Spring 2009

Mojave Applied Ecology Notes Spring 2009

Russell Scofield

Michele Slaton Ph.D

Alexis Suazo

Donovan J. Craig
University of Nevada, Las Vegas

Spring 2009
Volume 2, Issue 1

Mojave Applied Ecology Notes

A NEWSLETTER OF THE UNLV
DESERT AND DRYLAND FOREST RESEARCH GROUP

Guest contributor: Russell Scofield, U.S. Department of Interior Coordinator

California Desert Managers Group

russell_scofield@ca.blm.gov

The California desert: home to more than 100 sensitive, threatened, or endangered species; three national park units; 10 state parks; 83 BLM-managed wildernesses; and about 75 percent of the designated critical habitat for the threatened desert tortoise. Resource conflicts abound with the need for expanded military training, renewable energy development, additional wilderness proposals, tortoise recovery, recreation, and a strong desert constituency. Now more than ever, it is crucial for agencies to make decisions based on sound science.

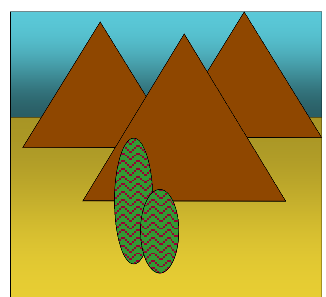
The Desert Managers Group (DMG) is a partnership between federal, state, and local resource managers within California who share the vision of working together to conserve and enhance the California desert for current and future generations. Because of the many range-wide issues within the Mojave Desert, the DMG is ideally suited to foster and coordinate research. As an example, the DMG coordinated the development of the springs monitoring database. Protocols were developed by the Desert Research Institute under contract with the National Park Service Vital Signs program. The result was a common set of protocols and a common database, which agencies can use to learn more about springs in the Mojave.

Another project of the DMG is the sharing of spatial data among agencies. The U.S. Army, through funding provided by a Legacy grant, established the Mojave Desert Ecosystem Program (MDEP) and the webpage http://www.mojavedata.gov that hosts data layers provided by many agencies participating in DMG. MDEP also provides much of the data processing for the interagency range-wide line distance sampling for the tortoise.

DMG is working with researchers in the U.S. Geological Survey and academia to identify projects that will provide resource managers with the vital information needed to make informed land-use decisions. There is a need of additional habitat modeling for rare or sensitive species. Little is known about wildlife corridors within the desert. And how will climate change affect the habitats we are currently protecting?

In addition to coordinating research and monitoring, DMG coordinates many implementation projects such as habitat restoration, desert tortoise recovery, and conservation land acquisitions. DMG also is actively involved in the coordination of renewable energy programs within the desert.

Please visit http://www.dmg.gov to learn more about the DMG and its partner agencies.



Inside this issue:

Monitoring in Death Valley National Park	2
492 Undergraduate Research Symposium	3
Sahara mustard research	4
Joint Fire Science Update	5

Desert and Dryland Forest Research Group

University of Nevada -Las Vegas
4505 Maryland Parkway
Las Vegas, Nevada 89154-2040

RESEARCH STAFF

Dianne Bangle, Research Assistant
Lindsay Chiquoine, Research Assistant
Donovan Craig, Research Assistant
Jill Craig, Weed Sentry Coordinator
Adria DeCorte, Graduate Assistant
Teague Embry, Botanist
Cayenne Engel, Research Associate
Ruben Ibarra, Undergraduate Assistant
Amber Lee, Undergraduate Assistant
Kate Prengaman, Botanist
Gary Reese, Botanist
Chris Roberts, Graduate Student
Alexis Suazo, Research Assistant
Sarah Schmid, Botanist
Peter Van Linn, Graduate Student

PROGRAM MANAGER

Scott Abella, Ph.D.
scott.abella@unlv.edu

Mojave Applied Ecology Notes

www.unlv.edu/staff/cengel/DDFRGHome.htm

Spring 2009
Volume 2, Issue 1

Editor: Jill Craig
jill.craig@unlv.edu

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.

Guest contributor: Michéle R. Slaton, Ph.D., Botanist, Death Valley National Park

Vegetation Monitoring in Death Valley National Park

At 3.4 million acres, Death Valley is home to 146 special status plant species, and 11 distinct mountain ranges with up to 11,000 ft. elevation gain. Against this backdrop of biological and physical diversity, Park staff have initiated several vegetation inventory and monitoring studies. The questions we pursue related to native vegetation management fall generally into two categories: 1) individual populations and 2) vegetation communities. Each type of study offers insight into the other; explanations for phenomena in one locality are often found by looking at the broader landscape.

Vegetation studies differ significantly in methodology, and are determined by species' life histories and distributions. Figure 1 illustrates three Park monitoring studies for rare plants, plus the locations of 200 plant community plots. Widely spaced Eureka dunegrass that occurs across nearly 6 square miles is monitored using large plots; Death Valley blue-eyed grass, limited to spring areas, is monitored on a finer scale; rock lady, constrained to vertical cliffs, is monitored by complete population census. Plant community inventory and monitoring plots are designed to capture species diversity and composition in moderately sized areas. This type of variety in study design is common, and its observation is nothing new- but it's important to reflect upon its significance when designing studies, developing databases, and sharing data.

(Continued on page 3)

ENV 492 Undergraduate Research Symposium

Scott Abella, Ph.D.

In spring semester since January, UNLV Environmental Studies and Biology students in ENV 492 (Undergraduate Research) have conducted a wide variety of ecological research projects. Projects range from insect community inventories to monitoring post-fire plant recovery at Red Rock Canyon and testing carbon addition as a tool for reducing exotic plants. Findings of these research projects may be of interest to faculty and students at UNLV, resource managers in the Mojave Desert, and interested citizens of the Las Vegas community. All of the projects are intended to supply ecological information with practical applications for conservation and resource management. This course is being taught by Scott Abella with Alex Suazo, Donovan Craig, and Cayenne Engel, all of whom are mentoring the students in their research projects.

A total of 12 student projects are ongoing. The students will be presenting the projects at the end of the semester on May 4, beginning at 12:00 noon, in UNLV's brand-new Greenspun Building. If you are interested in attending the symposium, please email dottie.shank@unlv.edu for directions and information on parking.

Vegetation Monitoring *(Continued from page 2)*

At first glance, it's obvious that Death Valley's rare plants are embedded in a sea of study sites of plant communities; seemingly isolated populations invariably interact with their neighboring communities. In the context of climate change, some plant populations may be able to migrate into surrounding areas. Others, which are constrained to specific substrates, may not have that opportunity. Ongoing monitoring at fine and broad scales will enable us to answer some of these questions and anticipate and manage changes in these interwoven populations and communities.

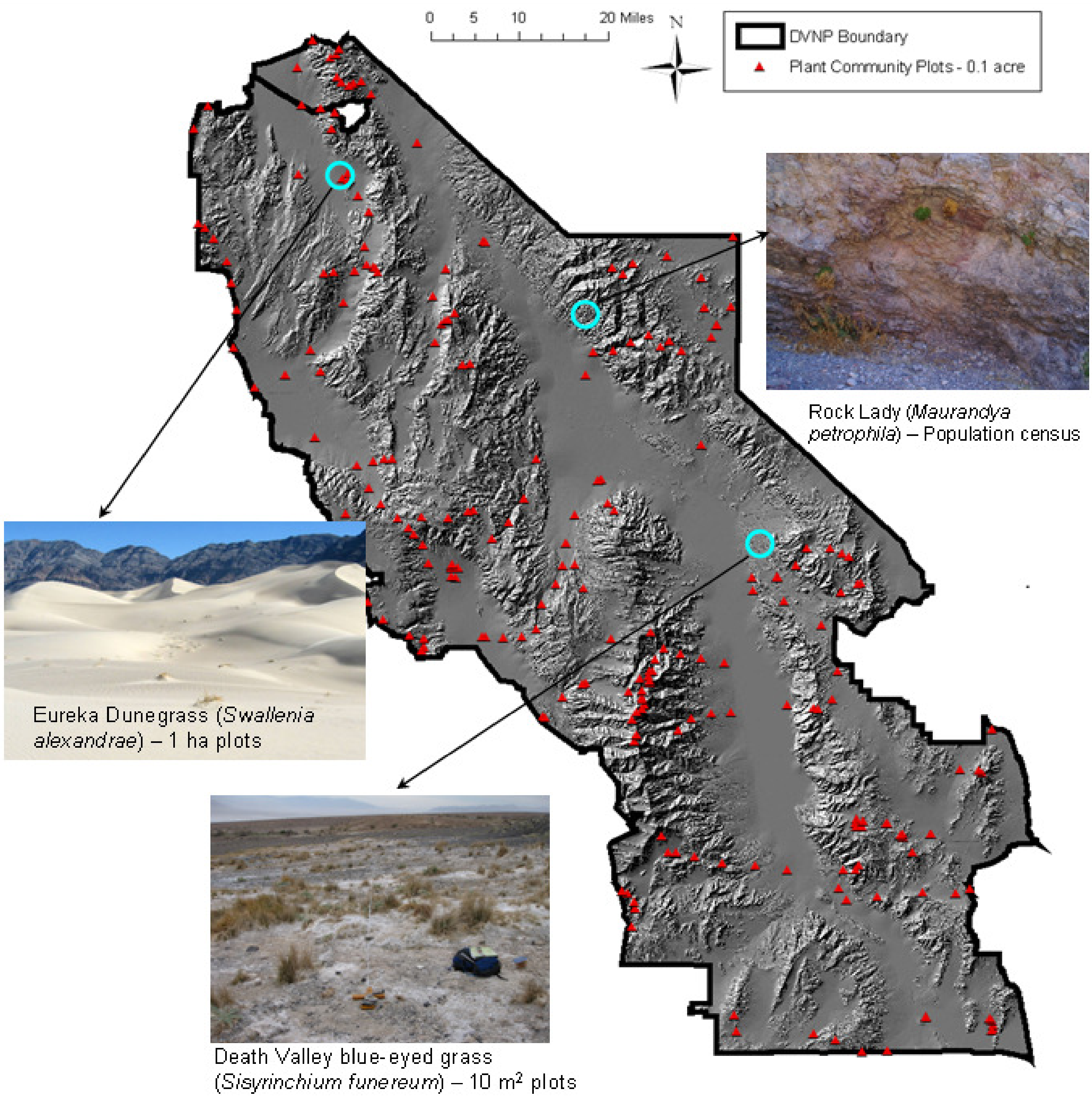


Figure 1. Rare plant and vegetation community inventory and monitoring in Death Valley.

Spring 2009
Volume 2, Issue 1

Response of Sahara mustard (*Brassica tournefortii*) to water addition and soil disturbance

Alexis A. Suazo, Research Assistant alex.suazo@unlv.edu

Invasive exotic species can have a significant impact on the structure, function, and diversity of ecological communities. Understanding factors that influence the susceptibility of plant communities to invasion has direct implications for designing effective management approaches. Currently there is no established general theory of community invasibility, but a theory based on increased resource availability has been successful in explaining exotic plant invasions.

Sahara mustard (*Brassica tournefortii*) is one of the top exotic invasive species spreading through the Mojave and lower Sonoran Deserts. In arid environments, water availability is an important resource in controlling the emergence and survival of winter annual plants. Therefore, in patches where water availability is high, annual plant density should be high. As a winter annual, Sahara mustard should benefit from this type of condition. In collaboration with Jessica E. Spencer, E. Cayenne Engel and Scott R. Abella, I experimentally tested this idea by creating habitat patches conducive to Sahara mustard invasion. Experimental patches consisted of water addition, soil disturbance, and their factorial combination. Patches were located at five sites scattered throughout Lake Mead National Recreation Area. Site selection was based on past Sahara mustard infestation; therefore, we assumed that Sahara mustard seed was present in the soil seed bank.

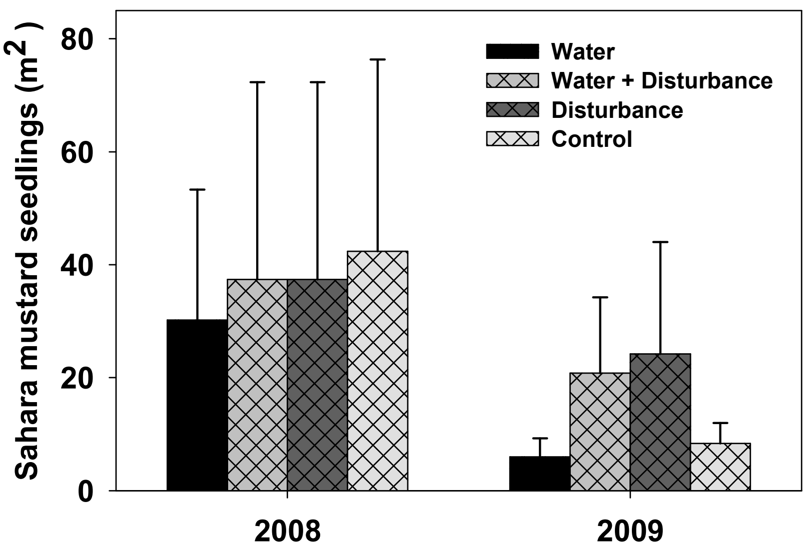


Figure 1. Mean (±SE) number of Sahara mustard seedlings in experimental patches.

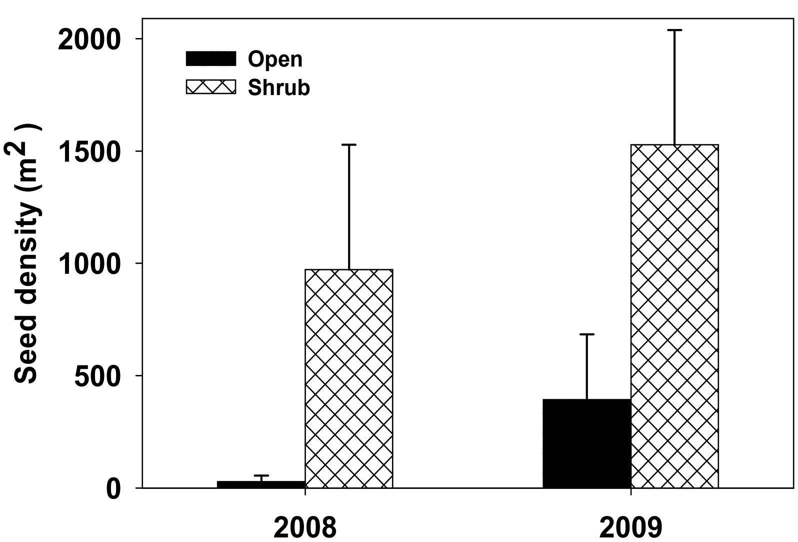


Figure 2. Mean (±SE) number of Sahara mustard seeds in the interspaces (open) and under shrubs (shrub) microhabitats.

Figure 1 shows Sahara mustard seedling density in experimental patches. Water additions did not have a positive effect on seedling emergence. In 2009, watered plots had the lowest seedling density when compared to other treatments. Figure 2 shows Sahara mustard seed density in the interspaces and under shrub microhabitats as a function of time. Seed density is consistently higher in under shrub microhabitat suggesting that Sahara mustard invasion at our study sites may be regulated by a combination of factors (e.g. soil temperature, light, and facilitation by native shrubs by creating favorable microhabitats). Water availability by itself did not influence seedling emergence. Future studies could investigate how different temperature regimes and water availability affect Sahara mustard establishment. Understanding the mechanisms of exotic plant invasions is particularly important given current trends and predictions about the effects of climate change for the southwestern US.

Joint Fire Science Update

Donovan Craig, Research Assistant
donovan.craig@unlv.edu

It has now been more than one year since the field trials for post-fire planting and seeding effectiveness were implemented. The seeding portion of the study, established at the end of January 2008, has had no plant establishment to date. As a result, we decided to examine the effects of granivory on seeded species. In Fall 2008, Alex Suazo and I implemented a study examining the roles ants and rodents play in seed removal. We established randomized blocks of cages in both burned and unburned habitat near Goodsprings, Nevada. The treatments consisted of ant-inclusion/ rodent-exclusion cages, rodent-inclusion/ ant-exclusion cages, and total exclusion cages. We added 20 seeds each of nine species into Petri dishes and placed them into the cages and allowed four days to pass until retrieving the seed dishes. We are repeating this each month throughout the year to account for changes in granivore activity. Preliminary results (fall and winter) indicate that seed removal is higher in the unburned area and that rodents are the driving force behind this (Figure 1). Rodents are targeting larger seeds like *Coleogyne ramosissima* while ants seem to be targeting small seeds like *Penstemon bicolor*. As we continue these trials throughout the year, we expect to see more activity by both ants and rodents.

Results from the outplanting portion of the study are indicating that adding supplemental water in the form of slow-release water gel packs and protecting the plant with a shelter increase survival. Data from all species are included to reflect treatment differences only (Figure 2). Some plant species such as *Sphaeralcea ambigua* are also exhibiting a higher tolerance (thus survival) to outplanting. While all plant species did not start on equal terms (e.g. size), four

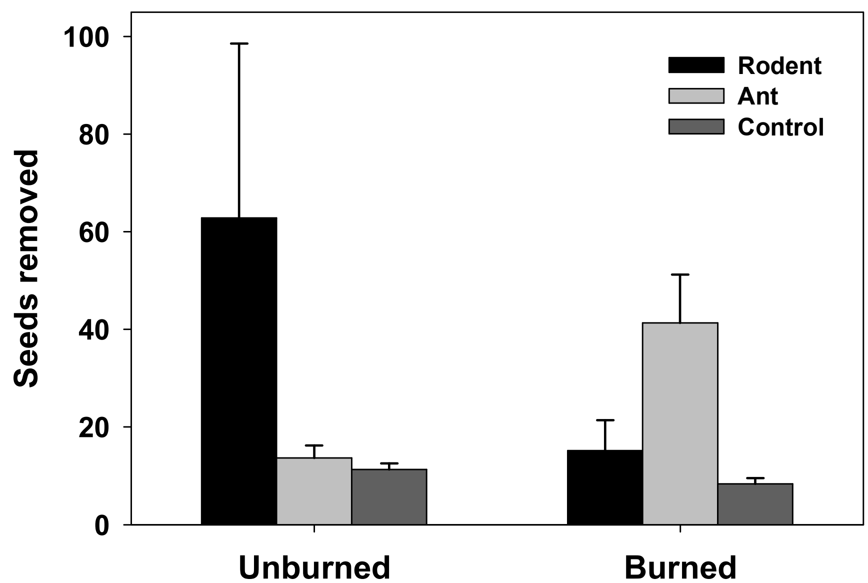


Figure 1. Preliminary results showing mean total number of seeds (±SE) removed by rodents and ants in burned and unburned habitat near Goodsprings, Nevada during the fall and winter 2008-2009. Control treatments had total exclusion of ants and rodents. (Figure by Alexis A. Suazo).

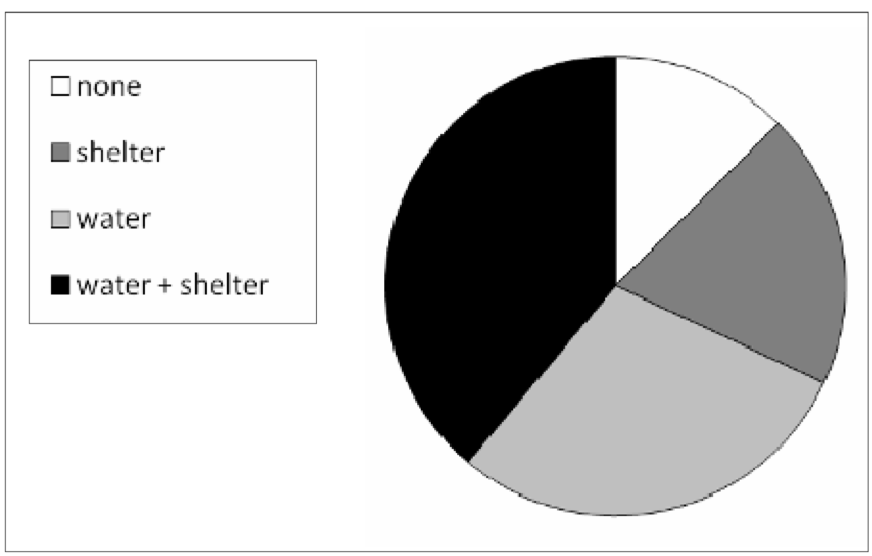


Figure 2. Proportions of surviving plants by treatment.

(Continued on page 6)

A Newsletter of the UNLV
Desert and Dryland Forest Research Group

University of Nevada - Las Vegas
4505 Maryland Parkway
Las Vegas, Nevada 89154-2040

Desert and Dryland Forest Research Group

A note from the Desert and Dryland Forest Research Group…

This volume marks the second year of ***Mojave Applied Ecology Notes***, and a continued commitment to printing articles written by all players conducting ecological research and management throughout the Mojave. We intend to communicate between agencies, researchers and land managers and invite your article contributions. Please remember to announce your events and recent publications in the newsletter. You can submit information to jill.craig@unlv.edu.

Upcoming events: the Eastern Nevada Landscape Coalition's 10th Annual Meeting is June 12-13, 2009 in Ely, NV. Pre-registration opens April 15, 2009. For more information contact Betsy McFarland at 775-289-7974.

Joint Fire Science *(Continued from page 5)*

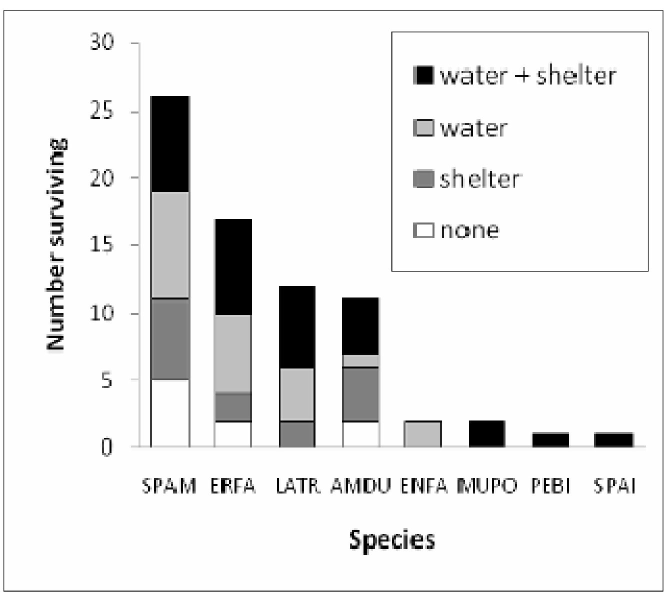


Figure 3. Species performance (number of surviving plants) in all treatments. See explanation in text for differences.

species were of equal condition prior to outplanting. *Sphaeralcea ambigua*, *Eriogonum fasciculatum*, *Larrea tridentata*, and *Ambrosia dumosa* were all nursery-grown, hardened, healthy plants in gallon-sized pots. *Encelia farinosa* were salvage plants from Lake Mead while *Muhlenbergia porteri*, *Sporobolus airoides* and *Penstemon bicolor* were outplanted from small cones instead of gallon-sized pots. Limited plant availability is a common stumbling block in revegetation projects; we will take into account differences in handling among species when interpreting survival percentages (Figure 3).