

## Protecting the Mojave from Wildland Fire Southern Nevada District BLM

Kevin E. Oliver, Fire Management Officer



Good fire management in the Mojave ecosystem equals a minimum impact fire suppression operation resulting in the smallest possible fire size. To accomplish this goal, the BLM Southern Nevada District employs a 30 - person team of firefighters, dispatchers and specialists to cover a 3.5 million acre response area stretching from California to Arizona and from Laughlin to Beatty. A key to the success of our resource protection goals is assistance from other federal, state and local interagency partners.

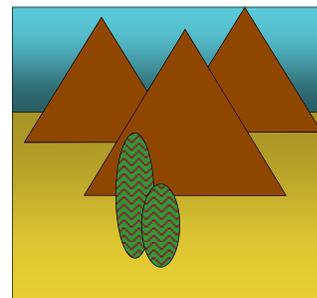


**Top.** Mobile attack from a BLM Engine – 2005 Loop Fire. **Bottom.** UTV in action – Ash Meadows 2008.

The execution of aggressive fire suppression, coupled with minimum impact has been well developed over time and can now be described as “well balanced.” In the past, fire suppression meant all out aggressive tactics with little regard for resource damage. As the desert tortoise listing occurred, fire suppression tactics were appropriately restricted. Eventually, the pendulum had moved so far toward minimum impact, that firefighters allowed fires to grow larger for fear of breaking “off-road” driving prohibitions.

Today the BLM employs a mix of minimum impact equipment, firefighter training, resource advisors and trust in the Incident Commanders decision to employ the tactics necessary to minimize fire size and resource damage in Mojave habitat.

Single Engine Air Tankers (SEAT's) and Utility Terrain Vehicles (UTV's) are two primary “light impact” tools being employed to keep fires small. In the right locations, mobile attack with fire engines is being utilized effectively. The BLM has SEAT bases at Jean and Mesquite, Nevada. Three UTV's in southern Nevada are equipped with tanks and foam units to support firefighters. While funding and staffing are always a challenge, the BLM is well equipped to manage fire in the landscape of southern Nevada.



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## Mojave Applied Ecology Notes

[www.unlv.edu/staff/cengel/DDFRGHome.htm](http://www.unlv.edu/staff/cengel/DDFRGHome.htm)

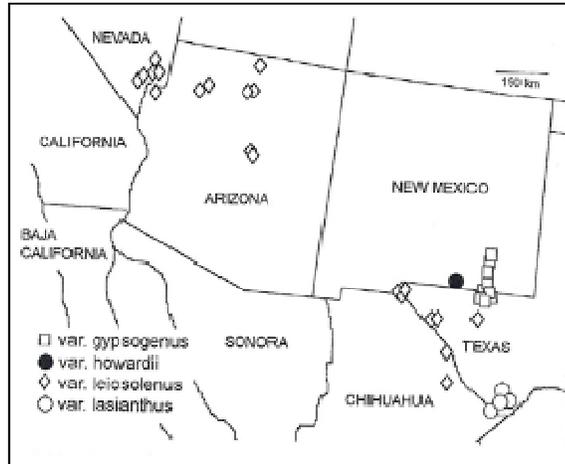
Summer 2009  
Volume 2, Issue 2

Editor: Jill Craig  
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Mojave Applied Ecology Notes is a newsletter published quarterly by the UNLV Desert and Dryland Forest Research Group. We specialize in working with resource managers to address key information needs for management through applied research. Submissions to the editor are welcome. We reserve the right to edit all article submissions.

## A Phenological Study of *Anulocaulis leiosolenus* var. *leiosolenus*

Dianne Bangle and Cayenne Engel



**Left.** Distribution map of *A. leiosolenus* varieties across the Southwestern United States and northern Mexico (from Spellenberg and Wooten, 1999.) **Top.** *Anulocaulis leiosolenus* var. *leiosolenus* flower.

The genus *Anulocaulis* is a taxonomically complex group of plants (Spellenberg 1993) in the Nyctaginaceae (four-o'clock) Family. *Anulocaulis* are long-lived perennials endemic to the arid regions of the southwestern United States and adjacent Mexico.

*Anulocaulis leiosolenus* var. *leiosolenus* (ringstem) is found within Lake Mead National Recreation Area (LMNRA) and surrounding Bureau of Land Management (BLM) lands in Clark County, Nevada and Mohave County, Arizona. It is a gypsum endemic (gypsophile), which means the species is restricted to gypsum soils. Ringstem is listed as a covered species under the Clark County Multiple Species Habitat Conservation Plan (MSHCP) and funding was provided by Clark County to conduct monitoring of randomly selected populations, as well as conduct research on the ecology of this species. Mapping of ringstem has occurred at LMNRA since 2005, with approximately 7,000 individuals recorded within LMNRA.

The name “ringstem” comes from a sticky ring, approximately 1 cm in width that is present along the stems of the plant. The purpose for and composition of the sticky ring is currently unknown, however we assume that the function of the ring is to trap floral predators and reduce predation and damage. The ring acts similarly to the commercial product, tanglefoot, and many species of insects end up caught in the sticky substance from which they cannot escape. We have observed crab spiders taking advantage of the sticky rings by making a meal out of trapped insects, while easily stepping over the rings themselves. (Top figure, page 3).

The distribution of *A.l.leiosolenus* is disjunct across its range and little is

(Continued on page 3)

### Phenological Study (continued from page 2)

known about the ecology or biology of this species. In Arizona, *A. l. leiosolenus* has been recorded at the Grand Canyon (bottom of Bright Angel Trail) and at Camp Verde (located 86 miles north of Phoenix). The New Mexico populations of *A. l. leiosolenus* are found along the southern portion of the Rio Grande down into Texas near El Paso and Ciudad Juarez, Mexico (pers. com. Norman Douglas).

Because the species has been described, but little is known about its natural history, we designed studies to add to the scientific knowledge about the reproductive function of *A. l. leiosolenus*. Our goal is to understand the vegetative and reproductive phenology (timing) of *A. l. leiosolenus*. We want to document information about the duration of flowering per plant, how many flowers and fruits a plant may produce, if leaf number is related to timing of bolting and flowering, and whether leaf number and stem length determine reproductive output.

Starting in 2008, we initiated observations of 21 individuals at each of three sites in rare plant habitat within LMNRA. Monitoring is designed to follow the development of the plants from the rosette stage through bolting, flowering, and fruit development. Plants are observed every 5 days from May until November in concordance with the flowering period of ringstem. Plant phenological stage, floral phenological stage, stalk measurements, and number of leaves are recorded.

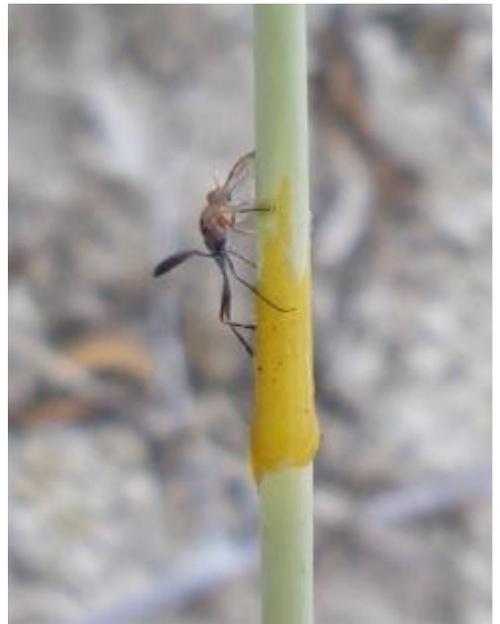
Ringstem flowers are short-lived, open in the evening, and wither in the morning. We conducted some initial pollinator observations and have observed that the main nighttime pollinator appears to be *Celerio lineate* (white-lined sphinx moth), however flowers are also visited by a generalist bee (species unknown) in the early evening and morning.

To date, we have observed significant flower and fruit production in undamaged plants, with up to 181 buds and 26 open flowers on a given plant. Many of the plants in the populations we are monitoring have suffered from herbivory or broken stems across both years, assumedly from rabbits or local rodents. The impacts to the population by this herbivory are unknown.

#### Citations:

Spellenberg, R. and T. Wootten. 1999. Vascular plants on a gypsum outcrop in Southern New Mexico: A listing, new varieties, and taxonomic realignments in the *Anulocaulis leiosolenus* complex (Nyctaginaceae) and a new variety of *Mentzelia humilis* (Loasaceae). *Sida*, 18(4): 987-999.

Spellenberg, R. 1993. Taxonomy of *Anulocaulis* (Nyctaginaceae). *Sida*, 15(3): 373-389.



**Top.** Crab spider with victim of sticky ring. **Middle.** Insect stuck to *Anulocaulis leiosolenus* var. *leiosolenus*. **Bottom.** *Anulocaulis leiosolenus* var. *leiosolenus*.



## Restoration Research in Gypsum Soils within the Mojave Desert, Lake Mead NRA

Lindsay Chiquoine, Research Assistant



**Left.** Established desert pavement site along Echo Wash.

**Right.** Biological soil crusts found at Overton Beach Road and Northshore Road.

Re-construction of the Lakeshore Road and Northshore Road within Lake Mead NRA began in the early 1990's. During the re-construction, rehabilitation success along the roadsides was loosely based on anecdotal observation, but not quantified. In early 2000's, road construction and restoration began in high gypsum content soils, and the previously used restoration techniques were not as successful due to several hypothesized factors. As a result, it was determined that restoration research in gypsum habitats is necessary to quantify responses to restoration treatments. The information gained will assist with future management decisions in areas with high gypsum content.

In October 2008, 2056 perennial plants were removed from the proposed path of destruction and stored for care and monitoring. During the salvage, combinations of two treatments were used to compare survival success to salvage technique. Soil crusts were also collected and research is being conducted on enhancing the recovery potential of the crustal communities.

During the spring of this year, 55 reference plots were established near realignment areas to gain a site-specific perspective of the vegetation communities. This information provides data on plant community diversity and density in specific soil types. It also identifies sites with established biological soil crust and desert pavement. With this information, planting treatments are being developed for roadsides and along the old road bed.

The reference sites will also be used as control plots for long-term monitoring to compare the established biological soil crusts, desert pavement, and vegetation community to disturbed sites, as well as identifying impacts and changes in the established seed bank. Once construction is completed, topsoil will be reapplied along most areas of the road. Long-term monitoring plots will be established after salvaged plants are replanted in the fall. In some areas salvaged biological soil crusts will be reapplied. These plant and crust treatments combined with watering treatments and topsoil reapplication will provide information related to restoration of gypsum soil communities. It will also provide baseline information for developing a program for gypsum restoration in Lake Mead.



**Above.** Valley of Fire Wash site.

## Synthesis Completed of Post-Fire Recovery of Native Perennials in the Mojave, Sonoran Deserts

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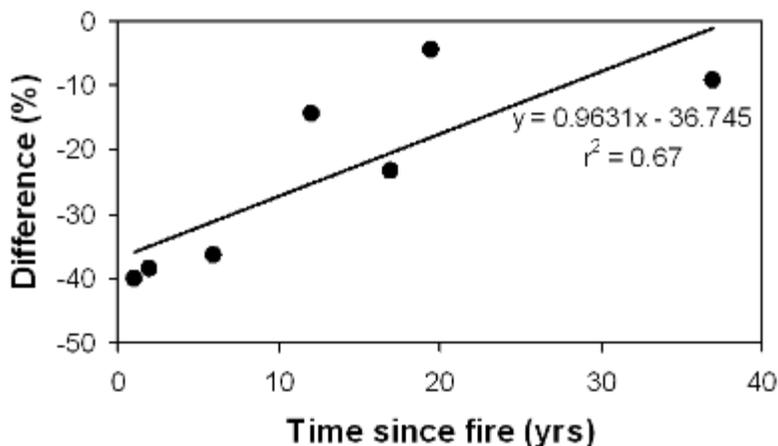
Literature syntheses to develop status of knowledge reports are important to integrate and summarize the scattered scientific literature on a particular topic. The isolation and fragmentation of scientific literature on a topic is not necessarily a shortcoming of science. Rather, it is simply a consequence of having (1) research published in a diverse array of journals, (2) articles build on each other and therefore articles relevant to a particular topic can be published decades apart, and (3) funding virtually impossible to secure to do these periodic assessments of what we know and don't know (competitive science grants want researchers to jump into novel, new research, and land management agencies, although wishful for syntheses, cannot typically target funding out of their budgets for syntheses).

I was able to recently complete the third in a series of literature reviews (the first one was on burro grazing effects on Mojave vegetation, the second on Mojave revegetation). To synthesize post-fire recovery of perennial vegetation in the Mojave and Sonoran Deserts, I analyzed data systematically extracted from published literature to address several questions about post-fire recovery patterns.

Sprouting by desert perennials after being burned is generally limited but varies among species. For example, only 3-37% of *Larrea tridentata* sprouted compared to 64-86% of *Yucca schidigera* (the best-sprouting *Yucca* species examined). Four of five studies measuring recovery of perennial cover reported close relationships ( $r^2 = 0.67-0.99$ ) between time since fire and cover (Fig. 1). In fact, three studies measuring the longest time since fire ( $\geq 37$  years) found that cover had returned to within 10% cover of unburned areas within approximately 40 years. Conversely, post-fire species composition exhibited little convergence with unburned composition in five of six studies even 47 years after fire. *Sphaeralcea ambigua*, *Gutierrezia* spp., *Achnatherum speciosum*, *Encelia* spp., *Hymenoclea salsola*, and *Baileya multiradiata* had the highest abundances on burns relative to unburned areas, meaning that these species actually increased their relative abundance compared to other species after fire. Analyzing the literature as a whole suggested some generalities about recovery after fire (e.g., that perennial cover reestablishes faster than composition), but more work is required for improving specific knowledge about plant recovery among different fires, sites, species, and climates.

The citation of the full article published in *Journal of Arid Environments* follows, and a PDF is freely available from <http://faculty.unlv.edu/abellas2/>:

Abella, S.R. 2009. Post-fire plant recovery in the Mojave and Sonoran Deserts of western North America. *Journal of Arid Environments* 73:699-707.



**Fig. 1.** Example showing one of the five studies that measured the natural reestablishment of perennial plant cover following wildfire in the Mojave Desert. This graph shows the difference between cover on burned and unburned areas (with zero at the top meaning that burned cover has recovered to levels on adjacent unburned areas) as a function of time since wildfire. The study used a chronosequence approach where each point on the graph represents a different aged wildfire. The studies generally found that native perennial cover on burns had returned to unburned levels within 40 years after fire, even though the cover was supplied by different perennial species on burned compared to unburned areas.

**A Newsletter of the UNLV  
Desert and Dryland Forest Research Group**

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## Recent Publications

- Abella, S.R., and J.D. Springer. 2009. Planting trials in northern Arizona ponderosa pine forests. *Ecological Restoration* (in press).
- Abella, S.R. 2009. Smoke-cued emergence in plant species of ponderosa pine forests: contrasting greenhouse and field results. *Fire Ecology* 5:22-37.
- Abella, S.R., J.L. Gunn, M.L. Daniels, J.D. Springer, and S.E. Nyoka. 2009. Using a diverse seed mix to establish native plants on a Sonoran Desert burn. *Native Plants Journal* 10:21-31.
- Springer, J., and S. Abella. 2009. Using a diverse seed mix to establish native plants on a Sonoran Desert burn. *The Plant Press* 33(1):16-17. Arizona Native Plant Society, Tucson, AZ.
- Sutter, Robert D., S. Kokos, and D. Bangle. 2009. Improving the Implementation of Ecological Monitoring and Adaptive Management in the Clark County Multiple Species Habitat Conservation Plan. Final Report for Contract 2005-TNC-574F-P between Clark County and The Nature Conservancy. 62 pages.