Small-Scale Grass Control Experiment in the Woolly Star Preserve Area (WSPA), San Bernardino, CA (2014 - Year 5 Selected Results)

Project Conducted under contract with the U.S. Army Corps of Engineers, Los Angeles District

Lauren M. Brown, Tom Mulroy PhD., Karen Green, and Tara Schoenwetter PhD. - Leidos, Inc. Carpinteria, CA

Photo by Arthur Davenport

Photo by Karen Green

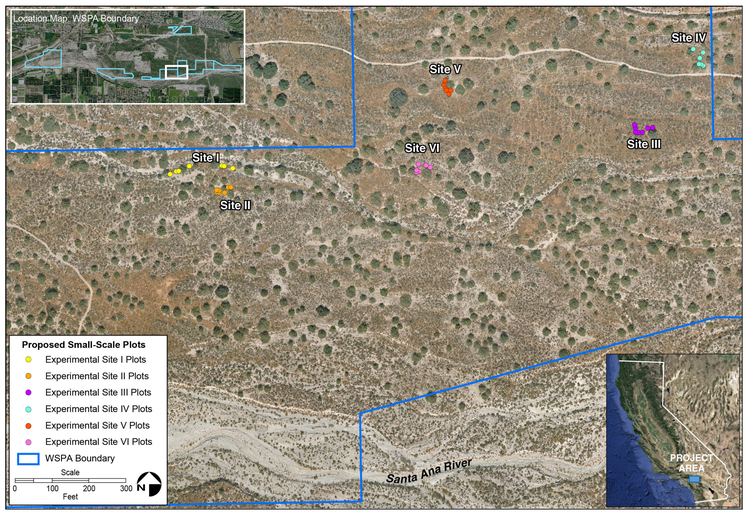
Photos by Tom Mulroy

Sites I, II, III Treatments	
Plot 1	• Grass-specific, post-emergent herbicide Fluazifop-P-butyl Butyl (Fusilade®) applied February and March 2010. • Reapplied March 2011. • No reapplication in 2012, 2013, or 2014.
Plot 2	• Non-selective, post-emergent herbicide Glyphosate (RoundUp®) applied February and March 2010. • No reapplication in 2011, 2012, 2013, or 2014.
Plot 3	• Pre-treatment raking to remove thatch and scarify soil. • Grass-specific, post-emergent herbicide Fluazifop-P-butyl Butyl (Fusilade®) applied February and March 2010. • Reapplied March 2011. • No reapplication in 2012, 2013, or 2014.
Plot 4	• Pre-treatment early season watering plus raking to remove thatch and scarify soil. • Grass-specific, post-emergent herbicide Fluazifop-P-butyl Butyl (Fusilade®) applied February and March 2010. • Reapplied March 2011. • No reapplication in 2012, 2013, or 2014.
Plot 5	• Pre-treatment early season watering. • Grass-specific, post-emergent herbicide Fluazifop-P-butyl Butyl (Fusilade®) applied February and March 2010. • Reapplied March 2011. • No reapplication in 2012, 2013, or 2014
Plot 6	• Control - No Treatment
Plot 7	• Treatment added in 2011. • Non-selective, post-emergent herbicide Glyphosate (Aquamaster®) plus surfactant (Agridex®) applied March 2011. • No reapplication in 2012, 2013, or 2014.

This work is in support of a Multi-Species Habitat Management Plan (MSHMP) focused on three endangered species

All three species are adversely affected by invasive annual grasses, which appear to be increasing on the site

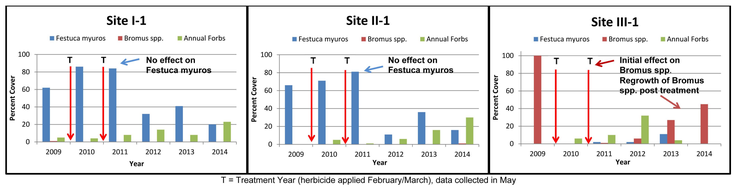
A method to reduce annual grasses is needed to improve conditions for endangered species



Location of Small-Scale Experimental Plots within the Woolly Star Preserve Area San Bernardino County, California

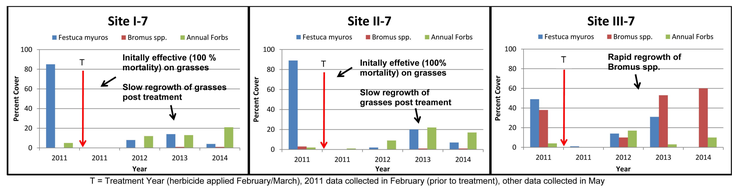
Sites IV, V, VI Treatments	
Plot 1	• Grass-specific, post-emergent herbicide Clethodim (Envoy®) applied February 2013. • No reapplication in 2014.
Plot 2	• Pre-treatment raking to remove thatch. • Grass-specific, post-emergent herbicide Clethodim (Envoy®) applied February 2013. • No reapplication in 2014.
Plot 3	• Grass-specific, post-emergent herbicide Sethoxydim (Grass Getter®) applied February 2013. • No reapplication in 2014.
Plot 4	• Pre-treatment raking to remove thatch. • Grass-specific, post-emergent herbicide Sethoxydim (Grass Getter®) applied February 2013. • No reapplication in 2014.
Plot 5	• Non-selective, post-emergent herbicide Glyphosate (Aquamaster®) plus surfactant (Agridex®) applied February 2013. • No reapplication in 2014.
Plot 6	• Control - No Treatment

Plant Cover Before and After Fluazifop-P-butyl Butyl (Fusilade®) Application, Site I, II, III - Plot 1



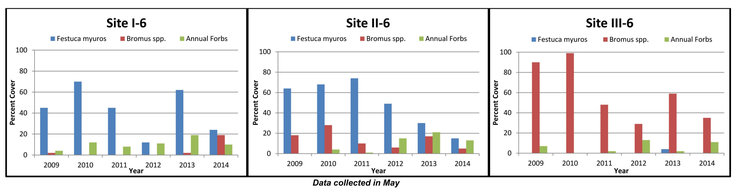
T = Treatment Year (herbicide applied February/March), data collected in May

Plant cover before and after Glyphosate (AquaMaster® with Agridex®) Application, Site I, II, III – Plot 7

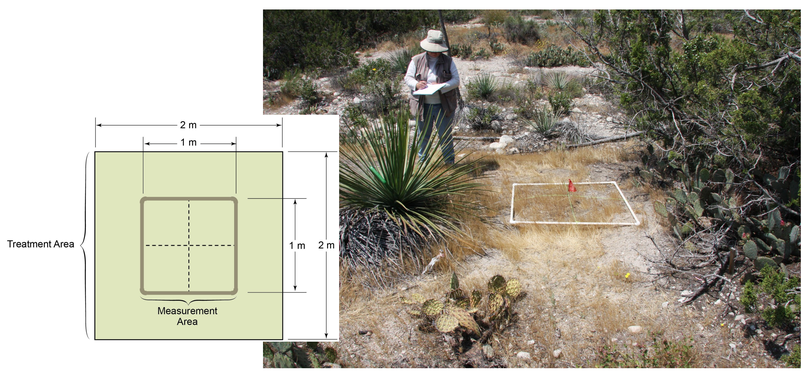


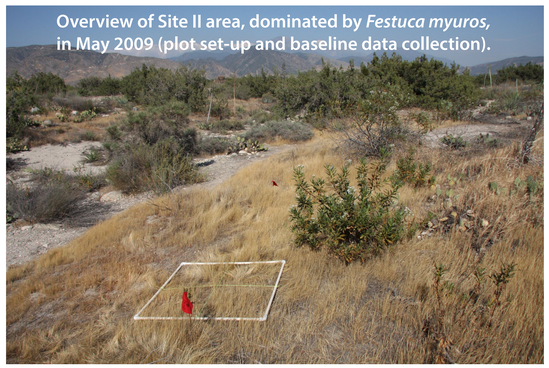
T = Treatment Year (herbicide applied February/March), 2011 data collected in February (prior to treatment), other data collected in May

Plant Cover in Controls (No Treatment), Site I, II, III Plot - 6

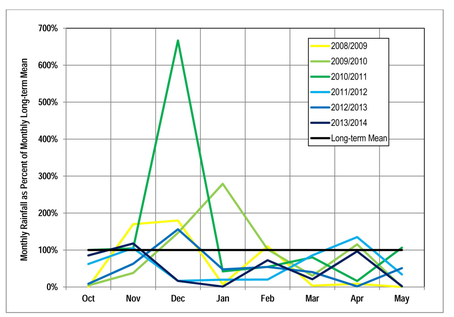


Data collected in May



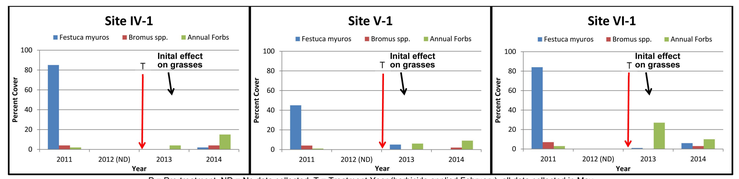


Treatment Photos by Tom Mulroy



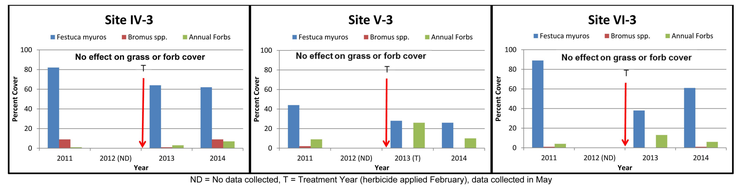
The most recent three years of this study coincided with three consecutive years of nearly unprecedented drought (2011-2012, 2012-2013, and 2013-2014). A decline in cover of *Festuca myuros* was noted in most plots in 2012 and 2014, including the control plots, indicating the dieback was independent of the experimental treatments and possibly due to lack of precipitation.

Plant Cover Before and After Clethodim (Envoy®) with Activator 90® Application, Site IV, V, VI - Plot 1



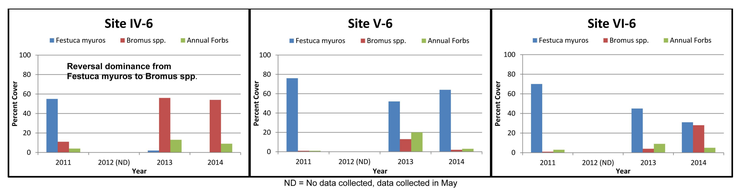
P = Pre-treatment, ND = No data collected, T = Treatment Year (herbicide applied February), all data collected in May

Plant Cover Before and After Sethoxydim (Grass Getter®) with Activator 90® Application, Site IV, V, VI - Plot 3



ND = No data collected, T = Treatment Year (herbicide applied February), data collected in May

Plant Cover in Controls (No Treatment), Site I, II, III – Plot 6



ND = No data collected, data collected in May

Next Steps/Additional Studies

- Implement a larger-scale study using Clethodim (Envoy®), with input and a recommendation from a Pest Control Advisor.
- Study to determine whether *Bromus tectorum* or *Festuca myuros* is more problematic for the recovery of the sensitive species and their habits.
- Additional experiments focusing on native forb seedbank and recovery that include post-treatment seeding or selecting plots having mixture of native forbs and non-native annual grasses.

Special thanks to Debra Barringer for data analysis and graphs and Joel Degner for climate data analysis and graphs.