Spring 2008

Mojave Applied Ecology Notes Spring 2008

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A NEWSLETTER OF THE UNLV DESERT AND DRYLAND FOREST RESEARCH GROUP

Spring 2008
Volume 1, Issue 1

Mojave Applied Ecology Notes

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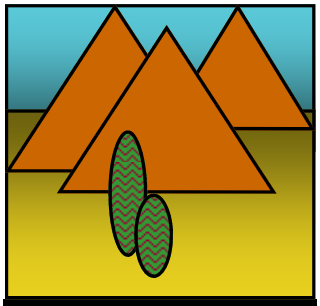
A Regional Approach for Understanding the Effectiveness of Post-fire Rehabilitation in the Mojave Desert

USGS is monitoring the effectiveness of seeding with native species in desert tortoise Critical Habitat (left) and the survivorship of greenhouse-raised shrub seedlings (right) across sites that vary in climate and soils.

Wildfires burned Mojave Desert shrublands during summers of 2005 and 2006 including designated Critical Habitat for the Threatened desert tortoise (32,000 acres in southern Nevada and 42,757 acres in the Grand Canyon – Parashant National Monument of Arizona). In an effort to re-establish plants important to desert tortoises and other wildlife, the Bureau of Land Management (BLM) distributed native seeds in burned Joshua tree – creosote bush shrublands in Nevada and Arizona. US Geological Survey (USGS) has monitored the effectiveness of the seeding effort for two years at seven fires in southern Nevada and for one year at eight fires in northwestern Arizona. Although rainfall for the region has been below average over the monitoring period, site-to-site variability in rainfall provides a unique experiment for understanding the influence of climate on post-fire habitat rehabilitation. While some sites have demonstrated successful establishment of seeded species, others have not received sufficient rainfall to stimulate significant germination. Consequently, BLM and USGS worked closely with the Nevada Conservation Corps and other volunteers to transplant shrub seedlings grown at the College of Southern Nevada and the Nevada Division of Forestry.

USGS is monitoring the success of transplanting seedlings into fires within southern Nevada as another method for re-vegetating burned habitats where seeding success may be hindered by low rainfall. Community volunteers with the Friends of Gold Butte and the Clark County Interagency Volunteer Program are also part of the monitoring: volunteers conduct monthly watering of seedlings and may be a viable method to accelerate shrub establishment. USGS is documenting the geographic variability in climate alongside its monitoring to determine whether post-fire treatment success can be predicted using current climate spatial models. If successful, managers will be able to prescribe restoration treatments such as seeding and shrub transplanting based on local climate and potentially predict how such prescriptions might look under projected climate change scenarios.

For more information about these and other USGS research projects on arid land restoration, contact Lesley DeFalco (lesley_defalco@usgs.gov).



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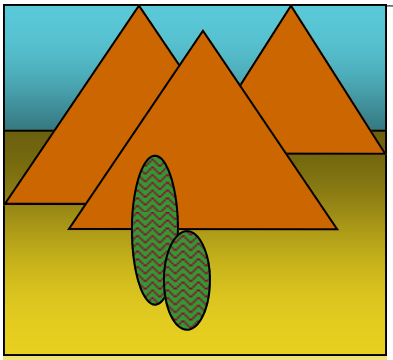

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Mojave Applied Ecology Notes is a newsletter published quarterly by the UNLV Desert and Dryland Forest Research Group. We specialize in working with resource managers to address key information needs for management through applied research. Submissions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

A Fresh Face and New Perspective

The Research Group is happy to introduce Graduate Research Assistant, Chris Roberts. Chris joins us from Albuquerque, NM, where his involvement in a wide array of natural history and ecology projects is remarkable. He was a primary investigator in ethnobotany work for the Hopi and Isleta Pueblos and created a herbarium for the Isleta Pueblo. He has also worked at the Sevilleta and the Jornada Basin long-term ecological research sites on mammal, avian and vegetation surveys, and for Parametrix, an employee-owned environmental consulting firm.

Along with his employment experience, Chris has been an initiator and active volunteer for environmental projects that facilitate public involvement. As a frequent visitor of the Rio Grande Nature Center State Park, he saw their traditional flowerbeds as an opportunity to raise awareness of the beauty and utility of native plants. After convincing Nature Center employees of his idea, he planned, installed, and then spent 10 years coordinating their native plant garden. Additionally, he worked with Bosque Prep School 6th graders for three years on environmental monitoring projects that changed their world. He had the students conducting vegetation surveys and trapping mammals (using Latin names!), recording, and analyzing data. They became "scientists" for the project, and no part of the process was simplified for them. Sixth graders reported the project as their favorite activity of the year, and Chris's work with them undoubtedly produced some budding ecologists. Chris has a B.S. in Wildlife and Fisheries Sciences from Eastern New Mexico University.

We look forward to Chris providing us with some exciting new information on vegetation change in the Mojave. Chris's thesis research involves intensive re-sampling of 116 transects initially sampled in 1979 by an earlier UNLV M.S. candidate: Jim Holland. Chris's study will detect changes in vegetation composition and structure that have taken place over the last 30 years. Future publications detailing his research will be posted in the Recent Publications column. Welcome Chris!

Chris Roberts, Graduate Advisee of Scott Abella and Stan Smith.

A Letter from the UNLV Desert and Dryland Forest Research Group

Mojave Applied Ecology Notes is designed to report on ecological research and land management activities occurring in the region's desert and dryland forests. This is a medium to communicate among agencies, land managers, scientists, and all people involved in the care of this fragile landscape. We invite article submissions from anyone who would like to communicate their research and/or ecological work to a regional audience. "Recent Publications" and "Upcoming Events" will be regular newsletter sections. Please email any proposed newsletter inclusions to jill.craig@unlv.edu. We look forward to working with you to disseminate important ecological information throughout the Mojave!

Plant Community Response to Fire: A Chronosequence Study

Cayenne Engel and Scott Abella

Fires are becoming more prevalent events across the landscape in the southwestern US. Over the next several decades the already arid southwest is predicted to become warmer and drier, with longer summers, and an increase of "extreme" weather events such as lightening inducing thunderstorms. While the "hotter and drier" forecast may indicate less abundant plant life, and thus less available biomass for fuel, exotic invasive plant species are becoming more dominant across the landscape with increases in human travel and commerce. Exotic species (particularly many of the invasive grasses) are adding fuel for the fires to burn when the annuals are left as skeletons at the end of summer.

A 2005 burn at Gold Butte. The road acted as a fire break.

With increases in fire frequency, land managers want to know what to expect of the visual and functional response of the plant communities in their systems. Like much of the ecology of Mojave ecosystems, little is known about the community level response to fire, such as recovery time and the factors affecting the rate of recovery.

Therefore, we are collecting data from a chronosequence of fires that have occurred in southern Nevada Mojave ecosystems over the last 30 years (along with adjacent unburned sites). We will be looking at recovery rates and trajectories in plant community composition across the various fires. Additionally, there may not be a single direct successional path between post-fire regeneration and a recovered climax system. Sampling a variety of fire locations and ages should elucidate general patterns. We have sampled 13 fires to date, and expect to add 17 more. By combining biotic (such as initial vegetation) and abiotic variables (such as soil chemistry) from each site we will explain the response and direction of the plant communities post-fire, and provide managers with a predictive framework.

Recent Publications

- Abella, S.R., A.C. Newton and D.N. Bangle. 2007. Plant succession in the eastern Mojave Desert: An example from Lake Mead National Recreation Area, southern Nevada. *Crossosoma* 33(2R):45-55.
- Belnap, J., S.L. Phillips and S.D. Smith. 2007. Dynamics of cover, UV-protective pigments, and quantum yield in biological soil crust communities of an undisturbed Mojave Desert shrubland. *Flora* 202 (8):674-686.
- Deacon, J.E., A.E. Williams, C.D. Williams and J.E. Williams. Fueling population growth in Las Vegas: How large-scale groundwater withdrawal could burn regional biodiversity. Bioscience 57(8):688-698.
- Kristan, W.B. and W.I. Boarman. 2007. Effects of anthropogenic developments on common raven nesting biology in the west Mojave desert. Ecological Applications 17(6):1703-1713.
- A new website by the NRCS provides interactive keys for grass identification by state. Accessible at: http://npdc.usda.gov/technical/plantid_wetland_mono.html

Joint Fire Science Grant Update

Donovan Craig, Research Assistant

A key issue in the Mojave Desert is finding native plants that can re-vegetate burned areas while out-competing invasive species. Invasions of red brome (*Bromus rubens*) and Mediterranean grass (*Schismus arabicus*) are fueling the fires that were once uncommon in the Mojave. Moreover, little is known about the dynamics of plant species interactions after fire. Research focusing on the revegetation of burned areas has been initiated through a grant written by Scott Abella, Stan Smith (UNLV), Alice Newton (NPS), and Christina Lund (BLM).

I will be implementing research that examines up to 12 native species representing four functional groups: late-successional shrubs, early-successional shrubs, forbs and grasses. One experiment will examine all 12 species and will take place at Lake Mead National Recreation Area's nursery. Plots were established and will be planted with natives in both community and individual arrangements. Then competitive interactions among planted species and exotic invasives will be examined under high- and low-nutrient treatments. The objective of this experiment is to determine which natives have the greatest nutrient-reducing abilities and can effectively depress exotic grasses in both high- and low-nutrient environments.

Last fall, 138 experimental plots were installed at Lake Mead National Recreation Area.

By determining the most competitive, easiest-to-establish native species, we will provide managers with valuable information for selecting native species that will minimize future invasion.

Early Detection, Rapid Response in Clark County: The Weed Sentry Story

Weed Sentry—Jessica Spencer, Research Assistant

The Weed Sentry program was created in late 2003, to be an early detection, rapid response program for locating and eradicating new infestations of invasive plants on public lands in Clark County. Surveys are performed along roads, trails, shorelines and in some backcountry areas on lands overseen by the Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service and U.S. Forest Service. The primary goal of Weed Sentry is the early detection of invasive plant species. The rapid response aspect of the program is a cooperative effort between Weed Sentry and land managers. If a small population is detected, the Weed Sentry crew attempts to treat it at the time it is detected. If a population is too large for the Weed Sentry crew to treat within a couple hours, Weed Sentry brings it to the attention of land managers and recommends treatment options.

Herbicide treatment of an incipient population of *Peganum harmala*.

Since its inception, the Weed Sentry program has documented over 12,000 occurrences of invasive plants. Several of these occurrences represent incipient populations that have been treated and eradicated. Weed Sentry is currently expanding to tackle various research questions surrounding invasive species. This column will provide regular updates on the status of the Weed Sentry program.

Desert National Wildlife Refuge 2007 Weed Surveys Provide a Unique Opportunity

Jill Craig and Jessica Spencer, Research Assistants

The Weed Sentry program is tasked with surveying for weeds on public lands. Generally, surveys focus on roadsides and established hiking trails. During meetings with Desert National Wildlife Refuge Manager, Amy Sprunger, we decided to try something new at the Refuge in 2007. We focused surveys on springs and set up permanent sampling frameworks at each visited. Sampling covered a 20-m gradient from spring source to surrounding uplands and allowed us to quantify the intensity of weed infestations. The frameworks will allow us to track weed populations over time, and provide information on the variation in weed prevalence depending upon the distance from each spring. As we hiked to springs we mapped weed infestations to help identify areas vulnerable to invasion.

We visited 16 springs and installed permanent frameworks and sampled vegetation at 12. Vegetation sampling revealed that three springs weren't infested by any weed species; these were high elevation springs without an access trail. In the future, we intend to establish sampling frameworks at additional springs on public lands managed by other agencies. We expect to resample springs regularly.

Top photo: November 1948 photo of Rye Patch Spring.

Bottom photo: Jessica Spencer performing a re-enactment in October 2007. Compare the distant mountain location with the biologists' left shoulders. Joshua Trees have grown significantly, and vegetation surrounding the spring appears more dense today. Depressed vegetation in 1948 could be due to recent disturbance during water tank installation.

Left photo: Yellowjacket Spring shows a typical spring set-up. There is a poly-tube leading to a bathtub.

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Mojave Events

April 9-11 **Climate Change Desert Science Symposium**

Sponsored by California Desert Managers Group and University of Arizona Extension

Held at the Aquarius Hotel and Casino in Laughlin, NV

April 18-21 **22nd Annual Desert Symposium**

Sponsored by the Desert Studies Consortium and California State University, with the support of LSA Associates

This interdisciplinary symposium includes research on archaeology, anthropology, paleontology, geology, ecology, biology and environmental issues.

Held at the Desert Studies Center in Zzyzx, CA

May 7-9 **Lower Colorado River Riparian Revegetation Workshop**

Sponsored by the Southern Nevada Water Authority and the Las Vegas Wash Coordination Committee

Will address the unique methods and procedures associated with revegetating the Lower Colorado River Basin. Plenary sessions will be on the science and methods of revegetation, there will also be hands on exercises and a tour of the Las Vegas Wash revegetation project.

Held at the Las Vegas Springs Preserve

We're on the web!
http://faculty.unlv.edu/abellas2/