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Spring 2011

Mojave Applied Ecology Notes Spring 2011

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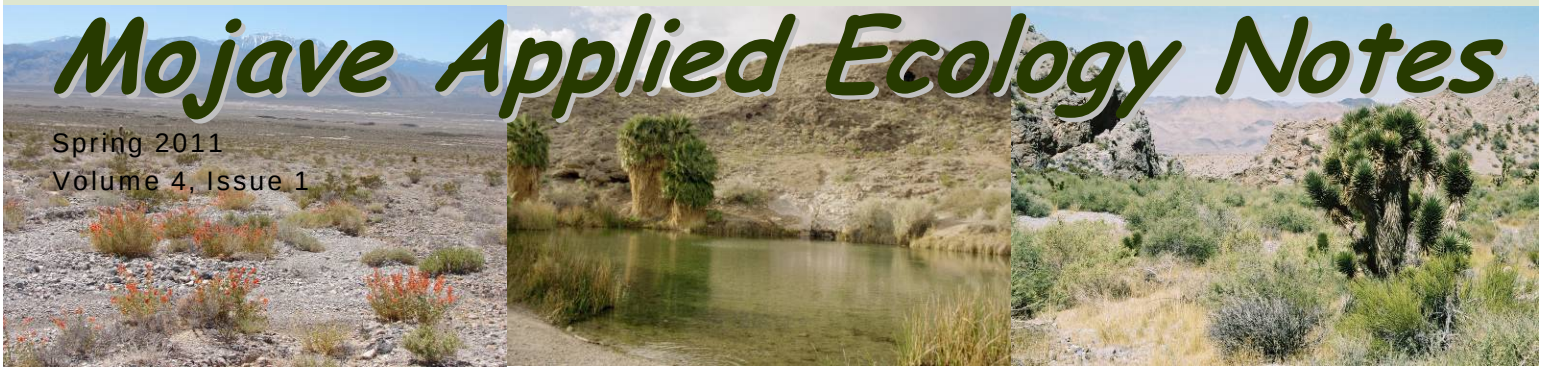
A NEWSLETTER OF THE UNLV
APPLIED ECOLOGY RESEARCH GROUP

Mojave Applied Ecology Notes

Spring 2011
Volume 4, Issue 1



UNIVERSITY OF NEVADA LAS VEGAS

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"A wide variety of related projects our lab is working on were discussed, including greenhouse and field experiments aimed at identifying native species that are most competitive with exotic annual grasses"

Recent and Upcoming Efforts to Synthesize the Science

Three presentations were recently given to manager-scientist groups on a series of projects about revegetating disturbances in arid lands and potential influences of climate change on Mojave Desert vegetation.

Scott Abella was invited to present "Identifying native species for use in successful revegetation projects in the desert Southwest" on March 30, 2011 at the Intermountain Native Plant Summit VI, in Boise, ID. This Summit included manager-scientist groups interested in developing plant materials for accomplishing restoration/revegetation and range improvements in the Intermountain West. Further information about the conference and list of presentations is available from: http://centralidahoextension.blogspot.com/2011/03/intermountain-native-plant-summit-vi.html

Scott discussed a wide variety of related projects our lab is working on, including greenhouse and field experiments aimed at identifying native species that are the most competitive with exotic annual grasses, as well as a literature review on species that have been the most successful in planting or seeding in Mojave Desert revegetation projects.

UNLV graduate student Ross Guida, who has been working jointly with our lab, presented the ongoing project on analyzing data from the Newberry Mountains of southern Nevada. A unique data set was collected in 1979 by then UNLV student Jim Holland, and the plots were remeasured in 2008 by current UNLV student Chris Roberts. Ross has been working with our group to model plant community changes that have occurred over the 30-year period and to make projections about future change over the next 40 years. Ross's analysis is funded by the National Science Foundation Experimental Program to Stimulate Competitive Research (EPSCoR). Ross presented the poster at the 3rd Annual Tri-State Western Consortium Meeting in Albuquerque, NM. 7 April 2011.

See *Synthesize* on page 7

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Mojave Applied Ecology Notes is a newsletter published quarterly by the UNLV Applied Ecology Research Group. We specialize in working with resource managers to address key information needs for management through applied research.

Scott Abella wins Award

By Sharon Altman

On Saturday, February 19, 2011, Scott Abella was presented with the Desert Tortoise Council's Robert C. Stebbins Research Award, at the 36th Annual Desert Tortoise Council Symposium held at Sam's Town Hotel and Gaming Hall in Las Vegas, NV. The symposium was attended by more than 300 participants.

The Robert C. Stebbins Research Award recognizes an individual who has an outstanding record of research in any of a number of scientific disciplines that contribute to understanding desert ecosystems and their biota.

Desert Tortoise Council Board of Directors member and Chair of the Awards Committee, Glenn R. Stewart, Ph.D., Professor Emeritus of Zoology and Environmental Science, Biological Sciences Department, California State Polytechnic University, Pomona; noted as he presented Scott with this award, "Dr. Abella's research focus is applied ecology for supporting land management and conservation, in the areas of plant ecology, restoration ecology, fire ecology, and scientific literature synthesis. He regularly works directly with resource managers on projects, enabling mutually beneficial science-management partnerships and clear paths for scientific information transfer.

To date, Dr. Abella has published over 50 scientific papers and has nine years of applied research experience in the Southwest. His work is regularly sought by media outlets such as the Las Vegas Sun, and he is invited to 4-6 conferences annually as a featured speaker on topics such as ecological restoration, fire management, and exotic species in southwestern deserts.

See *Award* on page 10

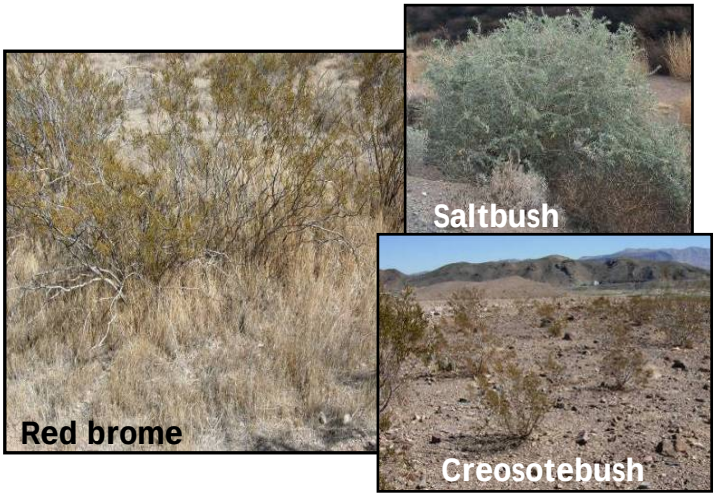
Red brome distribution in the eastern Mojave Desert

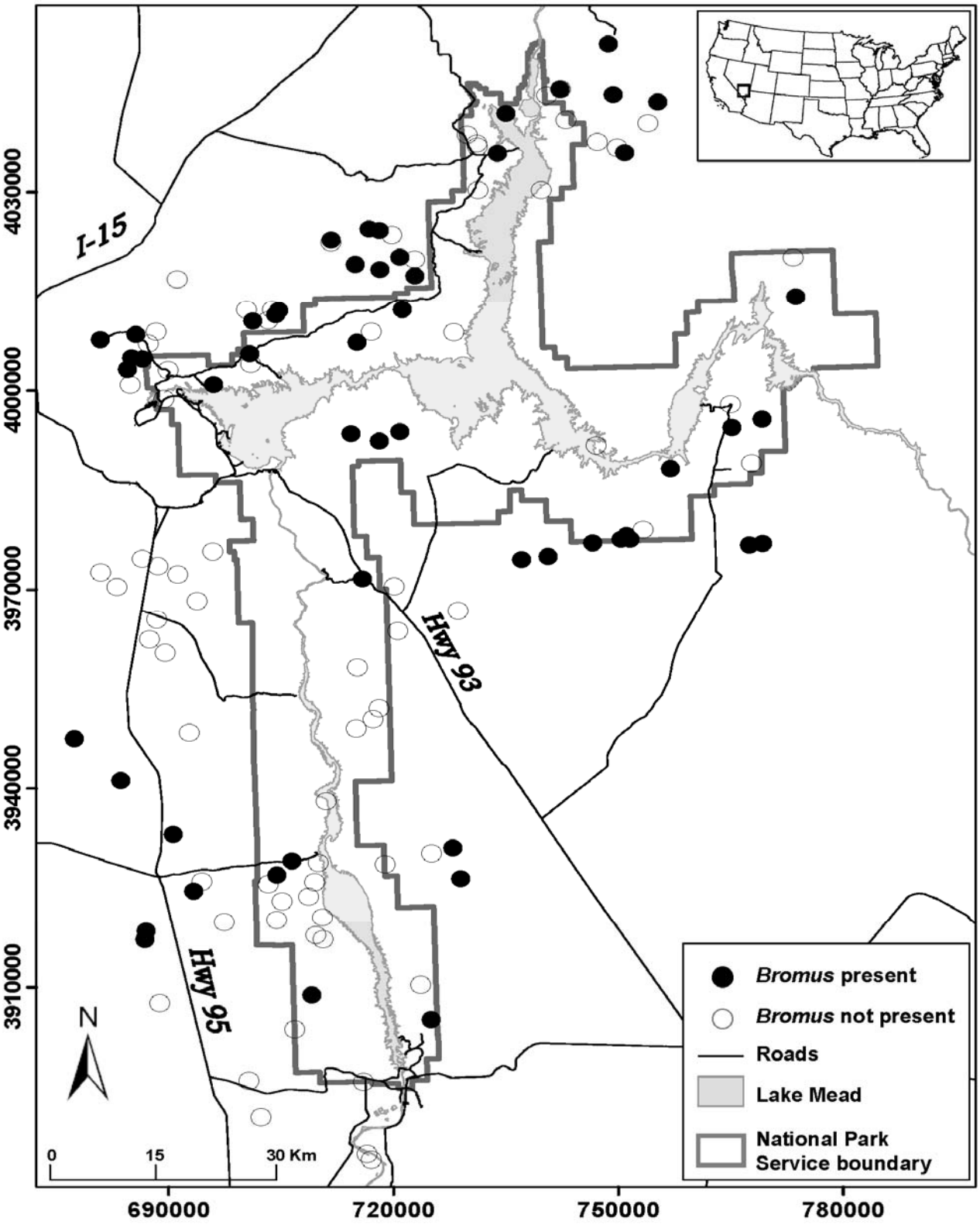
By Scott Abella

In collaboration with Lake Mead National Recreation Area, with support from the Bureau of Land Management Southern Nevada District for the former 'Weed Sentry' program, we have developed a series of models for red brome distribution in the eastern Mojave Desert. The data were obtained by measuring the presence/absence of brome on 126 field plots and environmental variables (including effectively using the NRCS Clark County soil survey) and native vegetation. A summary of the ongoing project is below:

Modeling the Distribution of the Exotic Annual Red Brome in the Eastern Mojave Desert

Because of its ability to transform ecosystems by increasing the prevalence of fire, the invasive annual red brome (*Bromus rubens*) is a priority exotic species for management in arid lands of the southwestern USA. By sampling brome presence and 97 environmental (climatic, topographic, and soil) and native vegetation (e.g., perennial species richness) independent variables on 126 sites, we developed several brome presence/absence models for a 755,000-ha (1.9 million ac) eastern Mojave Desert landscape. Brome occupied 55 of 126 (44%) 0.09-ha (0.22 ac) plots. The simplest models (i.e. those containing the fewest or most easily obtained variables) in multivariate (classification trees and non-parametric multiplicative regression) and univariate (x^2) models often overall performed as well or nearly as well as more complicated models containing more variables harder to obtain. The models varied, however, in their abilities for optimizing forecasting of presence versus absence. For example, a simple classification tree using only elevation, soil great group, parent material, and vegetation type improved estimates (over a naïve model representing the observed frequency of brome in the data) of brome presence for 55% of sites, absences for 87%, and overall for 73%. Conversely, a more complicated model including variables such as soil boron and sulfur performed better for presences (96%) than absences (73%; 83% overall). Results also showed variable support for two general postulates in invasive species science. Brome was not correlated with soil N, which is inconsistent with the supposition that nutrient-rich soils are more prone to invasion. Brome was correlated with native perennial species richness to support the postulate that exotic species abundance is correlated with species-rich habitats, but the correlation was weak (r = 0.38) and similar in strength to correlations with many other environmental variables. On this relatively low-elevation landscape, the areas currently most invaded by brome include the higher elevations (> 777 m [2,549 ft]), limestone/sandstone soils, and burrobush (*Ambrosia dumosa*) and mixed perennial communities. Areas least inhabited by brome are the lowest elevations (< 491 m [1,610 ft]), gypsum soils, and creosotebush (*Larrea tridentata*) and saltbush (*Atriplex* spp.) communities.





Distribution of 126 red brome assessment plots in the eastern Mojave Desert including Lake Mead National Recreation Area and surrounding BLM land managed by the Southern Nevada District.

Meet our newest

Ken Chittick is a new undergraduate research assistant seeking a bachelor's degree in environmental studies. Ken is currently doing research on shoreline succession at Lake Mead, fire succession at Parashant National Park, and laboratory work on brassica seed treatments. He hopes to pursue a career in restoration ecology. He enjoys hiking, looking for reptiles, watching movies, and fishing.

Sylvia T. Tran, a Las Vegan for 15 years, received her BA in Political Science and a minor in English from UNLV, class of '09. She just emerged from the Emigrant Wildness in Stanislaus National Forest, working on the 2010 California Conservation Corps Backcountry Trails crew, and before that she was a VIP at Zion National Park interning with the administration and interpretation in the Visitor Center. She is always prepared for an adventure; carrying her rain gear, head lamp, and at least 50 oz. of water with her everywhere.

Sylvia is working towards applying for graduate school in environmental science. She will take her GRE in June. She aspires to work for the Department of the Interior, in administration and eventually backcountry ranger. Since coming back to UNLV, her passion for applied ecology research has taken charge. She is currently working with Cayenne Engel on the fire recovery project at Parashant National Monument and Lake Mead shoreline projects.

Synthesize

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The co-authors and title of Ross's poster was:

Guida, R.J., H. Stephen, C.L. Roberts, S.R. Abella, W.J. Smith, J.S. Holland, and Z. Liu. Vegetation change in the Newberry Mountains, southern Nevada: Maxent modeling for policy decision support.

On April 20, 2011, Scott Abella was asked to present on revegetating burned arid lands by the Southern Nevada Restoration Team. The presentation took place at the new Red Rock Canyon visitor center and was well attended by resource managers. The title of the talk was: "Revegetating burned arid lands," and it featured ongoing and new work our lab is conducting on identifying native species competitive in post-fire environments and understanding post-burn recovery patterns. Co-authors included D.J. Craig, E.C. Engel, A.C. Newton, and S.D. Smith. More information about the Southern Nevada Restoration Team is available from: http://www.snap.gov/projects/restoration.cfm

Upcoming presentations:

Scott Abella was invited to present on the potential impacts of climate change to vegetation resources in the Mojave Desert in an upcoming workshop, the 2011 Devils Hole Workshop. This event, sponsored by the Nye County Water District and Amargosa Valley Conservancy will held May 4-6, 2011, at the Nye County Commission Chambers 2100 E. Walt Williams Parkway, Pahrump, NV 89048. Scott's presentation is scheduled for Wed., May 4, 2011, 1:30 –2:00 PM. The full abstract of his upcoming presentation is on the following page.

Scott has also been invited to be a panelist at the upcoming Las Vegas Science Festival 2011. The panel discussion entitled "A Local Look at Global Climate Change: Climate Change in Nevada through Time, and Implications for a Future Las Vegas" will take place Wednesday, May 4, 2011, 7:00 - 8:30 PM, at the Las Vegas Springs Preserve, 333 South Valley View Boulevard, Las Vegas, NV. The panel will cover a variety of views on climate change and the implications to Las Vegas and our surrounding communities. Panelists will include experts on climate change, paleoecology, water resources, and policy.

Graduate Thesis Defense

UNLV Environmental Science M.S. graduate student Peter Van Linn, advised by Scott Abella in collaboration with Peter's graduate committee and the U.S. Geological Survey, successfully defended his thesis on April 13, 2011, in a public presentation in the Greenspun Building on the UNLV campus.

Peter's project was a USGS project aimed at developing wildfire potential models for the Gold Butte Mojave Desert landscape.

Peter developed models of fuel abundance and distribution across the landscape and included a temporal component trying to forecast the potential for a fire season in any given year. More information will be provided as manuscripts are developed from the project.

Peter's thesis was titled: "Estimating Wildfire Potential on A Mojave Desert Landscape Using Remote Sensing and Field Sampling."

Abstract of the upcoming presentation for May 4, 2011 at the Devils Hole Workshop, Pahrump, Nevada

The Prognosis for Plant Community Habitat Alterations in Changing Desert Climates

By Scott R. Abella[1,4], Ross J. Guida[1], Stanley D. Smith[2], Chris L. Roberts[1,3], Haroon Stephen[1], William J. Smith[1], Zhongwei Liu[1], and James S. Holland[3]

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There is much uncertainty about how desert plant communities will respond to a changing climate in the southwestern USA. Understanding plant responses to climate change is especially important since as primary producers, plants affect habitat for wildlife, nutrient inputs to aquatic ecosystems, fuel for wildfires, and feedbacks for further climate change. We present two examples of approaches to forecasting potential plant community alterations in changing climates. First, we show the results of a free-air CO_2 enrichment (FACE) experiment at the Nevada Test Site in the northern Mojave Desert. Results indicated that CO_2 enrichment effects on shrub productivity interacted with moisture availability, with greater shrub productivity only in moist years. Production and seed rain of exotic annual species displayed greater increases under elevated CO_2 than did native annuals. Second, we present the 30-year remeasurement results (1979 and 2008) of a network of 116 plant community transects established along an elevational gradient in the Newberry Mountains within Lake Mead National Recreation Area of southern Nevada. Over the last 30 years, average annual minimum temperature has increased by 1.5°C in the study area. Based on the known species abundances within the remeasured transects and interpolative modeling using the climatic variables, some long-lived perennials such as *Larrea tridentata* have incurred little distributional change. However, some species that occur only at the highest elevations, or more generally only within specific elevational ranges, have shown substantial distributional changes. Taken together, results portray the value of these research approaches to land managers contending with uncertainty in developing resource management plans in changing climates.

Save the date: 2011 Devils Hole Workshop

The Nye County Water District and Amargosa Valley Conservancy are pleased to sponsor the 2011 Devils Hole Workshop, to be held May 4-6, 2011,

The workshop will be held at the Nye County Commission Chambers
2100 E. Walt Williams Parkway
Pahrump, NV 89048

The workshop website is: http://devilshole2011.com/Home.php

A look at the UNLV Xeric Garden and Marjorie Barrick Museum

By Aurore Giguet, Program Director, The Barrick Museum at UNLV

Donald H. Baepler Xeric Garden

In the 1980s, when grass and lush landscapes were prevalent in the LasVegas valley, Dennis Swartzell (then the UNLV Arboretum Director) had a vision of a beautiful demonstration garden of drought tolerant plants. Swartzell enlisted the help of prominent local landscape architect Jack Zunino. They soon approached President Robert Maxson with their idea but the proposal was rejected.

In passing, Dennis mentioned the rejection to Dr. Donald H. Baepler, then Director of the Marjorie Barrick Museum and Environmental Research Center, who saw this as an opportunity. The garden would act as an extension of the Museum, creating an outdoor exhibit of plants. Dennis went back to President Maxson and the project was approved.

Today the Xeric Demonstration Garden is located between the entrance to the Marjorie Barrick Museum and Wright Hall. Completed in February of 1988, this 1.5-acre collection of plants is the result of the cooperative efforts of the Arboretum, the Museum and numerous commercial contributors and organizations.

The garden features plants from Australia, South America, Mexico, and the Mediterranean, as well as plants native to the four North American deserts. There are 9,000 square feet of paved paths, numerous benches and shade structures and native Aztec Sandstone boulders, from a quarry at the base of Mt. Potosi in the Spring Mountains.

The garden is frequently utilized for education, research, and social events. It will forever serve as a tool for monitoring and evaluating the suitability of old, reliable plants as well as new introductions.

See Museum next page

Museum

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Marjorie Barrick Museum

Opening in 1967 and comprising more than 10,000 square feet, the museum's mission is to 1) support and enrich academic programs at the university, 2) serve as a center for Las Vegas Valley arts and culture of both past and the present and 3) present a broad range of exhibitions for study and enjoyment.

The Museum opened in September 1967 as a collection of archeological material from the Desert Research Institute (DRI) on Maryland Parkway. In 1969, the university took over management of the museum from DRI. In the late 1975 the museum began the process of relocating to the UNLV campus, moving into the university's original gymnasium. In 1989, the museum was named in honor of Marjorie Barrick, a longstanding benefactor of the university.

Today, the museum hosts a rotating series of exhibitions featuring modern and contemporary art as well as regional cultural history. Its cultural collections include over 5,000 objects, with special strengths in Pre-Columbian art from West Mexico, Mexican dance masks, and Bolivian and Guatemalan textiles. In addition to its collections and exhibitions, the Mannetta Braunstein Research Library is available to all users by appointment; it is a non-circulating library that primarily supports research associated with museum collections and museology. Additionally, the Museum has two research units: Ornithology and Cultural Resources.

Museum exhibits
Mexican dance masks, above
and
Bolivian and Guatemalan textiles, below

If you would like more information about the Xeric Garden or Barrick Museum, at UNLV, please visit the following links:

http://barrickmuseum.unlv.edu

https://www.facebook.com/unlvmuseum

http://twitter.com/UNLVMuseum

Award

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In 2010, Dr. Abella was a member of the independent scientific Advisory Panel that produced comprehensive recommendations for the 'California Desert Renewable Energy Conservation Plan (CDRECP).' For such a young guy, Dr. Abella has a very impressive record of accomplishment and is richly deserving of the Desert Tortoise Council's Robert C. Stebbins Research Award!"

We offer our congratulations to Dr. Abella.

Review of 2011 publications and in press articles

Abella, S.R., A.C. Lee, and A.A. Suazo. 2011. Effects of burial depth and substrate on the emergence of *Bromus rubens* and *Brassica tournefortii*. Bulletin of the Southern California Academy of Sciences (in press).

Suazo, A.A., J.E. Spencer, E.C. Engel, and S.R. Abella. 2011. Responses of native and non-native Mojave Desert winter annuals to soil disturbance and water additions. Biological Invasions (in press).

Abella, S.R., D.J. Craig, L.P. Chiquoine, K.A. Prengaman, S.M. Schmid, and T.M. Embrey. 2011. Relationships of native desert plants with red brome (*Bromus rubens*): toward identifying invasion-reducing species. Invasive Plant Science and Management 4:115-124.

PDFs available from http://faculty.unlv.edu/abellas2/

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