



Mojave Desert Native Plant Restoration Following Wildfires and Weed Treatments:

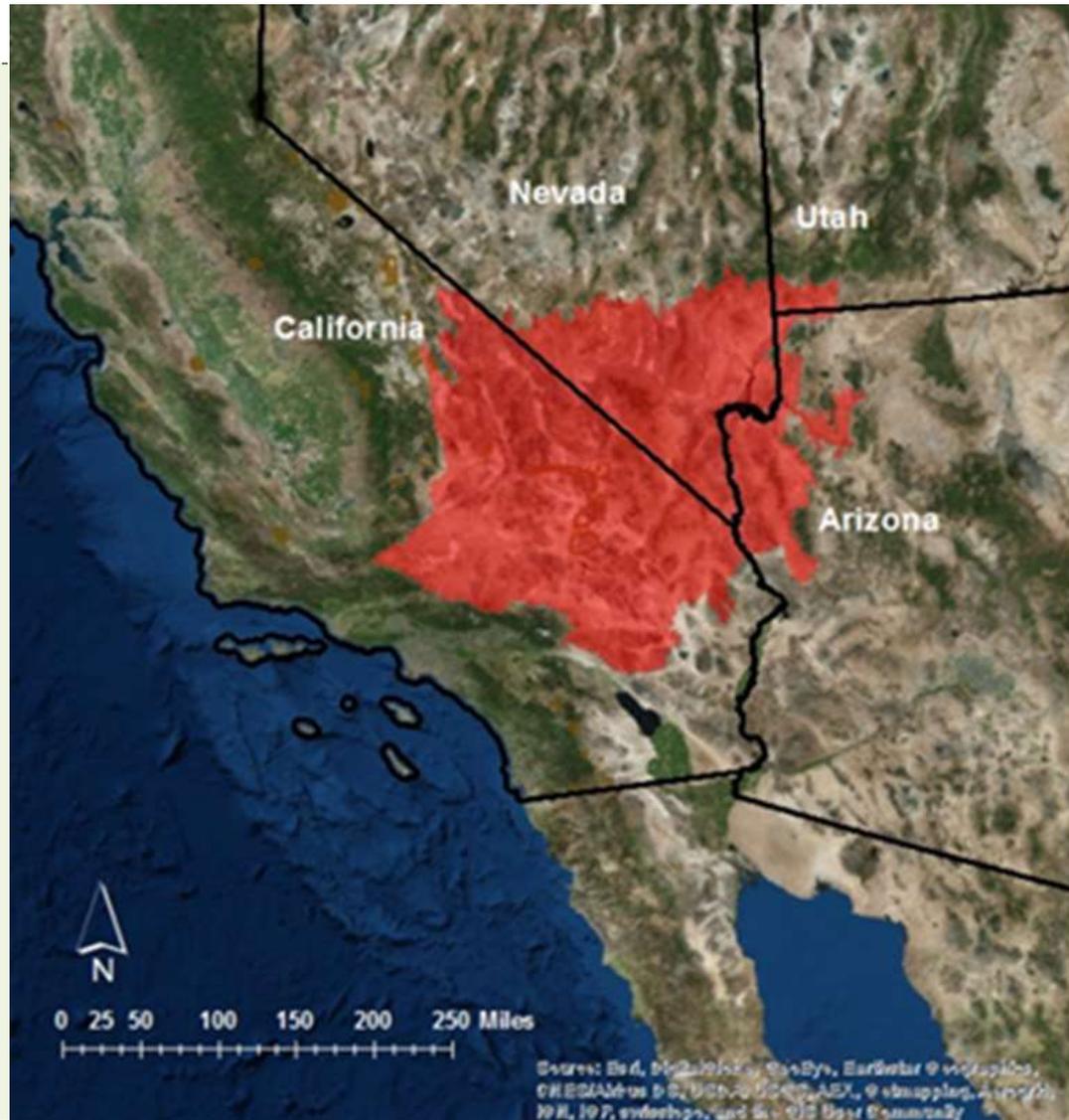
THE RIGHT SEED IN THE RIGHT PLACE



JJ Smith



Mojave Desert Ecoregion



Loss of Mojave Desert Tortoise Habitat

- Federally Threatened (listed 1990)
- Species decline through most of range
- Red brome, cheatgrass, Mediterranean grasses – poor nutritional value
- Large, severe fires – habitat loss, spread of annual invasive grasses
- Habitat restoration identified as highest priority by USFWS Recovery Implementation Teams (RITs).



Invasive Annual Grasses and Fuel Continuity



Aleta Nafus – BLM Southern Nevada District



Lynn Sweet – University of California Riverside

- Over 1 million acres burned since 2005 (Mojave Desert Initiative 2010)
- 2,307,068 acres burned at least once since 1980 (Mojave Basin and Range REA, NatureServe 2013)

Loss of Native Species from Soil Seed Banks

Todd C. Esque, James A. Young, C. Richard Tracy. 2010. **Short-term effects of experimental fires on a Mojave Desert seed bank.** *Journal of Arid Environments*, 74: 1302-1308.

- Fire depleted both native and non-native seed densities
- Native seed densities were significantly lower than non-native seed densities both before and after fire

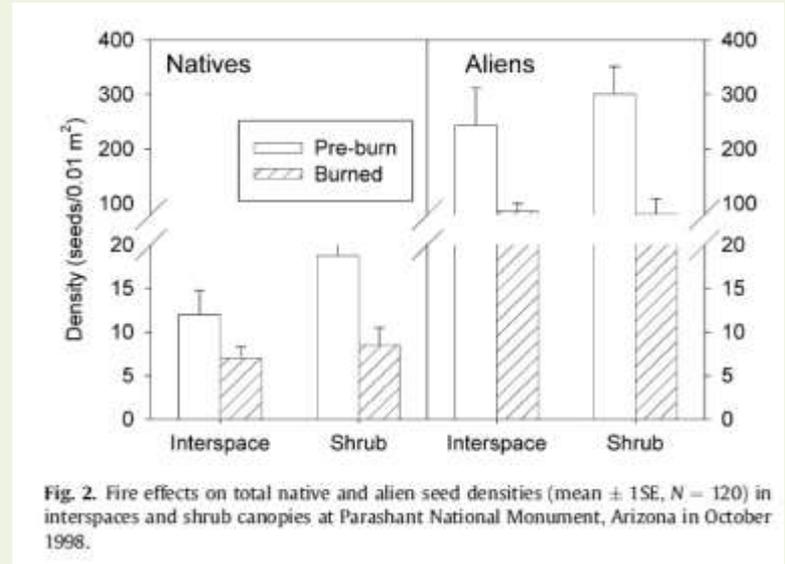
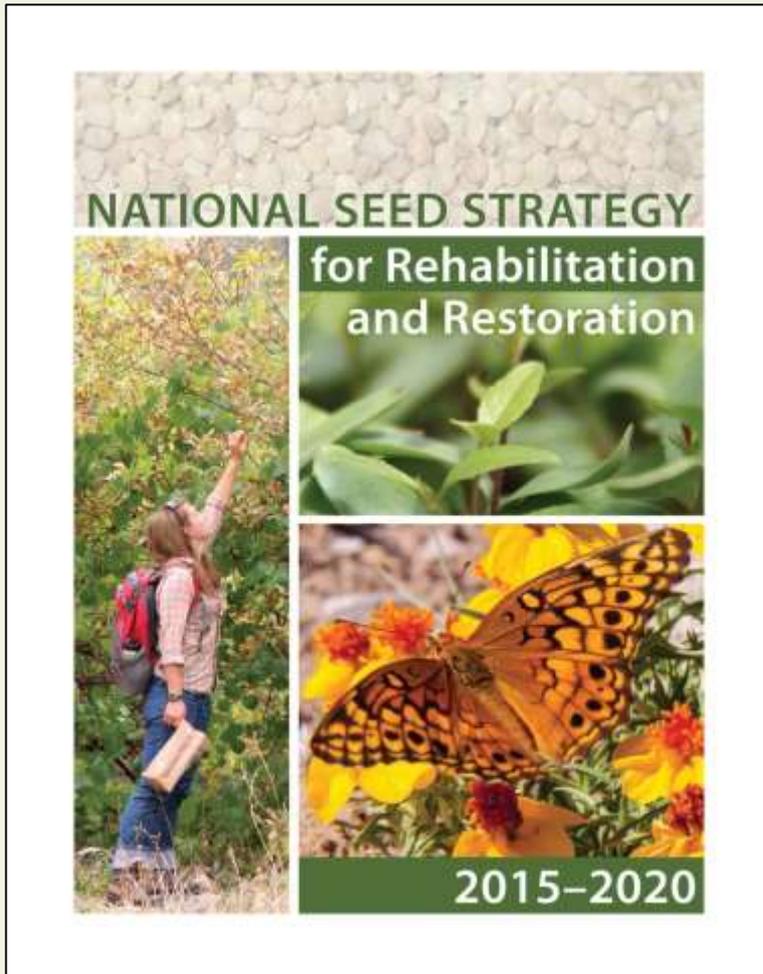


Fig. 2. Fire effects on total native and alien seed densities (mean \pm 1SE, $N = 120$) in interspaces and shrub canopies at Parashant National Monument, Arizona in October 1998.



National Seed Strategy for Rehabilitation and Restoration



- Congress created Native Plant Materials Development Programs in response to catastrophic wildfires in 1998 and 1999
- Builds on 15+ years of work
- National Seed Strategy announced August 2015
- Calls for an **Unprecedented Level** of Collaboration
- Developed by the Plant Conservation Alliance (PCA)
- Only country in the world with a National Seed Strategy

Plant Conservation Alliance Federal Committee

12 Federal Agencies 
Federal Committee – led by BLM

PCA also includes

- 325 Non-federal Partners
- 9 International Partners

MEMORANDUM OF UNDERSTANDING
among the
BUREAU OF INDIAN AFFAIRS
and the
BUREAU OF LAND MANAGEMENT
and the
FEDERAL HIGHWAY ADMINISTRATION
and the
NATIONAL PARK SERVICE
and the
SMITHSONIAN INSTITUTION
and the
U.S. BOTANIC GARDEN
and the
USDA AGRICULTURAL RESEARCH SERVICE
and the
USDA FOREST SERVICE
and the
USDA NATIONAL INSTITUTE OF FOOD AND AGRICULTURE
and the
USDA NATURAL RESOURCES CONSERVATION SERVICE
and the
U.S. FISH AND WILDLIFE SERVICE
and the
U.S. GEOLOGICAL SURVEY
ESTABLISHING THE
FEDERAL NATIVE PLANT CONSERVATION COMMITTEE
OF THE PLANT CONSERVATION ALLIANCE

This Memorandum of Understanding (MOU) is made and entered into by and between the Bureau of Indian Affairs, Bureau of Land Management, Federal Highway Administration, National Park Service, Smithsonian Institution, United States Botanic Garden, United States Department of Agriculture (USDA) Agricultural Research Service, USDA Forest Service, USDA National Institute of Food and Agriculture, USDA Natural Resources Conservation Service, U.S. Fish and Wildlife Service, and U.S. Geological Survey, hereinafter referred to as the Committee.

National Seed Strategy

“The right seed in the right place at the right time.”

- Goal 1 : Identify seed needs and **ensure** the reliable **availability** of **genetically appropriate seed**.
- Goal 2: Identify research needs and **conduct research** to provide **genetically appropriate** seed and to improve technology for **native seed production** and **ecosystem restoration**.
- Goal 3: **Develop tools** that enable **managers** to make timely, informed **seeding decisions** for ecological restoration.
- Goal 4: Develop strategies for internal and external **communication**.



National Seed Strategy Implementation: Ecoregional Programs

Great Basin Ecoregion



Colorado Plateau Ecoregion



Mojave Desert Ecoregion

Mojave Desert Native Plant Program



Mojave Desert Restoration Challenges: It's HOT and Dry!



- Limited source-identified Mojave seed production
- Wildland seed collection dependent on undependable precipitation
- Restoration seed germination dependent on undependable precipitation
- Heavy granivore pressure
- Container stock planting works, but requires watering
- Large acreage restoration impractical for container stock
- Competition from invasive species

Tucson Plant Materials Center

Heather Dial

Germplasm development for BLM
Southern Nevada District Office.
From wild collections in southern
Nevada:

- Existing Releases
 - Vegas Alkali Sacaton (*Sporobolus airoides*)
 - Moapa Alkali Muhly (*Muhlenbergia asperifolia*)
- Releases in Progress
 - Big Galleta (*Hilaria rigida*)
 - Bush Muhly (*Muhlenbergia porteri*)

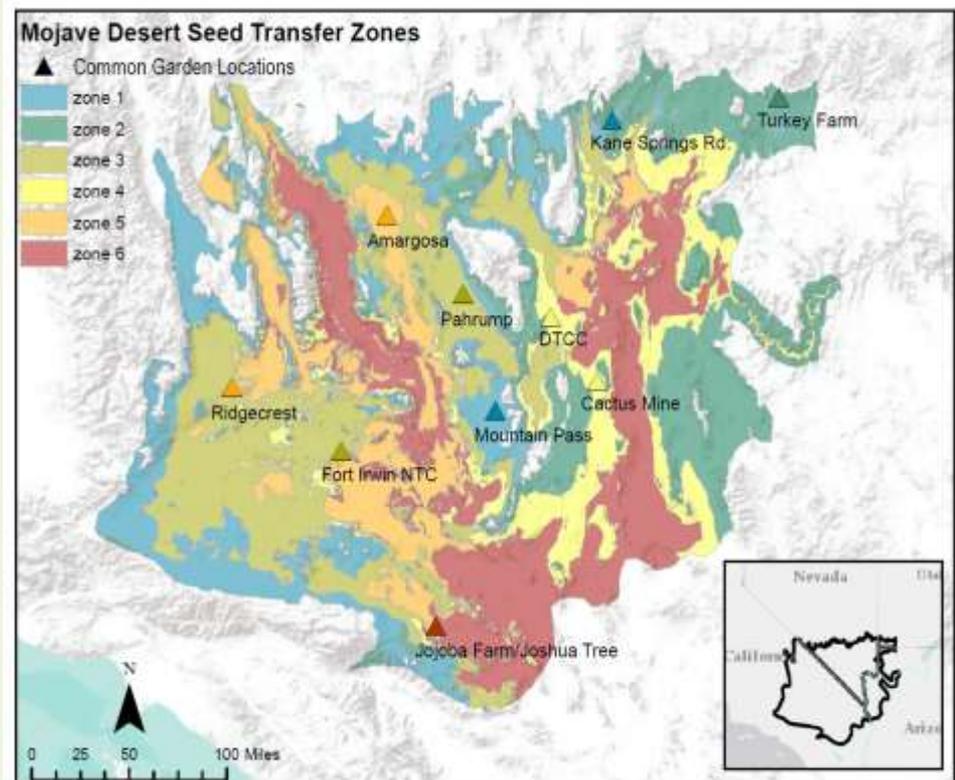


US Geological Survey, Henderson, NV

Dan Shryock, Lesley DeFalco, Troy Wood, Nathan Custer, and Todd Esque

Development of Seed Transfer Zones:

- Six Provisional Seed Zones for Mojave Ecoregion
- Development of 10 common garden research sites across all seed zones for testing
- Spatial genetics model development



Rancho Santa Ana Botanic Garden

Lorraine Washburn, Sarah deGroot, Andy Siekkinen, and Naomi Fraga

- Seeds of Success seed and plant tissue collections for common garden testing (USGS) and genetic analysis
- Gap analysis to identify missing collection areas
- Mapping of seed and tissue collection sites
- DNA extraction and genetic analysis on target restoration species



Photos: Rancho Santa Ana Botanic Garden

Tools and Resources

Dan Shryock, Lesley DeFalco, Todd Esque, USGS-Henderson, NV

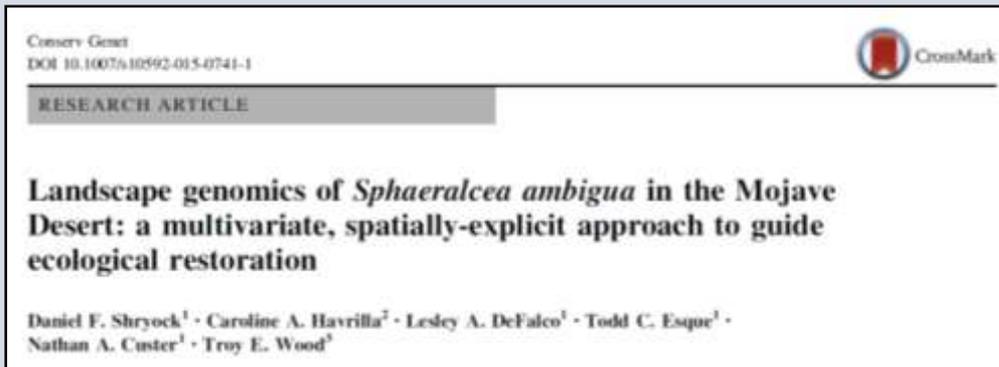
Seed Transfer Zones:

Ephedra nevadensis

Sphaeralcea ambigua

Mojave Desert Provisional Seed Zones

Articles:



Adaptive Distance Tools

- **Interactive spatial planning tools for seed sourcing**

- **User tutorial**

ArcGIS® Toolbox

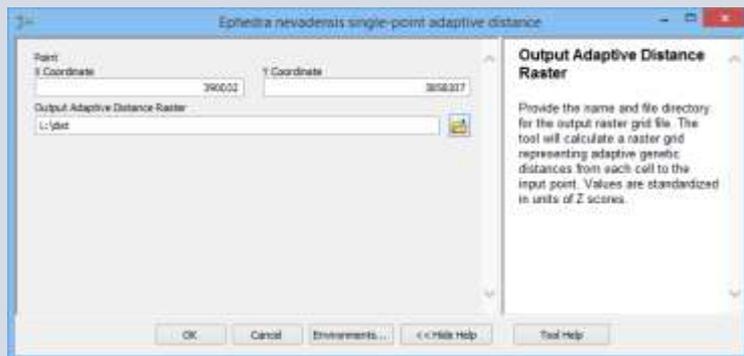
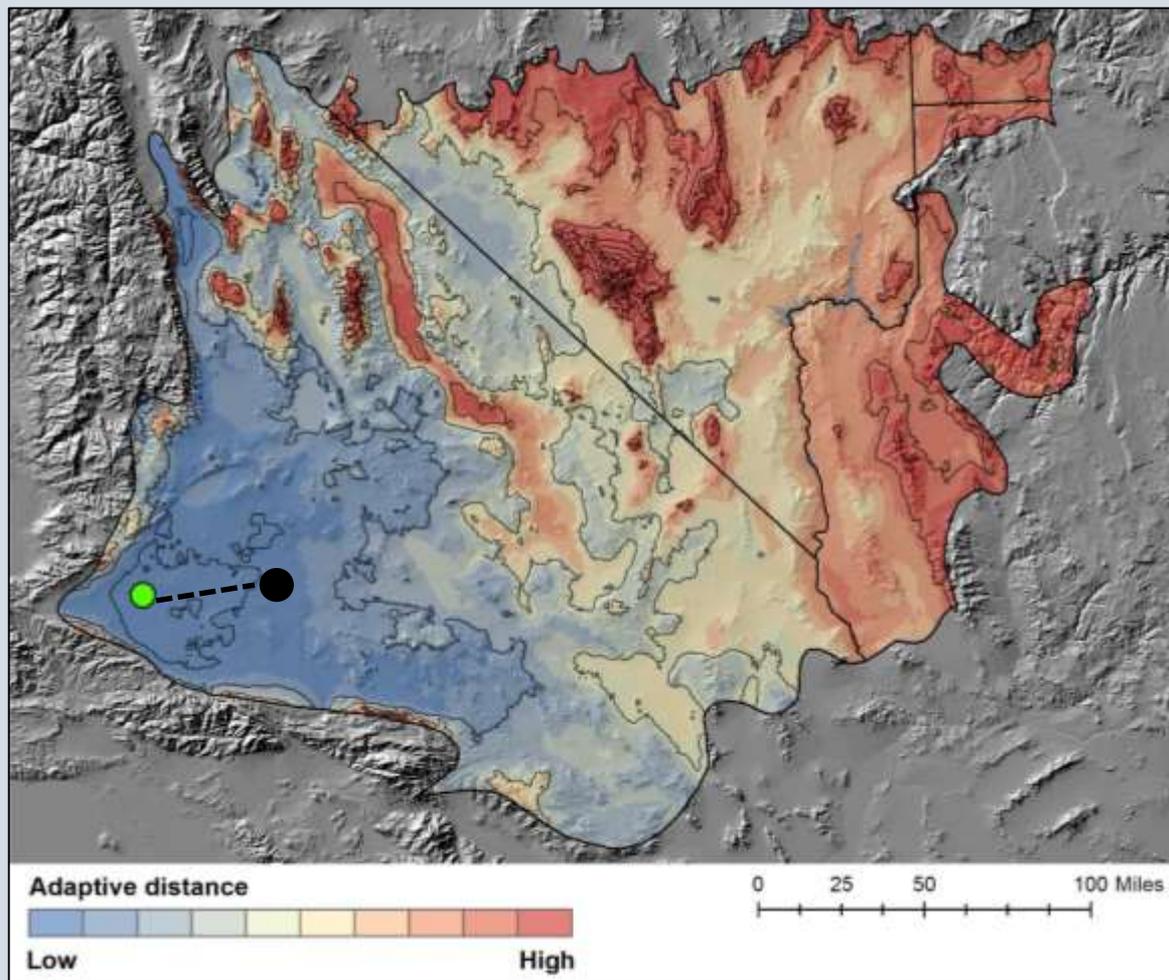


R scripts



Local provenancing

- Choose seed source with lowest adaptive distance to restoration site
- Species-specific (genetic distance) and environmental versions



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US Geological Survey, Bureau of Land Management, National Park Service

Fred Edwards, Christina Lund, Kathleen Harcksen, Lesley DeFalco, Sara Scoles-Sciulla, Todd Esque, Jennifer Fox, and Jonathon Smith

Experimentation with Restoration

Techniques:

- Granivore Circumvention
 - Decoy seeding
 - Seed balls/wafers
- Aerial Seeding
- Hand Seeding
- Herbicide Suppression of Invasives
- Container Stock Planting
- Fire Restoration Study



Lesley DeFalco, USGS

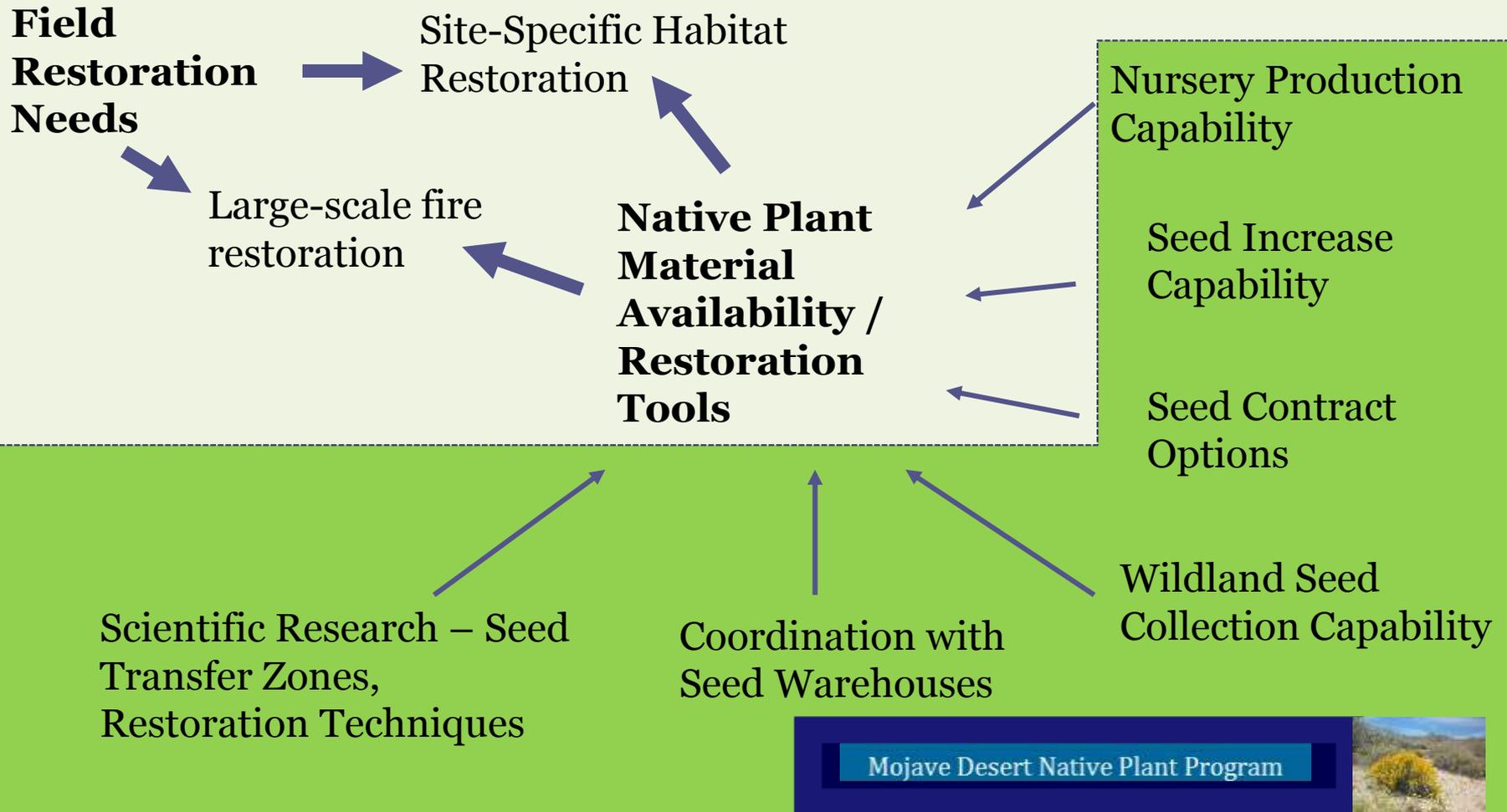
Fire Restoration Study, BLM Las Vegas District: Multiple Experimental Treatments

- Part of larger USGS research project
- Decoy seeding followed by native species seeding
- Island plantings
- Green strip plantings
- Herbicide treatments



Photos: Jonathon Smith, BLM Las Vegas

Mojave Desert Native Plant Program: Coordinating Availability with Needs





Contact: Judy Perkins, Mojave Desert Native Plant Coordinator:
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760-833-7148.