Assessment of Post-Fire Rehabilitation of Desert Tortoise Habitat in Clark County Project 2009-USGS-808A

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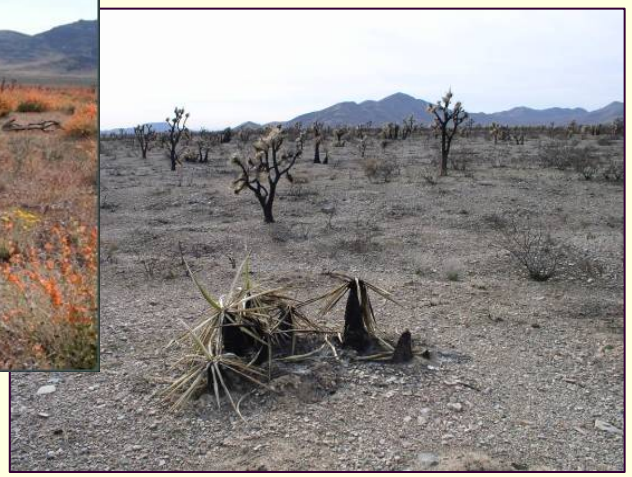

In Collaboration with
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UNIVERSITY OF NEVADA, LAS VEGAS

2012 MSHCP Project Progress Report Symposium
August 16TH, 2012

Project Overview

- Historical background of project
- Project objectives and approach
- Progress to date
- Schedule for completion

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Photos: LA DeFalco

Background of Problem

- The frequency and size of Mojave fires have increased (Brooks & Matchett 2006)

- Native shrubs have limited resprouting capacity (DeFalco et al. 2010)
- Vegetation recovery and responsiveness to restoration is poorly understood (Abella & Newton 2009)
- Fires alter important habitat elements for sensitive wildlife species (Esque et al. 2003)

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Photo: LA DeFalco

Wildfire Reduces Canopy Cover and Forage for Desert Tortoises

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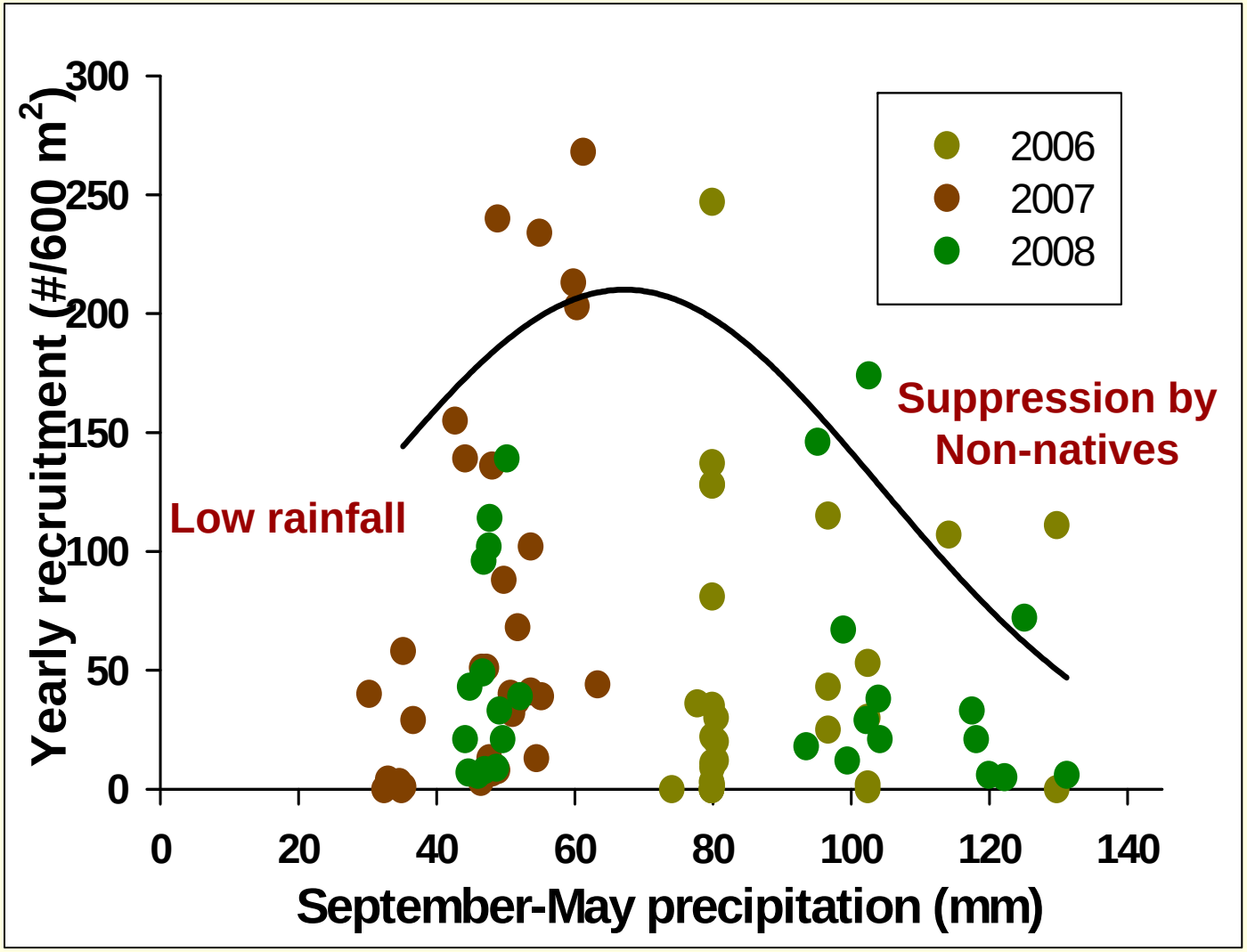
Photos: LA DeFalco

Variable Precipitation Limits Perennial Seedling Recruitment



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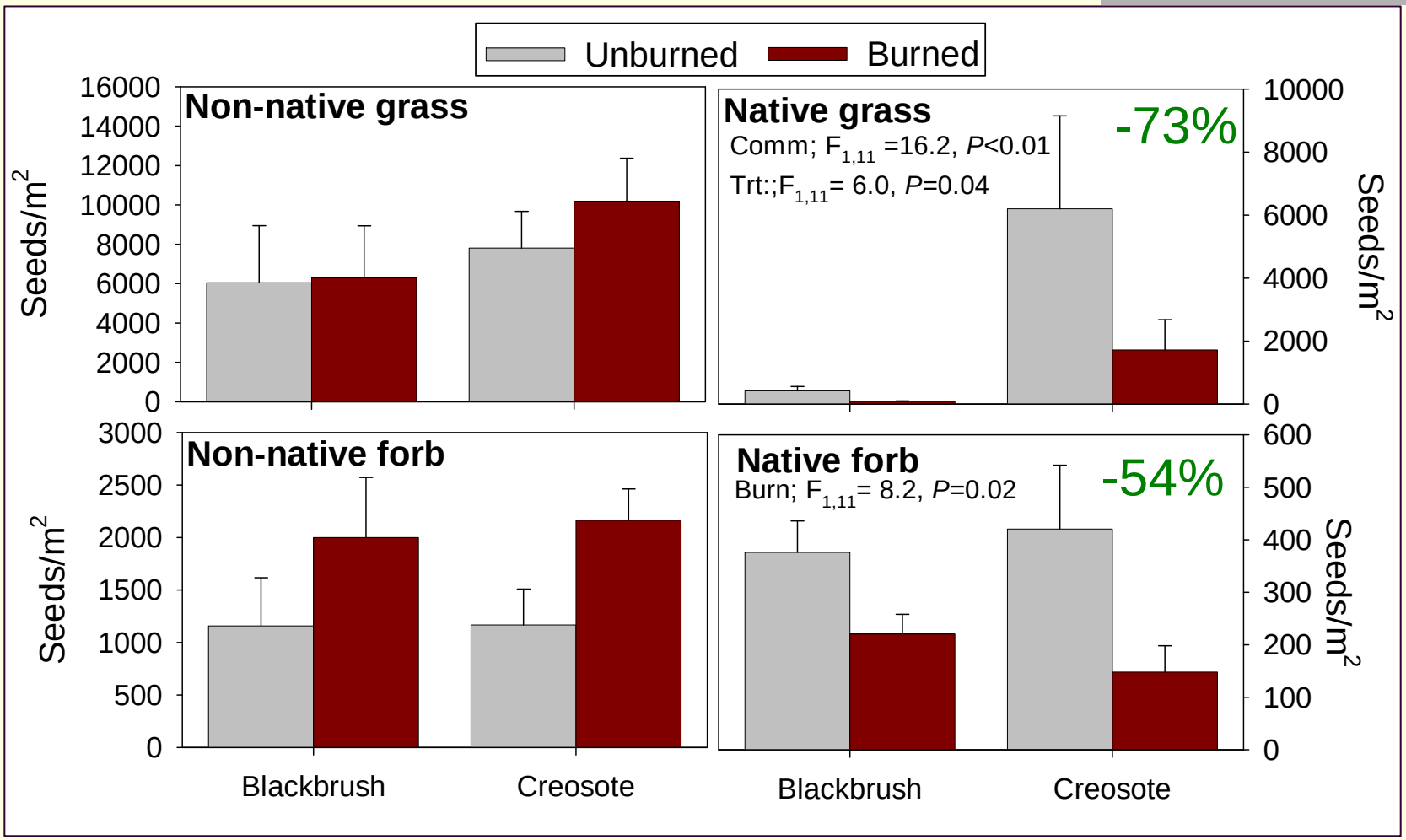
Wildfire Diminishes Soil Seed Bank



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DeFalco et al., In prep

Project Objectives

- Objective 1: Predict areas with high fine fuel production in desert tortoise habitat
- Objective 2: Determine recommended re-vegetation treatments that are appropriate for burned tortoise habitat
- Objective 3: Identify appropriate native Mojave Desert species for re-vegetating burned tortoise habitat

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Re-Vegetation Treatments

Seeding: Dec 2005/Nov 2006

- **Native species broadcast by hand**

Outplanting: Oct-Nov 2007

- **Blackbrush/Joint fir seedlings**
- **Soil moisture treatments**

Herbicide+Seeding: Oct 2008:

- **Pre- and post-emergent**
- **Native species**

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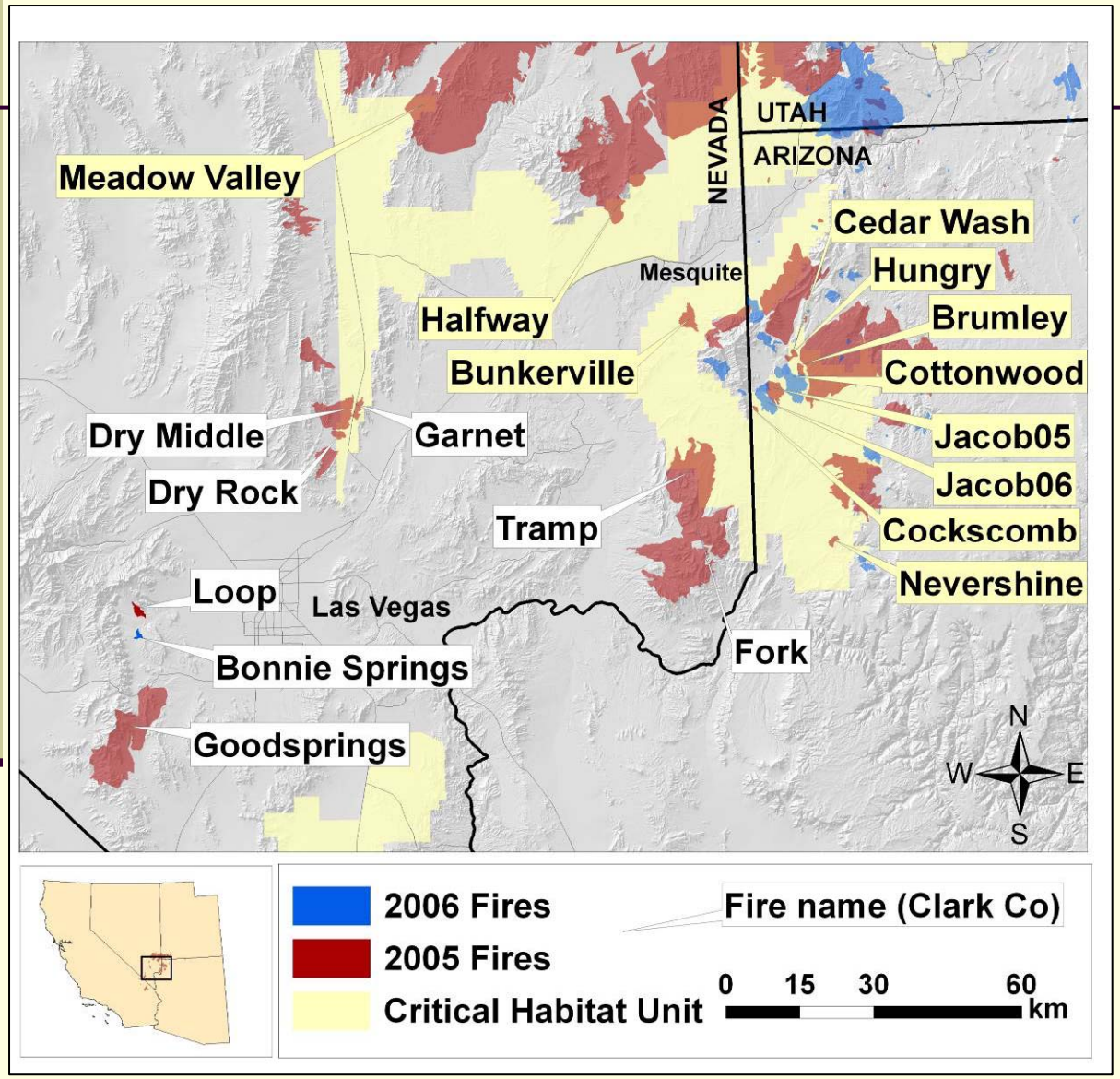
Photos: LA DeFalco

Network of Monitoring Sites



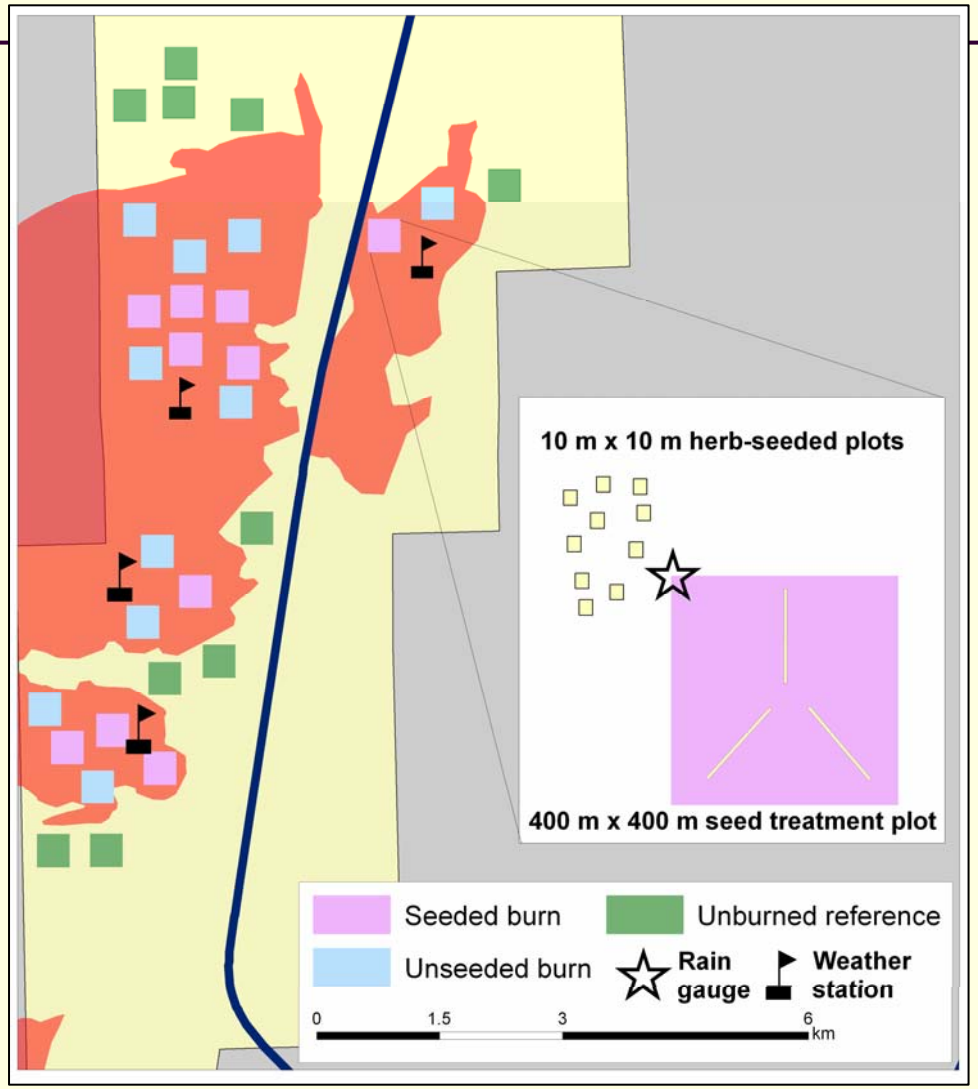
NV support (11 fires)

- ES&R (34%)
- CC DCP (21%)
- USGS-PES (5%)

AZ support (8 fires)

- ES&R (20%)
- BLM, AZ Strip (15%)
- USGS-PES (5%)

Monitoring Plots: Dry Middle, Dry Rock and Garnet Fires



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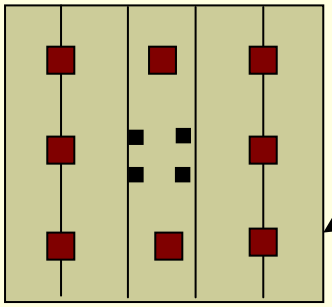
Vegetation Sampling: Perennial Cover and Density

10 m x 10 m



Cover (Line-intercept)
Density (Belt)

400 m x 400 m

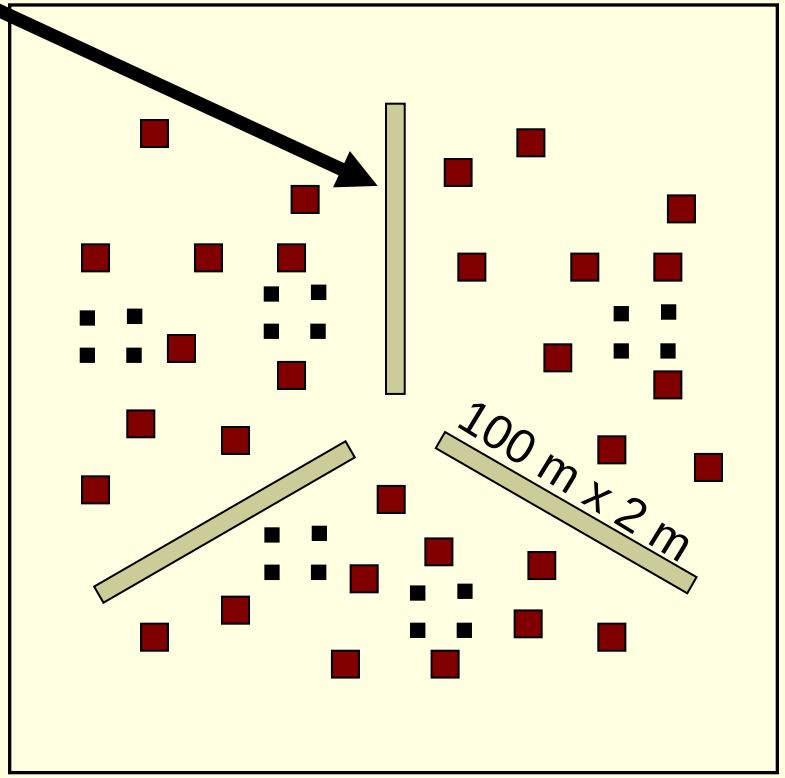
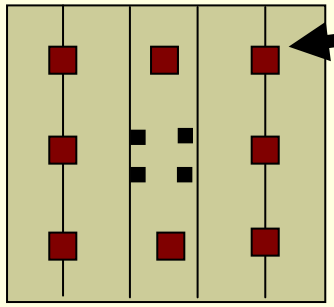
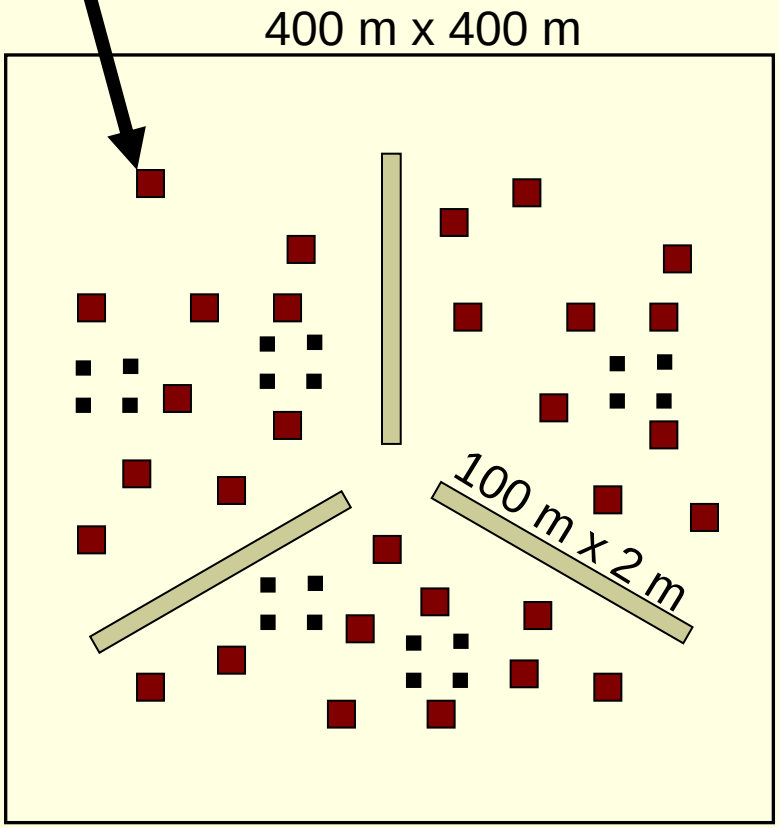


Photo: AT Smith

Vegetation Sampling: Annual Species Richness and Biomass



Richness (1 m^2 quadrats)
Biomass (nested 0.1 m^2 quadrats)



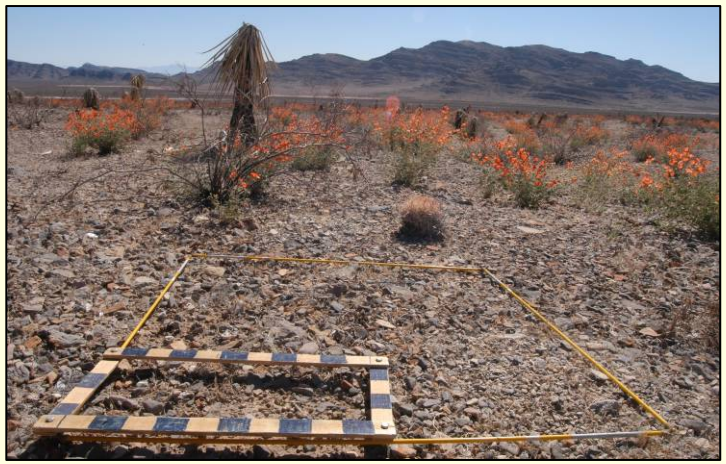


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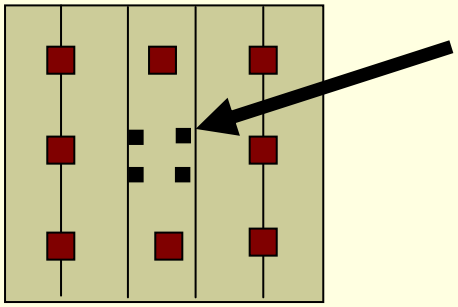
Photo: LA DeFalco

Vegetation Sampling: Soil Seed Bank



Seed bank density
4 pooled 10.5 cm x 10.5 cm cores

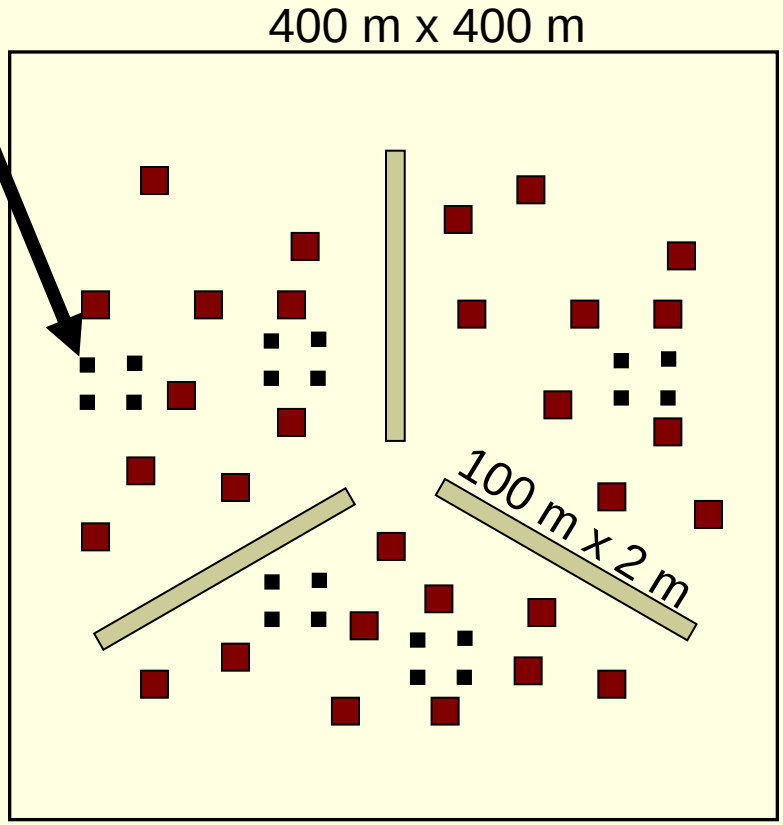


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Photo: LA DeFalco

Project Progress

- Objective 1: Predict areas with high fine fuel production in desert tortoise habitat

  - ☑Collect monthly rainfall: completed in 2010, 2011

  - ☑Measure annual plants ~ fine fuels
    - ☑Samples collected in 2010, 2011
    - ☑Weighing of samples completed in 2012
    - ☑Compiled NV/AZ data 2006-2011

  - ☐Explore fine fuel model approaches and identify areas for fine fuels management

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Fine Fuel Model Approaches

- Environmental covariate approach
  - Use precipitation/temperature/soil texture to explain annual plant biomass
  - Relate best relationship to known data layers (Nussear et al. 2009, desert tortoise habitat)

- Remote sensing approach
  - Use remote sensing surrogate of annual plant biomass
    - Van Linn et al, In Review, *Intl J Wildland Fire*
    - Wallace and Thomas (2008)

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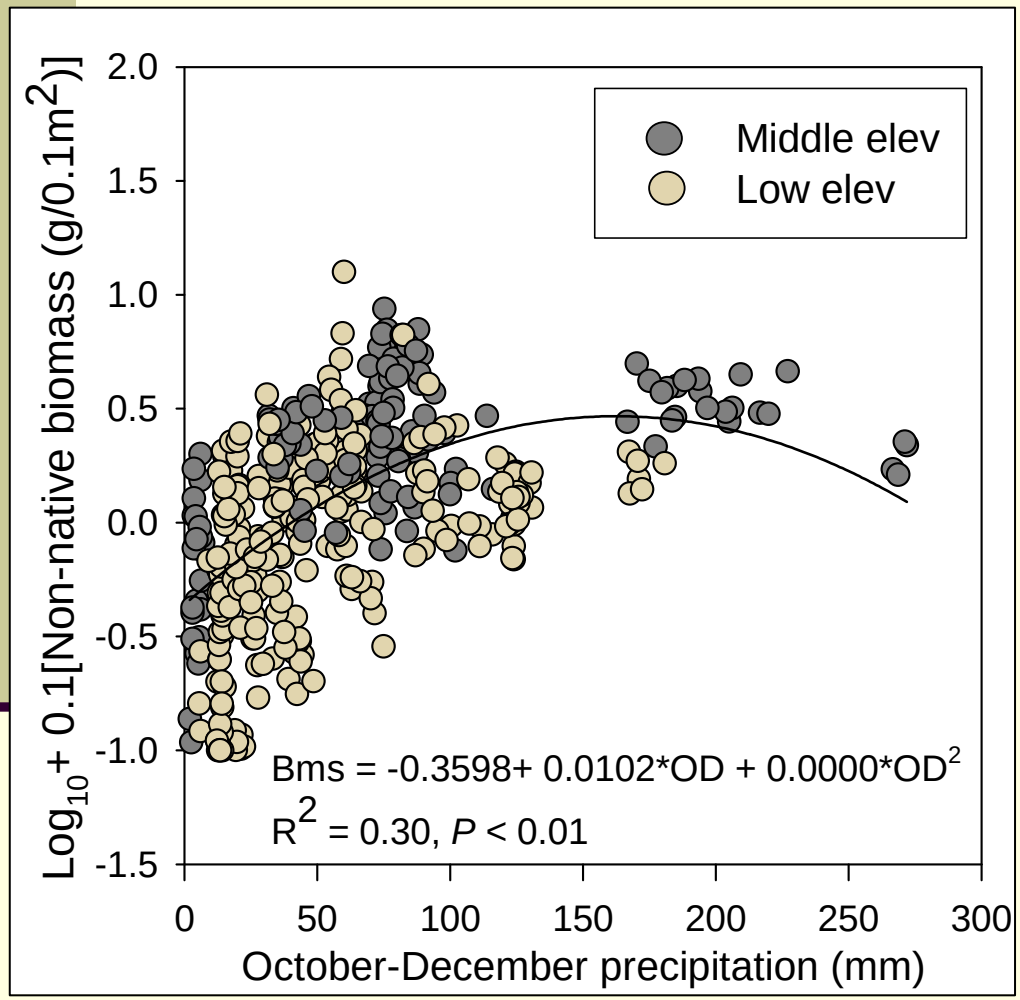
Precipitation Covariate (2007-2011)



Red brome

Mediterranean split grass

Stork's bill

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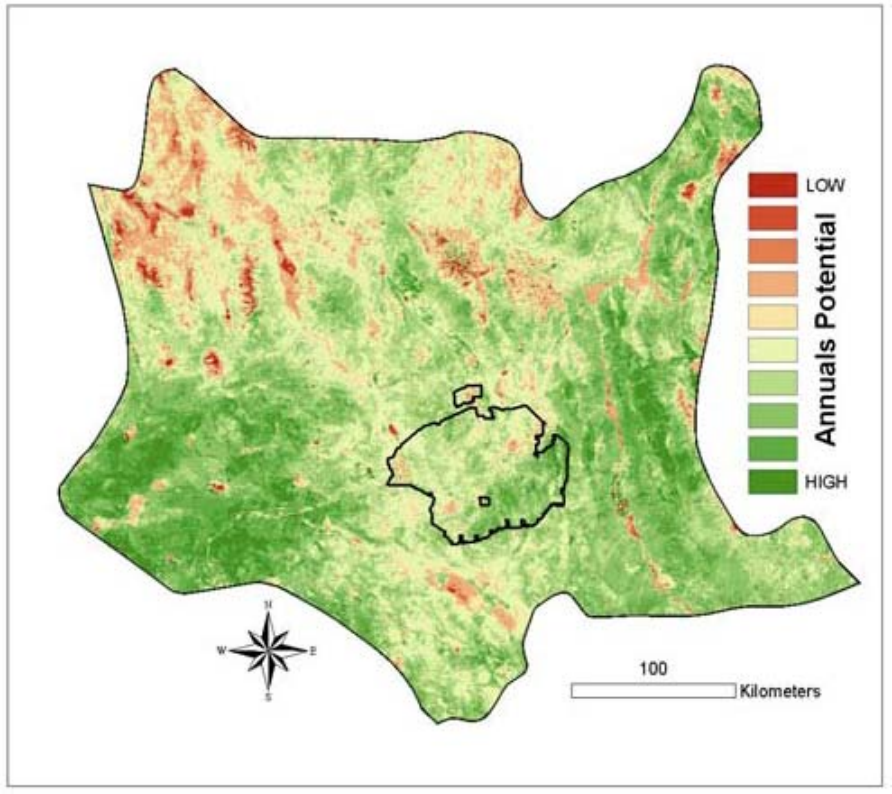
Photos: LA DeFalco

Remote Sensing – 2005 Annual Potential



MODIS – EVI (Wallace & Thomas 2008)

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Project Progress

- Objective 2: Determine recommended treatments that are appropriate for burned tortoise habitat

  - ☑ Monitor plant establishment
    - ☑ Outplanting, seeding and herbicide+seeding completed monitoring completed in 2010, 2011
    - ☑ Data QA/QC completed in 2012
  - ☐ Evaluate the influence of rainfall/temperature
  - ☐ Determine appropriate re-vegetation treatments

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Project Progress

- Objective 3: Identify appropriate native Mojave Desert species for re-vegetating burned tortoise habitat

  - ☑ Determine seed bank
    - ☑ Herbicide+Seeding: completed in 2011
    - ☑ Seeding: completed in 2012

  - ☐ Evaluate adequacy of selected species and seeding rates for post-fire re-vegetation
    - ☐ Species traits vs. functional group analysis

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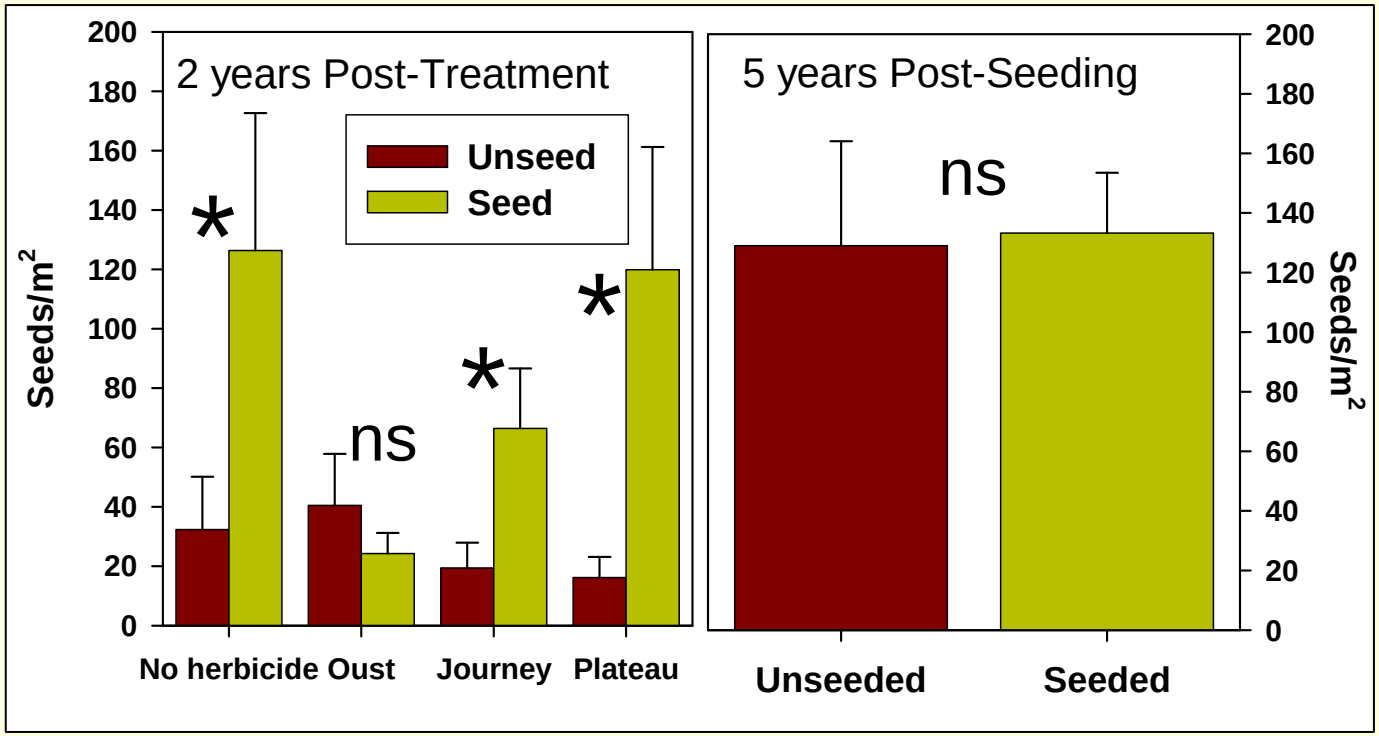
Perennial Seed Bank of Treated Areas



Summary of Progress

- All remaining data collection (seed bank) and sample processing (seed bank, annual biomass) completed in 2012
- Emerging results demonstrate short-term (~5 yr) success of re-vegetation methods
- Final year of work will elucidate the climate controls, and forecasting of, fine fuels and re-vegetation success

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Completion of Project (June 1, 2013)

- Precipitation and Fine Fuel Forecasting
  - Fine fuel dynamics and spatial map
- Evaluation of Rehabilitation Techniques
  - Success of broadcast seeding, herbicides, outplanting
- Evaluation of Native Species Rehabilitation
  - Comparison of species performances

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Acknowledgements

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Photo: LA DeFalco