & Practice" on March 10-12, 2015. The aim of the conference is to connect practitioners, scientists, land managers, students, and policymakers to enhance our understanding of restoration theory and practice in diverse ecosystems using a variety of methods. <http://chapter.ser.org/centralrockies/event/har-cerser-2015-joint-conference/>

BCNA Grants – Call for Proposals

The Boulder County Nature Association (BCNA) is a private, non-profit membership organization committed to preserving the natural history of our region through research, documentation and public education. BCNA is pleased to offer research funding by giving small grants for projects consistent with their mission. For more information visit <http://bcna.org/grantapplications.html>; applications should be submitted no later than February 7, 2015.

Plant Lists!

Are you going on a hike and need plant lists? CoNPS has plant lists from field trips on our website http://www.conps.org/Activities/lists_keys.shtml. If you have led a CoNPS field trip, please turn in the list of plants you saw on your trip to Linda Smith at conpsoffice@aol.com.

You can also generate plant lists for specific areas using SEINet, (<http://swbiodiversity.org/portal/index.php>) See article in *Aquilegia*, Winter 2013, pages 3-5 for details.

Native Plant Sale and Seed Swap

On Saturday, September 20, Dave Sutherland of City of Boulder Open Space and Mountain Parks hosted the Front Range Wild Ones/CoNPS Plant Sale and Seed Swap at his yard in Boulder. Representing Front Range Wild Ones and CoNPS, Susan Crick Smith, Director of Education at the Plains Conservation Center, and Linda Hellow coordinated the plant sale and seed swap.

Linda observed that two of the participants had recently moved to Colorado from the midwest and were interested in landscaping their new yards with native plants.



Susan Smith, Linda Hellow, Dave Sutherland

Dave's yard contains a large area devoted to prairie plants native to the Boulder area including grasses (blue grama, buffalo grass) and wildflowers (prairie coneflower, hairy golden-aster). In addition to the thriving prairie, the yard has a number of native trees and shrubs. The ponderosa and pinyon pines have grown quickly and the mountain ash looked showy with its abundance of red-orange berries.

In the front yard along the street, drought tolerant shrubs provided interesting forms and a colorful display with rabbitbrush, cholla, and a variety of asters.



Watch this news column for announcements of future plant sales and seed swaps held by Front Range Wild Ones and CoNPS.

Photos by Jan Loechell Turner

Peter Lesica

The biographical note at the end of Peter Lesica's article, "How Lupines Talk to Bees," was accidentally omitted in the Summer 2014 issue (p.11) of *Aquilegia*. Peter Lesica is a free-lance botanist and plant ecologist who has been exploring the flora and vegetation of Montana for over 40 years. Peter has authored the *Manual of Montana Vascular Plants*. See page 27 of this issue for the book review by Rudi Schmid.

Your E-Mail Address is Important!

Be sure that you keep a current e-mail address and mailing address with Linda Smith at conpsoffice@aol.com. Your email address is kept private but we need it to send updates, important news, and the link to the latest issue of *Aquilegia*. You may receive *Aquilegia* by email or print but remember that you will receive the print copy 1-2 weeks after the electronic version. To try to keep print subscribers up-to-date, we send a link to the online PDF file of *Aquilegia* via email.

Help Native Plant Garden in Estes Park

I take care of Mrs. Walsh's Garden in Estes Park. We are open to the public (usually) and our mission is to educate and inspire by demonstrating native plants of Estes and the surrounding Rocky Mountain region.

We had extensive damage during the flood last year. The garden has been closed since last September. We (the garden is now owned by Community Foundation of Northern Colorado) finally have a contract for rock mitigation work to be accomplished this fall.

Most of the vegetation on the back half of the garden was wiped out by the collapse of the cliff face and the subsequent clean out of the debris. We will lose even more vegetation with the rock mitigation work.

The good news is that CFNC is committed to reopening the garden next year. Part of the garden, including the pond/waterfall, will be reconfigured as we view the unfortunate flood damage as an opportunity to make the garden better than its previous condition.

I am wanting a person or persons that would be willing to help me with ideas for plants to include and how best to include them. Anyone interested can call me at 303-887-7709 or email jsapplandscape@gmail.com. Thanks. *Joan Sapp*

Volunteer with us! Program Director, Metro Denver CoNPS

The Metro Denver CoNPS Chapter is seeking a Program Director to schedule programs for 2015-16. This volunteer will be responsible for scheduling monthly programs and will have the opportunity to meet and interact with speakers and CoNPS members to identify speakers, program topics, and coordinate meeting announcements with the webmaster, newsletter editor, and other club officers. It's a great way to meet people and get involved. Contact Jannette Wesley at metrodenverconps@gmail.com if interested.

Citizen Science Projects for Plant Lovers

Project Budburst (<http://budburst.org>) and USA National Phenology Network (<https://www.usanpn.org>) provide volunteers the opportunity to collect data about plants that can help scientists learn more about how plants change through the seasons. See page 30 for more information.

Funding for Prairie/Savanna Research

Prairie Biotic Research (PBR) is an all-volunteer, Wisconsin nonprofit established in 2000 to foster basic biotic research in prairies and savannas. One way they do this is through a competitive Small Grants Program that funds grants up to \$1000 to individuals for the study of any grassland taxon anywhere in the USA. They support both natural history and experimental science. They support independent researchers (those lacking institutional support), having a U.S. Social Security number. Your proposal must be received through the mail before December 31, 2014. For forms and information contact prairiebioticresearch.org

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CoNPS 2014 CALENDAR

OCTOBER 2014

Oct. 25 Sat. Restoration Workshop, RMAWR, 9 am-3 p.m
Oct. 26, Sun. Restoration Workshop, RMAWR, 9 am-3 pm
Oct. 28, Tues. Gardening with Cold Hardy Cacti, 7 p.m. (D)

NOVEMBER 2014

Nov. 1 & 2, Sat. & Sun. Ethnobotany Workshop, Greeley, 9-3 (N)
Nov. 6, Thurs. Conservation of Plants of the Western Himalayas, 7 pm (N)
Nov. 8, Sat. Restoration Workshop Field Trip 10 am -6 pm
Nov. 12, Wed. "Naturalist" Exhibit, Dr. Weber, 4:30 - 7 pm (p. 4)
Nov. 12, Wed. Biology of *Ipomopsis ramosa*, Durango (SJ)
Nov. 13, Thurs. Butterflies & Their Host Plants (B)
Nov. 15, Sat. *Phacelia* & *Aliciella* Workshop, Longmont, 9 am - 3 pm (N)
Nov. 22, Sat. *Phacelia* & *Aliciella* Workshop, Loveland, 9-3 pm (B)

DECEMBER 2014

Dec. 2, Tues., Weed Management in Arapahoe County, 7 pm (D)
Dec. 13, Sat. *Phacelia* & *Aliciella* Workshop, Avon, 9 am-3 pm (GR)

JANUARY 2015

Jan. 13-17 California Native Plant Society (CNPS) Conservation Conference, San Jose, CA
Jan. 17, Sat. Grass ID Workshop, Grand Junction, 9 am-3 pm
Jan. 27, Tues. Denver Chapter Meeting, TBA, 7 p.m.
Jan. 31, Sat. Landscaping with Native Plants, Loveland, 9-3

FEBRUARY 2015

Feb. 14, Sat., Sunflower Family Workshop, RMAWR, 9 am-3 pm
Feb. 15, Sun. Sunflower Family Workshop, RMAWR, 9 am-3 pm
Feb. 19-21 Colorado Environmental Film Festival, Golden
Feb. 24, Tues. Extreme Rich Fens, Englewood 7 pm (D)

MARCH 2015

March 10-12 High Altitude Restoration Science & Practice Conference, Fort Collins
Mar. 21, Sat., Grass ID Workshop, Pueblo, 9 am-3 pm
Mar. 24, Tues. U.S. 36 *Spiranthes* Migration, 7 pm (D)
Mar. 28, Sat. Landscaping with Native Plants, Pueblo, 9-3

April 2015

Apr. 25, Sat. Grass ID Workshop, Castle Rock, 9 am-3 pm
Apr. 28, Tues. Benefits of Conserving Biodiversity, 7 pm (D)

JULY 2015

July 17-19 Native Plant Society of New Mexico Annual Meeting, Durango, CO (SJ)

KEY

B	Boulder Chapter	N	Northern Chapter
GR	Gore Range Chapter	P	Plateau Chapter
MD	Metro-Denver Chapter	SE	Southeast Chapter
		SJ	San Juan/4 Corners

CoNPS WORKSHOPS

The Colorado Native Plant Society Workshops are exceptional learning experiences for professional and amateur botanists alike.

Workshop presenters are experts on Colorado flora and are very generous in sharing their knowledge and time. They come with plant samples and hands-on exercises designed to expand your plant identification skills and ecological understanding.

Workshops are held at various locations throughout Colorado, with the majority at venues along the Front Range.

Workshops begin at 9 am and end between 3 and 4 pm.

Workshops are limited to 15-30 people, depending on location, and priority is given to CoNPS members.

We encourage you to register early.

We suggest participants bring a lunch, hand lens, pad of paper (for notes and drawings), pencil(s) and pen and any other materials as noted below, to each workshop. Beverages and snacks will be provided.



Castilleja integra Photo © Charlie & Jan Turner

This year's Workshops have been organized by CoNPS Workshop Coordinator Ronda Koski with input from former Workshop Coordinator, Linda Hellow. If you have suggestions for future workshops, please contact Ronda Koski at conpsworkshops@gmail.com.

Workshop costs:

One-day workshop - \$30 (CoNPS Members) / \$40 (non-members)

Two-day workshop - \$60 (CoNPS Members) / \$80 (non-members)

Additional field sessions associated with some of the workshops - \$15 (CoNPS Members) / \$30 (non-members)

To become a CoNPS member, visit <http://www.conps.org>. Click on the Membership page.

To register, visit <http://www.conps.org>. Click on the Activities/Workshops page, <http://www.conps.org/Activities/workshops.shtml>

You can pay with Paypal or credit card, or check.

If paying via check, fill out the *mail-in registration form*, make check payable to "CoNPS" and send to:

CoNPS, c/o Linda Smith at 4057 Cottonwood Drive, Loveland, CO 80538

For any questions regarding registration, please contact Linda Smith at conpsoffice@aol.com.

For questions about workshop content or locations, please contact Ronda Koski at conpsworkshops@gmail.com.

Please check the website periodically for updates and additional workshops.

2014-2015 Workshop Schedule

Restoration: Principles and Techniques

Two-day workshop (One day of classroom instruction; choose Saturday or Sunday session) plus one day of in-field instruction and demonstration.

Cost: \$45 (non-member price \$70)

Classroom Sessions

Saturday, October 25 OR Sunday, October 26, 2014, 9 am - 3 pm - Indicate desired date when registering!

Location: Rocky Mountain Arsenal Wildlife Refuge, 6550 Gateway Road, Commerce City, CO 80022

Workshop will be in a classroom in the Contact Station. Look for signs that will direct you to the classroom.

Presenters: David Buckner and Carla DeMasters

Field Session

Saturday, November 8, 2014, 10 am - 6 pm (or earlier)

Location: Near Erie, CO (exact location will be announced during each workshop session)

Presenters: David Buckner and Carla DeMasters

David and Carla will provide practical instruction on basic restoration principles and techniques. Topics covered in the indoor sessions will include important concepts of ecological design and expectations as well as nuts and bolts details relating to design seed mixes for specific situations, working with pure-live-seed rates, seeds per square foot and related seed density considerations, topsoil salvage and replacement, site preparation, seasonal considerations, mulches, erosion control, and other topics of practical significance.

For the follow up field session, we will visit a reclamation equipment yard to discuss the use of different tools in site preparation and seeding (Courtesy of Mark Phillips, Phillips Seeding). We will also visit a restoration site to talk about techniques of revegetation, soil considerations, and methods for on-going documentation of results (monitoring).

***David Buckner** is a plant ecologist with 45 years of field experience. He was educated at University of Colorado at Boulder (B.A., M.A., Ph.D. 1977). Since then he has worked across the western U.S. in assessment of plant community composition and the recovery of disturbed and rehabilitated sites. He has also conducted work in the development and implementation of specifications for restoration of disturbances following construction or mineral extraction. He has familiarity with both the theory of restoration and its practical implementation in the field. He is familiar with soils, plant materials, husbandry practices, erosion control and mulching materials, and the quantitative evaluation of the results against performance standards. He has conducted previous workshops for CONPS on the Asteraceae, Poaceae and Soils.*

***Carla DeMasters** has worked as a Plant Ecologist/Botanist in the western United States for more than 10 years. Much of her work has included the quantitative monitoring of vegetation on coal mine reclamation. She has a Master's degree in Geography from the University of Colorado at Boulder, where she studied the biogeography of reproductive modes in *Erigeron strigosus* (prairie fleabane). She is interested in the conservation and restoration of plant species and communities. She enjoys spending time outdoors with her family and botanizing with friends.*

Ethnobotany: The Fascinating Study of the Relationships between Peoples and Plants

Two-day workshop

Cost: \$60 (non-member price \$80)

Saturday, November 1 AND Sunday, November 2, 2014; 9 am – 3 pm

Location: Poudre Learning Center, 8313 West F Street, Greeley, CO 80631

Presenter: Don Hazlett, Ethnobotanist, Denver Botanic Gardens

Saturday, November 1: Great Plains Ethnobotany and Folklore

Don will begin the session with an introduction on current trends in ethnobotany and ethnobiology research, followed by discussion of specific plant species from eastern Colorado and the Great Plains, and a presentation of the insights to ethnobotany available from the translations of Native American plant names. Attendees are encouraged to participate in the discussions and to share the ethnobotany stories that have been passed down through their families!

Sunday, November 2: Tropical & Latin American Ethnobotany

Don will show and discuss plants from the ethnobotany materials collection maintained at Denver Botanic Gardens. Attendees will learn intriguing information about the names given to many of our common nuts and grains. Key topics will be herbal plants sold in hispanic "boticas" (pharmacies) in CO, NM and TX. Santeria herbal plants, many from Cuba, are also sold: these will be discussed as well. These are the syncretism or merging of plants and rituals from African slaves in the Antilles with Catholic religion and Native American traditions.

***Donald L. Hazlett, Ph.D.**, earned his doctorate in tropical forest ecology (Honduras) from the University of Washington, Seattle in 1980. Don lived and worked as a botanist in tropical countries for 10 years and is still actively working on several Honduran floristic projects. He also provides scholarships for Honduran botanists. However, as a native of the Colorado steppe (Fowler) Don has long been addicted to learning the names and uses for shortgrass steppe plants (Note: He sometimes looks at mountain plants: usually if they have an ethnobotanical use). He has been a member of the Colorado Native Plant Society since 1984. Among his more than 25 peer-reviewed*



Yucca baccata Photo © Charles & Jan Turner

publications (a mix of tropical and steppe topics) are vascular plant checklists from the Pawnee, Comanche, Kiowa, and Rita Blanca National Grasslands. For the past 20 years Don has specialized in ethnobotany and has prepared a series of shortgrass steppe essays that includes folklore and ethnobotanical topics. He maintains a master list of all steppe plants (6 states). On this list are annotations, such as translations of indigenous plant names, Spanish common names, plant uses, ecological notes, and a few humorous (at least to some) anecdotes attributed to Plainsman Pete. Plainsman Pete is a fictional curmudgeon of the Plains with an endless supply of stories. I often doubt the validity of Pete's stories, but he assures me that they are as true now as they ever were!

Phacelia and Aliciella: Two Genera Rich with Endemic Species - Notes from the Field and Beyond

Cost: \$30 (non-member price \$80)

This one-day workshop will be presented on the following three dates at the specified venue, 9 a.m. - 3 p.m.

Saturday, November 15, 2014, Boulder County Extension Office, 9595 Nelson Road, Longmont, CO 80501

Saturday, November 22, 2014, High Plains Environmental Center, 1854 Piney River Drive, Loveland, CO 80538

Saturday, December 13, 2014, Walking Mountains Science Center, 318 Walking Mountains Lane, Avon, CO 81620

Indicate desired date when registering!

Presenter: Luke Tembrock

Luke Tembrock will teach how to identify endemic species of *Phacelia* (members of Hydrophyllaceae) and *Aliciella* (members of Polemoniaceae), and will share other fascinating information about these genera.

If you have copies of the following books, please bring them with you:

Colorado Flora: Eastern Slope (Fourth Edition) by William A. Weber and Ronald C. Wittmann

Colorado Flora: Western Slope (Fourth Edition) by William A. Weber and Ronald C. Wittmann

A few copies of these books will be available for workshop attendees to use during the workshop session.

Luke Tembrock is a Ph.D. Candidate in the Department of Biology at Colorado State University. In addition to his interests in species of *Phacelia* and *Aliciella*, Luke is interested in the evolution of plants that are cultivated by humans, and in particular the genetic changes that take place in these plants as humans move them from their wild centers of origin. Luke has studied this evolutionary process in the stimulant drug plant *Catha edulis* (Qat), for which there is a well-documented written history, and thus a set of testable hypotheses. In his research, Luke employs methods from the fields of phylogeography and population genetics to test said hypotheses. Luke is also interested in the evolution of alkaloids (especially those that affect the human central nervous system) and related molecules in plants. He employs techniques from analytical chemistry, phylogenetics, and ethnobotany to study these alkaloids.

Grass Identification Workshop

One-day workshop offered on 3 separate dates and locations; Indicate desired date when registering! **9 a.m. - 3 p.m.**

Cost: \$30 (non-member price \$45)

Saturday, January 17, 2015 - Colorado Mesa University, 1100 North Avenue, Grand Junction, CO; 9 a.m.-3 p.m.

Workshop will be in room 302 in Wubben Hall. Look for signs that will direct you to the classroom.

OR

Saturday, March 21, 2015 - Pueblo County Extension, 701 Court Street, Pueblo, CO 81003; 9 a.m.-3 p.m.

OR

Saturday, April 25, 2015 - Douglas County Extension, 410 Fairgrounds Road, Castle Rock, CO 80104; 9 a.m.-3 p.m.

Workshop will be in the CSU Extension Building - Garden Level Conference Room

Presenter: Rich Rhoades



Phacelia formosula © Scotty Smith



Bouteloua gracilis. USDA-NRCS PLANTS Database / Hitchcock, A.S. (rev. A. Chase). 1950. Manual of the grasses of the United States. USDA Miscellaneous Publication No. 200. Washington, DC http://plants.usda.gov/java/largeImage?imageID=bogr2_001_avd.tif

This workshop is designed to provide a basic knowledge of grass morphology and terminology as it pertains to identifying grasses. Workshop attendees will use "Illustrated Keys to the Grasses of Colorado" by Janet Wingate to learn how to use keys to identify common grass species. Rich will provide a brief presentation about grasses, and the remainder of the workshop will be devoted to keying out a variety of species. At the end of the workshop attendees will have the ability to key out many common grass species.

If you have copies of the following books, please bring them with you:

Illustrated Keys to the Grasses of Colorado by Janet Wingate

How to Identify Grasses and Grasslike Plants by H.D. Harrington

Colorado Flora: Eastern Slope (Fourth Edition) by William A. Weber and Ronald C. Wittmann

Colorado Flora: Western Slope (Fourth Edition) by William A. Weber and Ronald C. Wittmann

A few copies of these books will be available for workshop attendees to use during the workshop session.

Rich Rhoades is District Conservationist with Natural Resources Conservation Service (NRCS) in Pueblo, Colorado. Rich graduated from Colorado State University with a B.S. degree in Range and Forest Management. Rich has worked for the NRCS (SCS) for 38 years in the Sterling, Eads and Pueblo Field Offices. Grass identification is important in his work with ranchers, rural landowners, reclamation and revegetation.

Landscaping with Native Plants

One-day workshop on two separate dates and locations; 9 a.m. - 3 p.m. Indicate desired date when registering!

Cost: \$30 (non-member price \$46)

Saturday, January 31, 2015 - High Plains Environmental Center, 1854 Piney River Drive, Loveland, CO 80538

OR

Saturday, March 28, 2015 - Pueblo County Extension, 701 Court Street, Pueblo, CO 81003

Presenter: Jim Tolstrup

Jim will talk about some of the Colorado native species commonly used in planted landscapes and provide planting suggestions.

Workshop attendees will have the opportunity to design their own native garden, so be sure to bring drawing paper, pencils, and an eraser!

Jim Tolstrup is the Executive Director of the High Plains Environmental Center in Loveland, Colorado. High Plains Environmental Center is a unique model for preserving native biodiversity in midst of development. Jim works to promote the conservation, restoration and landscape use of native plants and is the State Education and Outreach Chair for the Colorado Native Plant Society. His past work experience includes serving as Land Stewardship Director of Shambhala Mountain Center in Red Feather Lakes, Colorado, and running his own landscape design business in Kennebunkport, Maine, where he installed gardens at George and Barbara Bush's "Summer White House."



Photo ©Jim Borland

Jim holds a Certificate in Gardening Arts from the Landscape Institute of Harvard University and the Arnold Arboretum; he has written numerous articles on gardening and environmental stewardship for various publications, and is a past recipient of Denver Water's Xeriscape Award, ALCC's Excellence in Landscaping Merit Award, ASLA Land Stewardship Award, and the Sustainable Living Association's Sustainable Contribution Award. Growing up in an urban environment near Boston, Maine, Jim had to "look hard to find nature." This background has led to a strong sense of empathy for people, and children in particular, who don't have access to the restorative qualities of nature in their daily lives.

How to Know the Sunflower Family: Learning the Terminology, the Major Groups, and the Ecology of this Major World-Wide Family

One-day workshop on two separate dates, 9 a.m. - 3 p.m. Indicate desired date when registering!

Cost: \$30 (non-member price \$45)

Dates: Saturday, February 14, 2015 OR Sunday, February 15, 2015

Location: Rocky Mountain Arsenal Wildlife Refuge, 6550 Gateway Road, Commerce City, CO 80022

Workshop will be in a classroom in the Contact Station. Look for signs that will direct you to the classroom.

Presenters: David Buckner and Carla DeMasters

This workshop will cover the basics needed to identify members of the Sunflower family (Asteraceae) including structures and their names (often unique to the Asteraceae). Streamlined visual flow charts to the tribes of the family will be provided. Evolution and ecology of the Asteraceae will also be covered. David will have specimens of western U.S. species available for examination and materials will also be available for dissection to allow participants to become familiar with the appearance of previously unfamiliar structures —phyllaries, receptacle, pappus, etc.

If you have copies of the following books, please bring them with you:

Colorado Flora: Eastern Slope (Fourth Edition) by William A. Weber and Ronald C. Wittmann

Colorado Flora: Western Slope (Fourth Edition) by William A. Weber and Ronald C. Wittmann

A few copies of these books will be available for workshop attendees to use during the workshop session.

David Buckner is a plant ecologist with 45 years of field experience, during which time knowledge of Asteraceae has been a tool used more or less continuously, given the ubiquity of members of this family. He has conducted previous workshops for CONPS on the Asteraceae, Poaceae and Soils. He was educated at University of Colorado at Boulder (B.A., M.A., Ph.D. 1977). Since then he has worked across the western U.S. in assessment of plant community composition and the recovery of disturbed and rehabilitated sites.

Carla DeMasters has worked as a Plant Ecologist/Botanist in the western United States for more than 10 years. Much of her work has included the quantitative monitoring of vegetation on coal mine reclamation. She has a Master's degree in Geography from the University of Colorado at Boulder, where she studied the biogeography of reproductive modes in *Erigeron strigosus* (prairie fleabane). She is interested in the conservation and restoration of plant species and communities. She enjoys spending time outdoors with her family and botanizing with friends.



Erigeron pinnatisectus Photo © Bob Powell

Chapter Events

BOULDER CHAPTER

Winter chapter meetings will be held at the West Boulder Senior Center at 6:30 p.m. every 2nd Thursday, November through April. We hope that this location will be easier to find and parking should be a breeze in the center's dedicated parking lot. The building is downtown off Arapahoe and 9th, just west of the Library (909 Arapahoe Ave., Boulder, CO 80303). Future speakers will be announced via this newsletter and the website, so stay tuned. The Chapter meeting schedule is on the CoNPS website, <http://www.conps.org/Chapters/boulder.shtml>

Field Trip: Tallgrass prairie, Tuesday, Oct 14 5-6:30 p.m.

Join OSMP Plant Ecologist Lynn Riedel to learn about tall grass prairies. Lynn will discuss grasses and forbs, including species identification and the ecology behind these local plant communities. These tallgrass prairie relicts should be showing beautiful colors this time of year, making for a pleasant sunset hike. Exact location TBD and communicated to those registered. Please contact Lynn directly to register: RiedelL@bouldercolorado.gov

Field Trip: The Miraculous World of Mosses -Boulder Friday, October 24, 9 a.m.-1 p.m.

Explore the world of mosses with Ron Wittmann. Learn how to shift gears from the more familiar methods of looking at flowering plants to those used for mosses. For

more information or to register: Megan Bowes, bowesm@bouldercolorado.gov or call 303-561-4883. Ron is the co-author of the Colorado Flora and Bryophytes of Colorado.

Thursday, Nov. 13, 6:30 pm Butterflies and their Host Plants Boulder Chapter Meeting

Speaker: Christian Nunes, City of Boulder Open Space and Mountain Parks

Location **West Boulder Senior Center** (behind Boulder Main Branch Library)

CoNPS Workshop: *Phacelia* and *Aliciella*, Nov 22, 9 am - 2pm

Learn more about these two genera rich with endemic species, with notes from the field and beyond. Presented by CSU Graduate Student Luke Tembrock.

The Boulder Chapter workshop will be held on November 22 from 9 a.m.-2 p.m. at the Boulder County Extension Office in Longmont. For more information and to register, contact Luke at luke.country@yahoo.com



Photo @ Dave Elin



Aliciella haydenii

Photo © Loraine Yeatts

GORE RANGE CHAPTER

CoNPS Workshop:

Phacelia and Alicelia: two genera rich with endemic species - notes from the field and beyond", presented by CSU Graduate Student Luke Tembrock

December 13, from 9 am to 2 pm

Walking Mountains Science Center, Avon.

Description on page 9.

METRO DENVER CHAPTER

Metro Denver Chapter is seeking a Program Director

Please contact Jannette Wesley if you are interesting in volunteering or would like additional information about the position. metrodenverconps@gmail.com

Gardening with Cold Hardy Cacti

Kelly Grummons

October 28, 2014, Tuesday, 7 pm

Daniels Center, 101 Monroe St, Denver

Kelly Grummons studied botany and horticulture at the University of Wyoming and Colorado State University in the early '80's and moved to Denver in '86 to work as a horticulturist at an enormous retail nursery (Paulino Gardens). He developed systems for growing over 2000 varieties of native and exotic perennial plants. While in Denver he met Al Frost who introduced him to Mary Ann Heacock. Mrs. Heacock had compiled an impressive collection of choice plants including many wonderful cacti, Penstemons, native bulbs and native collected bonsai. Mary Ann Heacock became Kelly's mentor and fellow cactiphile. The trio began traveling the West, discovering and rediscovering populations of native cacti and Penstemons. These trips and his friendships with other plant junkies helped Kelly collect and grow hardy cacti from the most garden worthy species and varieties from across North America. Kelly is a co-owner of Timberline Gardens (www.timberlinegardens.com) located in Arvada, CO.

The talk will emphasize native cacti and present an overview of the many beautiful cacti, century plants (*Agave* spp.), yuccas, and their relatives that thrive in our harsh climate. These plants look as good in the winter garden as they do in the summer. Timberline is well known for its work with these hardy plants and is expert at using them in the garden.

Weed Management in Arapahoe County

Russell Johnson

December 2, 2014, Tuesday, 7 pm

Anderson Room, Englewood Public Library, 1000 Englewood Parkway

Denver Chapter Meeting

January 27, 2015 – TBA

Extreme Rich Fens

Carol English

February 24, 2015, 7 pm

Englewood Public Library, 1000 Englewood Parkway



Eriophorum angustifolium

© Loraine Yeatts

Carol English grew up loving the outdoors and spent her high school summers backpacking in the Sierra Nevada. She received a BS degree in Earth Science from UCSC, and then promptly moved to Steamboat Springs, CO learning to telemark ski, rock climb and kayak. She then taught environmental science for 10 years at both Yosemite Institute in California and at Lookout Mountain Nature Center in Colorado. After that she received a master's degree in Biology and studied the pollination biology of the lovely, rare and endemic *Penstemon degeneri* that occurs in and around Cañon City, Colorado. Carol now works as a Conservation Biologist for the Colorado State Land Board. She travels the state working on various biological projects including extreme rich fens in South Park, and greater sage grouse work in Western Colorado.

Extreme rich fens are unique and amazing habitats that are rare on this planet. The plants, plant communities and animals in these ecosystems have adapted beautifully to harsh and extreme conditions. Colorado is home to some of these rare ecosystems due to a unique set of conditions that occur in Park County, Colorado. I will introduce and explain why these extreme rich fens occur and how they differ from other wetlands and fens. I will also share with you many photos of the plants and plant communities that live in these ecosystems.

US 36 *Spiranthes* Mitigation

Samantha Clark

March 24, 2015, Tuesday, 7 pm

Englewood Public Library, 1000 Englewood Parkway

Samantha Clark is a biologist with more than 20 years of experience in wetland, riparian and upland mitigation design and construction/mitigation monitoring. Ms. Clark has worked very closely on the US 36 Phase 2 mitigation with CDOT staff including Patrick Hickey, Wetland and Wildlife Biologist with CDOT Region 4 and Tim Buntrock, CDOT Environmental Manager for the US 36 Express Lane/BRT Project

Section 7 of the Endangered Species Act mitigation for the construction of US 36 Phase 2 was completed in the spring of 2014. Mitigation goals included the creation of habitat for the Preble's meadow jumping mouse and Ute ladies'-tresses orchid (ULTO) on a 24 acre parcel located in Boulder County, Colorado. This presentation focuses on the creation of ULTO habitat including grading plan/specification development and agency/contractor coordination that occurred to relocate ULTO plants and sod to the mitigation site.

The Benefits of Conserving Biodiversity: A Case Study in Jefferson County, Colorado

Pam Smith

April 28, 2015, Tuesday, 7 pm

Location TBA

Pam Smith is a Field Botanist and Ecologist for the Colorado Natural Heritage Program at Colorado State University in Fort Collins, Colorado. She has a BS in Environmental Biology from Ohio University, Athens, Ohio and an MS in Biology from Andrews University, Berrien Springs, MI.

Have you ever wondered why do rare species really matter? As more people are utilizing our natural resources it becomes imperative to understand the benefits of conserving our natural landscapes and their biodiversity and sharing it with local and regional land planners and resource managers.

Critical sites for biodiversity have been shown to provide disproportionate benefits to people. In Jefferson County Colorado, the Open Space Program began a proactive initiative to protect not only open lands but high quality large landscapes.

Two studies conducted by the Colorado Natural Heritage Program at Colorado State University over two decades (one in 1993 and one in 2011) demonstrate the benefits of the conservation of critical sites for biodiversity. We will take a photo tour of some of the exciting and unexpected finds that have resulted from the conservation of high quality, biologically diverse sites.

NORTHERN CHAPTER

The Northern Chapter meetings will take place at the Gardens on Spring Creek (2145 Center Ave, Fort Collins, CO 80526)
The Northern Chapter meetings will take place at the Gardens on Spring Creek (2145 Center Ave, Fort Collins, CO 80526)

Conservation of the Medicinal and Aromatic Plants of the Western Himalayas

Dave Anderson

Nov 6, 2014, Thurs., 7 p.m.

Gardens on Spring Creek, Fort Collins

Dave Anderson spent 6 weeks in India in the summer of 2014 working with researchers at the Wildlife Institute of India to exchange conservation practices and identify priority landscapes for the conservation of some of India's rarest plants. He'll show us some of the rarest and most spectacular plants of the Western Himalayas, mixed in with photos and stories of Northern India's people, landscapes, and natural and cultural heritage sites.

Dave's background includes many years of conducting biological research, with an emphasis on the monitoring and management of natural resources. Mr. Anderson is the chief scientist and director of the Colorado Natural Heritage

Program, Warner College of Natural Resources, Colorado State University. In his current role he works with a broad range of stakeholders throughout Colorado and elsewhere to address conservation challenges through collaborative development and the application of data and tools to biodiversity conservation priority setting.

Program descriptions will be posted on the CoNPS website once they are available.

Holiday Potluck, Dec 3 WEDNESDAY 6 p.m.

Program TBA, Thursday, Jan. 8, Gardens on Spring Creek

Program TBA, Thursday, Feb. 5, Gardens on Spring Creek

Program TBA, Thursday, Mar. 5, Gardens on Spring Creek

Program TBA, Thursday, Apr. 2, Gardens on Spring Creek

PLATEAU CHAPTER

***Phacelia* and *Aliciella*: two genera rich with endemic species - notes from the field and beyond**, presented by CSU Graduate Student Luke Tembrock. Description on p. 9.

The workshop will be held **December 13, from 9 am to 2 pm** at the Walking Mountains Science Center, Avon.

SOUTHEAST CHAPTER

Grass Identification Workshop

One-day workshop, 9 am – 3 pm, Cost: \$30

Saturday, March 21, 2015 - Pueblo County Extension, 701 Court Street, Pueblo, CO

Saturday, April 25, 2015 - Douglas County Extension, 410 Fairgrounds Road, Castle Rock, CO 80104; 9 a.m.-3 p.m.

Workshop will be in the CSU Extension Building - Garden Level Conference Room

Presenter: Rich Rhoades

Indicate desired date when registering!. See p. 10 for details.

San Juan/4 Corners NPS

See <http://www.swcoloradowildflowers.com/San%20Juan%20Four%20Corners%20Native%20Plant%20Society.htm> for details.

The San Juan/Four Corners Native Plant Society holds its lecture series at the Center of Southwest Studies, Lycium Room, Fort Lewis College in Durango. See <http://www.swcoloradowildflowers.com/San%20Juan%20Four%20Corners%20Native%20Plant%20Society.htm> for details.

Oct. 29, Human Bear Conflicts in the Greater Durango Area

Nov. 12, Biology of the Newly Discovered Phlox, *Ipomopsis ramosa*

Feb. 11, From Desert Dust to Mountain Snow to Desert Dust

March 11, Climbing with the Wildflowers in Ecuador

Reports on the 2014 CoNPS Annual Meeting

The CoNPS 2014 Annual Meeting this year was interesting and informative with its focus on collaboration with other organizations with a similar mission. Dave Anderson, Executive Director and Chief Scientist, Colorado Natural Heritage Program, introduced the meeting and welcomed keynote speaker Dan



Gluesenkamp, Executive Director of the prestigious California Native Plant Society, which has over 10,000 members. Another exciting aspect of the meeting is that CoNPS had visiting dignitaries: Barbara Fix, President of the Native Plant Society of New Mexico, and Dorothy Tuthill, President of the Wyoming Native Plant Society. Talk about cross-pollination!



Photos on this page & page 16 by Charlie Turner

The other major focus of the meeting was native plant gardening/landscaping and a number of speakers presented a variety of talks on the subject on Saturday and Sunday. Ackerfield's *Flora of Colorado*, CSU Herbarium's database, challenges of collecting seeds from wild populations, and plant community responses to the High Park Fire were other topics covered at the meeting.

Our thanks to the Northern Chapter for organizing the 2014 Annual Conference. Committee members included Ronda Koski, Hugh Mackay, Nan Daniels, Lynn Rubright, Connie Gray, Jan Loechell Turner, and Irene Shonle.

A summary of the talks and field trips by reporters Jessica Smith, Kelly Ambler, Ann Grant, Judy von Ahlefeldt, Erica Cooper, and Ronda Koski follows.

Dan Gluesenkamp's Keynote Speech by Kelly Ambler

Dr. Dan Gluesenkamp, Executive Director of the California Native Plant Society, gave an excellent talk on "Reaching Out, Looking Forward: A Report on the Past, Present, and Prospects for California Plant Conservation". He briefly outlined the events from the past (plate tectonics, and the relationships between the ocean, mountains, and deserts) that have shaped California's amazing biodiversity over time. Much more recently, humans have had the most influence over California's ecosystems. These human activities eventually led to the formation of the California Native Plant Society (CNPS) and other organizations, which have worked to protect the plants and their habitats. The three primary human-caused threats to plants and ecosystems are habitat loss, biologic invasions, and pollution.

CNPS has grown from a small group of concerned gardeners and botanists to a membership of around 10,000 with 34 chapters, including the newest Baja California (Mexico) chapter. Since the beginning of their alliance, the major focus of CNPS has been to protect the plants native to the California ecosystems. The five following programs are utilized to achieve this goal: 1) reclaim lost opportunities (turn urban sites into native plant habitats); 2) conservation activities (preserve sites with minimal or no alteration); 3) map California's vegetation distribution according to rigorous standards; 4) rare plants program (mapping, DNA sequencing, data collection over time); and 5) resurrection initiative (locate populations

of plants thought to be extirpated and recover rare plants through propagation of herbaria seeds).

Gluesenkamp ended his talk with a reminder that individual species do matter. Conservation successes require rigorous data collection standards. And these data should drive our plans. Modeling is only as good as the data. Finally, the public interest in native plants can be increased through native plant sales and landscaping, active citizen scientist programs and legislation advocacy.



Panel: Synergy Through Collaboration by Kelly Ambler

Irene Shonle (CSU Extension's Colorado Native Plant Master Program) led a panel discussion on "Synergy Through Collaboration". Other panel participants included Nick Daniel (Denver Botanic Gardens), Dan Gluesenkamp (California Native Plant Society), Don Hajar (Pawnee Buttes Seed Inc.), and Susan Smith (Front Range Wild Ones). The goal of the discussion was to bring together individuals with a range of experiences and perspectives to brainstorm on improving collaboration



between different organizations concerned with protecting native plants and their habitats. The main point each of the panelists made was to educate the public about what each of their organizations is

capable of doing. Other salient suggestions included getting different native plant societies to share ideas and resources with each other and to encourage citizen scientists.

Waterwise Wildlife Gardening: Jim Knopf, Landscape Architect

by Ann Grant

Jim Knopf broke landscape design down into some easy-to-remember principles. One of the things he stressed is the importance of grouping together plants in the landscape according to their water needs: high, medium, low, and very low or none. Areas included in the no water zone are gravel, stone and paved surfaces. These no-water zones should not be next to areas requiring high water, such as a blue grass lawn.



In order to have wildlife in the garden, he stressed that their habitat essentials must be provided year-round. These essentials are food, water, and shelter. Consideration must be given to providing food especially year-round. For instance, plants with seeds and berries that persist into late winter will encourage bird populations. Small water features, such as bird baths, can be engineered passively for delivery of fresh water. He also provided a list of waterwise plants known to provide food or cover for many species.

He touched on the issue of "Mischief Management", when the garden becomes attractive to species you may not have had in mind, such as deer eating favorite plants or the problem of large carnivores attracted by the deer. The talk was sprinkled with many practical examples, humor, and cartoons apropos of the subject.

Progress Report on the Upcoming *Flora of Colorado*: Jennifer Ackerfield, Collections Manager, CSU

by Ann Grant

As Collections Manager of the Herbarium and instructor of the course "Plant Identification" at Colorado State University (CSU), Jennifer has frequently observed students struggling to key out and identify unknown plant species. At her office,



Photo © Ann Grant

many references are readily available to help with this task. In the field, this is not possible.

Through her position at CSU for 20 years, she has been developing a new flora for Colorado, due to be published this spring. It has a robust dichotomous key, offering many features to effectively aid the keying out of flowering plants. The new Flora will reflect modern phylogenetics, have keys that cover major and important characteristics, and provide photographs of major delimiting characteristics. Species descriptions include habitat and flowering times, and common names. Distribution maps are from vouchered sources, and she hopes these maps will highlight geographical areas for further plant exploration and discovery.



The book is being published through the Botanical Research Institute of Texas and is coming out this spring. Online advertising says "The aim of this guide is to enable students, researchers, amateur and professional botanists, or anyone interested in the flora of Colorado to successfully identify plants with confidence and satisfaction."

The book can be pre-ordered at the Shop Brit website, <http://shop.brit.org/products/coloradoflora>. **CoNPS members can receive a 10% discount, using the code CoNPS2014.**

Building Biodiversity into Gardens:

Larry Vickerman

by Kelly Ambler

Larry Vickerman, Director of the Denver Botanic Gardens at Chatfield, spoke to us about "Building Biodiversity into Gardens" and about his unique opportunity to design several acres of biodiverse gardens around the new visitor center at Chatfield. The vast majority of the plants in the new gardens are native to the Rocky Mountains and surrounding prairies and are arranged into different habitats based on the amount of water required by the plant communities.

Biodiversity is defined by the number of different, distinct types of organisms living in a given area. A biodiverse habitat may be more resilient to pests and pathogens while improving conditions for many beneficial organisms, including pollinators. During the last century, Earth has seen a dramatic decrease in biodiverse acreage due to large-scale agriculture and urban spread. Increasing biodiversity in our gardens is one way to offset the impact of our disruption of native habitat.

The following are important points to consider when establishing a biodiverse garden. Addition of compost is the number one amendment for soil improvement. Proper plant selection includes a wide variety of flowering plants that

bloom over a long period of time and a mix of trees and shrubs with fruit and seeds in a layered vegetation pattern. These arrangements will minimize or eliminate the use of fertilizer and pesticides. Finally, a liberal use of rocks and boulders will provide shelter for beneficial insects.

Opportunities and Challenges of Making Collections from Wild Populations: Christina Walters

by Jessica Peterson Smith

The National Center for Genetic Resource Preservation (NCGRP) acts as a library of genetic diversity. Their main mission is to preserve genetic resources for agriculture, but their services are also used for conservation of threatened and endangered plants, forensics, and to study evolution. For example, the Center has looked at plant diseases, as well as studying wild land races of agricultural crops to understand how these species have responded to climate changes over time.

Dr. Walters stressed that the NCGRP is in the business of preserving genetic diversity, not saving species. They can only stop the clock. They preserve plants, animals, insects and microbes by storing germplasm, living tissue that is totipotent (another organism can be derived from the material). They have cryogenic facilities that can store material at -20° C. Along with seeds they store pollen and plant cuttings. They have more than 900,000 accessions.

There are challenges with preserving genetic material from wild populations. Wild populations are much more heterogeneous than an agricultural crop; therefore, it is much harder to get a representative sample. A key challenge is acquiring enough samples to capture genetic diversity but not overwhelming the storage facility. Dr. Chris Richards with the Center solved this problem for a wild species, *Helianthus pumilus*. With a genetic analysis of the population, he determined that there were two main geographic groups with similar genetic composition. He was able to sample only these two representative groups, rather than 29 populations, to capture the geographic diversity.

Finally, there can also be challenges in storing seeds. Some seeds, such as avocado and other tropical species, are recalcitrant, meaning they do not last long in storage. Luckily, seeds in a temperate climate such as ours do not typically have this problem. The Center is also working on non-destructive techniques to monitor seed viability.

Restoring Native Plants in the Midst of Development: Jim Tolstrup

by Jessica Peterson Smith

Jim Tolstrup discussed a sustainable housing community in Loveland, called The Lakes at Centerra, which is including a new facility for the High Plains Environmental Center (HPEC) in its design. The HPEC is being funded by the development itself, using a fee for building in this 3000-unit housing development. The center will have a large role in the design of the community. The HPEC will review the landscaping of the houses, manage open space, and the proceeds from the



HPEC Nursery Photo by Jim Tolstrup

land management will fund staff and outreach programs.

This development is repurposing weedy, agricultural land. A massive re-grading project has created wetland and upland environments, all seeded with specially

designed native seed mixes. The mixes recommended by state and local government agencies included reed canary grass, smooth brome, and crested wheatgrass, but HPEC removed those species in favor of native grasses. Most of the backyards have direct access to open space, and there will be a STEM (Science, Technology, Engineering, and Mathematics) school in the neighborhood. Ten acres of open space will be retained without any human access for a wildlife retreat.

Tolstrup maintains that restoring native biodiversity in the built environment requires significant outreach and community engagement on multiple levels. He believes we need to understand other people's needs to leverage our conservation goals. His goal has been to engage developers and make this process replicable.

This talk began with some staggering statistics: the average person in Colorado uses 150 gallons of water per day and 60% of that goes to residential landscaping. In light of this, can we incorporate nature into the human footprint? Mr. Tolstrup recommended the books *Bring Nature Home* by Douglas Tallamy and *Last Child in the Woods* by Richard Louv for additional reading. The HPEC website is www.suburbitat.org.

Putting 135 Years of CSU Herbarium Specimens Online: Colin Gerety

Gerety described the software strategies he devised, working with Collections Manager Jennifer Ackerfield, to digitally catalog the large number of specimen accessions. This enables on-line users to research and identify specimens using high-resolution photos of the items cataloged, along with standard information of collector, date and location, and any notes. To date, about 60,000 specimens have been databased.

The procedure for imaging herbarium specimens and making them viewable on the internet was discussed, stressing the greatly broadened availability to researchers of the CSU collection, both singly and together with about 20 other herbaria through SEINet (Southwest Environmental Information Network) with its maps and dynamic checklists.

Gerety also talked about future plans for the website, including mapping capabilities showing the distributions of species and searching for specimens via a small subset of characteristics (such as flower color, elevation, etc.) The CSU Herbarium website is at <http://herbarium.biology.colostate.edu/collection/specimens/>

Plant Community Responses to the High Park Fire: John Giordanengo

by Ann Grant

In June of 2012, lightning struck in the mountains west of Fort Collins and an intense wildfire eventually burned over 87,000 acres. At the time the High Park Fire was possibly the worst wildfire in Colorado history, but since then has been surpassed in acreage and loss to property by other very destructive fires later in 2012 and 2013. The flames and smoke could be seen as far east as Weld County. John conducted studies in revegetation to assist the process of restoration. The process involved several steps: site protection (e.g., from cattle), slope stabilization, revegetation with ecotypic species, and monitoring.

It is an accepted convention that seed needs to be raked in to promote germination and to help prevent it from being eaten by wildlife. On steep and partially wooded terrain, this can only be done by hand. It is dirty and arduous work, performed frequently by volunteers. The study used three test models, sowing native grass seed in raked and non-raked areas, both covered by mulch, plus a control with no planting and no mulch. Percent of revegetation was measured in 2013 and 2014 using a special measuring device that allowed for accurate recordings. In the first year, there was no appreciable difference in percent of cover between “rake” and “no rake” plots, both showing about 80% cover, with the control only 9%. In 2014, the mulched areas were a little higher, but the control increased to almost 60%. The type of vegetative cover, grasses, forbs, shrubs, and weeds was also measured, with the seeded areas showing only about 2% weeds, and the controls about 13% weeds relative to all species present.

The results suggest that seeding with native, ecotypical grass seeds can enhance and speed the normal restoration process, while inhibiting weeds. They also show that raking may not always be necessary, which John remarked would be of great relief to restoration volunteers.

The Wild Ones Come to Colorado

by Kelly Ambler

Susan Smith (Director, Plains Conservation Center) and Linda Hellow (Free-lance Writer) introduced us to Wild Ones: Native Plants, Natural Landscapes, a national organization promoting the use of native plants in landscaping projects in the session on “The Wild Ones Comes to Colorado”. Their motto is “Healing the Earth, one yard at a time.”

Wild Ones started in 1979 in Milwaukee, WI, and has gradually expanded to a consortium of 34 chapters. Their general mission is to “... promote environmentally sound landscaping practices to preserve biodiversity through the preservation, restoration and establishment of native plant communities.” They work towards this goal by providing resources to gardeners and homeowners in order to encourage landscaping with native plants. These resources include educational materials and workshops, providing connections to native

plant sources, and help with modifying HOA or municipality weed ordinances. In addition, the organization is involved with community projects such as seed collection or weed pulling. An important focus of the national organization is the ‘Wild for Monarchs’ campaign. The Front Range Wild Ones hope to become a regional “go-to” site for connecting the general public to native plant information.



REPORTS ON FIELD TRIPS

Post-Fire Plant Community Succession on Emergency Watershed Protection Sites in the High Park Fire Burn Area

by Judy von Ahlefeldt



Left: untreated area Right: John and others in seeded area
Photos by Judy von Ahlefeldt

Restoration Ecologist and former CoNPS Board member John Giordanengo led a field trip to experimental restoration sites in Redstone Canyon west of Horsetooth Reservoir on the High Park Fire burn area.

The Emergency Watershed Protection-funded work on private land was designed to test whether raking in grass seed made a difference in reseeding success. John concluded that by the second year there was not a significant difference in raking in and straw mulching versus broadcasting only and mulching.

The seeded areas had more overall basal cover than untreated areas for both 2013 and 2014, but control areas were catching up in 2014. Regarding the recovery of native plants, John found a suite of native vegetation (especially perennial shrubs and grasses) in the untreated areas. Native resprouting plants were largely absent in the seeded plots, as were native grasses and forbs, but they were coexisting with early seral stage plants (weedy ruderals) in the untreated areas.

The group had some lively discussions about the possible effects of seeding cultivars on the trajectory of native

ecosystem recovery after fires and alteration of succession. Steve Popovich led an interesting discussion on the non-existence of completely weed-free seed, and the group discussed possible effects on local ecotypes from infusion of genes from native plants that do not have accession from local plant populations. The desirability of having supplies of local seed for restoration work was also discussed.

Red Mountain Open Space Field Trip by Kelly Ambler

The field trip to Red Mountain Open Space was led by an enthusiastic Pam Smith of the Colorado Natural Heritage Program. The nine participants in this field trip ranged from plant novices to those that have



Photo © Kelly Ambler

led plant workshops themselves. The Red Mountain Open Space is home to at least nine globally rare plant communities and ten globally rare plants (http://www.co.larimer.co.us/parks/red_mountain_plan.pdf). Four of the rare plant communities are comprised of healthy stands of *Cercocarpus montanus* (mountain mahogany) mixed with different dominant grasses (*Muhlenbergia montana*, *Pseudoroegneria spicata*, *Stipa comata*, and *Stipa neomexicana*). We were able to directly observe three of these communities. Although some of the valley floors have been impacted by cattle grazing, much of the area remains undisturbed by human activities. Pam took us on the Bent Rock loop trail, where we saw plenty of plants still blooming while others were putting on their fall foliage. Pam's knowledge of how the geology affected the plant communities was enlightening. Overall, we identified well more than three dozen plants, including the two rare plants, *Lomatium nuttallii* (dog parsley, *Aletes nuttallii* in Weber), and *Aletes tenuifolius* (slender parsley, aka *Musineon tenuifolium*), of the Apiaceae family. We felt quite privileged to find these plants at a time of year when they aren't easily observable. All of us thoroughly enjoyed our morning in Red Mountain Open Space and I, for one, look forward to visiting this area again.

Lory Park Field Trip by Erica Cooper

We had a great hike! There were about 8 of us of various skill levels. As we started the hike, we stumbled upon a grass that confused the most talented of our botanists, so we took this



Rattlesnake photo © Nicole Ellison

as an opportunity to practice keying grasses! We actually used three different keys, and after a little bit of trial and error, each got to the same grass in each of our keys (Ackerfield, Weber & Wittmann, and Wingate). The grass was *Arrhenatherum elatius*, false oat-grass. We continued and actually found a surprising number of plants still in

bloom, though they were inconspicuous and could easily be overlooked for those not searching for them. We were also able to discuss family and genus characteristics without flowers, sometimes just getting to genus is good enough! We took a break at a natural spring where we keyed out a number of plants, then continued on to discuss lichens and ferns on the adjacent cliffs, where we lunched and saw *Epilobium turions*. Wandering down the trail through the ponderosa pine forest we encountered *Astragalus canadensis*. We continued more quickly along the loop through a burned area and stumbled upon a rather large rattlesnake just a couple feet off the trail, close to the parking lot! It was an exciting end to an educational and fun hike on a beautiful day!

The Gardens on Spring Creek Tour & Talks by Ronda Koski

Sherry Fuller, one of the Horticulturists at the Gardens on Spring Creek, greeted CoNPS members at the Gardens on Spring Creek at 9:00 a.m. on Sunday morning.

Fuller provided an informative welcome to the six CoNPS members who attended the "non-hiking field trip." Sherry then took us on a tour of the Gardens. Although there is no designated "native garden" currently at the Gardens, there are plans in the future for gardens that will feature Colorado native plants.

Native plant gardens will provide a wonderful opportunity for CoNPS to collaborate with the Gardens on Spring Creek!

Nick Daniel, Horticulturist at the Denver Botanic Gardens (along with his wife), joined us at the Gardens around 11:00 a.m.

After concluding the tour of the Gardens, the group moved into the Evelyn Clark Classroom where Nick gave a beautiful presentation about the native plant gardens at the Denver Botanic Gardens.

There are several gardens at DBG's main facility on York Street that incorporate Colorado native plants including the Birds and Bees Walk, the Dryland Mesa, the Gates Montane Garden, the Laura Smith Porter Plains Garden, and the Western Panoramas. In addition to the main botanical collections at the York Street location, Denver Botanic Gardens has two satellite locations elsewhere in Colorado: DBG Chatfield and DBG Mount Goliath (<http://www.botanicgardens.org/our-gardens>). Nick encouraged CoNPS members to plan a visit to all of the DBG locations!

Don Hijar, owner of Pawnee Buttes Seed Inc. (<http://www.pawneebuttesseed.com>) located in Greeley, joined the group for lunch.

Don shared some delightful stories as we ate our lunches in the attractive timber frame Outdoor Classroom.

After finishing lunch, the small but enthusiastic group of botanists moved back inside the Evelyn Clark Classroom where Don gave a presentation about the native seed industry and highlighted many of his favorite Colorado native plants.

Book Sale, Silent Auction, & Food

A number of volunteers gave their time and energy to make the Annual Meeting a success. There were also a number of generous donors including Hugh Mackay who donated time in his cabin along the Poudre River for the silent auction. There was obvious excitement around the tables of books and the tables with silent auction items. If there are two things CoNPS members love, it is plants and books. Another thing they love is food and we had delicious food at the meeting. The apple crumb cake at the luncheon was amazing!

Posters were displayed by Larimer County Natural Resources (they just came out with a native plant guide to Larimer County - see p. 26) and Judy von Ahlefeldt, who provided a poster about logging threats in the Black Forest. This year we asked for sponsors and we received generous support from a number of businesses, organizations, and individuals (see pages 30 and 31 for a list). CoNPS members are wonderful!



Above: Patrick Murphy (right) is assisted by Denise Wilson at Book Sales.



Photos on this page by Jan L. Turner

11th Annual Colorado Rare Plant Symposium

The 11th annual Colorado Rare Plant Symposium was held October 3rd in Fort Collins, Colorado. The symposium, held in conjunction with the Colorado Native Plant Society Annual Meeting, was well attended, with more than 70 attendees from across the state coming together to share the latest information on Colorado's rarest plants. Facilitated by Jill Handwerk of the Colorado Natural Heritage Program and Jennifer Ramp Neale with Denver Botanic Gardens, photos and distribution maps of over 100 species of rare plants were reviewed and discussed. Guest speakers Brian Elliott, Marika Majack, and Bonnie Heidel treated attendees to presentations on the elusive Halls Fescue (*Festuca hallii*), aquatic plants of Colorado, and rare Wyoming plants lurking just across the border. To view symposia presentations and minutes visit the Colorado Natural Heritage Program website at: <http://www.cnhp.colostate.edu/teams/botany.asp>

Annual Meeting Reporters:

Kelly Ambler has a Ph.D. in Biology with an emphasis on molecular pharmacology. Understanding native ecosystems has been a long-standing passion of hers. She has recently begun to expand her knowledge of native habitats by immersing herself in learning about native plant communities.

Erica Cooper, stay at home mom and former Plant Ecologist/Volunteer Coordinator for Boulder County Parks and Open Space, is the president of the Boulder Chapter of CoNPS.

Ann Grant moved to Colorado 17 years ago, having vacationed here hiking in the summers and skiing in the winters. Educated and worked as a chemist in the pharma and food industries, her passion is plants. She and her husband Butch ran a wholesale nursery for 13 years, specializing in plant propagation, including native forbs and grasses.

Ronda Koski is Chair of the CoNPS Workshop Committee and is a Research Associate in Landscape Horticulture at CSU.

Jessica Smith holds a master's degree in environmental science, Ecology concentration, from the University of Maryland. She has been involved in the field of plant ecology for 13 years, and has assessed plant communities and populations in a variety of ecosystems across the country. Currently she is employed as a field technician with the Colorado Natural Areas Program.

Judy von Ahlefeldt, a resident of the Black Forest, has a PhD in Landscape Ecology from Colorado State University. She was formerly an Ecologist on the Medicine Bow National Forest. Judy owned and published the *Black Forest News* for 17 years.



Conservation Corner: Thoughts on the Sequester and the U.S. Forest Service

by Mo Ewing, Conservation Chair

Last fall when we were in the middle of the sequester issue in the U.S. Congress, I wondered what it was like to be on the receiving end of all those budget cuts. So I came up with the idea of interviewing some people in the Forest Service and writing an article for *Aquilegia*.

The picture that was painted for me was a discouraging one. When folks came into the service in the past they had good staff support and ample funding to allow them to set up creative programs to carry out their jobs. There were internal funds from the Forest Service to fund special projects to study and manage the forests and to create programs to educate the public. Seasonal employees could be hired each summer to carry out the field work necessary. New staff was hired in order to meet increasing responsibilities. There was ample support staff to provide assistance on administrative issues like human resources, budgeting and reporting.



But, over time, all of that changed. And it didn't just happen last fall with the sequester. It started long before that in the Reagan administration, which began peeling funds from the Forest Service's budgets in order to down-size government. As time went by, the cuts kept coming, and increased as we passed the millennium.

In 1991, a couple of years after the end of the Reagan administration, the discretionary budget of the Forest Service was \$2,350 million (MacCleary). Part of the budget of the Forest Service is mandated by law. These "non-discretionary" expenses are not included in this figure. In 2013 the discretionary budget was \$4,861 million (Tidwell), which on the surface doesn't look so bad. However, in comparing the two figures, one must consider two critical factors. The first is that the costs of fighting forest fires exploded from 1991 to 2013, and Congress during that period, was, for the most part, unwilling to provide separate, additional funds to cover the costs.

In 1991, the budget for fighting forest fires represented 13% of the discretionary budget. In 2013 fire-fighting costs represented 41.3% of the budget (Tidwell). Subtracting the costs of fighting fires results in discretionary budgets of \$2,044.5 million in 1991 and \$2,853 million in 2013.

The second critical factor that must be considered is inflation. From 1991 to 2013, inflation, as measured by the Consumer Price Index, increased 71% (U.S. Inflation Calculator). That means that the effective budget in 1991 (in 2013 dollars) was \$3,496 million, compared to \$2,853 million in 2014, a 19% decrease in funding over the period.

The result of these budget cuts was that proactive, creative programs were cut, full-time staff were underfunded, and seasonal employees were eliminated. In addition, administrative support staff were laid off. Senior level staff were mired in doing administrative duties that support staff used to do, and were unable to get out into the field. And seasonal staff were no longer available to fill this void.

Unfortunately, Congress' disinterest in providing appropriate funding for the Forest Service did not result in fewer mandates to accomplish. Partly because of the focus on budget cutting, the Forest Service was required to set up a byzantine system of "accomplishment reporting". This reporting consisted of individual databases that collected either financial or other detailed data designed to justify to Congress everything they were doing. There were individual databases for botanical data entry, weeds data, range data, timber data, recreation data, timesheets, travel, budgets, training, performance reviews, safety, and so forth, all designed to measure and justify the work they accomplished and the dollars spent.

The data collected included such arcane facts as how many fence miles were repaired, and how many miles were repaired in each congressional district!



The result of this new business model is that morale in the Forest Service is at one of its lowest points since the agency's inception more than 100 years ago, and many employees agree that it is the lowest that it's been in their careers. More and more staff are retiring or resigning. The Forest Service has largely dropped the high degree of past mentoring designed to help bring new employees up to speed on existing programs. Corporate knowledge is being lost as knowledge built upon generations is not being well transitioned to the new workforce. Training programs and the ability to attend them have been greatly reduced, and the result is that the knowledge base of incoming scientists has been diminished.

In 2013, the Forest Service was ranked 260 out of 300 federal sub-agencies as the best place to work, where it had once being ranked eighth (Partnership for Public Service). In the 1950s and 60s, the U.S. Forest Service was the second-most well-recognized and well-respected federal agency in the nation, behind only one other federal government entity – the U.S. Marines. That standing has since fallen.

And it is not just the Forest Service that is suffering. The same thing is happening in the U.S. Bureau of Land Management (BLM) and the U.S. National Park Service, which together with the Forest Service, are the principal federal public land management agencies, overseeing 522 million acres of our public's natural resources.

The article that I wrote was originally intended to be about what it was like for individual employees to be on the receiving end of the sequester and what the budget cuts meant to their staff and programs. However, word of the article traveled up the chain of command at the Forest Service and then word came back down, and back to me, that the Forest Service did not appreciate my efforts. I was told that if I ran an article on this issue, I was to remove any reference to any individual employee, or to any particular program, or to any specific national forest. I was told that if I wanted to print the article, I could go to Washington and try to get it approved.

Because I have some pretty good friends in the Forest Service, I backed off. The last thing I wanted to do was to put any of them at risk. Even though there are "whistle blower" statutes on the books, it is apparent that they are not well supported by this government.

The thing that I found sad about all this was that the powers in the Forest Service were unwilling to allow me to write an article that supported appropriate funding and support for their agency. But on the other hand, we all know what the routine might have been. Congress would investigate why the Forest Service was cutting creative programs, accuse them of bad management, and outsource their jobs to private industry, which would "do the job more efficiently, and at reduced cost."

The problem is that there is little leadership in Congress or the Executive Branch to strongly support our national forests, BLM and National Park lands. This, in spite of the fact that during the sequester, the one thing that the public demanded was to open our national parks.

Look, for instance, at our latest presidents. President Obama was raised in Chicago. How could he, a city dweller, so deeply appreciate our public lands that he would rank them high on his agenda? One might have expected his predecessor, who was from Texas, to be a strong advocate. After all, George Bush bought a ranch and cut brush there when he was president. But, when the presidency ended and photo ops were no longer necessary, the ranch was sold, and he moved back to the city.

Go back one more administration and look at his predecessor. Clinton was from a rural state - Arkansas, but he was a workaholic who disliked vacations, and when forced to take them, went to fancy residences on Martha's Vineyard and the Hamptons. He did, however, name 16 national monuments at the end of his presidency. But my point is that this was really an afterthought, part of the legacy-thing.

When you think of it, Teddy Roosevelt was the last president who really loved wild places and put conservation and management of public lands high on his agenda. He was, in fact, an excellent naturalist, made a study of botany and wildlife, and understood why these lands are so important to our national psyche. He once said: "There is a delight in the hardy life of the open. There are no words that can tell the hidden spirit of the wilderness that can reveal its mystery, its melancholy and its charm. The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased and not impaired in value. Conservation means development as much as it does protection." (Wilderness Society)

Recently, I drove up to the top of Georgia Pass in South Park. It was a beautiful day and I sat in a lovely meadow full of *Tetraneuris grandiflora*, keying out some alpine plant species. A family roared up the pass in three ATVs and parked on the tundra (rather than in the parking area). The parents and children poured out of the vehicles and ran around inspecting the flowers and spectacular views.

At first I was put off by the ATVs, but on further thought I felt that maybe it was better that they came at all. The children were inspecting the flowers, and the mother was dancing around singing "The Sound of Music." Maybe one of those daughters will be president one day and remember how wonderful it was to be on the top of a beautiful pass looking out over a national forest. Maybe she will become the advocate that we so dearly need for our public lands.

What can you do to help? One option is to volunteer your services. The Forest Service still has an active volunteer program. Volunteers can assist in such field projects as conducting rare plant surveys, rehabilitating trails, eradicating weeds or assisting in office duties like researching plant bibliographic databases. Another option is to call your congressman and tell him to support our public lands. A third is to thank the next forest service employee you see. And the fourth is to VOTE.

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Photos in Conservation Corner by Mo Ewing

Penstemon Robbed...Flies Caught in the Act

By Jim Knopf

Cardinal Penstemon (*Penstemon cardinalis*) is one of the longest-living, longest-blooming, and showy penstemons for dry Colorado gardens. It's also subject to occasional protracted, dramatic robbery.

In one Front Range episode lasting several consecutive days, fuzzy flies with awesome saw-like proboscises slit the flowers and stole nectar without providing pollination. After the first robbery, the slits would seal, but the flies would soon return and "unzip" the original slit with the greatest of ease. The flowers were covered with dozens of flies. The entire scene is especially interesting because the flowers are classic hummingbird flowers with well-developed defenses against such robbery. They are red. They have thick petals with ridges to make cutting into them difficult. The flies defeated the thick ridges in the flowers by cutting the flowers lengthwise. The petals are also turned back to prevent crawling insects like ants from stealing nectar then wasting the pollen as they crawl away.



Penstemon cardinalis being robbed
Photo courtesy Jim Knopf

Find a few Cardinal Penstemon plants for your garden and enjoy the flowers and hummingbirds even if the robbers don't show up.

Jim Knopf is a noted landscape architect and the author of *The Xeriscape Flower Gardener* and *WaterWise Landscaping with Trees, Shrubs, and Vines*. Jim gave an entertaining presentation on *WaterWise Wildlife Gardening* at the CoNPS 2014 Annual Meeting.

What's the Buzz About Flower Color Diversity?

by Julienne Ng and Robert G. Laport

There is no denying that flowering plants (angiosperms) exhibit a dazzling array of flower colors, from white, all the way through the colors of the rainbow to black, and even in the UV spectrum. Perhaps most amazing is that we often see a broad swath of this diversity just by looking at a single plant community. This incredible diversity of flower color has led biologists, at least since Darwin, to wonder how and why such flower color variation arose. Given the vital role animals play in helping flowering plants disperse pollen and reproduce, many ideas about flower color evolution have revolved around pollinator. For example, plants may exploit new pollinators with differing color preferences or there may be competition among plant species for pollinator visits. However, other hypotheses unrelated to pollinators have also been proposed, including flower color diversity arising as an adaptation to environmental conditions or because flower color genes are influenced by other plant characteristics needed for survival.

The relationship between pollinators and plants

Many flowering plants largely rely on animals to disperse their pollen. Plant species that are most successful in producing offspring are those that increase the chance that pollinators visit multiple individuals of the same species depositing pollen along the way. Pollinator movements among different species results in wasted pollen, either because fertilization does not occur or, if it does, unfit hybrid offspring might be produced (those having fewer ovules, reduced pollen receptivity, or reduced seed production). To ensure pollen is moved between individuals of the same species, flowering plants must produce an attractive visual or olfactory cue that entices pollinators to repeatedly visit the "correct" species. Coloration is a highly conspicuous signal that serves to increase the probability of pollinator visitation and fertilization (Figure 1). Therefore, if a chance genetic mutation occurs that alters flower color in a species, and particular pollinators increase their visits to the new color variant because it is preferable to the old color, then the new flower color would become more widespread after several generations due to natural selection.

Hypothesis I: Flower color diversity is driven by differences in preference between different types of pollinators

The close interaction between flowering plants and their pollinators gave rise to the idea that different pollinators may have different flower color preferences. Therefore, a plant species with a flower color different from others in the community could exploit this preference and increase the likelihood that a particular pollinator type will only visit and fertilize other individuals of the same species. This hypothesis is bolstered by the observation that plants pollinated by the same types of pollinators often have flowers that look the same ("pollination syndromes"), even though the plant species might be distantly related. For example, bee-pollinated flowers are often blue or purple with short, wide corolla tubes and small volumes of concentrated nectar. Moth-pollinated flowers are typically white, with long, narrow corollas that are very fragrant at night. Hummingbird-pollinated flowers tend to have long, red floral tubes that are scentless, but contain copious amounts of dilute nectar. Given these associations, we might expect that the diversity of colors in a field of wildflowers is a function of a diverse pollinator community, and some studies have supported this tight association between flower color and pollinator preferences. For example, Colorado populations of a larkspur, *Delphinium nelsonii*, are typically blue-flowered but on occasion, white flowers are found. The rare white flowers (only about 0.1% of Colorado populations) are thought to have arisen from chance mutation, but remain at a low frequency because blue flowers are favored by the species' main pollinators, hummingbirds and bumblebees (Waser and Price, 1981). In another study, researchers made hybrids between the pink-flowered, bee-pollinated monkey flower *Mimulus lewisii* and the red-flowered, hummingbird-pollinated *M. cardinalis* that looked just like one parent or the other, but with the flower colors switched. Just this shift in flower color was sufficient to elicit a change in pollinator type (Bradshaw and Schemske, 2003).

Hypothesis II: Flower color diversity is driven by specialization of individual pollinators or particular species of pollinators, regardless of pollinator type

The idea that flower color diversity is driven by differences in preference between different types of pollinators is complicated by the fact that many flowering plants do not exhibit such tight associations with their pollinators. In fact, if you observe floral visitors for any length of time, you will find that many deviate from their expected pollination syndrome. This was shown in a study (Elam and Linhart, 1988) of white, pink and red-flowered fairy trumpets (*Ipomopsis aggregata*) in the Front Range of Colorado in which researchers found that hummingbirds and hawkmoths did not discriminate between the different flower colors, instead visiting and cross-pollinating all flowers regardless of color (Figure 2). Another piece of evidence supporting that flower color and pollinators are not always tightly linked, is that many groups of plants share the same pollinators yet exhibit a diversity of flower colors. Therefore, an alternative explanation for flower color diversity is that different flower colors arise as a result of competition among plant species (or varieties within a species) for visits from individual pollinators or particular species of pollinators. For example, if a community of plant species flower at the same time, are all pollinated by hummingbirds and exhibit the same color flower, then it is likely that the hummingbirds will visit several different species transferring pollen between them, thus wasting pollen resources. It would therefore be advantageous for plants to exhibit a flower color different from others in the community

to take advantage of the tendency of a pollinator (e.g. a single bird) to move between flowers that look the same during a foraging bout, a phenomenon referred to as flower constancy. Therefore, even though the pollinator type as a whole might visit a variety of different flower colors, any given individual or species of pollinator might be faithful to only a single color, which would effectively prevent hybridization and maintain a variety of flower colors through natural selection.

Hypothesis III: Flower color diversity is driven by environmental differences

While interactions with pollinators are clearly important for flowering plants, there are other factors that could influence flower color diversity. Environmental differences may cause changes in flower color, as different populations are likely to experience unique habitat conditions, such as soil type, temperature, and access to water. For example, imagine the stress of living at high elevations in the Rocky Mountains with huge fluctuations in daily temperature and intense UV radiation! Flavonoid pigments can help protect plants against environmental stresses, such as harmful UV-light, extreme heat, and drought conditions. By producing more anthocyanin pigments (a class of flavonoids responsible for many of the colors we see in flowering plants) in the stems and leaves to protect itself from environmental stress, a plant may also produce anthocyanins in floral tissue as a by-product, altering the color of the flower. This could explain why the buds of the yellow stonecrop, *Sedum lanceolatum* are red-tinged in the parts of its range where it experiences more sun (Figure 3), and why our very own state flower, the Rocky Mountain Columbine (*Aquilegia coerulea*), exhibits bluer flowers at higher altitudes than at lower elevations in Colorado. But, changes in flower color need not only arise as a by-product of pigment production elsewhere in the plant. Plants may express particular characteristics when dealing with the challenges of their environment, such as the production of compounds that protect against being eaten, or leaf hairs that help prevent thermal stress in arid and/or sunny environments. Natural selection on one of these traits could also influence unrelated traits, such as the biochemical pathways responsible for flower pigmentation. One gene affecting multiple traits (“pleiotropy”) is common in both plants and animals, and explains, for example, why blue-eyed, white cats are often deaf. Therefore, if natural selection favors certain characteristics that help a plant survive in a given environment (e.g. leaf hairs), and the genes for these traits also affect flower color, we may see differences in flower color simply because they arose as a side effect of the evolution of other traits.

We have discussed just some of the hypotheses that have been proposed to explain the striking diversity of flower coloration and researchers are still trying to determine the relative importance of each of these. While some studies have shown that the competing interests of plants and their pollinators are important drivers of flower color evolution in many species, other studies have shown support for factors such as environmental variation and adaptation as a significant force. Together, this suggests that flower color evolution (Cont. on next page)

PHOTOS

Figure 1



Figure 1. Variation in flower color can be seen at different levels: among different plant species, among different individuals of the same species (see Figure 2), on the same individual and even within an individual flower! A number of species exhibit flowers that undergo a change in color with age, such as these bluebells, *Mertensia lanceolata*, whose buds are a color different from the open flowers. Photo courtesy of Ernie Marx.

Figure 2



Figure 2. Fairy trumpets, *Ipomopsis aggregata*, exhibit white, pink, or red flowers but their main pollinators, hawkmoths and hummingbirds, do not appear to show any preference in flower color, instead visiting and cross-pollinating each variant. Left and middle photos courtesy of Ernie Marx, right photo courtesy of Mary Dubler.

Figure 3



Figure 3. Yellow stonecrop, *Sedum lanceolatum*, has red-tinged buds in sunnier areas. Photos courtesy of Jeffry Mitton.

among angiosperm groups is multifaceted, with many possible routes to generating and maintaining the diversity of colors that we see even in small communities of plants. Thus, when next marveling at the incredible array of spring wildflower colors, keep in mind the intricate underlying processes that are constantly shaping plant diversity. And, keep an eye out because if you are lucky, you might even find a familiar species with a new color variant!

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Julienne Ng is a postdoctoral researcher at the University of Colorado, Boulder. Her research focuses on the diversity of colorful signals that plants and animals use to communicate, and she is currently studying flower color evolution in the tomato family (*Solanaceae*).

Robert Laport is a postdoctoral researcher at the University of Nebraska, Lincoln and the University of Colorado, Boulder. His research primarily takes place in the desert southwest, where he studies the ecological and evolutionary consequences of genome duplication (polyploidy) in the creosote bush, *Larrea tridentata*. This includes plant-pollinator interactions and how polyploidy may influence patterns of diversification.

Just Published:

Wildflowers and Other Plants of the Larimer County Foothills Region

From the Introduction: "This guide focuses on the most common, showy, native plants growing in parks and open spaces in Larimer County, Colorado, between 5,000 - 8,000 feet in elevation. Key traits for identification, comparisons between similar species, and fun facts help you identify and learn about these interesting plants." CoNPS contributed funding for this guide. Available through CoNPS Bookstore.



BOOK REVIEWS

Vascular Plants of the San Luis Basin Colorado and New Mexico: The San Luis Valley, The Taos Plateau, and Surrounding Mountains

Hobart Dixon Printed by O&V Printing Inc. Alamosa, 2012.

Review by Patrick Murphy

Those who work and play in the Rio Grande drainage will enjoy this light, functional, and quick key to the flora in this south-central pocket of Colorado. This is an excellent field manual that will slip easily into a small pack. The book is 6"x 9"x 0.5" and as I always like to report, the weight is 11.4 ounces. There are about 1,300 species in the key, so that is about 144 species per ounce.



This field key includes a map of the San Luis Basin, a review of the vegetation eco-regions within the basin, an index to the genera, index to English common names, and especially pertinent to this region of Colorado, an index to the Spanish common names.

There is also a glossary of terminology and some useful line drawings with descriptions of family or genera characteristics spread throughout the book. For example, diagrams explaining the jargon associated with Asteraceae and *Carex* are included.

The font is somewhat small but clear (even for my old eyes). There are a few exceptions to this, for example, the Family Characteristics page for Asteraceae is not as clear as the other pages.

The author explains the trials and tribulations of plant nomenclature (about which we are all aware) and has selected the PLANTS database as his nomenclature standard. That seems as reasonable as any alternative, but here is a personal comment. The PLANTS database is an old standard that was started by Dr. John T. Kartesz. He is now associated with Biota North America Program (BONAP) and has disassociated himself with PLANTS. I guess poor Dr. Dixon had to pick between Weber & Wittmann, PLANTS, BONAP, and the as yet unreleased flora by Jennifer Ackerfeld, Colorado State University, Fort Collins.

I have not actually tested the keys, and keep in mind, there is no such thing as a perfect key. I did appreciate the fact that the *Salix* key allowed a branch to evaluate just vegetative characteristics of the willows. Like most quick keys, a complete description of the species is not included so you may need to find additional references to confirm your identification.

One final recommendation, immediately take the book to have the spine removed and have the book bound with a comb

binder. That way the book will stay open as you are identifying a plant, and not automatically close when you look away.

Patrick Murphy is a botanist and plant ecologist. Since 1979, he has been a botanical field worker in the Rocky Mountain region. He has an MA from University of Colorado, Boulder.

Manual of Montana Vascular Plants

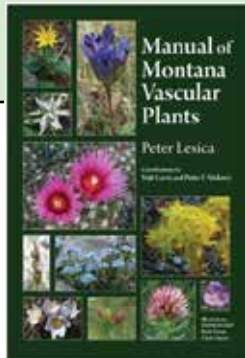
Lesica, Peter (w/ contribs. by Matt Lavin & Peter E. Stickney). 2012 BRIT Press, Fort Worth (www.britpress.org). \$55.00.

Review by Rudolf Schmid

Review printed with permission from Rudolf Schmid and IAPT. As any schoolchild used to know, the four largest states are, in descending rank, Alaska, Texas, California, and Montana. The size and varied topography of Montana, "the big sky country," and its intersection of several floristic provinces and geographic regions has resulted in a rather large flora for such a northern state (stats quoted from p. 18): 2512 species (2082 native, 431 alien; NB, = 2513), 2661 total taxa (including infraspecific). These are alphabetically arranged within the 733 genera (586 native, 248 alien; NB, = 734), which in turn are similarly arrayed in the 128 families. These are sequenced "phylogenetically" (p. 2) fide Cronquist, FNA, and, "in a few cases," APG, as Chenopodiaceae included in Amaranthaceae, and Scrophulariaceae dismembered. Lesica cites APG Peter Stevens's website for "Version 9, June 8" [Stevens, P.F. 2001-. *Angiosperm phylogeny website*. Ver. 12, July 2012 (\pm continuously updated). www.mobot.org/MOBOT/research/APweb (accessed 18 June 2014)]. Lesica's circumscriptions of families presumably is closer to APG III published in October 2009 (see *Taxon* 59: 1633) than to APG II published in April 2003 (*Taxon* 52: 652). The largest families and largest genera are the usual suspects: comps, *Carex*, etc. Matt Lavin and Peter Stickney contributed, respectively, the accounts of Gramineae and Ericaceae.

Illustration is extensive: in rather faint (BRIT-style) B&W over 2000 county maps with a black dot centered in each county (56 total) to show distribution, and 127 full-page plates of plant drawings by Debbie McNiel, Rich Adams, and Claire Emery. The book also has a frontispiece color photo of montane wildflowers, on the title page an unlabeled color relief map of Montana, McNiel's attractive color painting of the state wildflower *Lewisia rediviva* (bitterroot), and on page 8 a labeled B&W physiographic map.

Descriptions of families, genera, and species are terse and in synoptic form with bolded vegetative and reproductive parts preceding the brief but adequate descriptions. A feature that immediately impresses is the large amount of white space in most keys because the leads of a couplet are generally very short, most leads being less than half a page wide. For example, pages 50–51 for "Group G" (the Englerian Tubiflorae) in the eleven-page "key to plant families" has 48 couplets, with only *Aquilegia* Volume 38, No. 4 Fall 2014



one lead (number 34) involving two lines. Or, *Ribes* has 32 one-line leads to its 15 species.

Lesica's "taxonomic philosophy" was to be "more amenable to field botanists" and, "in general, ... to err on the side of nomenclatural stability, maintaining names employed by other recent regional manuals unless there is strong evidence otherwise" (pp. 1–2). [For W.A. Weber & R.C. Wittmann's field botanical approach in the nearby *Colorado Flora* see *Taxon* 62: 202–204.] Lesica's excellent flora of Montana should also be usable in the prairies and mountains of adjacent states and Canadian provinces. — Rudolf Schmid, UC

From *TAXON* Aug. 2014, 63(4):961

Rudolf "Rudi" Schmid is Professor Emeritus, Department of Integrative Biology, UC Berkeley and the editor of the "Reviews and Notices of Publications," in the prestigious journal, Taxon. His website, http://www.rudischmid.com/, includes a section on early women botanists.

The Wildlife-Friendly Vegetable Gardener: How to Grow Food in Harmony with Nature

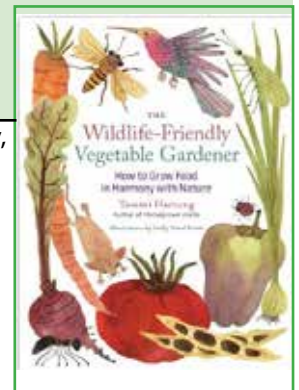
Tammi Hartung; illus. by Holly Ward Bimba

Review by Sarah Myers

First things first – this book has lovely, creative, whimsical, and artistic illustrations that will delight readers of all ages and gardeners of all skill levels. The illustrations alone offer a charming way to share learning about gardening with children or for beginners and those who want to change their approach to gardening.

The real heart of the book is in the writing, which serves as a handbook to gardening in a way that fosters nature and wildlife in any garden or community. The author is based in Colorado and practices what she writes at her Desert Canyon Farm, a USDA certified organic farm. In its exploratory form, the book also offers insight into "rethinking our relationships with nature," valuable for any level of gardener or horticulturist. The author challenges the gardener to reconsider ways to deal with so-called "pests," such as skunks, bugs, and other fauna that love garden environments. Viewing gardening on a macro-level approach serves as a way to learn from the garden environment and take in the lessons learned from observations alone. The author recommends a journaling and photo documenting approach to contemplate all the different levels of activities and visitors to the garden. Co-existence and patience with wildlife is a theme encouraged throughout the book.

Sarah Myers is a member of the Northern Chapter of CoNPS who works with information and research for a non-profit association and enjoys native plant study, gardening, birding, writing, music, hiking, and all outdoor activities in her free time.





Colorado Native Plant Society

The Colorado Native Plant Society is dedicated to furthering the knowledge, appreciation and conservation of native plants and habitats of Colorado through education, stewardship and advocacy.

Membership is open to all with an interest in our native plants and is composed of plant enthusiasts, both professional and non-professional.

The Colorado Native Plant Society was founded in 1976.

CoNPS Administrative Assistant Linda Smith CoNPSoffice@aol.com 970-663-4085

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AQUILEGIA: Newsletter of the Colorado Native Plant Society

Aquilegia is the newsletter of the Colorado Native Plant Society and is available to members of the Society and to others with an interest in native plants. Four regular issues are published each year (Spring, Summer, Fall, Winter) plus a special issue for the Society Annual Meeting held in the Fall.

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

The deadline for the Winter issue is Nov. 15, 2014

Announcements, news, articles, book reviews, poems, botanical illustrations, photographs and other contributions should be sent to Jan Loechell Turner, Editor, at JLTurner@regis.edu

Aquilegia Staff: Jan Turner, Charlie Turner, Sally L. White, Linda Smith, Rob Pudim, John Vickery, Nan Daniels, Mo Ewing, Sarah Myers

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Become Involved in CoNPS! We Need You!

The Metro Denver CoNPS Chapter is seeking a Program Director

We need a volunteer to schedule programs for 2015-16. This person will be responsible to scheduling monthly programs and will have the opportunity to meet and interact with speakers and CoNPS members to identify speakers, program topics, and coordinate meeting announcements with the webmaster, newsletter editor, and other club officers. It's a great way to meet people and get involved. Contact Jannette Wesley at metrodenverconps@gmail.com if interested.

Join the Colorado Native Plant Society



Membership in CoNPS entitles you to:

- Subscription to the CoNPS Newsletter, *Aquilegia*
- Field Trips to see and learn about native plants
- Educational Workshops by experts
- Annual Conference
- Conservation and Restoration Activities
- Camaraderie of plant lovers from Colorado
- Local Chapter Educational Programs & Email Updates

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You are free to affiliate with any chapter you choose and to attend the meetings of any chapter. Chapters do not have drawn map boundaries.

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OPTIONAL PRINT DELIVERY OF AQUILEGIA NEWSLETTER

Most members prefer to receive the newsletter electronically via e-mail (PDF file), and this saves the Society considerable printing and postage expense. If you would like to receive a print copy of the newsletter instead, check this box. Please note that print copies usually arrive about a week later than the electronic version. Please deliver a printed copy of *Aquilegia* by mail.

DONATION

\$ _____ General Fund

Endowments in support of small grants-in-aid of research:

\$ _____ John Marr Fund: research on the biology and natural history of Colorado native plants

\$ _____ Myrna P. Steinkamp Memorial Fund: research and other activities to benefit the rare plants of Colorado

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Mail to: CoNPS Office, P.O. Box 200, Fort Collins, CO 80522

Please make checks payable to "Colorado Native Plant Society." Dues and contributions are tax-deductible.

Citizen Science for Plant Lovers



Project Budburst <http://budburst.org>

From their website:

Every plant tells a story. Whether you have an afternoon or a whole season, you can make an important contribution to a better understanding of changing climates. We are a national network of people monitoring plants as the seasons change.

Project BudBurst data is collected in a consistent manner across the country so that scientists can learn more about the responsiveness of plant species to changes in climate locally, regionally, and nationally.

If you would like to make a meaningful contribution to understanding environmental change, join our rapidly growing community today! We are looking forward to learning more about the stories your plants can tell.

iNaturalist.org

Here is something else that looks interesting.



U.S.A. National Phenology Network

<https://www.usanpn.org/>

From their website:

Phenology refers to key seasonal changes in plants and animals from year to year – such as flowering, emergence of insects and migration of birds – especially their timing and relationship with weather and climate.

We bring together citizen scientists, government agencies, non-profit groups, educators and students of all ages to monitor the impacts of climate change on plants and animals in the U.S.A..

Nature's Notebook - Join amateur and professional naturalists in regularly observing plants and animals to generate long-term data sets used for scientific discovery and decision-making.

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A number of organizations and individuals generously helped sponsor the meeting with funding. These included:

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Colorado Native Plant Society

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