Sego Lily
Newsletter of the Utah Native Plant Society

January 2010
Vol. 33, No. 1

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*Left: Smooth fleabane (*Erigeron glabellus) by Tony Frates

Smooth as a Daisy, Pretty as an Aster, and Still Here: Erigeron glabellus *in Salt Lake and Davis Counties*

By Tony Frates

When authors of printed floras, with their highly limited space, dangle tantalizing tidbits relating to the rarity or lack of current information about a given native plant species, the antenna of interested readers begin to twitch.

In the *Flora of the Central Wasatch Front* (an account of specimens housed at the Garrett Herbarium on the University of Utah campus and further restricted to collections in mainly Salt Lake and Davis counties) by Lois Arnow, Beverly Albee, and Ann Wyckoff, such a comment was made about Smooth fleabane (or daisy), *Erigeron glabellus* Nuttall. That offering was: "Not reported from higher elevations in our area and not collected since 1946."

Such highly appreciated comments have been known to cause madness in certain native plant obsessed individuals.

On Saturday, June 6, 2009, such an individual decided that instead of working in front of a [continued on page 4]

Utah Native Plant Society

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For more information on UNPS: Contact Bill King (582-0432) or Susan Fitts (801-756-6177), or write to UNPS, PO Box 520041, Salt Lake City, UT, 84152-0041 or email unps@unps.org

Sego Lily Editor: Walter Fertig (walt@kanab.net). The deadline for the March 2010 *Sego Lily* is 15 February 2010.

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Chapter News

Escalante: On December 8, the chapter held its annual Christmas party at the Priska's new home. Members braved 8 inches of fresh snow to attend and donated over 65 food items for the Care and Share program.

We have a full slate of meetings planned for early 2010. On Tuesday, January 12th, Deborah McLaughlin, USU extension secretary, will discuss extending the growing season using greenhouses, cold frames, and raised beds. On Tuesday, February 9th, Alan Titus, paleontologist with the Grand Staircase-Escalante National Monument will talk about "Plants the Dinosaurs Ate". Both meetings will be held at the BLM-Interagency Visitor Center at the west end of town at 7 PM.—*Harriet Priska*

Manzanita (Kane County): Monday, January 11: Dr. Mark Miller of the US Geological Survey

Biological Resources Division, will speak about a number of research projects the USGS is doing in southern Utah. These include monitoring of the endangered Shivwits milkvetch, tracking invasive weeds in Washington County, studying impacts of fire on soils in the Milford Flats area, and analyzing effects of range management activities on soil properties. The meeting will be held at 7 PM at the new Southwest Applied Technology College at 733 South Cowboy Way (across from the Kanab Middle School and behind the high school). Please note this is a different location than usual.

Wade Parsons from the Grand Staircase Escalante Partners group spoke to our group in November on a project involving the Grand Staircase and Kanab High School students in growing native plants for restoration in the high school greenhouse. This was followed by a short presentation that I gave on the Deer Creek bio-blitz project (discussed in even more detail in the article starting on page 6 of this issue).—*W. Fertig*

Southwestern: Monday, January 4, 2010, Rick Heflebower, USU Extension Horticulture and Natural Resources specialist, is presenting a program designed to answer those

mid-winter questions about watering, pruning, mulching, and more. He also will inspire us with ways to get a start on those early spring chores: seed planting, preparing gardens, and insect control.

Monday, February 1, 2010: Dr. Larry Higgins, Dixie State Professor of Botany, will share his extensive knowledge of Utah's native plants, focusing on our southern area. Both programs will be at 7 PM at the Springdale Canyon Community Center.—*Barbara Farnsworth*

Utah Valley: Our next member meeting will be on Friday, January 22 at 7 PM at Celeste Kennard's house located at 160 N 400 E, in Provo. We have lots of ideas for next year. Do you like to go on plant hikes? Or like to garden with natives? Or have a canyon you have adopted or a plant you are especially concerned about? Maybe you want to learn more about Utah's native plants or our Heritage Garden program? Come to this evening program and enjoy a look at what we have done in the past year and help us plan this year's activities. Call Celeste for more information (377-5918) or email celeste@byu.edu.

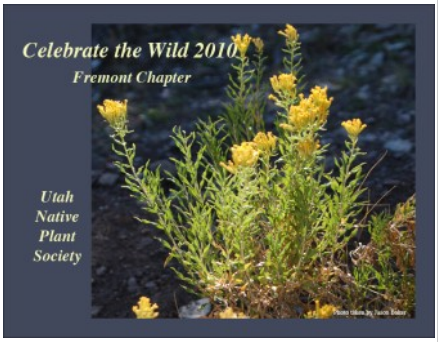
If you have not seen it yet, we will have a copy of the new book *Landscaping on the New Frontier—Waterwise Design for the Intermountain West* at the meeting.

Robert Fitts and Susan Garvin Fitts have been working in the Uinta Basin for the last 3 years and will be sharing some of their research with us. Robert will present a talk entitled "Two rare Penstemons on oil shale land" on Friday, February 5th at the Monte L Bean Life Science Museum on the BYU campus (645 East 1430 North in Provo). We will meet for a potluck dinner at 6 PM at the museum and the presentation will begin at 6:45 PM.

We will also be starting up our Plants and Preschoolers hikes again this spring, once the flower-producing weather returns. April Jensen has compiled a great list of hikes for the Utah County area complete with directions and what plants you are likely to encounter. Make sure to email me if you want to be included in our weekly hike bulletin.—*Celeste Kennard*

Bulletin Board

Fremont Chapter Publishes 2010 Wildflower Calendar



The Fremont Chapter 2010 calendar is ready to order just in time for holiday giving. *Celebrate the Wild* calendar is a unique gift that the water wise gardener and native plant enthusiast will enjoy all year long. (See the sample page below to arouse your curiosity and nudge you to purchase a calendar and see just how marvelous the other 11 months are!) The price is the same as last year- $10.00 each or $8.00 for 10 or more; plus shipping $1.75 for each calendar.

We would like to thank all of the gardeners who contributed photos of their gardens and their special native plants. The goal of producing the calendar is to promote and support native plants and water wise gardening throughout the Intermountain West.

To order your calendar, please send a check or money order to: Fremont Chapter UNPS, c/o Janet Nielson, PO Box 104, Elsinore, UT 84724. Or email jbnielson@sisna.com, phone: 435-527-4866, or email janett@wildlandnursery.com, phone: 435-527-1234 or 801-599-9055
-Fremont Chapter Calendar Committee

Smooth as a Daisy, Pretty as an Aster, and Still Here: Erigeron glabellus *in Salt Lake and Davis Counties*

[continued from page 1]

*Above: Smooth fleabane (*Erigeron glabellus*). Photo by Tony Frates.*

computer screen that instead a wildflower hunt of some/any kind would be highly preferable. After checking on several locations for the status of *Opuntia fragilis* blossoms and of, well, anything in bloom, I decided to check on the status of known *O. fragilis* occurrences at Crestwood Park in the Cottonwood Heights area which I had not visited for several years, and which I had only seen previously in the fall. Crestwood is a multi-use park which borders a short remnant section of Little Cottonwood Creek in the Salt Lake valley and is enclosed by humanity. Thankfully at least some natural space has been preserved here.

I had no particular thoughts of daisies as I ventured into the park but almost immediately I noticed a plant that looked *Aster*-ish. Yet, it was early June which here is not *Aster*-time. A closer looked indicated that it was an *Erigeron*. At the initial location, the scattered plants were growing in fairly dry soil as evidenced by the fact that Spreading fleabane (*E. divergens*), another native that occasionally turns up along ignored Salt Lake County sidewalk strips and abandoned lots, was growing with it. Also growing nearby was the noxious Leafy spurge (*Euphorbia esula*, a Utah state designated noxious weed which needs management attention by SL County Parks & Recreation) and *Melilotus officinalis* (Yellow sweet-clover, which should be designated a noxious weed, and which also had a banner year).

While Smooth fleabane most often occurs near streams (one of its common names being Streamside fleabane) or in meadows, it occurs in a number of different types of habitats and elevations. In Utah, its distribution seems to be concentrated along the Wasatch Front from Utah Co. to Cache Co. with some outlying occurrences in the Uinta Basin and eastern Beaver Co. (the Digital Atlas also reports an occurrence in San Juan Co.). The global distribution of the species is also curious. The species does not occur west of Utah or eastern-central Idaho. Instead it occurs from New Mexico to Montana, Nebraska, the Dakotas, Michigan, Wisconsin, and in mainly western-central Canada to Alaska. Two varieties are recognized, var. *pubescens* (does not occur in Utah) and var. *glabellus* (ours).

So, this species is not globally rare nor is it "Utah rare." It is, however, among the vanishing native flora that once occurred in the valleys and foothills of the increasingly populated Wasatch Front in northern Utah. If our Salt Lake chapter were to maintain a list of "Salt Lake County Rare Plants" (which it should), this species would be on the list.

While it does occur at high elevations elsewhere (in Utah as least as high as 8,050 feet based on a 1995

Sherel Goodrich collection from Uintah Co.), it has not been found at higher elevations in the central Wasatch Front.

As I continued on my Saturday semi-nature walk, I encountered *E. glabellus* plants with several inactive bees appearing to be sleeping off a late-night nectar party. Retired bee expert Dr. Vincent Tepedino reviewed some pictures of these bees and initially indicated that crab spiders are common on fleabanes and that they commonly catch and kill . . . . bees. So perhaps these bees were not as happy as I might have thought (although I did not observe any spiders, so I would like to think that these bees arose from their slumber and happily continued on with their tragically short lives). Dr. Tepedino further advised that these are anthophorid bees and are probably *Anthophora* or, perhaps *Diadasia* (which he explained are normally globemallow specialists and not usually found on fleabanes).

As I continued to look for the extent of these daisies at this unusual remnant occurrence, ultimately I came across more ideal habitat without as many noxious weeds where Smooth fleabane was growing with verdant grasses under river birch, a picture perfect spot suitable for framing. The plants under the birch canopy grow even taller, up to a height of roughly 20 inches.

Collections of *Erigeron glabellus* from Salt Lake and Davis Co. at Garrett Herbarium are shown in Table 1.

So, the 1946 collection date mentioned by Lois Arnow in her classic work refers to the Albert O. Garrett collection above from Davis Co. The last Salt Lake Co. collection, based on Garrett Herbarium specimens, appears to be the 1925 City Creek Canyon specimen (which also refers to "Pleasant Valley" no doubt referring to the area in the vicinity of the Pleasant Valley Reservoir which was closed in the 1950's). In addition to Garrett Herbarium's namesake and one of our true pioneer collectors, this list includes moss expert and botanical illustrator without peer, Dr. Seville Flowers, and one of our earliest botanical educators who made numerous important local collections in the early 1880's (yet he seems to be almost lost to obscurity and who needs to be remembered as much more than just the first University of Utah Alumni Association president), Dr. Orson Howard.

We are fortunate to still have a few remnant patches of native plants that remind us of a heritage which has been largely lost. We are indebted to those who have painstakingly documented at least some of this heritage, much of which will never be seen again, and for those who continue to work to store, protect and preserve the knowledge of this heritage in special libraries of highly organized and processed specimens of pressed, dried plants (i.e. herbaria). Our generation must continue to work to save these few remaining open natural spaces with their valuable storehouse of ecological information that will very likely be highly desirable, if not essential, assets of the next generation.

Above: Bee pollinating the disk flowers of Erigeron glabellus. *Photo by Tony Frates.*

Table 1. Collections of *Erigeron glabellus* from the Garrett Herbarium

Collector	#	Date	Ecology/elev if any	County
A.O. Garrett	9373	May 13, 1946	Swampy meadow	Davis
A.O. Garrett	6284	June 23, 1933	Meadow, 4300 ft.	Davis
S. Flowers	200	June 15, 1929	Moist meadows, 4400 ft	Davis
Unknown	------	June 12, 1925	City Creek Canyon	Salt Lake
A.O. Garrett	2683	June 8, 1912	West SLC, 4300 ft.	Salt Lake
Irvin Fisher	------	June 7, 1888	Meadow west of SLC	Salt Lake
O. Howard	------	July 15, 1880	In flower	Salt Lake

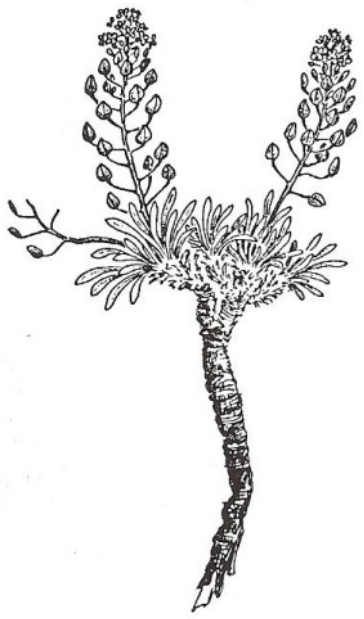
Every Species Counts: The Deer Creek Bio-Blitz

By Walter Fertig

It was nearing mid-day as my team of intrepid botanical explorers climbed out of Nazer Draw towards the pencil-thin shadow of a slot canyon in the Navajo Sandstone cliffs ahead. We were already flushed with some success that early May morning, having documented several new plant species for the Deer Creek watershed checklist. Moments before, we had checked off Hood's phlox (*Phlox hoodii*) and Smallhead sunflower (*Helianthella microcephala*) on a slickrock ledge. Neither species had been previously reported during our weekend of botanizing in this picturesque canyon, located just 2 air miles northeast of Boulder, Utah. Our immediate goal was the grove of Ponderosa pine and Gambel oak at the mouth of the little slot canyon where we would find some welcome shade for lunch.

As we approached the canyon our path bisected a parallel row of neatly stacked black volcanic rocks marking the route of the Long Neck pack trail. This path might be more obvious farther up the south flanks of Boulder Mountain, but here, it was largely invisible among the bare white slickrock. Just beyond the trail were less orderly jumbles of black boulders amid deep pockets of white sand and scattered Ponderosas, Utah serviceberry, and Greenleaf manzanita. A chocolate-colored leopard-lily (*Fritillaria atropurpurea*) caught our attention, and I checked our plant list to see if it had already been documented (it had not). We paused briefly to inspect the flower and its odd, square fruits when something even more interesting caught my eye: a dwarf pepperwort mustard no more than six inches tall with a ball-like head of white flowers.

I knew of Neese's pepperwort (*Lepidium montanum* var. *neeseae*) from doing some background research on the flora of the Boulder area. It is a narrow endemic of



Above: Neese's pepperwort (Lepidium montanum *var*. neeseae*) . Illustration by Kaye Thorne.*

Navajo sandstone outcrops with Ponderosa pine or spruce-fir at 7000-9000 feet. Neese's pepperwort is known from less than a dozen sites, all in Garfield County, and mostly along the flanks of Boulder Mountain. It is one of several locally endemic varieties of this polymorphic species, distinguished from all others by its short stature, perennial habit, entire or 3-5 lobed leaves, glabrous foliage, and purplish sepals. I had never seen it before, yet here it was, right in front of us. I began taking notes and photos, as well as a sample to voucher the new location. Lunch would have to wait a little longer.

My colleagues, Linda Whitham of The Nature Conservancy's (TNC) Utah Field Office, Deer Creek property owner Tom Hoyt, and Boulder organic farmer (and classically-trained paleobotanist) Eric Feiler, and I were exploring the slickrock country that fine day in early May 2008 as part of the second Deer Creek Bio-blitz. The task of our botany team that weekend was to identify as many vascular plant species as possible in the middle reach of the watershed. Simultaneously, other teams of entomologists, wildlife biologists, ornithologists, bryologists, and ecologists were cataloging other components of biodiversity.

Bio-blitzes started in the early 1990s as a fun way to bring experts on plant and animal identification together with interested members of the public to learn as much as possible about the biodiversity of a specific area in a 24-48 hour period. The idea grew out of the Rapid Assessment Program (or RAP) developed by several international conservation groups in the 1980s to quickly identify and quantify species richness in vulnerable areas of the tropics. Bio-blitzes are less formal and have a stronger public education component than traditional RAPs, but can be just as useful a tool for identifying lands that may be of conservation significance and for creating local enthusiasm about native biological diversity.

Deer Creek originates at nearly 10,400 feet on the south flank of Boulder Mountain in Dixie National Forest. It meanders through steep Navajo Sandstone cliffs (some nearly 1000 feet thick) for about 17 miles before joining Boulder Creek at 5,400 feet in Grand Staircase-Escalante National Monument. Deer Creek and its major tributary, Nazer Draw, are bordered by riparian bottomland forests of Lanceleaf, Narrowleaf, and Fremont cottonwoods, Water birch, and Silver buffaloberry. These woods are interspersed by wet meadows of Nebraska sedge, Baltic rush, and Yellow and Coyote willows. Surrounding uplands are dominated by Navajo slickrock, scattered patches of Ponderosa pine, and more extensive woodlands of Utah juniper and Two-needle pinyon. Areas of deep sand support Basin big sagebrush and Fourwing saltbush.

The middle reach of the creek flows through private property bordered on two or three sides by public lands. As a perennial stream in a desert landscape, Deer Creek is a magnet for resident and migratory wildlife and is under increasing development pressure as people are drawn to the Boulder area. Property owner Tom Hoyt and his wife Caroline were interested in seeing the private lands in the Deer Creek watershed protected, and first approached TNC to create a conservation easement in 2004.

Preliminary studies in the Deer Creek drainage and vicinity amply demonstrated the great potential of the site as a hotspot of native biological diversity. Tom Hoyt, a Colorado businessman and consultant, wanted to convince his neighbors that they should also help conserve the watershed. Linda Whitham suggested that a bio-blitz might be a good way to bring interested members of the Boulder community together and gather a lot of useful information on the proposed easement. I was brought on board to coordinate the botanical part of the effort and to help persuade some zoologists and ecologists to lend their expertise.

It did not take a lot of persuasion. With the Hoyt's and TNC sponsoring the event, more than a dozen professional and amateur biologists descended on the Boulder area on the weekend of July 20-22 2007 for the first Deer Creek Bioblitz. Participants included Chris Pague of TNC; Keith Schulz, ecologist with NatureServe; Kevin Wheeler, biologist from the Utah Division of Wildlife Resources; Evelyn Cheng, entomologist with the US Geological Survey in Moab; Jim Catlin of the Wild Utah Project; Mary O'Brien and David Smuin of the Grand Canyon Trust; and numerous other neighbors and friends of the Hoyts. The botany team, consisting of myself, Linda Whitham, Tom Hoyt, Mary O'Brien, and Sedona landscape architect and wildflower photographer Max Licher set out to explore representative examples of the major vegetation types found in the middle-reach of the Deer Creek drainage (an area of 4000 acres). Over the two full days of the event, we climbed sandstone slickrock cliffs, explored Utah juniper/two-needle pinyon woodlands, slogged through riparian meadows and dense streamside forests, and investigated roadside sagebrush and disturbed meadow communities en route to tallying 256 different species and varieties of vascular plants.

The insect team performed valiantly, attracting hundreds of bugs to white sheets hung near bug lights and catching insects with butterfly nets and pitfall traps. Alas, they came in a distant second with just 42 species identified (mostly to family or morpho-species). Birds were third with 40 species, followed by mammals with 18 and reptiles/amphibians with 10. All told, 366 animal and plant species were identified over the weekend.

Among the botanical highlights of the July bio-blitz was the discovery of Utah knotweed (*Polygonum douglasii* var. *utahense*) on a sandy spit bordering the marly wetlands of Nazer Wash. Utah knotweed occurs only in southern Utah and was first described by Brenkle and Cottam from a collection near Escalante in the mid 1930s. This slender annual in the buckwheat family can be recognized by its tiny white flowers (related knotweeds tend to be pink) that are widely flared at the tips and its slender, almost grass-like leaves. Utah knotweed is usually found in dry, upland sites with deep sand and scattered pinyon or juniper, so the small population at Deer Creek is unusual. The species is probably more abundant on the surrounding mesa tops and the Nazer Wash patch may be ephemeral.

Another important find was the recognition of a new vegetation type that may be restricted to the Boulder/Escalante area. The uppermost slopes of Navajo Sandstone mesas

*Left: Utah knotweed (*Polygonum douglasii *var.* utahense*), a Utah endemic originally described from the Escalante area and discovered at Deer Creek in 2007. Illustration by W. Fertig*

Left: volcanic boulders overlying Navajo Sandstone slickrock cliffs provide habitat for the Bigelow sagebrush-Blue grama vegetation type, which may be restricted to the vicinity of Boulder and Escalante in south-central Utah. Photo by W. Fertig

bordering Deer Creek are covered by black volcanic boulders, similar to the ones we encountered at the Neese's pepperwort site. These igneous rocks are vivid reminders that Boulder Mountain has a volcanic past. The rocks were emplaced in their present location by ancient rivers and streams draining the Aquarius Plateau. Today, these boulders and smaller volcanic rocks trap wind-borne sand to create a shallow layer of soil directly over the slickrock. Such sites support an unusual plant community dominated locally by Bigelow sagebrush (*Artemisia bigelovii*) and Blue grama (*Bouteloua gracilis*) or, less often, Black grama (*B. eriopoda*). From a distance, the Bigelow sagebrush-grassland can be easily recognized by the grayish-brown color of the rock and vegetation, which contrasts with the stark whiteness of the Navajo sandstone slickrock. Keith Shulz notes that the only other Bigelow sagebrush-Blue grama vegetation reported in the literature occurs on gray shales in New Mexico and otherwise differs significantly in associated plant species. Volcanic rocks are also associated with Navajo sandstone in the Kolob area of Zion National Park, but this unusual community type has not been documented there.

Building on the success of the 2007 effort, TNC and the Hoyts decided to conduct a second bioblitz for the following year. In order to find a wider array of species, we decided to hold the 2008 event in early May and to invite some additional species experts. Joining the team in 2008 would be Dr. John Spence of Glen Canyon National Recreation Area, a noted authority on bryophytes, but also skilled with lichens and birds; Dr. Larry Stevens and Jeri Ledbetter to focus on aquatic biology and insects; Dr. Tim Graham of the USGS for reptiles, amphibians, and invertebrates; Neil Perry and Rhett Boswell of the Utah Division of Wildlife Resources to study birds and small mammals; Dr. Jim Catlin and Allison Jones of the Wild Utah Project to assess riparian systems; and an assortment of local Boulder property owners and interested parties.

In 2008 the botany team focused on new areas that were not visited the previous year, which is why we were exploring the slickrock of the southern Dixie National Forest on the fateful day when Neese's pepperwort was discovered. We explored more sandy areas in the vicinity and located a second small colony of this rare plant. All told, we documented about 150 individuals and mapped out the population so that other researchers might relocate the plants in the future.

By the end of the weekend the botany group had observed 21 vascular plant taxa not previously reported for the middle reach of the Deer Creek watershed. Combined with the results from 2007 and previous surveys done on the Grand Staircase-Escalante National Monument, the known vascular flora of the study area now stood at 356 species. Of these, at least 10 were rare plants considered species of concern by the Utah Conservation Data Center. Alas, one of the rarest of these species, the federally Threatened Ute ladies'-tresses orchid, continued to elude us on the private lands in Deer Creek, though several areas of suitable habitat were present (the species is known from monument lands just downstream).

John Spence's moss, liverwort, and lichen team (consisting essentially of Spence himself, with some specimens provided by the aquatic

specialists) found 35 bryophyte species and 16 lichens. Among the more notable finds was a first record for the state of Utah of the moss *Anomobryum julaceum* var. *mexicanum* in a small hanging garden and an observation of *Crumia latifolia* (a rare moss) on basalt boulders in Deer Creek. According to Spence, the variety of habitats present at Deer Creek may support as many as 25 more bryophyte species and more than 100 additional lichen taxa.

The vertebrate teams also enjoyed success in the 2008 bio-blitz. The number of bird species for the area increased from 40 to 58 (with another 30 reported by local naturalists, mostly based on fall and winter sightings). Noteworthy among the bird species are five considered priority species by Utah Partners in Flight, a conservation group focusing on rare birds that migrate to Central and South America for the winter and other avian taxa at risk. The mammal team set up a series of live traps each night to catch (and later release, unharmed) rodents and small mammals that are too secretive to be readily seen in the daytime. Among their discoveries were new distribution records for the Long-tailed pocket mouse and Little pocket mouse. Perhaps the most celebrated discovery, however, was finding evidence of beaver naturally recolonizing Nazer Draw (teams observed a small dam and several recently gnawed trees). The Forest Service, Utah Division of Wildlife Resources, and private conservation groups had been discussing releasing beaver into the drainage, but nature apparently had beaten them to the punch.

Larry Stevens, Tim Graham, and the invertebrate team collected at least 88 different species of insects from 51 families. The 2008 samples more than doubled the number of known insect species in the Deer Creek watershed, bringing the total to 122. Insect species richness is higher than any other taxonomic group in the study area except for vascular plants. In reality, the number of insect species in the area is probably much greater than currently known. Several studies have shown that insect diversity typically exceeds vascular plant diversity by a ratio of 10:1, suggesting that the number of insects in the Deer Creek area might exceed 4,000 species. More insects probably could have been found had more pitfall traps, nets, or warm bodies been available. Recording insect diversity is also inhibited by difficulties in specimen identification (in some cases collections might need to be sent to taxonomic experts for identification). Many insects also remain undescribed. Indeed, Tim Graham reports that he may have discovered a new and unnamed species of sand treader cricket (genus *Ammobaenates*) at Deer Creek.

Collectively, the bio-blitz teams documented 388 species of plants and animals in May 2008. This figure is only about 5% higher than the total sum of species found the year before. But of these new species, 191 (or nearly 50%) were new to the area. Between the two years, bio-blitzers documented 558 taxa in the Deer Creek study area. Coupled with additional species reported for the area (but not observed in the 2007 or 2008 bio-blitzes), the total flora and fauna of Deer Creek stands at 675 species.

The actual number of species in the watershed is undoubtedly higher. As mentioned earlier, insect, bryophyte, and lichen diversity are probably higher than currently recognized, but even vertebrates and vascular plants may be undercounted based on additional species known from the vicinity (as many as 200 additional plant and animals are known from the adjacent Grand Staircase-Escalante National Monument). Several important taxonomic groups have also not been studied yet in the Deer Creek watershed, including fungi and invertebrates other than insects.

As the yearly results of our bio-blitz show, the entire species diversity of an area cannot be readily documented during any single weekend. Only 54-57% of all the known species were detected in each of our two bio-blitzes, though cumulatively, our teams found over 80% of the known species of plants and vertebrates. The number of species present at any site will always vary from year to year and season to

Below: Allison Jones holds a pocket mouse while Neil Perry looks on to make the identification. The little rodent turned out to be a new species for the Deer Creek area. It was later released unharmed. Photo by Linda Whitham.

season depending on climatic conditions, germination response, or random events. If we were to conduct a third bio-blitz at Deer Creek, a suitable time might be a fall weekend to better capture migrating songbirds and insects attracted to autumn-blooming shrubs.

The data collected during the two bio-blitzes has been extremely useful to The Nature Conservancy in quantifying the significance of the Deer Creek watershed as a hotspot of biological diversity. The enthusiasm generated by the Hoyts has spread to several of their neighbors, who are now also pursuing conservation easements to preserve their properties. Many residents of Boulder are now much more aware and appreciative of the biological importance of their corner of the world. The bio-blitz was also a great way for scientists from different disciplines to meet, collaborate, eat good food, and have fun doing what they love to do most—tromp around in the great outdoors identifying birds, bugs, and plants.

Aldo Leopold wrote in *A Sand County Almanac* that "to keep every cog and wheel is the first precaution of intelligent tinkering". Knowing the identity of those cogs and wheels is critical for identifying and prioritizing important conservation lands. Bio-blitzes are a relatively low cost and fun way to catalog the various cogs and wheels that make the natural world go round.

Above: Boulder Mountain looms in the distance above the middle reach of Deer Creek (foreground), surrounded by steep canyon walls of white and reddish Navajo Sandstone. Photo by W. Fertig.

Below: Statistical summary of the 2007 and 2008 Deer Creek bio-blitzes. Note that Cumulative Total column is the total number of species found over both years (about 50% of species were found in only one of the two years).

Taxonomic Group	**# of Taxa found during 2007-2008 Bio-Blitz**			**# of Taxa known from Deer Creek Watershed**	**Potential # of taxa in Deer Creek Watershed**
	2007	**2008**	**Cumulative Total**		
Lichens	0	16	16	16	130
Bryophytes	0	35	35	35	60
Vascular Plants	256	159	290	356	400-500
Insects	42	88	122	122	4000-5000
Fish	0	1	1	5	20
Amphibians	3	1	3	4	10
Reptiles	7	6	9	12	20
Birds	40	58	58	88	150-190
Mammals	18	24	24	37	50
TOTAL	**366**	**388**	**558**	**675**	**4840-5980**

The Real Sages: Salvia

By Walter Fertig

Mention sage and most westerners automatically think of the ubiquitous sagebrush (*Artemisia tridentata*) and its relatives in the sunflower family (Asteraceae). True sages, however, actually belong to the mint family (Lamiaceae) and are represented by just a handful of species. Purple sage (*Poliomintha incana*) is a shrubby mint with aromatic flowers and foliage, but it too, is not technically a sage. Only members of the genus *Salvia* can claim the distinction of being authentic sages.

Botanists recognize nearly 900 species of *Salvia*, making it the largest genus in the mint family. The vast majority of these species occur in the New World tropics, Himalayas, and southwest Asia (especially Turkey). Perhaps the best known species is the edible Garden sage (*Salvia officinalis*). Others are cultivated for their oils used to scent soap and candles (*S. sclarea*) or as ornamentals (*S. azurea, S. greggii, S. splendens,* and others). Relatively few are native to the intermountain west, but at least one has great potential as a garden species.

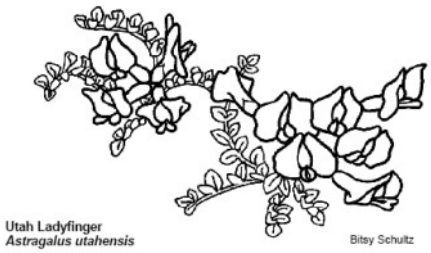
Besides their characteristic aroma, true sages share an unusual floral feature that enhances their pollination. *Salvia*s have just two stamens (nearly all other mints have four), each consisting of a pair of long-stalked anthers attached to a central filament like the two ends of a teeter-totter. Often only the upper anther is functional and produces pollen. When a bumblebee lands on the lower lip of the *Salvia* flower it bumps into the lower arm of the stamen, causing the upper arm to swing downward and deposit a load of sticky pollen on the bee's back. At this stage the flower is functionally "male" or staminate and the pollen-receptive stigma (tip of the "female" part of the flower) is not mature. In a day or so the style of the flower will elongate and the now ripe stigma will be in a position to accept pollen off the back of the next bee, to arrive (assuming the bee has just encountered the swinging stamens of a different *Salvia* flower). The ingenious pollination strategy of *Salvia* ensures cross-pollination and greater genetic variability in the plant's progeny, which in turn may help account for the unusually high species diversity in the genus.

Above: Dorr's sage (Salvia dorrii) *blooming in Snow Canyon State Park, Washington County, UT. Photo by Steve Dahl.*

Utah has just three native *Salvia* species. Annual sage (*S. reflexa*) has tiny blue or whitish flowers and entire to slightly toothed narrow leaves and occurs in sagebrush or pinyon-juniper habitats in widely scattered locations across central and southern Utah. It is more widespread in the Great Plains of North America and may actually have spread westward into Utah during historical times.

Another annual is Chia (*S. columbariae*), a primarily Mohave Desert species of Washington and Kane counties. Chia has a ball-like head of small flowers subtended by round, sharp-tipped leafy bracts and has distinctive pinnately toothed and lobed leaves. Most plants have blue or purple flowers, but populations associated with Chinle badlands are often white-flowered and have been named as a separate variety (*argillacea*) that is apparently endemic to Utah.

The most widespread and showy native *Salvia* in the state is Dorr's sage (*S. dorrii*). This low-growing woody shrub occurs in creosote bush, blackbrush, sagebrush, and pinyon-juniper communities of the southern Great Basin, Mohave Desert, and Colorado Plateau areas of southwestern Utah. Dorr's sage has a series of ball-like royal blue (or rarely white) flowers surrounded by purple bracts that stand out against the gray-green foliage. Like all true sages, it is pleasantly aromatic and attracts many pollinators. This species can be grown from seed sown in the fall or from cuttings and is hardy over much of western and southern Utah. It thrives best if grown in well-drained, dry areas with full sun. According to Susan Meyer, Dorr's sage also makes a good host plant for gardener's interested in growing Indian paintbrushes (*Castilleja* spp.). Dorr's sage is an outstanding accent or specimen plant for the water-wise garden.



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