USDA

United States Department of Agriculture

Natural Resources Conservation Service

Mitigation on Agricultural Lands

27 February 2018 | Heather Dial, Tucson Plant Materials Center

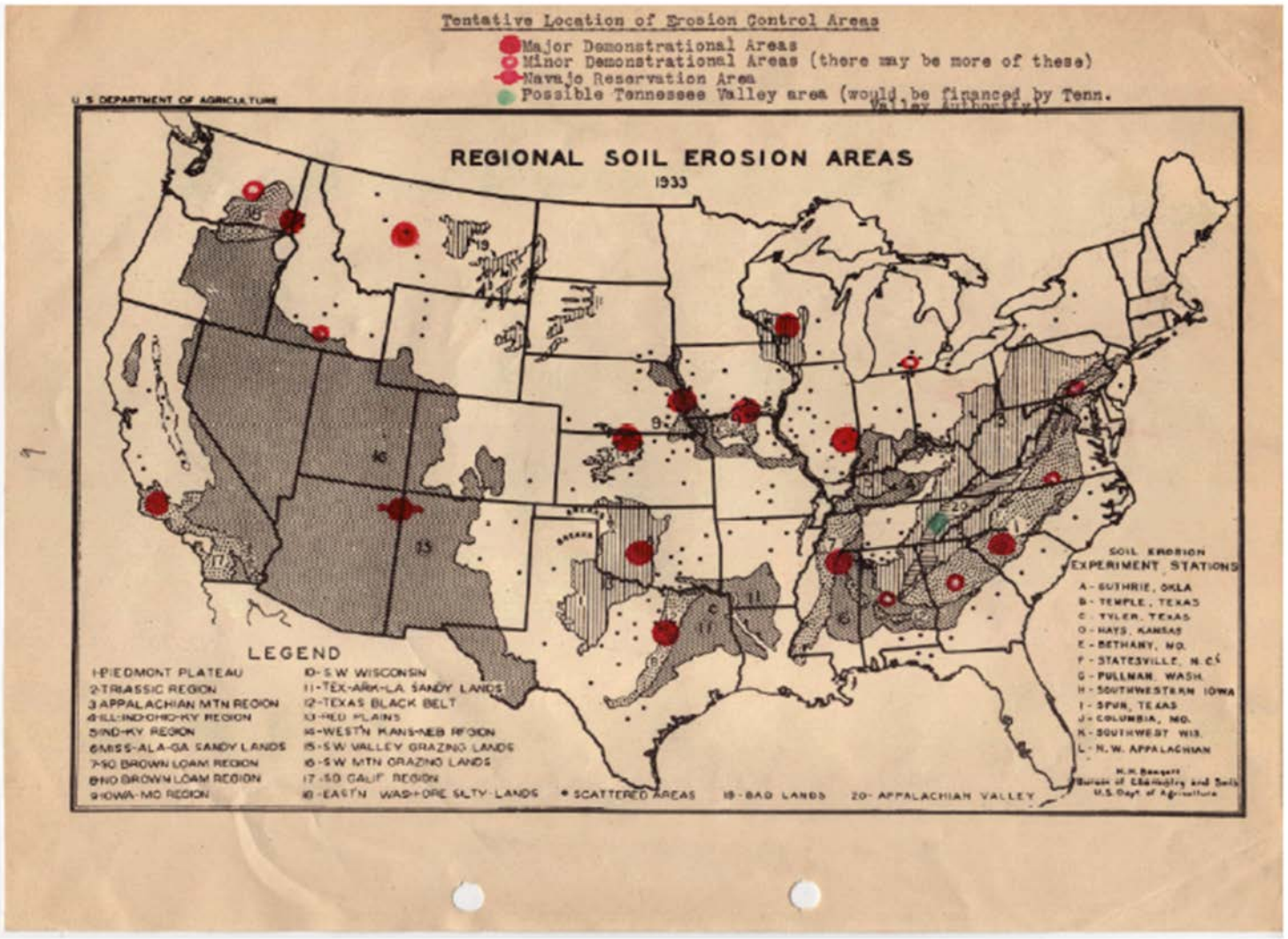
Natural Resources Conservation Service

az.nrcs.usda.gov

Overview

- **The Plant Materials Program**
  - History
  - What we do
  - Releases
- **Historical and Present Studies**
  - 1977 and 1979 Trials
  - 2016 Trial
  - Pecan Orchard Trial
  - Rangeland Trial
- **Summary**

History



Natural Resources Conservation Service

History

"Nursery production in this region with its attendant problems, is peculiar in that one is dealing primarily with range revegetation and restoration rather than with farm erosion control. The complexity of the situation is further enhanced by reason of the low rainfall, temperature extremes, and wide range of vegetation types which prevail in this section and which of necessity is reflected in the composition of propagation materials and general nursery practices as well as field applications."

Dr. F.J. Crider, 1934 Tucson Plant Materials Center Technical Report

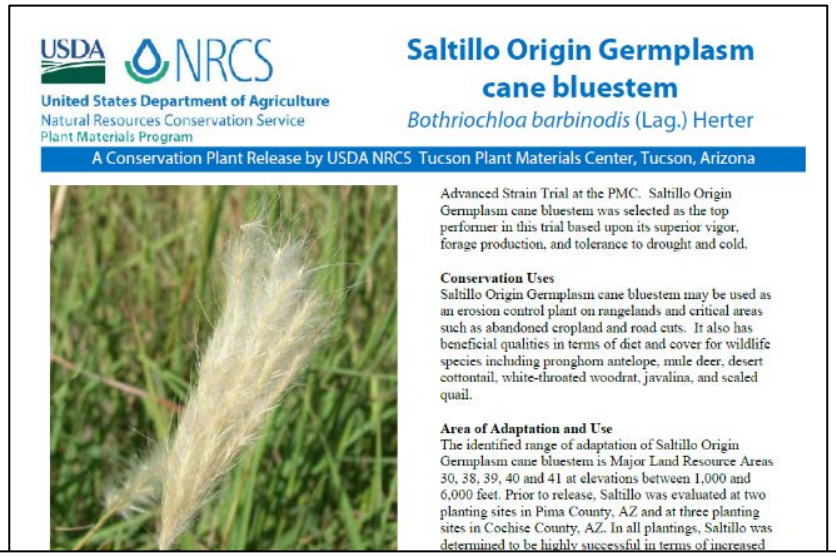
History

"Plants must be chosen, in the first place, especially for their known or potential erosion control values." Dr. F.J. Crider, 1936 Field Memorandum #SCN-4

"What plant can possibly be more important in the Southwest than blue grama?"
Leslie N. Gooding, 1939 Annual Report for the Field

Tucson Plant Materials Center Mission

- **Assemble, test and release native plant material for conservation use in the Sonoran, Chihuahuan, and Mojave Deserts**
- **Encourage the commercial increase of conservation species**
- **Develop and transfer plant science technology to address conservation problems**



USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service
Plant Materials Program

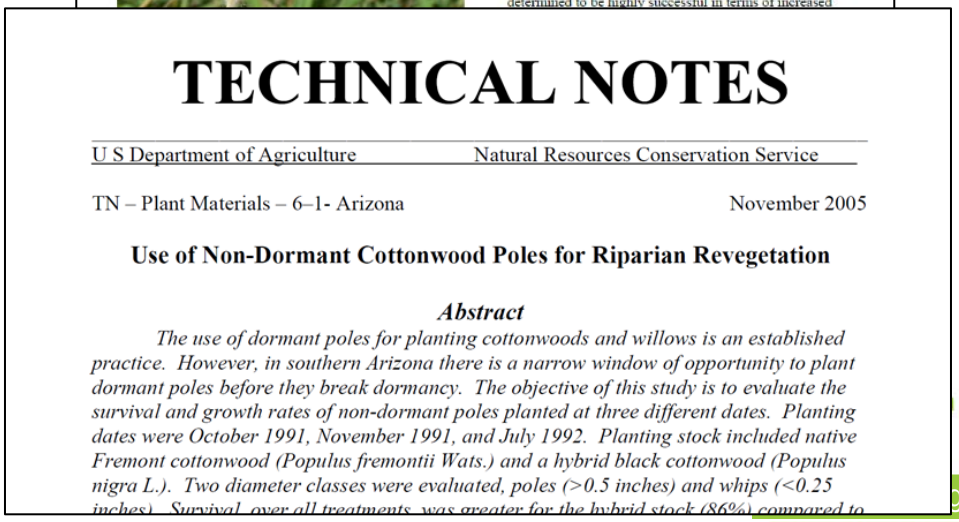
Saltillo Origin Germplasm cane bluestem
Bothriochloa barbinodis (Lag.) Herter

A Conservation Plant Release by USDA NRCS Tucson Plant Materials Center, Tucson, Arizona

Advanced Strain Trial at the PMC. Saltillo Origin Germplasm cane bluestem was selected as the top performer in this trial based upon its superior vigor, forage production, and tolerance to drought and cold.

Conservation Uses
Saltillo Origin Germplasm cane bluestem may be used as an erosion control plant on rangelands and critical areas such as abandoned cropland and road cuts. It also has beneficial qualities in terms of diet and cover for wildlife species including pronghorn antelope, mule deer, desert cottontail, white-throated woodrat, javalina, and scaled quail.

Area of Adaptation and Use
The identified range of adaptation of Saltillo Origin Germplasm cane bluestem is Major Land Resource Areas 30, 38, 39, 40 and 41 at elevations between 1,000 and 6,000 feet. Prior to release, Saltillo was evaluated at two planting sites in Pima County, AZ and at three planting sites in Cochise County, AZ. In all plantings, Saltillo was determined to be highly successful in terms of increased



TECHNICAL NOTES

U S Department of Agriculture — Natural Resources Conservation Service

TN – Plant Materials – 6–1- Arizona — November 2005

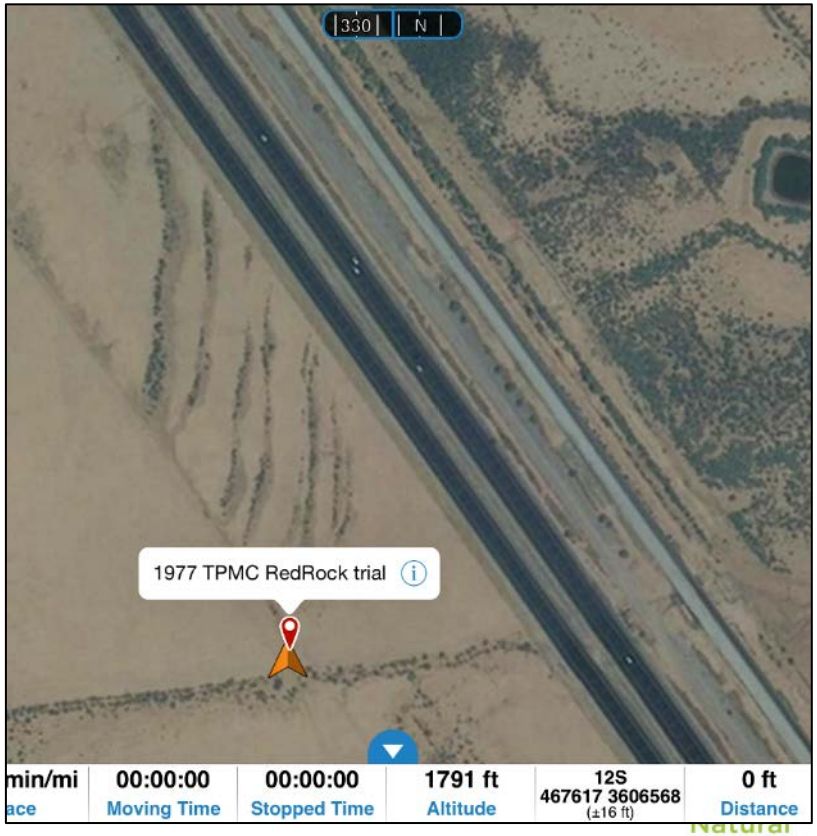
Use of Non-Dormant Cottonwood Poles for Riparian Revegetation

Abstract

The use of dormant poles for planting cottonwoods and willows is an established practice. However, in southern Arizona there is a narrow window of opportunity to plant dormant poles before they break dormancy. The objective of this study is to evaluate the survival and growth rates of non-dormant poles planted at three different dates. Planting dates were October 1991, November 1991, and July 1992. Planting stock included native Fremont cottonwood (Populus fremontii Wats.) and a hybrid black cottonwood (Populus nigra L.). Two diameter classes were evaluated, poles (>0.5 inches) and whips (<0.25 inches). Survival, over all treatments, was greater for the hybrid stock (86%) compared to

Studies

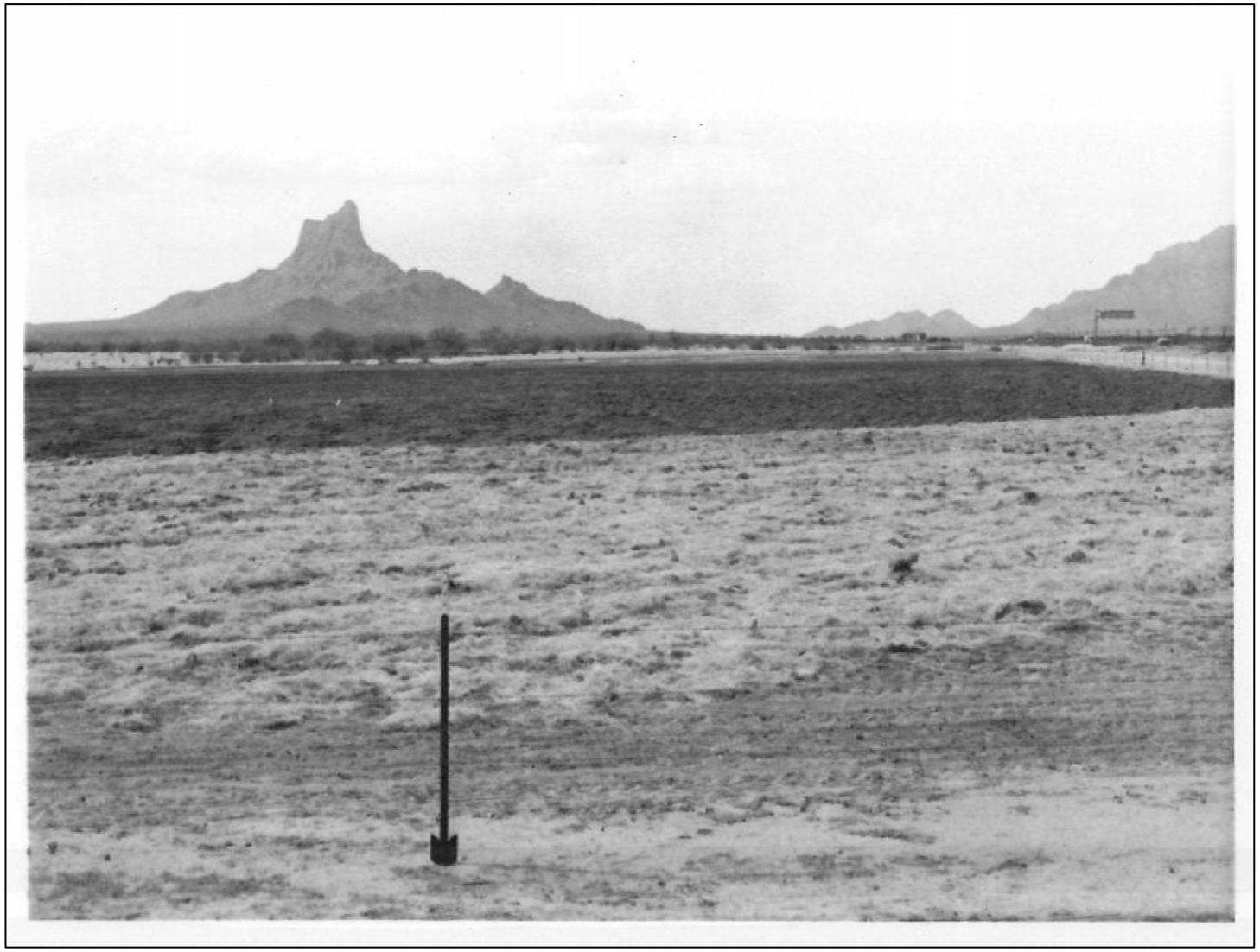
- **Collaborative work**
- **Objective was to control blowing dust causing multiple accidents along Interstates 8 and 10**
- **Two separate trials**
  - 1977
    - 20 acre abandoned field
    - Two seeding mixtures & 11 cultural techniques
  - 1979
    - 34 acre abandoned field
    - One seeding mix & 2 cultural techniques



1977 Trial

- Entire area was fenced
- Cultural treatments used included pitting, land imprinting, mulching, listing, ripping
- Some successful establishment of seeded species
- Best results were from contour-furrowed and drill seeded plots
- Results were used to develop 1979 study plan

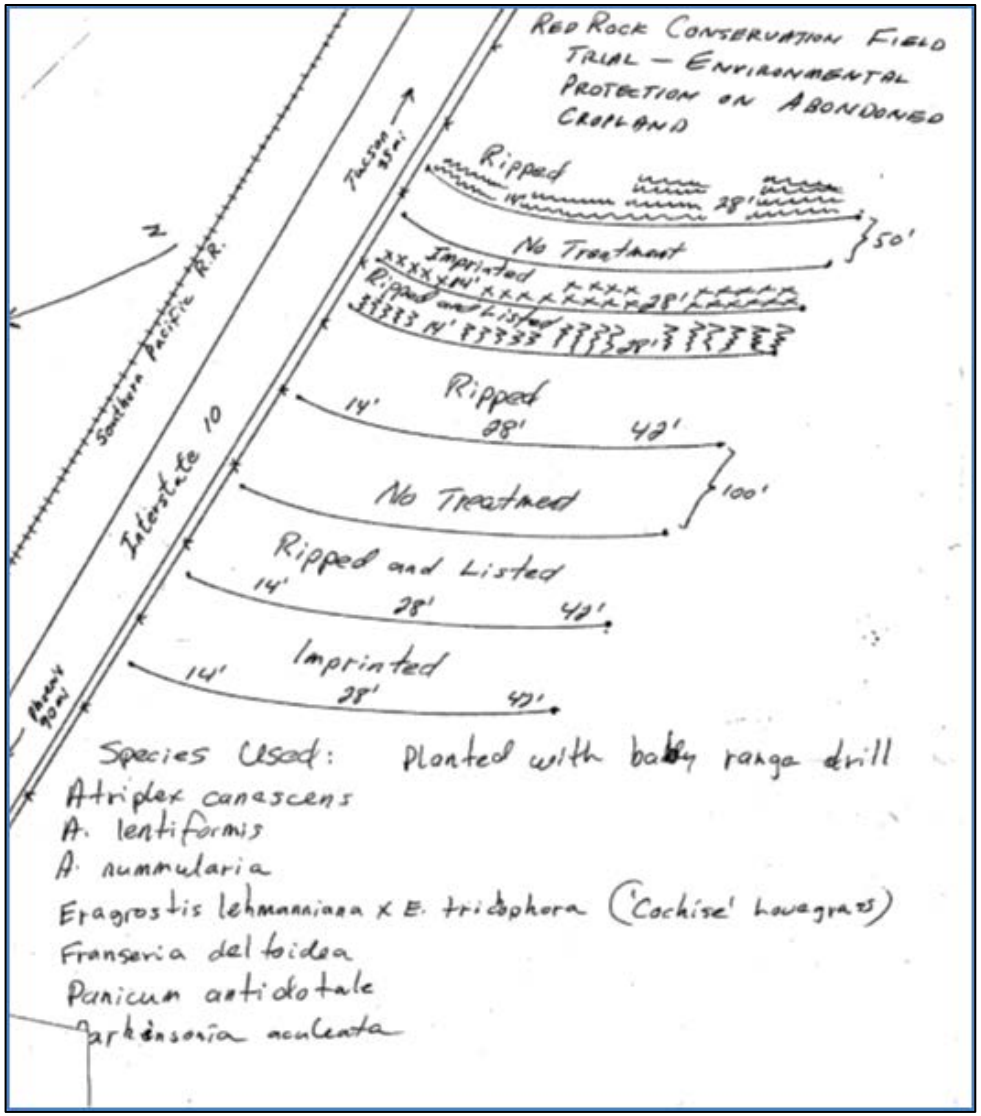
1977 Trial



1979 Trial

- One of the problems from the 1977 trial was water infiltration
- Constructed contour borders at 50’ and 100’ wide
- Between each border varying widths were contour furrowed, ripped or left as a check and then drill seeded
- A portion between each border was left as a watershed area to provide extra moisture for the seeded area
- Average slope of the field between borders was 1.5%

1979 Trial


Red Rock Conservation Field Trial – Environmental Protection on Abondoned Cropland
Tucson 35 mi
Ripped
14'
28'
No Treatment
50'
Imprinted
14'
28'
Ripped and Listed
14'
28'
Ripped
14'
28'
42'
No Treatmed
100'
Ripped and Listed
14'
28'
42'
Imprinted
14'
28'
42'
Southern Pacific R.R.
Interstate 10
Phoenix 90 mi
Species Used:
Planted with baby range drill
Atriplex canascens
A. lentiformis
A. nummularia
Eragrostis lehmanniana x E. trichophora ('Cochise' Lovegrass)
Franseria deltoidea
Panicum antidotale
Parkinsonia aculeata

1979 Trial

- The techniques worked and are still working today
- Present day vegetation on the berms consists of velvet mesquite, wolfberry, fourwing saltbush and annual forbs and grasses
- Of these, only fourwing saltbush was seeded

1979 Trial

- After 6 years of evaluation of the trial, a “prescription” for planting abandoned cropland was developed
- Further trials were conducted in various areas along I-10 but none with the success of the Red Rock Trials
- Collaboration was key

Project Seeks To Reclaim Abandoned Lands

By Don Dale

RED ROCK, Ariz. — The Soil Conservation Service says there are hundreds of thousands of acres of abandoned croplands and other denuded lands in Arizona that are creating environmental problems—and the agency is starting to do something to reclaim them.

"The land has been abandoned because of water problems," said Pat Williams, director of the SCS Plant Materials Center at Tucson.

Williams was in the Red Rock area recently with his assistant, Jim Briggs, to check on the re-

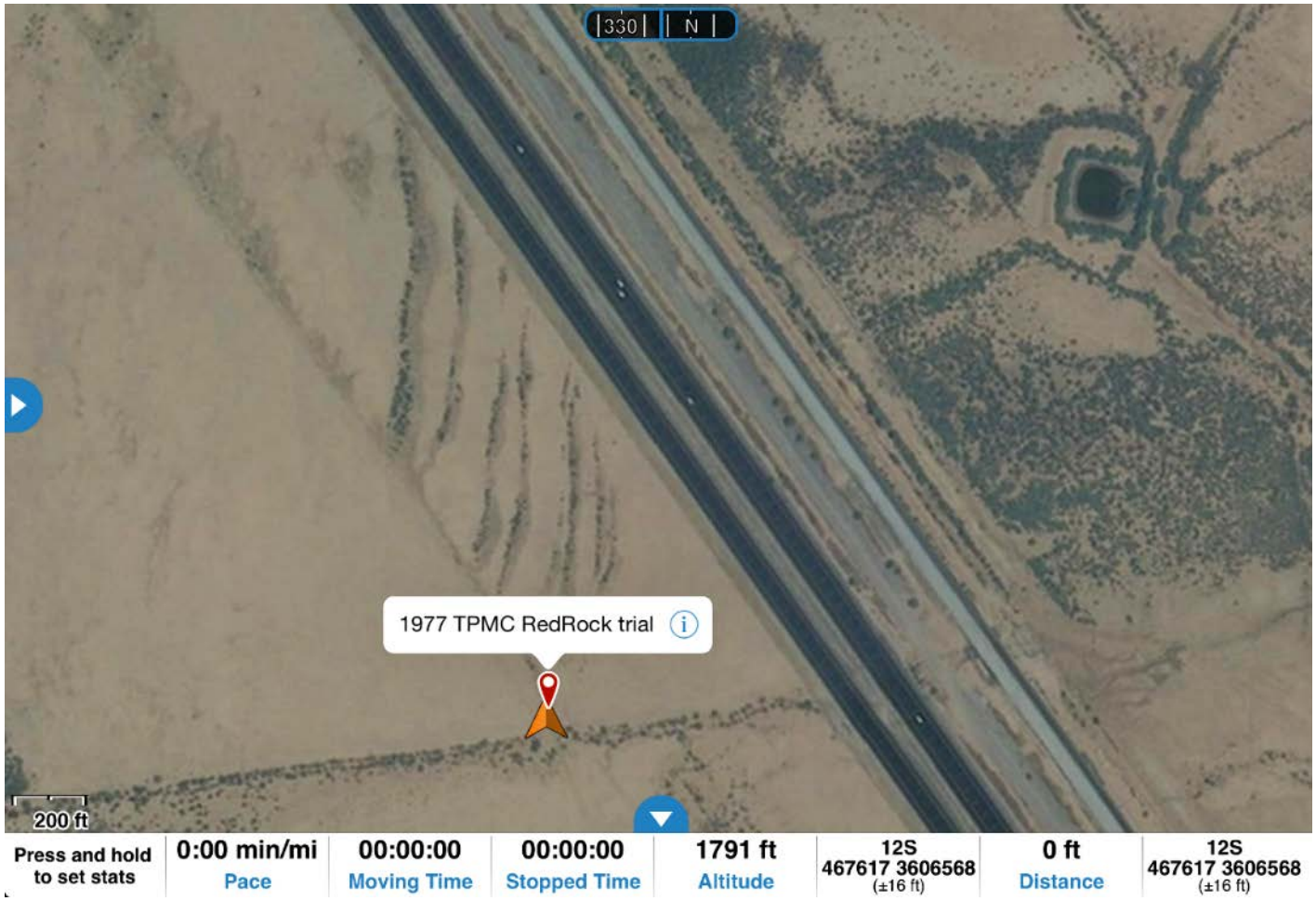
(See RECLAIMING, pg. 36)

UNSEEDED areas show contrast to re-vegetation sections, where grasses and plants have begun to re-establish themselves.

PLANT SPECIES in the re-vegetation area were selected for their adaptation to desert conditions; most are native to Arizona, though not necessarily to this area.

JIM BRIGGS and Pat Williams, photo at bottom left, examine a four-wing saltbush that appears to be thriving in a re-vegetation area. In the photo at bottom right, blue panic seedheads indicate the grass is doing well.

1979 Trial


330
N
1977 TPMC RedRock trial
200 ft
Press and hold to set stats
0:00 min/mi
Pace
00:00:00
Moving Time
00:00:00
Stopped Time
1791 ft
Altitude
12S 467617 3606568 (±16 ft)
0 ft
Distance
12S 467617 3606568 (±16 ft)

2016 Trial

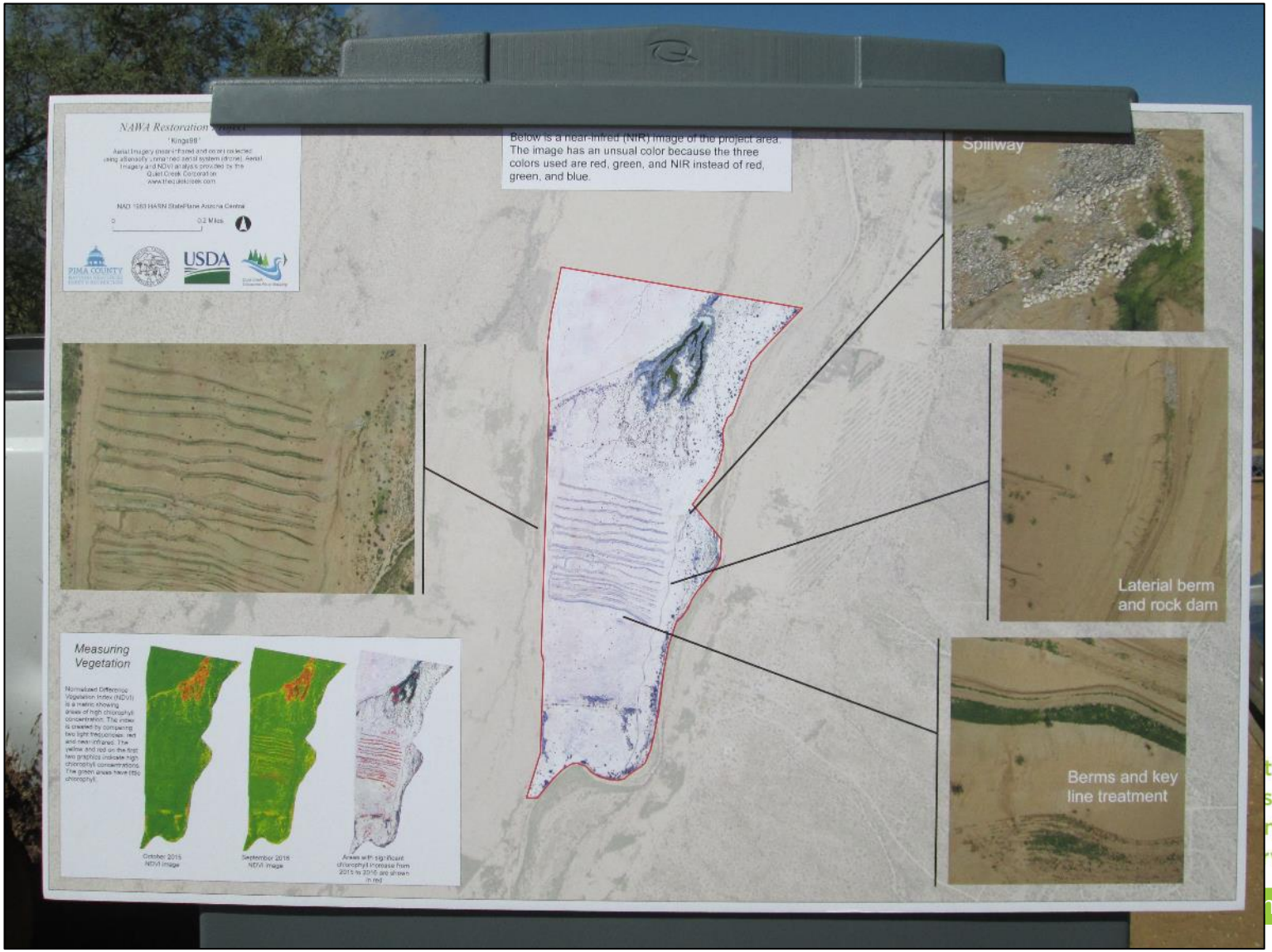
- Collaborative project
- 200 acre site
- Farming began on the site in the 1960s; the fields were abandoned by the late 1970s
- Similar soils and condition to Red Rock

2016 Trials

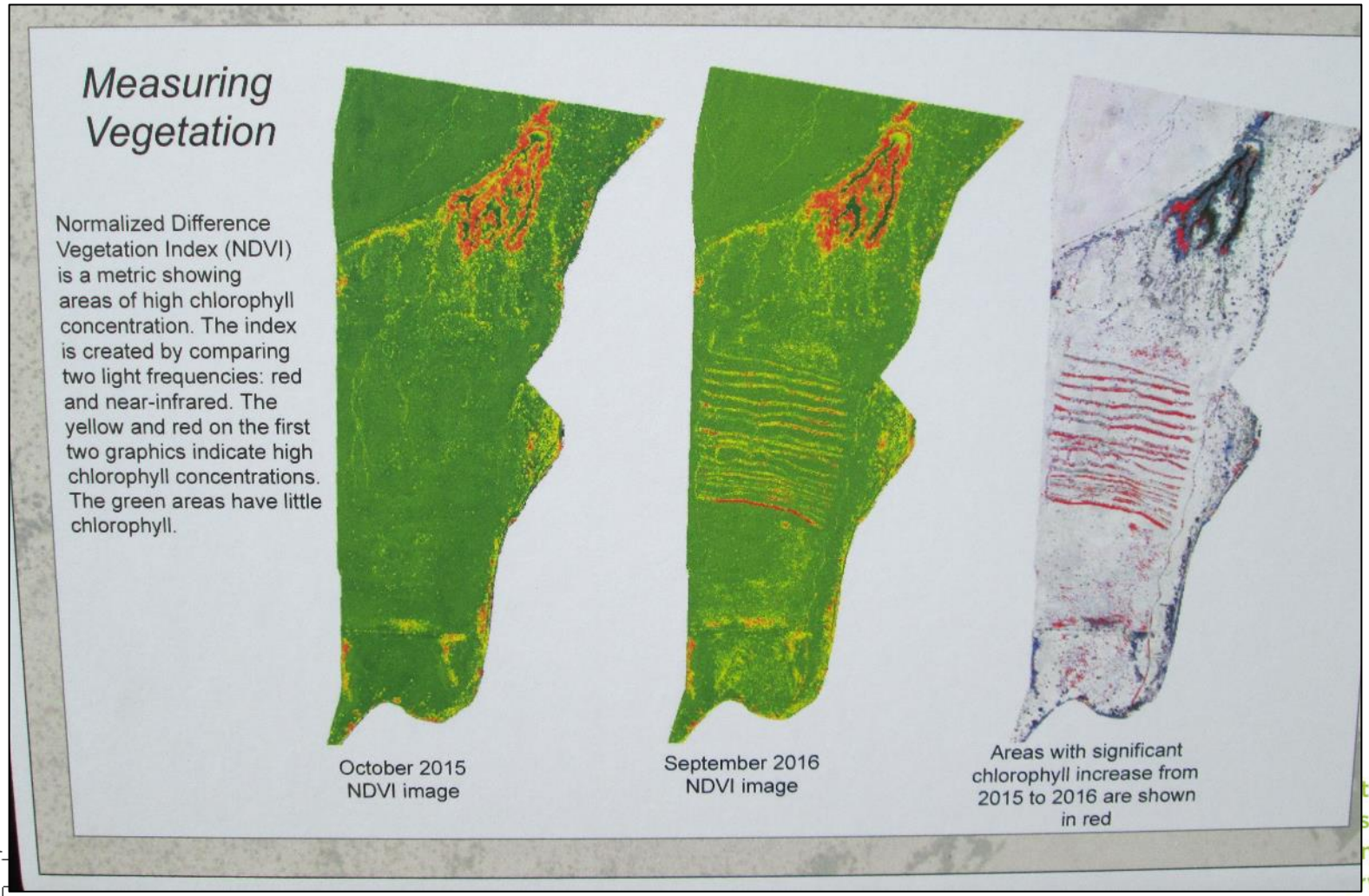
- Berms were built on 40 acres of the site at 3 different widths
- The upstream side of each berm was ripped and seeded
- May and August seeding dates
- Section of land was key line plowed

2016 Trials

2016 Trials


NAWA Restoration
Below is a near-infrared (NIR) image of the project area. The image has an unusual color because the three colors used are red, green, and NIR instead of red, green, and blue.
Spillway
Lateral berm and rock dam
Berms and key line treatment
Measuring Vegetation
October 2015 NDVI image
September 2016 NDVI image

2016 Trials


Measuring Vegetation
Normalized Difference Vegetation Index (NDVI) is a metric showing areas of high chlorophyll concentration. The index is created by comparing two light frequencies: red and near-infrared. The yellow and red on the first two graphics indicate high chlorophyll concentrations. The green areas have little chlorophyll.
October 2015 NDVI image
September 2016 NDVI image
Areas with significant chlorophyll increase from 2015 to 2016 are shown in red

2016 Trials

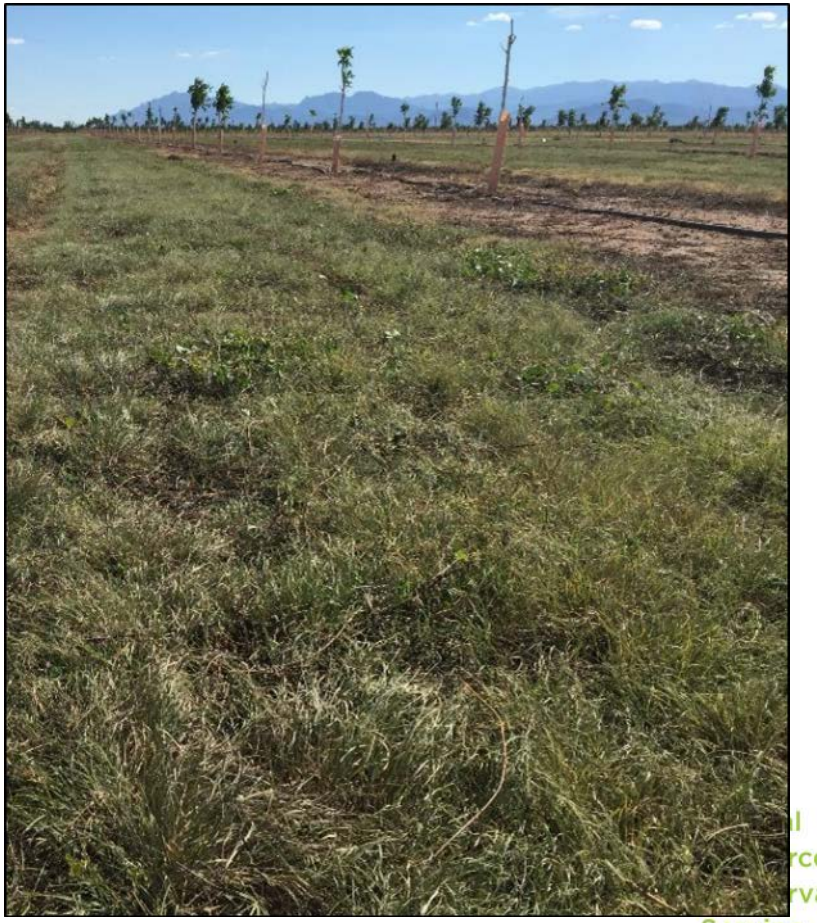
Pecan Orchard Trial

- Contacted by U of A professor regarding new pecan orchards and potential for trials
- Coordinated site visit and developed study plan to test various releases in between orchard rows
- Orchard acreage is on the rise in Arizona and this particular orchard is near I-10

Pecan Orchard Trial

- Finding a native commercially available species that can exist in the understory of pecan orchards could provide soil coverage for thousands of acres in Southern Arizona
- Replicated trial was installed in 2015
- Preliminary results indicate that two species have established, and are providing cover despite weed competition

Pecan Orchard Trial

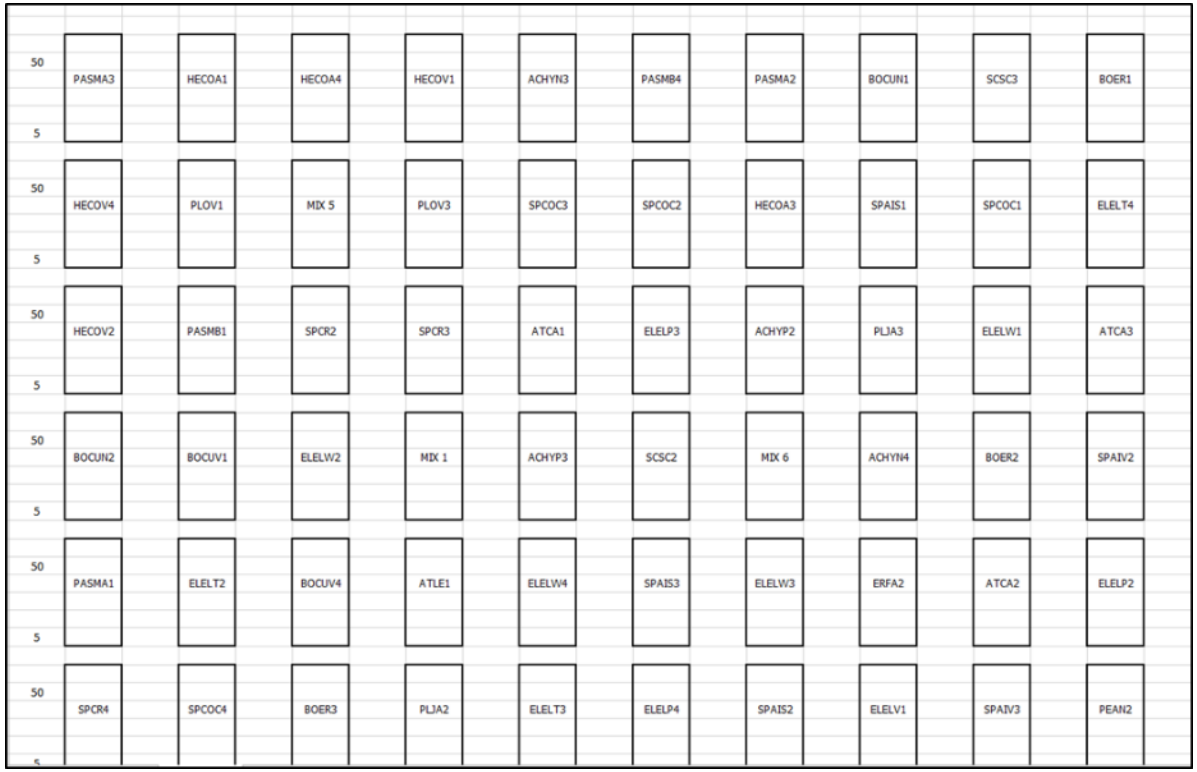


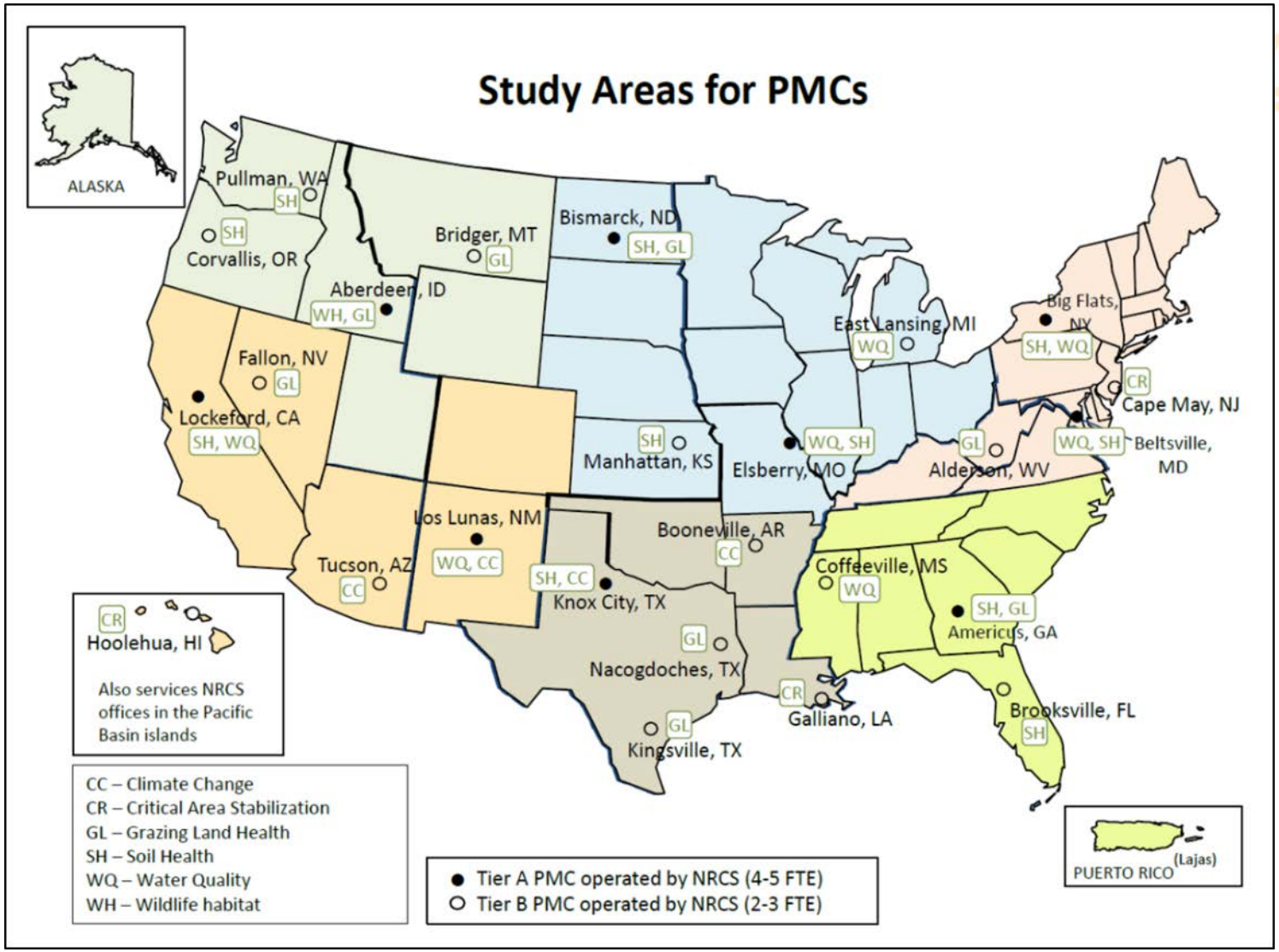
Rangeland Trial

- Site has low productivity, subject to wind erosion
- What species will establish and persist?
- Developed planting plan and procured the seed
- Installed the trial in three days with assistance from NRCS and AZ Game and Fish staff

Rangeland Trial

- Replicated trial
- 2 acres
- 17 species
  - 26 entries
- Multiple cultivars of some species
- 6 mixed plots





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  - Rangeland Trial
- **Summary**

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