



Bulletin

of the

Native Plant Society of Oregon

Dedicated to the enjoyment, conservation and study of Oregon's native plants and habitats

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JUNE 2015

Diversity within a Species: Studying Sagebrush Morphotypes

by Marcella R. Fremgen, Graduate Student, Boise State University

This article originally appeared in Sage Notes, Volume 37 Number 1 (March 2015), the newsletter of the Idaho Native Plant Society.

Driving along the highway at 65 mph, looking out across a shrub-steppe landscape it all looks remarkably homogenous. However, to an ecologist or botanist, there are subtle differences – the sagebrush high on the hills is generally shorter often with sticky, greenish leaves, and the sagebrush low in the drainage is tall, with long silver leaves. There is actually a large amount of diversity in sagebrush, from the species level all the way down to

the individuals within patches and the chemicals that individuals or specific leaves produce. This has important implications for sagebrush-obligate herbivores like the Greater Sage-grouse (*Centrocercus urophasianus*, hereafter, sage-grouse).

Sage-grouse rely on sagebrush for food and cover throughout their life. During the winter months, sage-grouse rely entirely on sagebrush for food resources. Sagebrush, however, is heavily defended, producing a suite of secondary metabolites for defense, including monoterpenes, phenolics, and sesquiterpene lactones. These chemicals have negative physiological effects that deter herbivory. Sage-grouse select plants with lower chemical defenses when

they are foraging, searching for the least toxic food to consume.

As a Masters Student at Boise State University in Dr. Jennifer Forbey's chemical ecology laboratory, I study how herbivores select certain plants to consume on based on their chemistry. We track sage-grouse with radio-transmitters (Figure 1) to their foraging site and identify browsed plants that we then analyze in the lab.

By studying the sagebrush plants that were selected by sage-grouse as food and those that were not, we have identified the importance of diversity below the species level. Plants were split into different size classes or morphotype, which reflect the species and age of the plant. These morphotypes include identifying morphology for the species itself, as well as structural (height, stem branching) characteristics that further separate species by size

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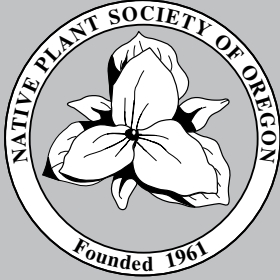


MARCELLA R. FREMGEN

Figure 1. Idaho Fish and Game employee Lisa Cross tracking sage-grouse with radio-transmitters. We then identify plants that have been browsed on at the foraging site.

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Native Plant Society of Oregon

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Opinions expressed in this publication are those of the authors of the articles. They do not represent the opinions of the Native Plant Society of Oregon, unless so stated.

Siskiyou Chapter Funds Education

Kristi Mergenthaler recently shared this educational outreach story on the NPSO listserve. In 2014, the Siskiyou Chapter of NPSO provided support for a graduate project conducted by Peter Kleinhenz, a Southern Oregon University graduate student in environmental education. Peter's goal was to create simple videos highlighting the Endangered Species Act, geared for high school students. His video, "The Fabulous Phlox," shows the human relationships that are providing protection for the endangered Yreka Phlox (*Phlox hirsuta*). Watch it on YouTube at www.youtube.com/watch?v=Crk5Qr9ULYs.



New NPSO State Board Members

NPSO has new and returning State Board Officers as of June 2015. We also have several new Chapter Presidents and Committee Chairs who have been elected/appointed in the past few months. Please welcome the new faces and thank the outgoing volunteers — many of whom are continuing to serve NPSO in other capacities.

State Board Officers Elected Spring 2015

President	Kelli Van Norman
Vice President	Lisa Blackburn
Secretary	Rosalie Bienek
Treasurer	Cyndi Dion
Directors-at-large to 2017	Mary Beth Averill and Billy Don Robinson

New Chapter Presidents and State Committee Chairs

Emerald Chapter President	Steven Yeager
Klamath Basin President	Kim Elliott
Siskiyou President	Kristi Mergenthaler
Umpqua Valley President	Neal Hadley
NPSO Fellows Committee	Cindy Roché, Kareen Sturgeon
Rare & Endangered Plants Committee	Jason Clinch



Share Your Annual Meeting Photos and Stories

Do you have fond memories of this year's Annual Meeting in the Columbia Gorge? Perhaps you saw intriguing species on a field trip, caught up with old friends, or volunteered to help the event run smoothly. Whether your memories are in text, photos, or illustrations, we invite you to share them in the *Bulletin*. NPSO armchair travelers are waiting for you to submit your articles and/or high resolution images to bulletin@NPSOregon.org. The submission deadline for the August/September *Bulletin* is July 24.

NPSO CALENDAR

Blue Mountain

For information on Blue Mountain Chapter call Jerry Baker, 541-566-2244.

Cheahmill

For questions, or to be added to the Cheahmill Chapter's email list for reminders of upcoming programs and events, please contact the Cheahmill Chapter President at ch_president@NPSOregon.org.

Corvallis

For questions, information on upcoming events, or to be on the Corvallis chapter e-mail list, contact Jordan Brown at co_president@NPSOregon.org or 253-820-3934.

June 6, Saturday, 1-4 pm

Tour: Three Gardens. View the gardens of three NPSO members in Corvallis: Matt Blakeley-Smith, Loren Russell and Esther McEvoy. The gardens are all within a block of each other. Loren has a beautiful collection of plants from around the world, Matt specializes in carnivorous plants and Esther has a garden landscaped with native plants. Location: Please park on Willamette Ave. and start at Esther's Willamette Gardens nursery, two lots to the east of the house at 3290 SW Willamette Ave. The gate will be open by the lamp post and the shore pine. For more information call Esther 541-754-0893.

June 7, Sunday, 10 am-3 pm

Field Trip: Marys Peak. We will hike from the campground to the summit and back in a loop through the noble fir forest. Bring a lunch, raingear, and sturdy shoes. Hope to see many of the early spring flowers and check out the restoration at the summit in the rock garden area. Location: meet at the usual spot in the OSU parking lot SW of the Monroe St. Beanery. Contact Esther for more information and to RSVP in case there is a change in plans due to the weather: 541-754-0893.

June 20, Saturday, 8 am

Field Trip: Iron Mountain and Cone Peak. Hike the Iron Mountain Cone Peak loop, identifying wildflowers in this botanical hotspot. We will return in the late afternoon. Bring a lunch and water, dress for the weather, and wear sturdy shoes. Location: meet at the OSU Wilkinson Hall parking lot southwest of the Beanery at 26th and Monroe. For more information and to

IMPORTANT NOTE TO FIELD TRIP PARTICIPANTS

Field trips take place rain or shine, so proper dress and footwear are essential. **BRING WATER AND LUNCH.** Trips may be strenuous and/or hazardous. Participation is at your own risk. Be prepared to sign a release form indicating this. A sample waiver form is available at http://npsoregon.org/documents/NPSO_waiver.pdf. Please contact the trip leader or chapter representative about difficulty, distance, and terrain to be expected on field trips. Dogs are not allowed. All NPSO field trips are open to the public at no charge (other than contribution to carpool driver) and newcomers and visitors are always welcome. You must pre-register for all events. National Forests require a Northwest Forest Pass for some field trip locations. Permits can be acquired at forest headquarters and ranger districts.

NOTICE TO FIELD TRIP CHAIRS AND LEADERS

The Forest Service and other agencies have set policies limiting group size in many wilderness areas to 12. The reason is to limit human impacts on these fragile areas. Groups using wilderness areas should be no larger than 12. A trip leader checklist and sample waiver form are available at: <http://npsoregon.org/calendar.html>

RSVP, contact Dan: 541-752-8860, or luomad@fsl.orst.edu.

Emerald

Visit the Emerald Chapter Web site at <http://emerald.npsoregon.org> to learn more about the latest chapter events, plant lists & botanical information about Lane County plants & the people who love them.

Meeting Location: Conference Room at Lane County Mental Health, 2411 Martin Luther King Blvd. Turn off MLK Blvd. onto Scout Access Rd. across from Autzen and take the first left into the parking lot. The meeting room is on the right side as you face the building.

June 13, Saturday, 9 am

Field Trip: Horse Rock Ridge. Alan Curtis leads a 3-mile hike to a steep, rocky meadow high in the Coburg Hills north of Springfield. Enjoy wonderful views of the surrounding countryside and great botanical diversity. Bring water and lunch. Location: meet at South Eugene High School, 400 E 19th Ave.

July 11, Saturday, 9 am-4 pm

Field Trip: Upper Elk Meadows. Alan Curtis leads this hike, located 30 miles from Cottage Grove. Elevation is 4,000 ft. Over 200 species of vascular plants have been identified here. We expect to see *Frasera umpquaensis* and several orchid species. Surrounding the meadow is an old-growth forest of *Abies amabilis*, *Abies grandis*, and *Pseudotsuga menziesii*. We will walk 1.5 miles through moist meadow. Wear boots and bring lunch and water. Location: meet at South Eugene High School, 400 E 19th Ave.

High Desert

For information, visit the High Desert Chapter website: www.highdesertnpsoregon.org and Facebook page: Native Plant Society of Oregon: High Desert Chapter, or email highdesertnps@gmail.com.

June 6, Saturday, 7:30 am

Field Trip: Big Summit Prairie Photography. Join MA Wilson and Susan Berger for a field wildflower photography workshop. Location: meet at Office Max on the east side of Bend (Costco shopping center). Please have a full tank of gas and be rarin' to go at 7:30! It's over 80 miles and 2 hours to our destination.

June 19-21, Friday-Sunday

Event: Central Oregon Wildflower Show. We will be plant collecting on June 19 and the Show is June 20-21, with displays of wildflowers, native plants for sale, and guest lectures. Please contact highdesertnps@gmail.com if you are interested in participating. Location: Sunriver Nature Center, 57245 River Road, sunrivernaturecenter.org. Additional information can be found on our chapter website, www.highdesertnpsoregon.org.

July 11, Saturday

Field Trip: Steins Pillar. Hike with Sarah Garvin to the pillar named for Enoch Steen, though it is known as Steins Pillar. Check our chapter website (www.highdesertnpsoregon.org) for details.

July 18-19, Saturday-Sunday

Field Trip: Steens Mountain. This landform was also named for Enoch Steen. Join Rick Hall, retired BLM botanist, and Lindsey Riibe, who is researching plants and their importance for the Greater Sage Grouse. We will be staying at Page Springs and botanizing the Loop Road. Check our chapter website (www.highdesertnpsoregon.org) for details.

Klamath Basin

For information on the Klamath Basin Chapter, visit <http://klamathbasinnps.com> or contact the chapter president, Kim Elliott, kb_president@NPSOregon.org. 252.

Mid-Columbia

For information on the Mid-Columbia Chapter, contact Sara Wu at

mc_president@NPSOregon.org.

Our regular chapter meetings will recommence on September 17.

June, TBD

Field Trip: TBD. There will probably be a summer hike and picnic sometime in June. Watch your email for details.

Portland

If you would like to receive the chapter's semi-official e-mail newsletter, The Calochortus, e-mail Don Jacobson at donj-photo@gmail.com.

Facebook: Take a look at our Facebook page. Native Plant Society of Oregon-Portland-Chapter. It will have the most up-to-date information on hike and other events as well as great plant pictures.

Meeting location: The Portland Chapter meets the second Thursday of most months in the Metro Building at 600 NE Grand Ave., Portland. Enter from NE Irving St. on the north side of the building and walk across the upper plaza to the entrance (not the door on 600 NE Grand Ave.). An attendant will let you in and direct you to the meeting room upstairs. Meetings and programs begin at 7 pm.

June 11, Thursday, 7 pm

Program: Oregon and the Wilderness Act at 50. 2014 marked the 50th anniversary of the Wilderness Act. Bridget Callahan, wilderness campaign organizer for Oregon Wild, will discuss past victories and current campaigns to expand and protect wilderness areas in Oregon. She will highlight the Crater Lake Wilderness proposal and explore the botanical treasures of the Kalmiopsis Wilderness. Meeting location: Metro Building, see above for details. Contact: Mary at alphiesmith@comcast.net or 503-288-4340.

June 14, Sunday, 9 am

Field Trip: Larch Mt. Hike. This is a moderate to strenuous hike that consists of an approximately 6.4 mile loop with an elevation gain of 1,300' through mostly forest and some riparian areas. We will also view wildflowers that have emerged within the last several weeks

from the recent snow melt. Contact Ron Klump at ronklump55@comcast.net for more information or to sign up for the hike. This is a joint hike with Suksdorfia Chapter of the Washington Native Plant Society.

June 20, Saturday, 9 am-3 pm

Field Trip: Grassy Knoll. Strenuous 6.5 mile hike. up and back with 1,280' elevation gain. Great wildflowers at the start, along the way, and at the top, which also has stunning views. The trail is steep at times. Hiking sticks are advised. Bring lunch and plenty of water. Contact Ron Klump at ronklump55@comcast.net for more information or to sign up for the hike. This is a joint hike with Suksdorfia Chapter of the Washington Native Plant Society.

June 27, Saturday

Field Trip: Iron Mountain. This is a botanical paradise so wonderful, there's a book about it: *Wildflowers of the Western Cascades*, by Ross & Chambers. The mountain is home to 18 different community types, and at the end of June the meadows are in full bloom. Expect to see several *Sedum* and *Castilleja* species, *Nothochelone*, *Aconitum*, *Lilium washingtonianum*, *Orthocarpus imbricatus*, *Ipomopsis aggregata*, *Rudbeckia occidentalis* and more. We'll have lunch at the top on the new viewing platform, with a spectacular view of Cascade peaks. Moderate 3.4 mile hike round-trip with 1,200' gain. 260 miles total driving distance, with an early morning start. Forest Service pass required (or bring \$5 cash for the self-service kiosk). Contact Brent Miller, 503-382-7605, or foliosus@foliosus.com, for more information or to sign up.

July 11, Saturday, 7:30 am

Field Trip: Lookout Mountain, Wash. A moderate 2-mile round trip hike along a rough mountain road with a steady elevation gain of 759'. Hiking sticks help going down. Bring lunch and water. Co-leaders are Don Hardin of the Suksdorfia Chapter, Washington Native Plant Society and Ron Klump, Portland Chapter, Native Plant Society of Oregon. For more information or to sign up for the hike, contact Don Hardin at donhardin2@gmail.com.

Siskiyou

To join the Siskiyou Chapter email list: Send an email, from the address at which you want to receive announcements, to announce-join@siskiyou.npsoregon.org. No subject or message is required. You will get a confirmation email. If you would like to volunteer to lead a hike in 2015, make a suggestion, or provide feedback regarding the field trip program, please contact Julie Spelletich at: jspelletich@gmail.com. Join us on Facebook at: [facebook.com/SiskiyouChapterNativePlantSocietyOfOregon](https://www.facebook.com/SiskiyouChapterNativePlantSocietyOfOregon).

June 20, Saturday, 9 am-Sunset

Field Trip: North Fork Rogue River Watershed and Rogue-Umpqua Divide. Hike with Wayne Rolle, USFS botanist, and explore the wetlands at Muir Creek Meadow and the meadows around Hershberger Lookout. We will see the Mt. Mazama collomia, Pacific silver fir, Alaska yellow cedar, some locally unique forbs, and impressive rock outcrops in the Hershberger area. We will also see wetland vascular plant and bryophyte flora at Muir Creek Meadow. Plan on a long day, home about dark. Bring wetland footwear as well as hiking boots and perhaps a ski pole for support. Location: meet at Medford Interagency Office (BLM/FS headquarters office), 3040 Biddle Road in Medford, at 9:00 am or Prospect Ranger Station at 10:00 am. Call Wayne for more details: 541-482-0093.

June 26, Friday, 6-7 pm

Hike and Learn: Rare Plants and Local Stewardship at Mariposa Botanical Preserve. KS Wild's Adopt-a-Botanical Area Coordinator, Jeanine Moy, will introduce local rare plants such as Greene's mariposa lily, Gentner's fritillary, peninsular onion, and Nuttall's larkspur. Discuss local issues regarding both rare plants and non-native weed species of the Cascade Siskiyou National Monument. Prepare for the following day of action and learn how to be a steward on your local public lands! This event is a collaboration with: Friends of the Cascade Siskiyou National Monument, Medford BLM, and the NPSO Siskiyou Chapter. Location: Ashland Public Library, 410 Siskiyou Blvd.

June 27, Saturday, 9:30 am-4 pm

Hike: Mariposa Botanical Preserve. Join Botanist Julie Spelletich (NPSO Siskiyou Chapter) to participate as forest stewards to pull non-native weed species with Botanist Armand Rebeschke (Medford BLM). The BLM acquired this Colestin Valley property in 1993 in a unique land exchange involving the Nature Conservancy and local ranchers. The 222 acre Botanical Area, located west of Interstate 5 and just north of the California border, provides protection for Greene's mariposa lily and Detling's microseris. Greene's mariposa lily grows only in southern Jackson County, Ore. and northern Siskiyou County, Calif. Detling's microseris is found only in Jackson County. Location: carpool leaves ShopNKart at 9:30 am.

July 16, Thursday, 4:30 pm

Field Trip: McDonald Peak. Escape the valley heat; walk into the sunset along the Siskiyou Crest with cheese, wine, and wildflowers! Join Adopt A Botanical Area Program Coordinator, Jeanine Moy, and NPSO Siskiyou Chapter President, Kristi Mergenthaler, for an evening walk on the Siskiyou Crest to observe rare and disjunct plants such as the Mt. Ashland lupine, monument plant, Henderson's horkelia and Howell's tauschia. Bring wine or cheese to share! Location: carpool leaves from the Northwest Nature Shop in Ashland at 4:30 pm.

July 18, Saturday, 10:45 am

Hike: Crater Lake. We will hike with CLNP botanist Jennifer Beck to the summit of Mt. Scott (the highest point in the Park) to see what plants grow in this harsh environment, and discuss the plight of whitebark pine and the Park's efforts to conserve and restore it. It is a strenuous 4.4 miles round trip with a gain of 1250' ft. Afterward, we will drive along East Rim Drive to view some of the Park's rare plants, including the Crater Lake rockcress (*Boechea horizontalis*) and the pumice grapefern (*Botrychium pumicola*). Bring plenty of water, sunscreen, hat, and layers of clothing. Location: meet at 10:45 at the Mt. Scott trailhead on East Rim Drive.

A map of the park is available at www.nps.gov/crla, click the "view Park Map" option in the "Park Tools" section in the lower left corner.

South Coast

This is a newly formed chapter. For more information, contact the chapter president, Alexis Brickner, sc_president@NPSOOregon.org.

Umpqua Valley

Visit umpquavallemnativeplants.com for more information on chapter activities or to be added to our email list. Check out our Facebook page, www.facebook.com/UmpquaValleyNPSO. Not online - call Donna Rawson 541-459-2821.

Willamette Valley

For program information, contact John Savage at 503-399-8615 or Alexandra Ninneman at 503-391-4145.

May 31-June 7, Sunday-Sunday

Field Trip: Blue Mountains Retreat. Spend four days at Oregon's Emigrant Springs State Heritage Area and/or three days at Fields Spring State Park in Washington, exploring the Blue Mountains and identifying plants David Douglas discovered during his travels. Registration is free for members, friends and families of the David Douglas Society and Native Plant Society; \$25 for non-members. For registration and detailed information, visit <http://www.daviddouglassociety.org/events.html>, call 503-302-4645, or email ImagoBotanica@outlook.com.

June 14, Sunday, 8 am-11:30 am

Field Trip: Kingston Prairie. This 52-acre Nature Conservancy Preserve southeast of Stayton is the best example of native prairie remaining in the central Willamette Valley. Both wet and dry habitats harbor native grasses and a host of wildflowers. To register and get carpooling instructions, call John Savage at 503-399-8615 after 7 pm. The hike is free and open to the public.

June 28, Sunday, 7 am

Field Trip: Iron Mountain. Enjoy one of the best wildflower hikes in Oregon.

Iron Mountain (near Sweet Home) has over 300 different species of flowers amid stands of trees and meadows. John Savage will lead the all-day hike over a seven-mile loop with elevation gain. Bring food and water. Free and open to the public. For more information and to register, call 503-399-8615 after 7 pm.

William Cusick

Visit our Web site at <http://williamcusick.npsoregon.org> or contact Susan Geer at 541-963-0477 or Emelie Montgomery-Jones at 541-963-3339 for updates and general information. Chapter notices and communications are done primarily through a Google group. Members are reminded to contact Susan or Emelie if they want to be added to the Google group, or if they do not have internet access and want to be contacted by phone for events.

Invasive Species for Your Diet

Control of invasive species continues to be a hotly debated topic. Joining the discussion is a recent trend – serving the invasives on a dinner plate. People who promote eating invasive species are being referred to as “invasivores.” You can read some of their discussion at invasivore.org.

The Institute for Applied Ecology (IAE) calls it “Eradication by Mastication.” IAE held its first Invasive Species Cook-Off a few years ago as a fundraiser and it is now an annual event. The fourth Cook-Off will be held Saturday, August 22, 2015 at the Benton County Fairgrounds in Corvallis. Wild turkey ravioli and dandelion greens have been on the menu in past years. If that whets your appetite (or your curiosity), reserve a ticket at <http://iaecook-off.rsvpify.com>.

[rsvpify.com](http://iaecook-off.rsvpify.com).

Should you prefer to cook your own dandelion greens (*Taraxacum officinale*), a simple Google search returns a plethora of recipes. Add them to sautés and soups or munch on them raw in salads. While even *Sunset* magazine has ideas for eating dandelion greens, there are also websites dedicated to recipes for invasive species. One such site is eattheinvaders.org. In addition to recipes (wild fennel (*Foeniculum vulgare*) ice cream, anyone?), a species’ range, description, habitat, and history is included. When you tire of eating, you can move on to drinking, perhaps a glass of Japanese knotweed (*Fallopia japonica*) wine. Some websites are even more specialized. The Mid-Atlantic

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OTHER EVENTS

Leach Botanical Garden

June 7, Sunday, 1 pm-4 pm

June 11, Thursday, 10 am-4 pm

Open House: Upper Garden Design.

The second phase of design work is underway at Leach Botanical Garden in Portland. Nearly eight acres in the undeveloped Upper Garden will offer new botanical and programmatic experiences to visitors and make a connection to the historic Garden and Manor House along Johnson Creek. Open houses will present options for what various Garden improvements might entail and how they might be organized on the landscape. Comment cards will be made available and members of the Advisory Committee will be present to answer questions during the staffed open house hours. For more information, visit www.leachgarden.org.

Deschutes Land Trust

June 20, Saturday, 9 am-3 pm

Wildflower Hike: Metolius Preserve.

The Metolius basin near Sisters boasts a unique combination of wetter plants from the west side of the Cascades along with the drier eastern Cascade vegetation. We’ll hike 3-4 miles from the North Kiosk of the Preserve while searching for early summer wildflowers. Bring lunch, water, and sturdy hiking shoes. Dress for the weather. Registration is required. For information, registration, and more wildflower hikes, visit deschuteslandtrust.org/events or call 541-330-0017.

Oregon Wild

June 20, Saturday, 9 am-5 pm

Hike: Lookout Mountain. Hiking through old growth ponderosa and fir forests we will gradually climb through open meadows with spectacular wildflowers ending up on a rock promontory with sweeping views east to Big Summit Prairie, south to the Maury Mountains, and west to the Cascade

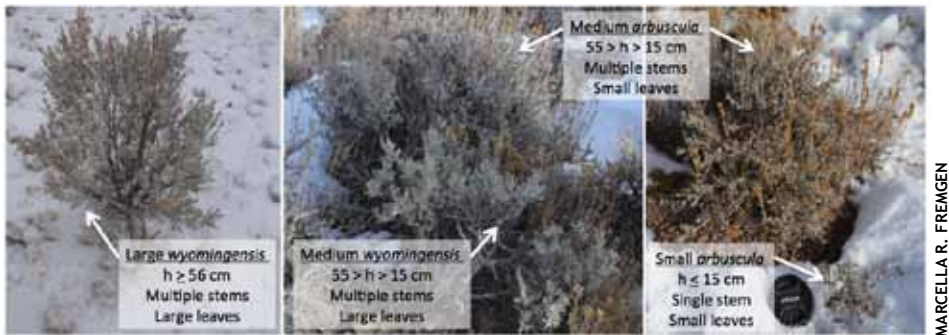
Mountains. Moderate 7 mile hike with 1,100’ gain. Carpools depart from Bend. Registration required, contact Sarah Cuddy, sc@oregonwild.org, or 541-385-3370. For more information and more hikes, visit <http://oregonwild.org/explore-oregon>.

Siskiyou Field Institute

July 10, Friday

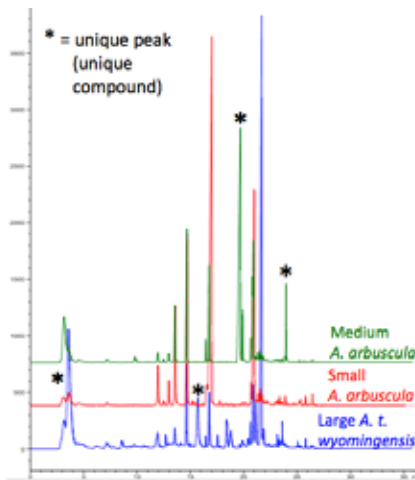
Workshop: Botanizing Bigelow

Lakes. Participate in a peak-season botany hike at Bigelow Lakes above Oregon Caves National Monument. This workshop is designed for anyone who wants to hike and learn about the native flora. Those taking the graminoids workshop are encouraged to participate; Instructor Linda Vorobik will be pointing out grasses, sedges, and rushes. Learn more native plants, hear their discovery stories and ecology and the rationale behind their nomenclature. Tuition: \$75. For registration or more information, visit thesfi.org or call 541-597-8530.



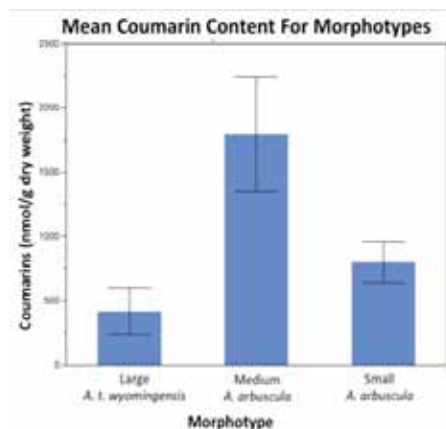
MARCELLA R. FREMGEN

Figure 2. Morphotypes of sagebrush found at the Raft River site, Cassia County, Idaho, USA. Left: a large *A. t. wyomingensis* plant. Center: a medium *A. t. wyomingensis* plant in front of a medium *A. arbuscula*. Right: a small *A. arbuscula* on the bottom right and a medium *A. arbuscula* in the center.



MARCELLA R. FREMGEN

Figure 3. Monoterpene profiles for each morphotype and species. Coumarins are UV-fluorescent compounds that are more abundant in more palatable plants. Large *A. t. wyomingensis* is significantly different (less palatable) from medium *A. arbuscula* (more palatable). This graph shows that the coumarin content is also reflected by morphotype, which suggests that each morphotype has different palatability. Error bars show mean \pm SEM.



MARCELLA R. FREMGEN

Figure 4. Coumarin content varies by morphotype and species. Coumarins are UV-fluorescent compounds that are more abundant in more palatable plants. Large *A. t. wyomingensis* is significantly different (less palatable) from medium *A. arbuscula* (more palatable). This graph shows that the coumarin content is also reflected by morphotype, which suggests that each morphotype has different palatability. Error bars show mean \pm SEM.

Sagebrush Morphotypes, cont'd
class (Figure 2).

These morphotypes are not only structurally different, but they also differ in their chemistry, with different size classes showing variation even within a single species (Figures 3 and 4). The figures show the difference in profile of monoterpenes (Figure 3), which are the volatile compounds you smell in sagebrush after it rains, and coumarins (Figure 4), a class of ultra-violet fluorescent compounds. Sage-grouse can see in ultraviolet (all birds can!) and we are learning that more and more birds can even smell their food. So grouse can potentially see the light emitted by chemicals or smell the volatiles released when they are foraging! This diversity in chemicals may provide important cues for foraging animals that are trying to avoid the intake of toxins in plants.

It is important to maintain this chemical diversity across the landscape, as it provides a wide range of foraging resources for herbivores, including sage-grouse, pygmy rabbits, pronghorn and wintering mule deer. This diversity also improves habitat resilience to climate change, as increased carbon dioxide and increased temperatures are likely to result in higher chemical defenses. Therefore, having a wide range of chemistry may provide some high-quality forage resources for wildlife in the future as toxins increase. It is important to preserve this diversity for the future.

Invasive Species, cont'd

Invasive Plant Council has a list of recipes almost entirely devoted to garlic mustard (*Alliaria petiolata*) at maipc.org/weedrecipes.html.

Goats are well known for their appetite for weeds, and the *Bulletin* editor has found that chickens can also be useful. Her neighbor's hens come running when they see her, hoping for a snack of shining geranium (*Geranium lucidum*). And what of *Arundo donax*? Practical Plants, an online encyclopedia, states that the leaves are edible when cooked and the rhizomes can be dried and ground into a powder for

mixing with bread flours. Read more at practicalplants.org/wiki/Arundo_donax and be sure to scroll down the page before you adjust your bread recipe so you can note that *A. donax* roots are a diuretic.

The practice of eating invasive species does have drawbacks. The plants may contain pesticides or be confused with an inedible species. In addition, harvesting plants may result in seed or root dispersal that spreads an invasive species even further. Be sure to do your homework before deciding to become an invasivore.



New NPSO Members

Please welcome these new members who joined NPSO between June 16, 2014 and May 10, 2015

Cheahmill

Adam Kotaich
Jante and Doug Rasmussen
Lizzy Trickey

Corvallis

Shonnard's Nursery & Florist
Joey Azul
Rosamaria Carbonell Mann
Christian Feuillet
Hans Hallman
Scott Harris
Kaynor Heineck
Patrick J. McDonald
Amy Rossman

Emerald

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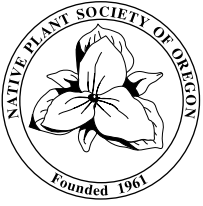
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