



Asombro Institute

FOR SCIENCE EDUCATION

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14 November 2012

Thomas M. Antonio, Ph.D.  
c/o Native Plant Society of New Mexico  
PO Box 35388  
Albuquerque, NM 87176-5388

Dear Dr. Antonio,

In March of this year, the Asombro Institute for Science Education was honored to receive a \$600 grant from the Native Plant Society of New Mexico for support of our project:  
**Desertification and Restoration: Teaching Students with a Real Conservation Project.**

Enclosed, please find a report on this project. We have completed the education project development and will continue to use these materials for years to come. The result will be thousands of New Mexico students who learn about New Mexico's native plants and large-scale efforts to restore plant communities.

I'd be happy to answer any additional questions you or other members of the Native Plant Society of New Mexico have about this project. Thank you very much for your support of science education in our state.

Sincerely,

Stephanie Bestelmeyer, Ph.D.  
Executive Director

# FINAL REPORT

## Desertification and Restoration: Teaching Students with a Real Conservation Project

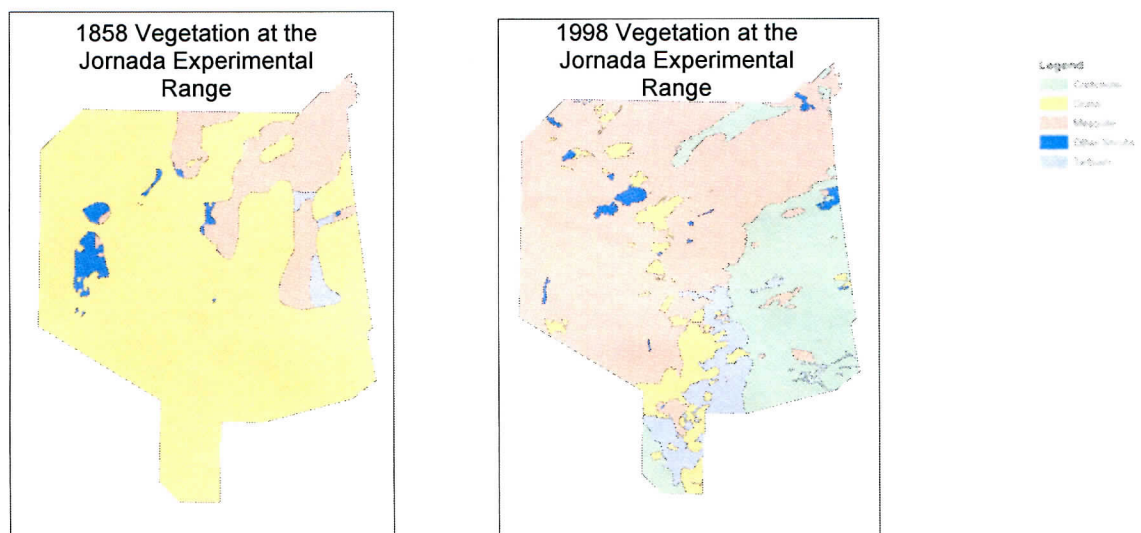
Asombro Institute for Science Education

### Project Summary

The purpose of this project was to develop hands-on education materials associated with a conservation project started in January 2012 at the Asombro Institute's Chihuahuan Desert Nature Park in Las Cruces. The materials help teach students about desertification (which is manifested locally as the conversion of historic grasslands to shrublands dominated by creosote bush, *Larrea tridentata*) as well as shrub removal techniques to promote grassland restoration. Creation of the shrub removal experiment was funded by a grant from the US Fish and Wildlife Service and in-kind donations from Full Circle Heritage Services, the BLM, and the Las Alturas Volunteer Fire Station. The report below gives highlights of the full shrub removal experiment as well as the creation of student data collection and analysis activities funded by the Native Plant Society of New Mexico.

### Background on Shrub Removal Research and Demonstration Project

It is hard to believe when you look at it now, but much of the Chihuahuan Desert Nature Park and surrounding desert used to be expansive desert grassland with few shrubs. Through a combination of heavy grazing, shrub seed dispersal, reduced fire frequency, and climate change, creosotebush (*Larrea tridentata*), honey mesquite (*Prosopis glandulosa*), and other shrubs spread throughout the area, leaving the shrub-dominated system we see today. The causes and consequences of this "desertification" process are the focus of considerable research at the nearby USDA-ARS Jornada Experimental Range and the Jornada Long-Term Ecological Research Program (for which the Asombro Institute coordinates K-12 science education initiatives).



The New Mexico Bureau of Land Management launched the Restore New Mexico initiative in 2005. The focus of the initiative is controlling invasive brush species, improving riparian habitat, reducing woodland encroachment, and reclaiming abandoned oil and gas well pads. According to the BLM, the goal of the program is

“to reduce existing invasive and noxious species and thus allow more desirable vegetative species to flourish. This, in turn, will benefit the watershed by stabilizing soil and ultimately increase forb, grass and favorable shrub production, resulting in increased and improved habitat for a variety of wildlife.”

The BLM is using a combination of mechanical treatments, prescribed fires and chemical applications to reduce invasive and noxious plant species. As of July 2012, more than 1.8 million acres of New Mexico land had been treated, although many sectors of the general public still know little or nothing about this massive effort.

### Plots

In January 2012, Asombro staff and volunteers established three plots, each 88 m wide and 210 m long. Pre-treatment measurements were taken of shrub density, shrub size, ground cover, and soil properties. Each plot contains one of the three treatments:

1. Physical removal – Between January 6 and 27, 2012, every creosotebush, honey mesquite, and tarbush was removed with pulaski axes and hand saws. All aboveground material as well as the majority of the root crown to a depth of approximately 10 cm was removed from the plant. Woody debris from uprooted shrubs was left in place. Treatment took 206.5 person hours.
2. Burn – On January 7 and 14, 2012, volunteers from the Las Alturas Volunteer Fire Station used drip torches with a 50/50 mix of gasoline and diesel to burn each shrub. Fuel was dripped around the crown of the shrub until ignition, and then fuel was applied to most major branches of the shrub. Fire was allowed to extinguish by itself for each shrub. Treatment took 102 person hours and 85.34 gallons of fuel mixture.
3. Control – No shrub removal on this plot.

### Transects and Student Data Collection

Within each plot, there are six 20-m long transects that were established in late March 2012. To facilitate use by students, we also created a cleared area near the road. These areas will be used to meet with students prior to sending them out to collect data. Trails from this meeting area allow students to access transects without disturbing the experiment.

In spring and summer 2012, we created an activity for students who visit the Chihuahuan Desert Nature Park to learn by participating in authentic research on the shrub removal project. Students will get background information on desertification, the BLM's Restore NM initiative. They then learn how to use student data collection protocols on the research plots. All protocols are based on methods from the Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems, published by the USDA-ARS Jornada Experimental Range. Some methods were modified slightly to make them more suitable for student use. Students collect data using three protocols.

1. Photo Points (approximately 2 students) - Students use photo points to make and record qualitative observations of how vegetation is changing on the plots over time.



Materials: Photo point white board, dry-erase pen, dry-erase eraser, digital camera, 4 foot long,  $\frac{3}{4}$ " diameter PVC pipe

2. Line Point Intercept (approximately 12 students) – Students use the line-point intercept method to get a quick, accurate measurement of vegetation cover.

Materials: Six 25m measuring tapes to run along transects, 12 steel pins for anchoring the tape measures along transects, six long pin flags (at least 75cm long and less than 1mm in diameter), data sheets (attached)

3. Belt Transects (approximately 12 - 18 students) - The belt transect helps us monitor the size and density of shrubs on each plot.

Materials: Six 25 m measuring tapes to run along transects, 12 steel pins for anchoring the tape measures along transects, 1.5 m long PVC pipe with 90 degree elbow at each end and size classes marked in pen, data sheets

Following data collection, students summarize their data and look at trends from their data combined with data collected by Asombro Institute scientists and other student groups.

Use of Funds: Funds from the Native Plant Society of New Mexico were used to create and pilot test the new student data collection activities and purchase the data collection materials listed above. We also purchased clipboards for use with all protocols. These materials will be used by students who help collect and analyze data for this project for many years to come.