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Applied Plant Ecology Newsletter

SAN DIEGO ZOO INSTITUTE FOR CONSERVATION RESEARCH

Division Programs Update

Seed Banking and Conservation

Through the continued cooperation of the Helix Water District, and Lucy Gavin for permission to collect on their lands at Lake Cuyamaca, we have been able to collect three new species for the Native Species Seed Bank. As part of the partnership, we also insure seed is available as an emergency reserve to the Helix Water District. During the collection of one of these species, the northern water plantain (*Alisma triviale*) the seed bank hit a benchmark, and thus spirits were high as the 500th seedlot was collected- despite an unseasonal downpour.

Habitat Management and Restoration

Over the past year, APE has made a lot of progress with the experimental restoration of Stephens' kangaroo rat habitat at the Lake Skinner Multispecies Reserve outside Temecula: mowing, herbicidng, planting, watering, and much more. However, none of this work would have been possible without the incredible support of the reserve staff: Tom Ash, Mike Gillette, Dave Borcheff, and Christine Moen. Whether scheduling CDF crews, hitching up water tanks, mowing, spot spraying herbicide, or just getting down in the dirt with us to plant grasses, the reserve staff has done much more than anyone anticipated when the project began. Thank you!

Sustainable Use of Plant Resources

In September, APE welcomed Emily Welborn Guevara to the team as a research assistant. Emily will be organizing and synthesizing information about the sustainable use of palm resources. Besides putting together a literature review paper, Emily hopes to develop a bilingual website for resource managers throughout the Americas. As people attempt to sustainably manage the resources on which they rely, the website would allow them to draw on the experiences of other people facing similar challenges and the knowledge gained by experimental research.

Summer Fun- Interns And Cactus Wrens

Braving summer sun, Doug Wylie measures vegetation as part of his coastal cactus wren nesting habitat study.

~With a background in geography and botany, SDSU master's student Doug Wylie was well suited to work with the Applied Plant Ecology division. Doug quickly became involved with an ongoing project centered on the coastal cactus wren, a Southern California bird species that has undergone tremendous habitat fragmentation and reduction over the last 100 years. The native species reserve surrounding the Safari Park in San Pasqual Valley happens to be home to the largest population of coastal cactus wrens in San Diego County, making the Institute the perfect entity to research their habitat.

The Coastal Cactus Wren Working Group, a collection of land managers and researchers from all areas of Southern California helped formulate the research questions Doug was tasked with throughout the summer. Through a synthesis of information various land managers shared, as well as their own observations, Doug and APE came up with the basic question to be asked: What are the spatial habitat requirements of wren nest sites in San Pasqual Valley? This would later be expanded to encompass more minute questions regarding vegetation height and amount of bareground for foraging.

These questions are important for many reasons, but mostly because, although people had a general idea of what constituted good wren habitat, no one had done a quantitative assessment measuring such habitat characteristics. If we can correlate the success of the population on the reserve with certain habitat, other areas with potential as cactus wren nesting sites could be identified, allowing land managers to protect good habitat and enhance other areas. Plus, managers would have solid goals of what to manage for in order to attract or retain wrens.

With a research question in hand, the division leaders and Doug began clarifying which methods to be used to gather this data. A separate project involving the USGS in their effort to band nestlings on the reserve had already marked the locations of nine breeding nests to include in the habitat study. With the methodology established, Doug was able to take to the hills surrounding the Safari Park and survey vegetation with a small team of researchers.

While surveying, Doug's days were generally spent collecting data in the morning and entering it into a computer throughout the afternoon. This helped everyone beat the heat of the afternoon, when it could easily reach the triple digits. Though the data from the nine nests aren't enough to make solid conclusions on the habitat requirements, it has helped refine the methods and put APE on the right track.

Doug worked with many people to get his project running. One aspect of this research that he truly enjoyed was that it included not just individuals from APE, but Applied Animal Ecology as well. Other summer fellows were generous with their time and were eager to help when the extra man power was needed. Additionally, he was able to learn more about animal behavior as he was able to help out with the cactus wren behavior study.

~UC San Diego graduate student Scott Gressard served as the Sefton Endowed Fellow with APE this summer. Throughout his short time at the Institute, Scott took full advantage of the opportunity to help with a wide variety of projects, including herpetofauna trapping surveys and midnight outings trapping Stephens' kangaroo rats. But most of his time was spent on his primary project: evaluating different methods of establishing prickly pear, or *Opuntia*, cacti to restore and connect habitat for the coastal cactus wren populations in the area. The coastal cactus wren is a species of special concern mainly due to habitat loss and degradation from things like fire and human development. However, in conducting restoration at the native species reserve adjacent to the Safari Park, APE has found the main barriers to establishing cacti for restoration are quite different- scorching weather and herbivores hungry, or thirsty, enough to bite into cacti. To better conduct restoration in the face of these challenges, APE staged an experiment that Scott took charge of through the summer.

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The Applied Plant Ecology Division researches the restoration and management of plant populations and communities. Focusing on more than threatened and endangered species, the division concentrates on keystone species, interactions, and processes for the benefit of not only plants, but the animals and people that depend on them. Our projects link research and application with a focus on solutions.

UPCOMING

• **October 2011** Coastal Cactus Wren Surveys.
With Applied Animal Ecology and a few volunteers, APE will start be doing their biannual cactus wren point counts starting mid-October.

• **December 1, 2011** Start Year 2 of Cactus Restoration.
It is time to restore an additional 15 acres of cactus scrub. Preparations, including cage building, will take place in November, but everything should be set to finish planting in early December.

• **November 7, 2011** Postdoctoral Fellow Leonel Lopez-Toledo Visits.
Leonel's visit will focus on preparing for his next round of field work in the beginning of 2012. He will also be giving a seminar presentation during his brief stay to update collegues on his work on the threatened *Brahea aculeata* palm in Sonora, Mexico.

Species Highlight

Cupressus forbesii
Tecate Cypress

Shredding gray to red bark and evergreen, scale-like leaves, Cupressus forbesii is an attractive tree growing in popularity as a native ornamental. Unfortunately, it is also a threatened plant with only four stable populations remaining in the U.S. and pockets of small groves scattered through California and Baja. San Diego County is home to 3 stands. Tecate cypress produces cones which only open in fire or extreme heat (known as serotinous); although trees are very long-lived, the species needs fire to reproduce and ensure vigor in the population. But in recent years the fires have come too often. Frequent fires prevent a population from reaching maturity before being burned- if individuals haven't developed cones before a fire, the population cannot recover.

Hiking in the Otay Mountains, one might stumble upon a grove of young Tecate cypress, a grove growing from seeds released by the 2003 fires. The population has reached an age where the trees are producing the small, round and scaled fruit characteristic of their genus. The golf-ball sized cones will take two years to mature, and remain on the tree for years, usually until a fire comes though. However, it is typical for Tecate Cypress to produce only a few fruits as they first mature, with peak production not occurring until they reach 40-50. Thus the Otay population risks extirpation should another fire, or other disaster, occur. For this reason, The Nature Conservancy, the BLM, and California Fish and Game are working on a plan with APE to collect, bank, and germinate seeds for a back-up population.

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A complicated undertaking

In five one-acre plots in the native species reserve, 375 Opuntia were planted in the winter of 2010 within the framework of a fairly complex field experiment. For each of the plants in the study, APE varied the watering regime of the cacti and watered each of the plants every 4, 6, or 8 weeks- or left them to fend for themselves and didn't water them at all (these were the controls). There was also a caging treatment where the plants were either caged to prevent herbivore access or left unprotected. As another treatment, the method used to plant the cacti was varied: some were potted and watered regularly for 6 months prior to being planted in the field, while others were left out to develop roots for six months but not watered, and the final group were merely taken as pads and planted directly into the soil without having any time to develop roots.

In June the data collection began. Scott and the APE team surveyed each individual cactus by taking its height, the number of fruits or flowers present, the number of pads it had grown, its general condition, and the percent of the plant that had been consumed by herbivores. After another survey conducted at the end of August, Scott compared the data sets and came up with some interesting results. Cacti that were caged, watered every 6 weeks, and were potted for 6 months before planting showed the most overall growth with the least amount of herbivore damage. It seems that putting the effort and resources into caring for cacti pays off. These are important findings for land managers that are seeking to find the most efficient ways to re-introduce *Opuntia* back into coastal sage scrub communities and APE will use them in our own restoration projects over the next few years. The project will be ongoing and we will continue to monitor these individuals overtime to see what changes occur in the long term as well.

Providing water to thirsty young plants was a large part of Scott Gressard's internship. Not only did he provide water to cactus as part of his restoration study, but he helped APE water grasses as a part of the Stephens' kangaroo rat restoration project (left). Both Doug and Scott helped the division with much more than their respective projects.