Brush Management, Site Evaluation and Planning in MLRA 41-3

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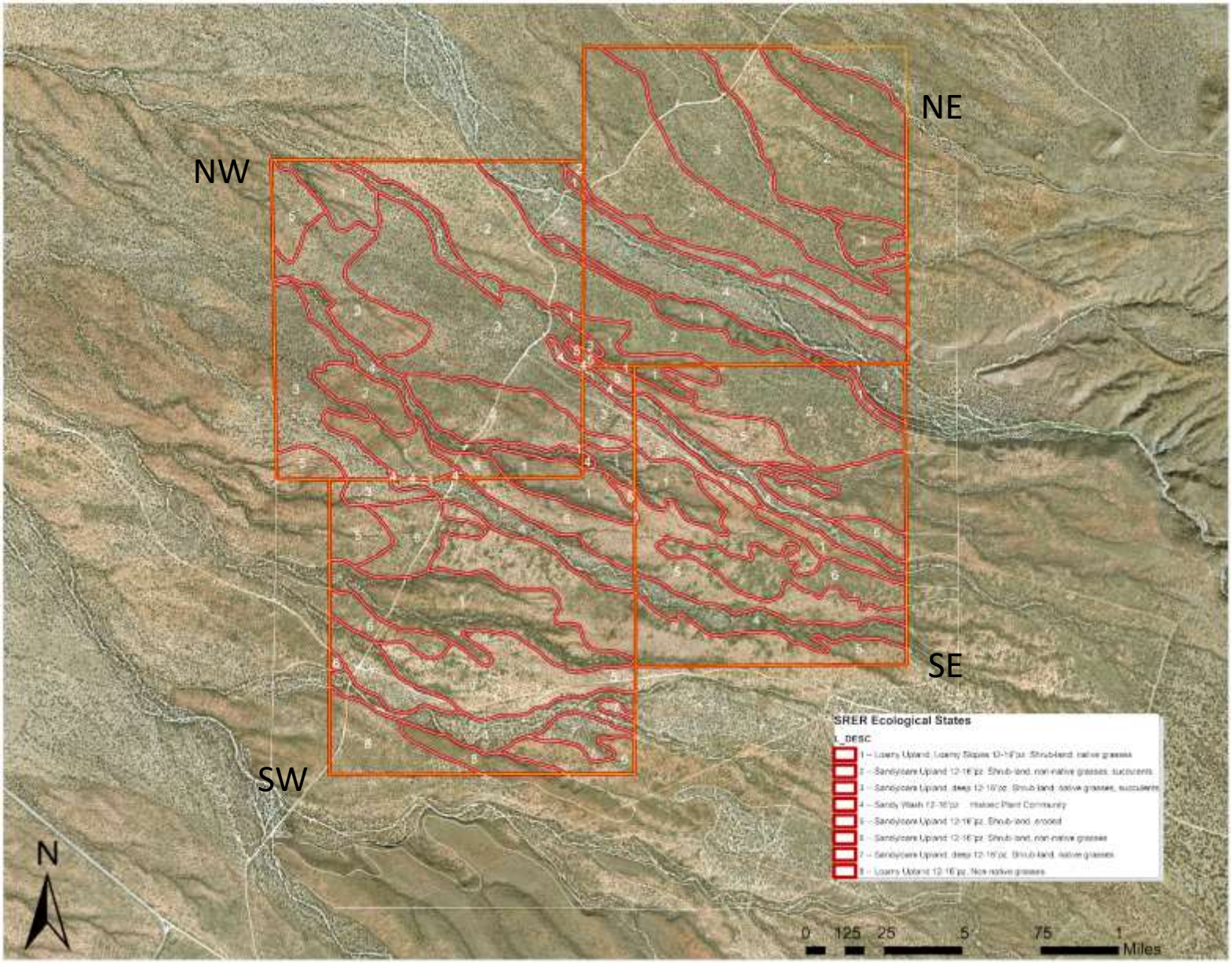
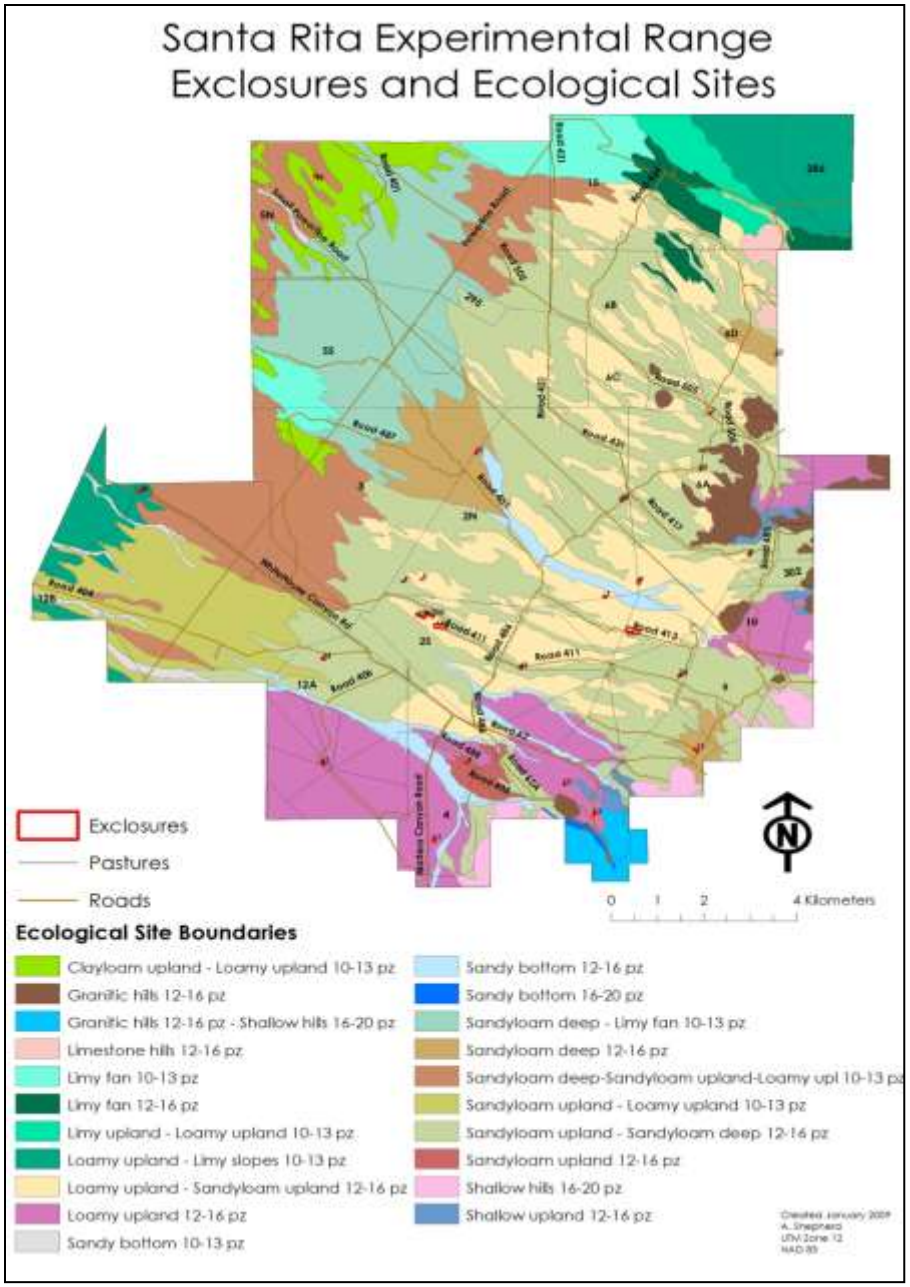
Site Evaluation and Brush Management Planning Exercise

- Four interdisciplinary teams
- One section, Santa Rita Experimental Range
- Major Land Resource Area 41-3, 12-16”pz.
- Will have a budget
- Arizona State Trust Land
- NRCS EQIP funded

Four sections on SRER in MLRA 41-3

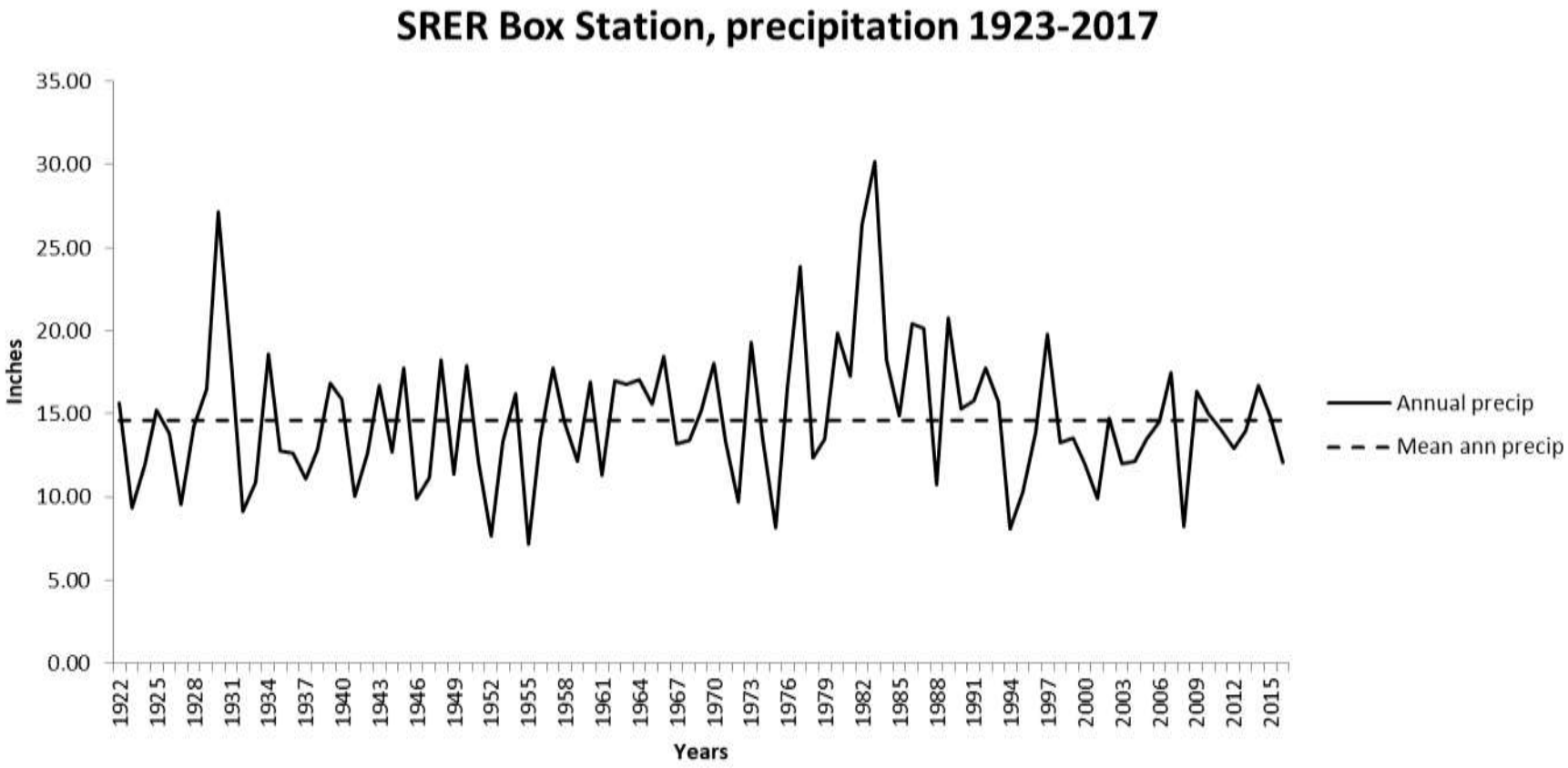




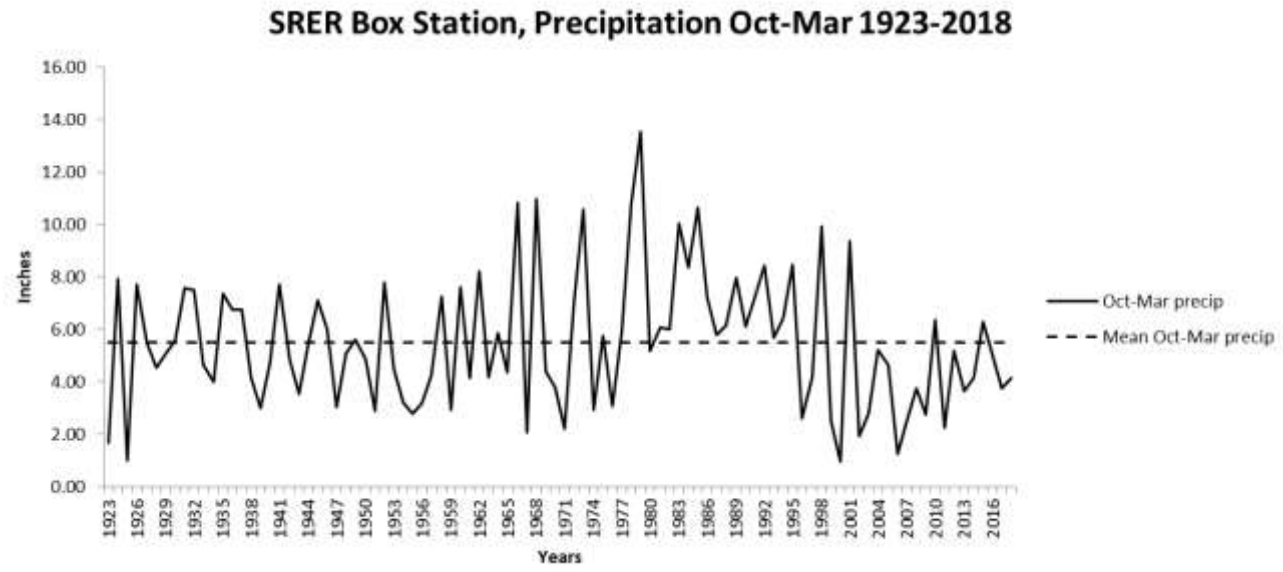
Ecological sites of the SRER

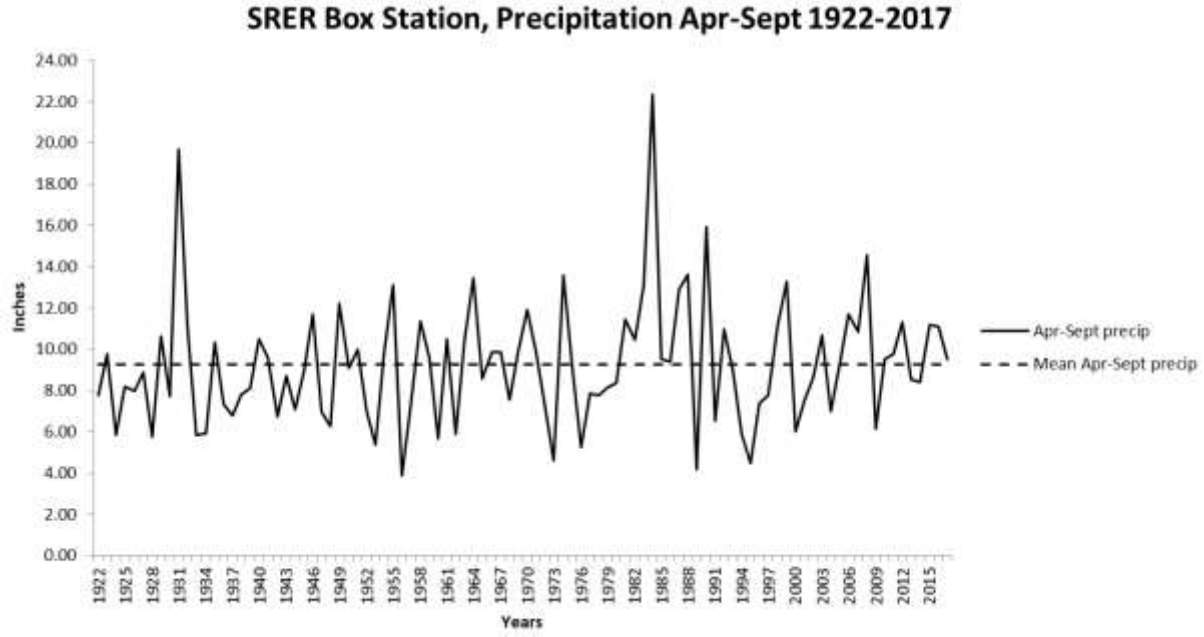
- MLRA 40-1 – Upper Sonoran
  - Elevation > 3300 feet on SRER
  - Typic aridic moisture regime
  - Thermic temperature regime
  - Mean annual precip 10-13 in.
- MLRA 41-3 – SE AZ Grassland
  - Elevation < 3300 ft. on SRER
  - Ustic aridic moisture regime
  - Thermic temperature regime
  - Mean annual precip. 12-16 in.

Box Station, 3943 ft. 14.6” mean annual precipitation

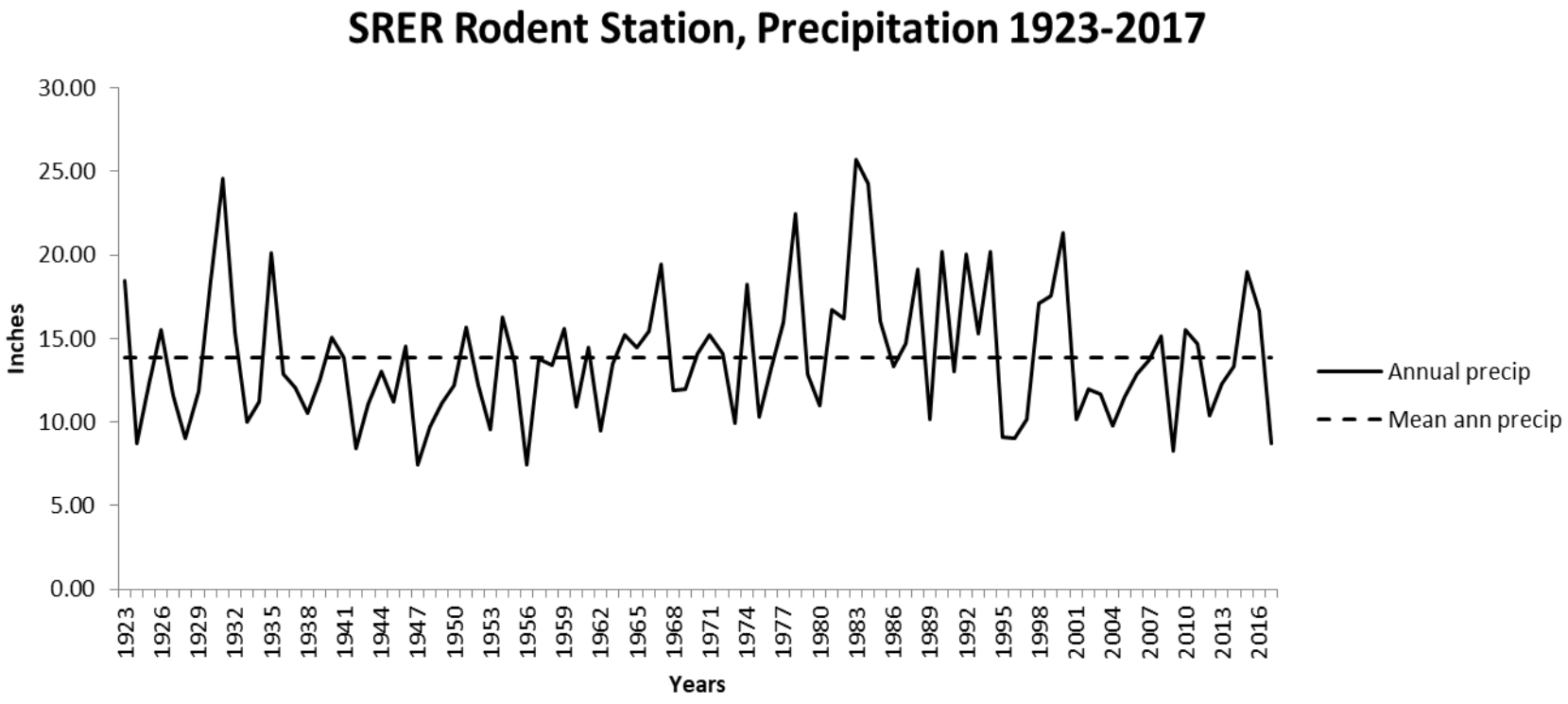


Seasonal Precipitation





Rodent Station, 3620 ft. 13.9” mean annual precipitation



Mesquite cover and density on the SRER

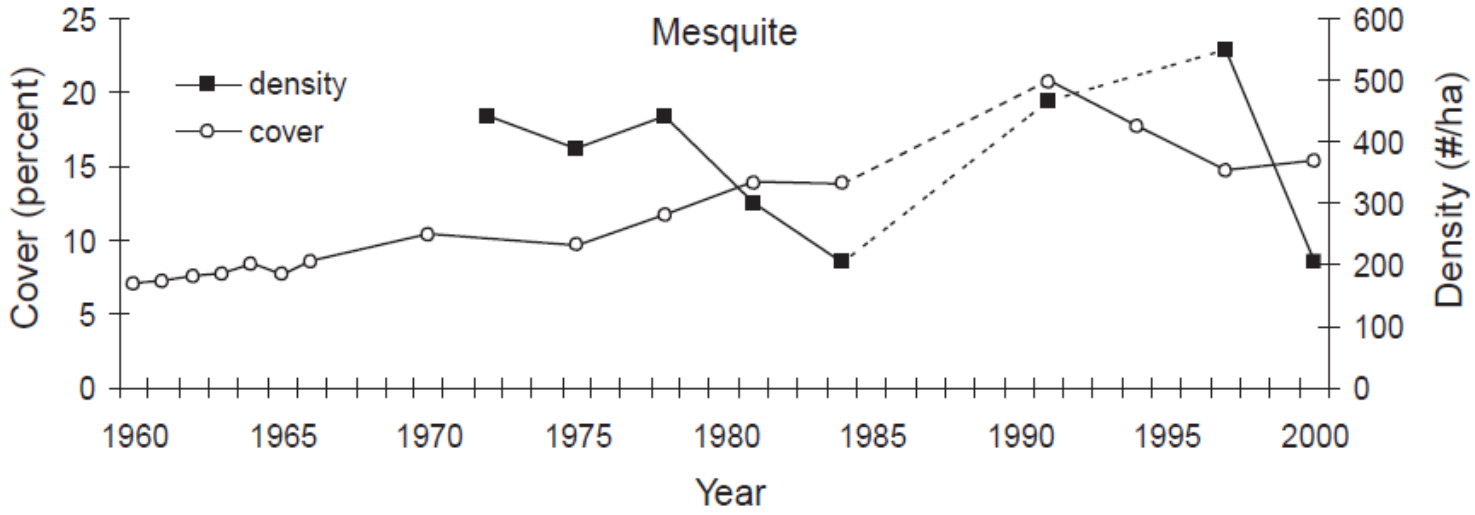
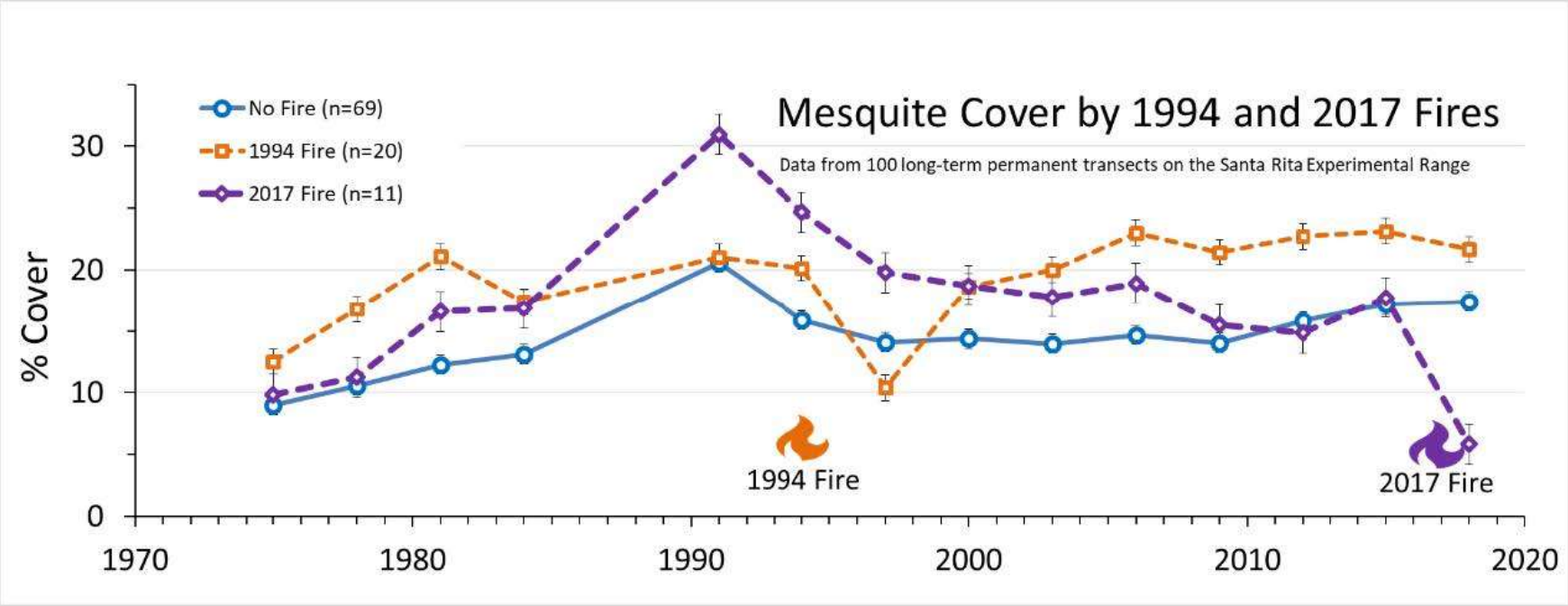
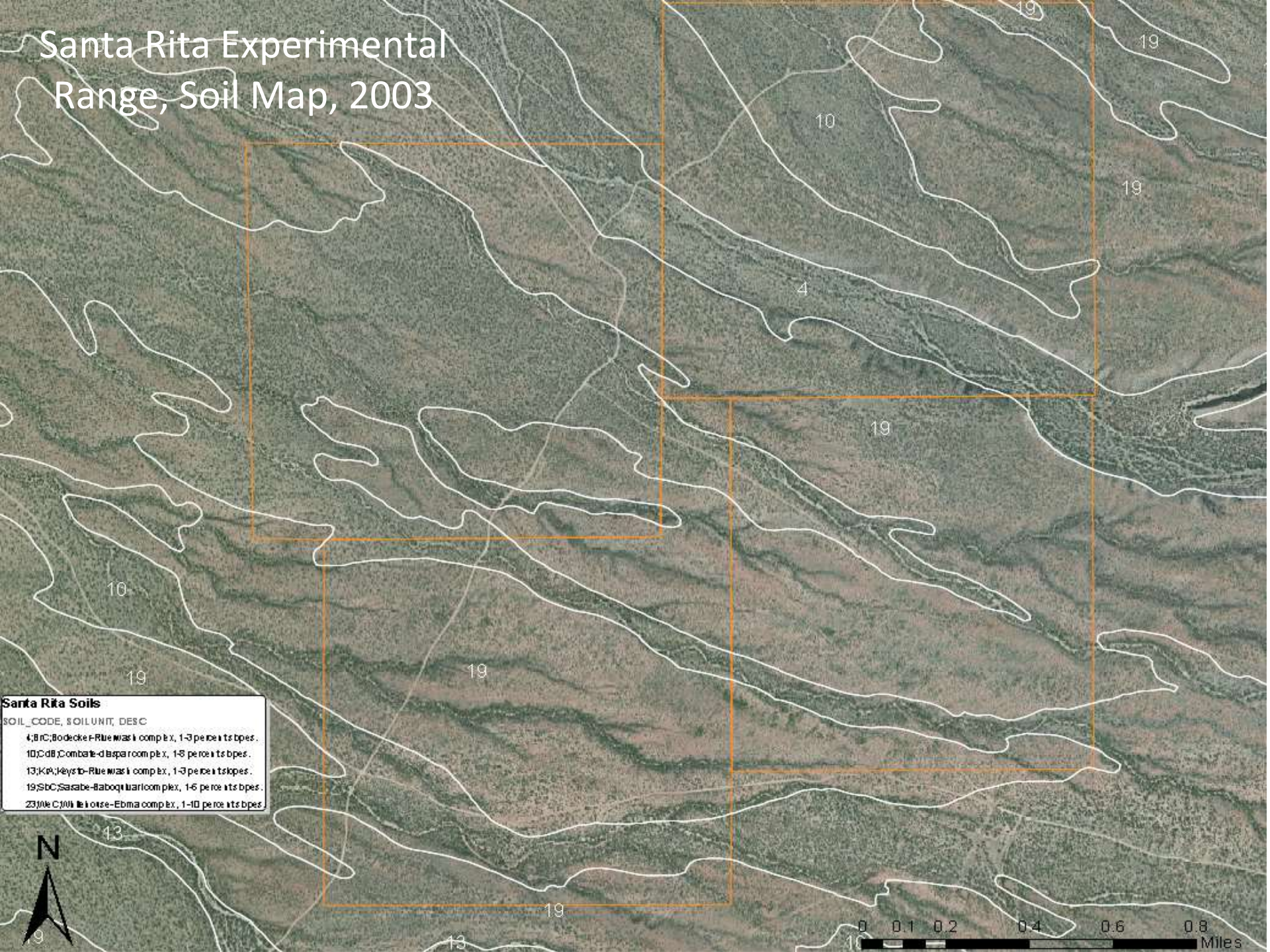


Figure 5—Change in mesquite cover and density on 74 permanent transects between 950- and 1,250-m elevation (McClaran and others 2002). No mesquite or burroweed removal treatments were applied to these transects. Dashed lines indicate periods of greater than 5 years between remeasurements.

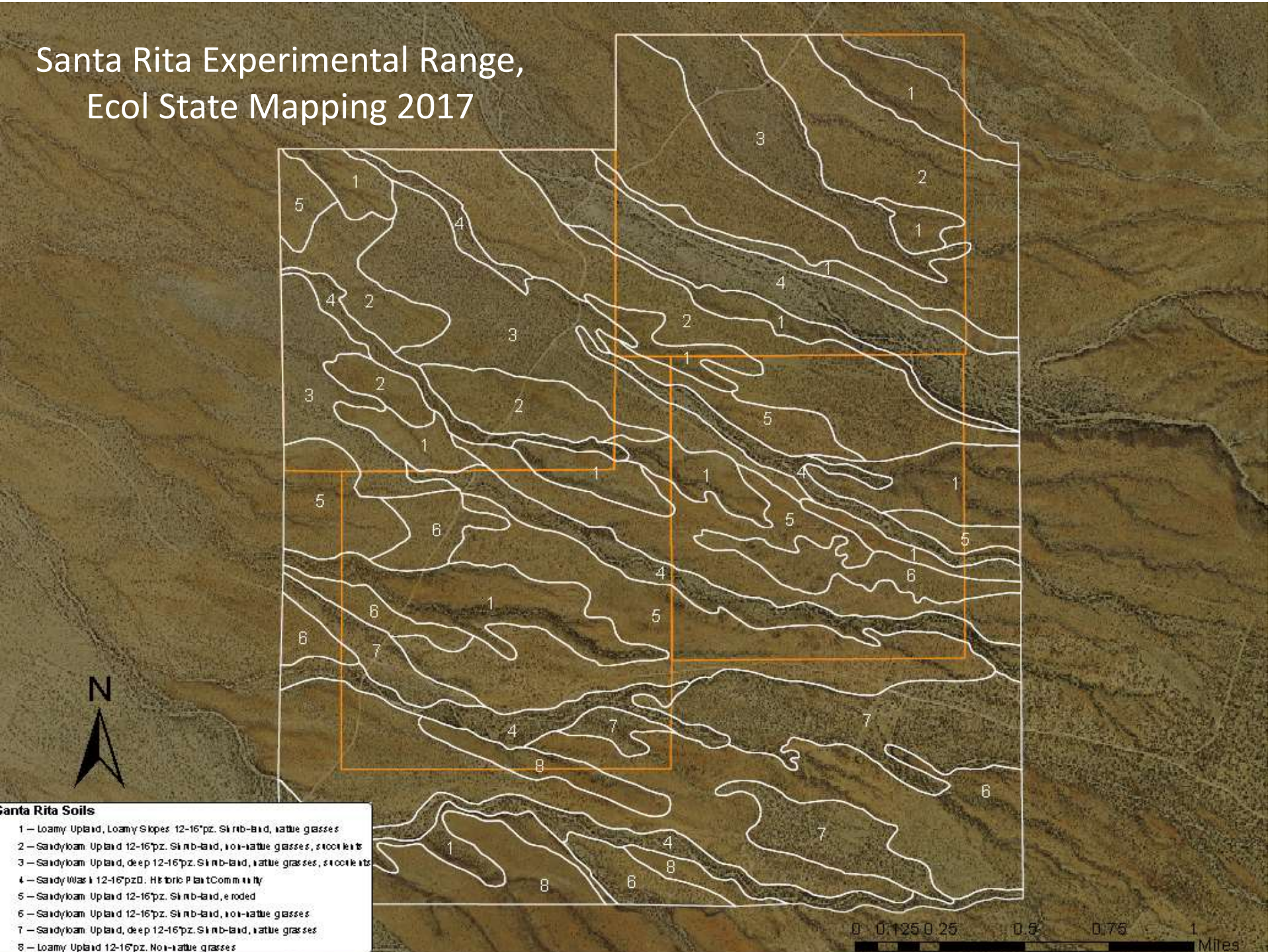
Mesquite cover trends (1994, 2017 fires) SRER



Santa Rita Experimental Range, Soil Map, 2003

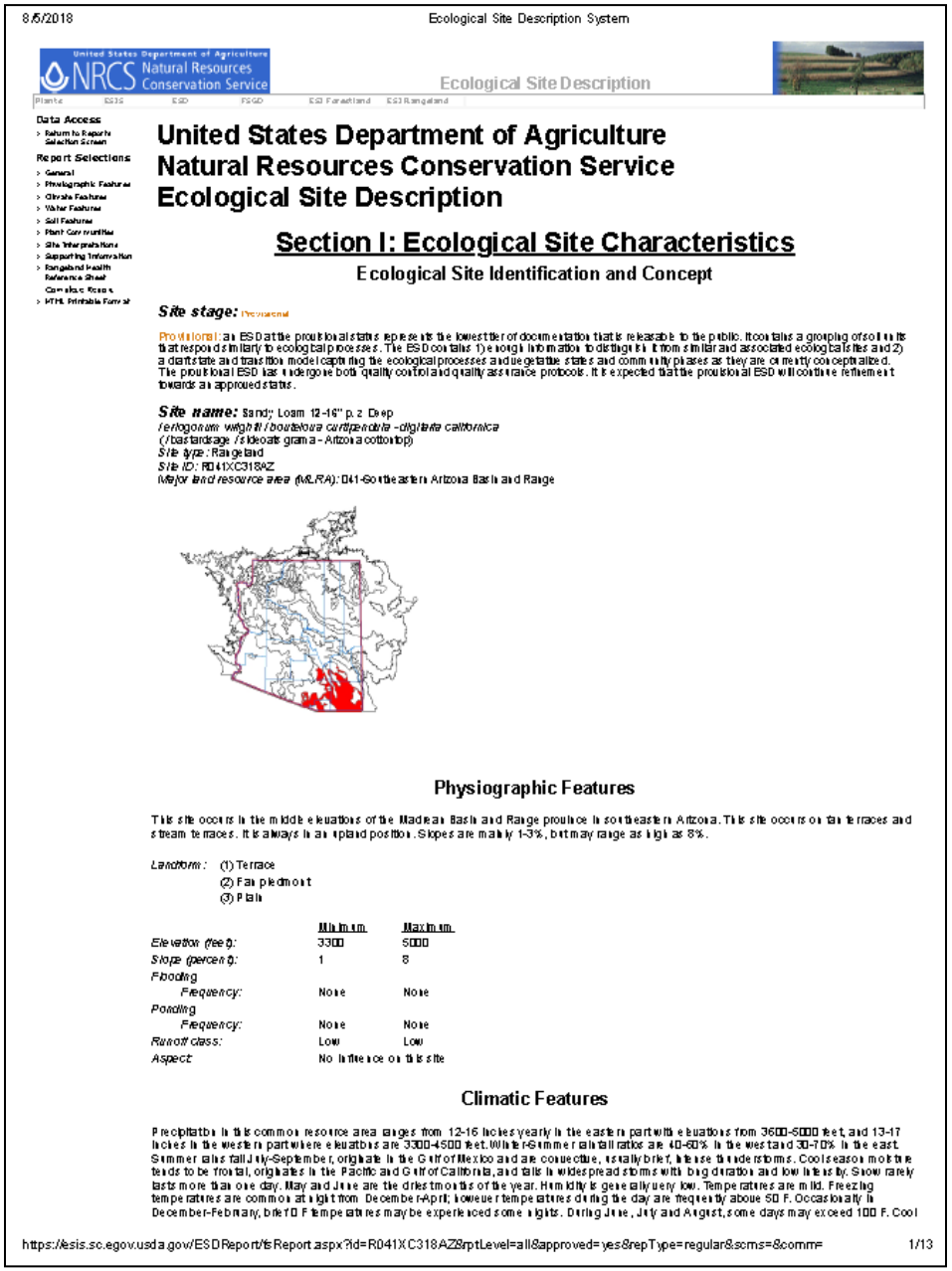


Santa Rita Experimental Range, Ecol State Mapping 2017



NRCS Ecological Site Descriptions, MLRA 41-3

- Loamy Slopes
- Loamy Upland
- Sandyloam Upland
- Sandy Loam, Deep
- Sandy Wash



8/5/2018 Ecological Site Description System

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Ecological Site Description

Plants ESIS ESD FSGD ESI Forestland ESI Rangeland

Data Access
› Return to Report Selection Screen

Report Selections
› General
› Physiographic Features
› Climate Features
› Water Features
› Soil Features
› Plant Communities
› Site Interpretations
› Supporting Information
› Rangeland Health Reference Sheet
Composition
› HTML Printable Format

United States Department of Agriculture
Natural Resources Conservation Service
Ecological Site Description

Section I: Ecological Site Characteristics

Ecological Site Identification and Concept

Site stage: Provisional

Provisional: an ESD at the provisional status represents the lowest tier of documentation that is releasable to the public. It contains a grouping of soils that responds similarly to ecological processes. The ESD contains 1) enough information to distinguish it from similar and associated ecological sites and 2) a draft state and transition model capturing the ecological processes and dominant states and community phases as they are currently conceptualized. The provisional ESD has undergone both quality control and quality assurance protocols. It is expected that the provisional ESD will continue refinement towards an approved status.

Site name: Sandy Loam 12-16" p.z. Deep
Pentagonum wrightii / Bouteloua curtipendula - Digitaria californica
(/ bastardage / sideoats grama - Arizona cottontop)
Site type: Rangeland
Site ID: R041XC318AZ
Major land resource area (MLRA): 041-Southeastern Arizona Basin and Range

Physiographic Features

This site occurs in the middle elevations of the Madrean Basin and Range province in southeastern Arizona. This site occurs on fan terraces and stream terraces. It is always in an upland position. Slopes are mainly 1-3%, but may range as high as 8%.

Landform: (1) Terrace
(2) Fan piedmont
(3) Plain

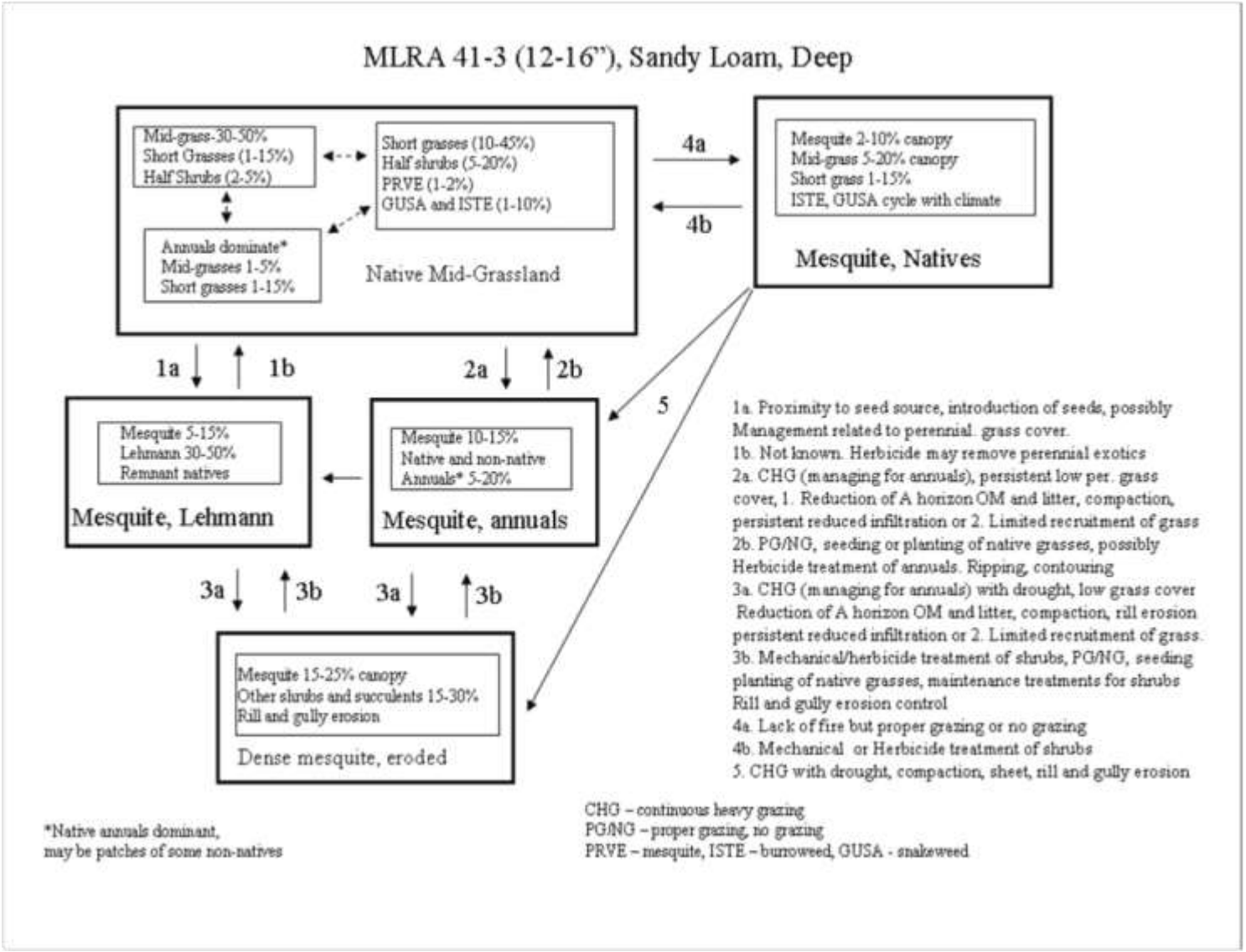
	Minimum	Maximum
Elevation (feet):	3300	5000
Slope (percent):	1	8
Flooding		
Frequency:	None	None
Ponding		
Frequency:	None	None
Runoff class:	Low	Low
Aspect:	No influence on this site	

Climatic Features

Precipitation in this common resource area ranges from 12-16 inches yearly in the eastern part with elevations from 3600-5000 feet, and 13-17 inches in the western part where elevations are 3300-4500 feet. Winter-Summer rainfall ratios are 40-60% in the west and 30-70% in the east. Summer rains fall July-September, originate in the Gulf of Mexico and are convective, usually brief, intense thunderstorms. Cool season moisture tends to be frontal, originates in the Pacific and Gulf of California, and falls in widespread storms with long duration and low intensity. Snow rarely lasts more than one day. May and June are the driest months of the year. Humidity is generally very low. Temperatures are mild. Freezing temperatures are common at night from December-April; however temperatures during the day are frequently above 50 F. Occasionally in December-February, brief 0 F temperatures may be experienced some nights. During June, July and August, some days may exceed 100 F. Cool

https://esis.sc.egov.usda.gov/ESDReport/fsReport.aspx?id=R041XC318AZ&rptLevel=all&approved=yes&repType=regular&scms=&comm= 1/13

Sandy Loam-Deep 12-16” pz
State and Transition Model



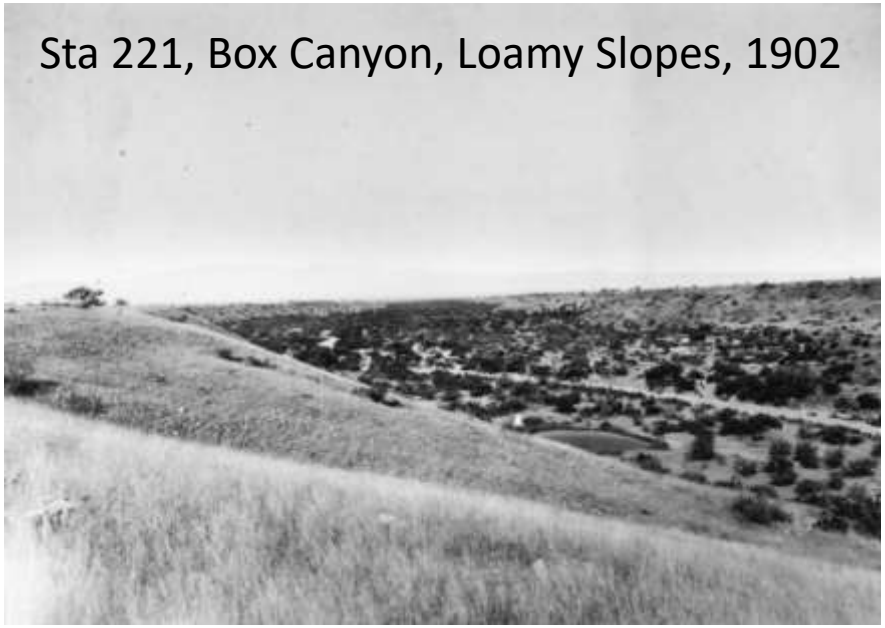
SRER Mapping Units

Map Unit	Ecological Site	Ecological State
1	Loamy Upland/Loamy Slopes	Large shrub / native grass
2	Sandyloam Upland	Large shrub/exotic grass/succulents
3	Sandy Loam - Deep	Large shrub/native grass/succulents
4	Sandy Wash	Historic Plant Community
5	Sandyloam Upland	Large shrub / eroded
6	Sandyloam Upland	Large shrub/exotic grass
7	Sandy Loam - Deep	Large shrub/native grass
8	Loamy Upland	Exotic grass

MU 1, Loamy Upland/Loamy Slopes
complex, 12-16”pz. large shrub-natives

MU 1, Loamy Upland/Loamy Slopes 12-16”pz. large shrub-natives

- Loamy Slopes portion
  - HPC – north aspects open, south aspects shrubby
  - Presently mesquite (*Prosopsis velutina*) 10-25% canopy
  - Moderate – steep slopes
  - VGR loam surface, clayey subsoils
  - Diverse native understory (sub-shrubs, perennial grasses, perennial forbs)
  - Good habitat for birds, deer and javalina
  - Desert tortoise?

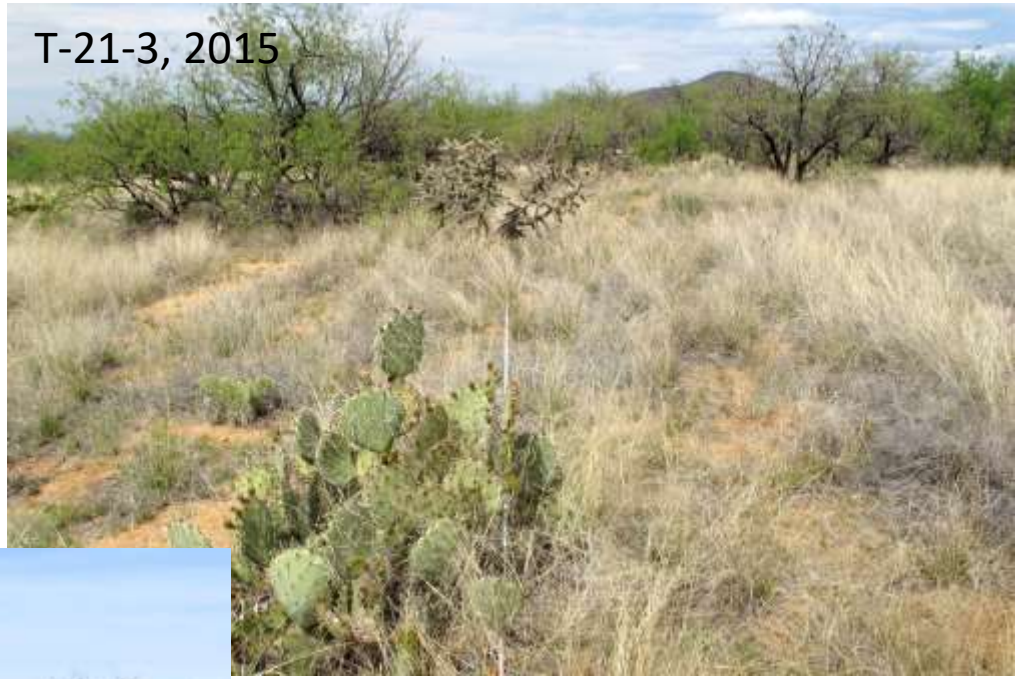

Sta 221, Box Canyon, Loamy Slopes, 1902

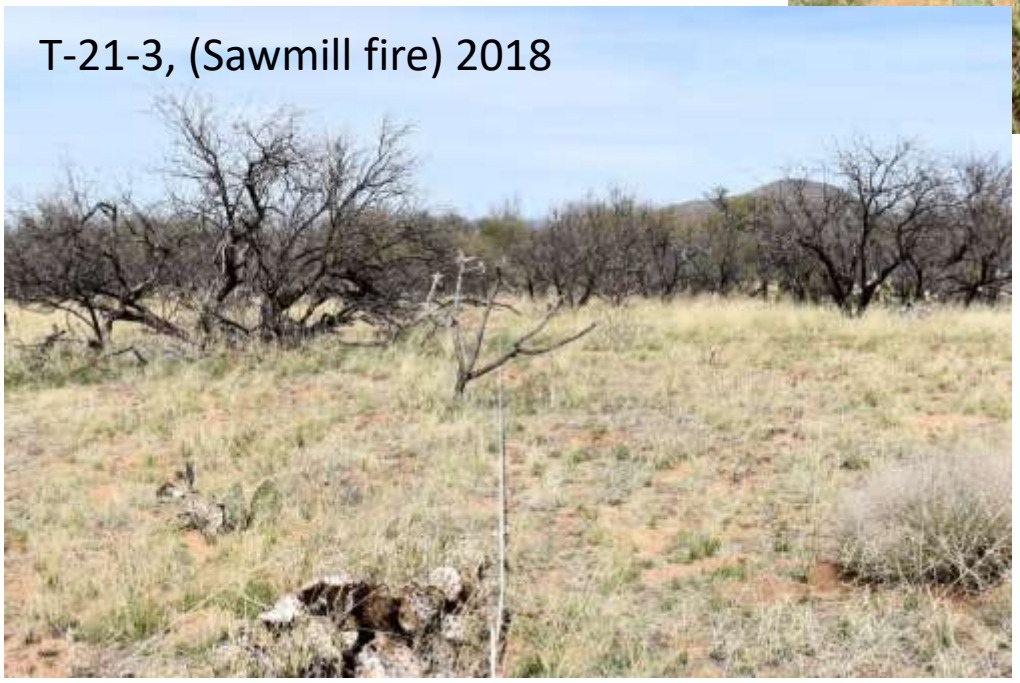

Sta 221, Loamy Slopes, 2018

MU 1, Loamy Upland/Loamy Slope, 12-16”pz. large shrub-natives

- Loamy Upland portion
  - HPC – open native grassland with sub-shrubs
  - Presently mesquite 20-35% canopy
  - Mesquite shrubby
  - Gentle slopes
  - Thin soil surface, clayey subsoils
  - Threshold for tree cover 5%
  - Threshold for Lehmann 1%
  - Sub-shrubs – False mesquite, Ratany, Desert zinnia
  - Good habitat for birds, deer
  - Pima Pineapple cactus (*Coryphantha scheeri var. robustispina*) habitat
  - Risk -Lehmann invasion with disturbance

MU 2, Sandyloam Upland 12-16”pz.
large shrub-exotics-succulents





- Sandyloam Upland
  - HPC – open native grassland
  - Presently mesquite 6-35% canopy
  - Nearly level slopes
  - Thick soil surfaces, clayloam subsoils
  - Understory of African lovegrass (*Eragrostis spp*) and cacti
  - Threshold for tree cover 5%
  - Threshold for succulent cover 3%
  - Threshold for Lehmann cover 1%
  - Sub-shrubs
    - False mesquite in places
    - Snakeweed (*Guiterrezia sarothrae*) – Burroweed (*Isocoma tenuisecta*) in places
  - Fair habitat for birds, deer and javalina
  - Forage quality for livestock
    - Better with mesquite?
    - How much
  - Increase in fire frequency?

MU 2, Sandyloam Upland 12-16”pz. large shrub-exotics-succulents

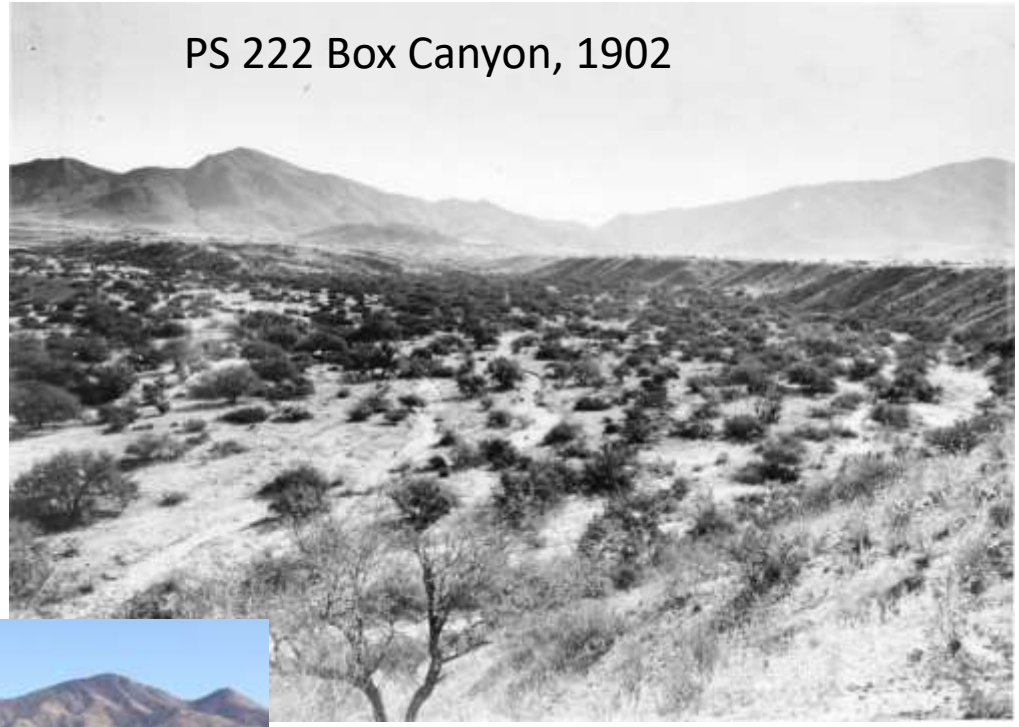
MU 3, Sandy Loam-Deep 12-16”pz.
large shrub-natives-succulents

MU 3, Sandy Loam-Deep 12-16”pz.
large shrub-natives-succulents

- Sandy Loam - Deep
  - HPC – open native grassland
  - Presently mesquite 15-45% canopy
  - Nearly level slopes
  - Loamy sand to sandyloam soils
  - Droughty
  - Understory of native grass spp, shrubs, cacti and other succulents
  - Reservoir of native perennial grasses
    - Under tree canopies
  - Threshold for tree cover 10%
  - Threshold for succulent cover 3%
  - Threshold for Lehmann cover 2%
  - Shrubs – Desert hackberry (*Celtis ehrenbergiana*), catclaw acacia (*Senegalia greggii*)
  - Sub-shrubs
    - Snakeweed, burroweed, shortleaf baccharis (*Baccharis brachyphylla*)
  - Good habitat for birds, small mammals, deer and javalina

Combate soil series

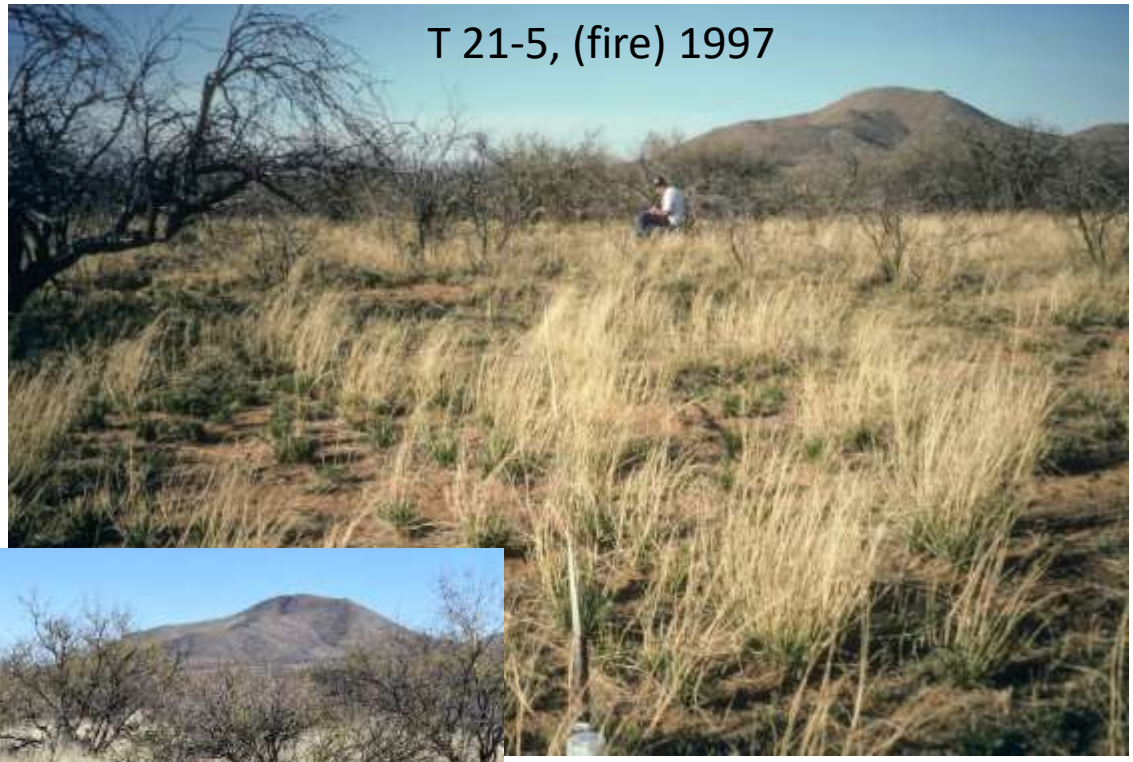
MU 4, Sandy Wash 12-16”pz.
Historic plant community



MU 4, Sandy Wash 12-16”pz. historic plant community

- Sandy Wash
  - HPC – Mesquite woodland with other native shrubs, grasses, forbs and vines
  - Tree canopy in HPC - 15-35%
  - Nearly level slopes
  - Deep sandy soils
  - Periodic flooding
  - Diverse native understory (shrubs, vines, perennial grasses, perennial forbs, annual grasses and forbs)
  - Good habitat for birds, small mammals, deer and javalina
  - NRCS leave area for wildlife

MU 5, Sandyloam Upland
12-16”pz. large shrub-exotics



MU 5, Sandyloam Upland 12-16”pz. large shrub-exotics

- Sandyloam Upland
  - HPC – open native grassland
  - Presently mesquite 10-35% canopy
  - Nearly level slopes
  - Thick soil surfaces, clayloam subsoils
  - Understory of African lovegrass spp
  - Threshold for tree cover 5%
  - Threshold for Lehmann cover 1%
  - Sub-shrubs
    - Snakeweed and burroweed in places
  - Poor habitat for birds, small mammals and deer
  - Forage quality for livestock
    - Better with mesquite?
    - How much
  - Increase in fire frequency?

MU 6, Sandy Loam-Deep 12-16”pz. large shrub-natives

- Sandy Loam - Deep
  - HPC – open grassland
  - Presently mesquite dominated
  - Nearly level slopes
  - Deep sandyloam soils
  - Droughty soil
  - Threshold for tree cover 10%
  - Threshold for Lehmann cover 2%
  - Understory of native grasses, forbs and shrubs
  - Reservoir of native perennial grasses
    - Under tree canopies
  - Sub-shrubs
    - Snakeweed, burroweed, short-leaf baccharis in places
  - Good habitat for birds, small mammals and deer

MU 7, Sandyloam Upland 12-16”pz. large shrub-eroded

- Sandyloam Upland
  - HPC – open native grassland
  - Presently mesquite dominated
  - Nearly level slopes
  - High bare ground, low plant cover
  - Eroded soil surfaces
  - Exposed clay loam sub-soil in rills, gullies
  - Remnant grasses under mesquite canopy
  - Very poor habitat for birds, small mammals and deer
  - Average fetch > 20 inches
  - Seeding needed?

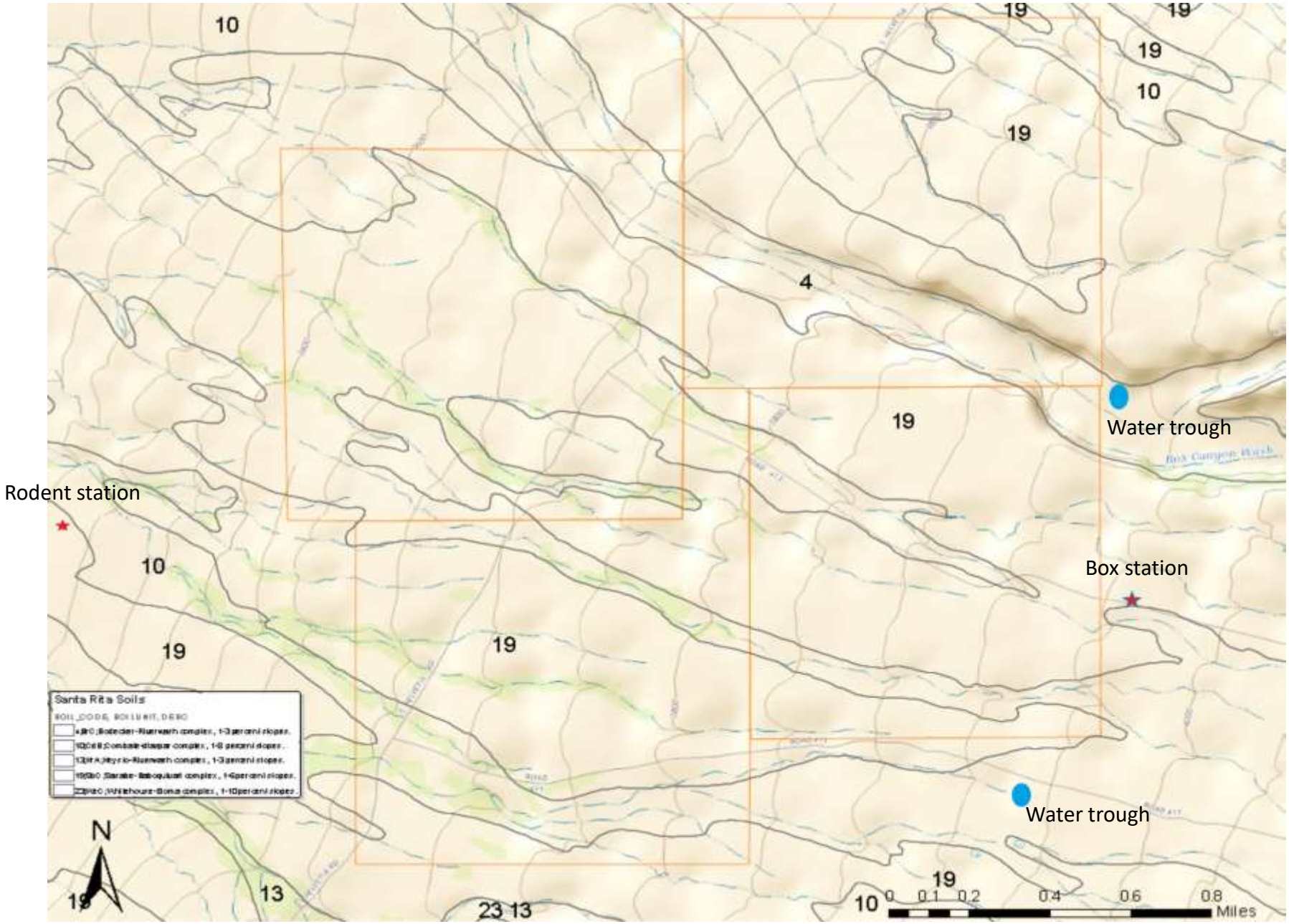
Root-plow Treatment on East Range of Fort Huachuca

- Sandyloam Upland, mesquite – eroded
- Completed in 1978-84
- Root-plow strips on the contour
- 100 yards treated – 200 yards leave
- Seeded to lovegrass spp. and blue panic
- Can use grubbing as alternative

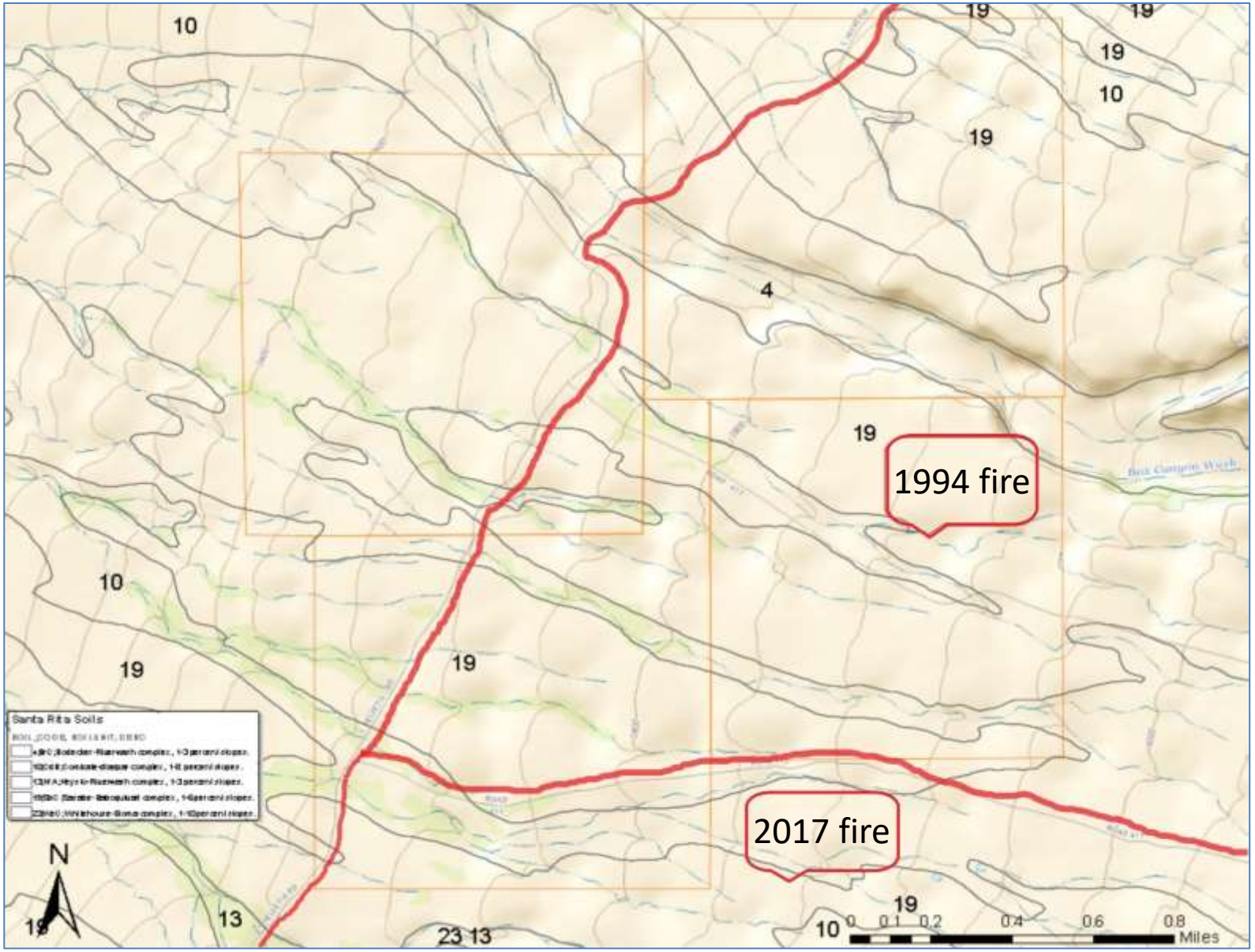
MU 8, Loamy Upland 12-16”pz. exotics

- Loamy Upland
  - HPC – open native grassland with sub-shrubs, perennial grasses
  - Presently mesquite dominated
  - Gentle slopes
  - Thin (gravelly) soil surface
  - Clayey subsoils
  - Threshold for tree cover 5%
  - Threshold for Lehmann cover 1%
  - Understory African lovegrasses, sub-shrubs like false mesquite, ratany
  - Fair habitat for deer and javalina

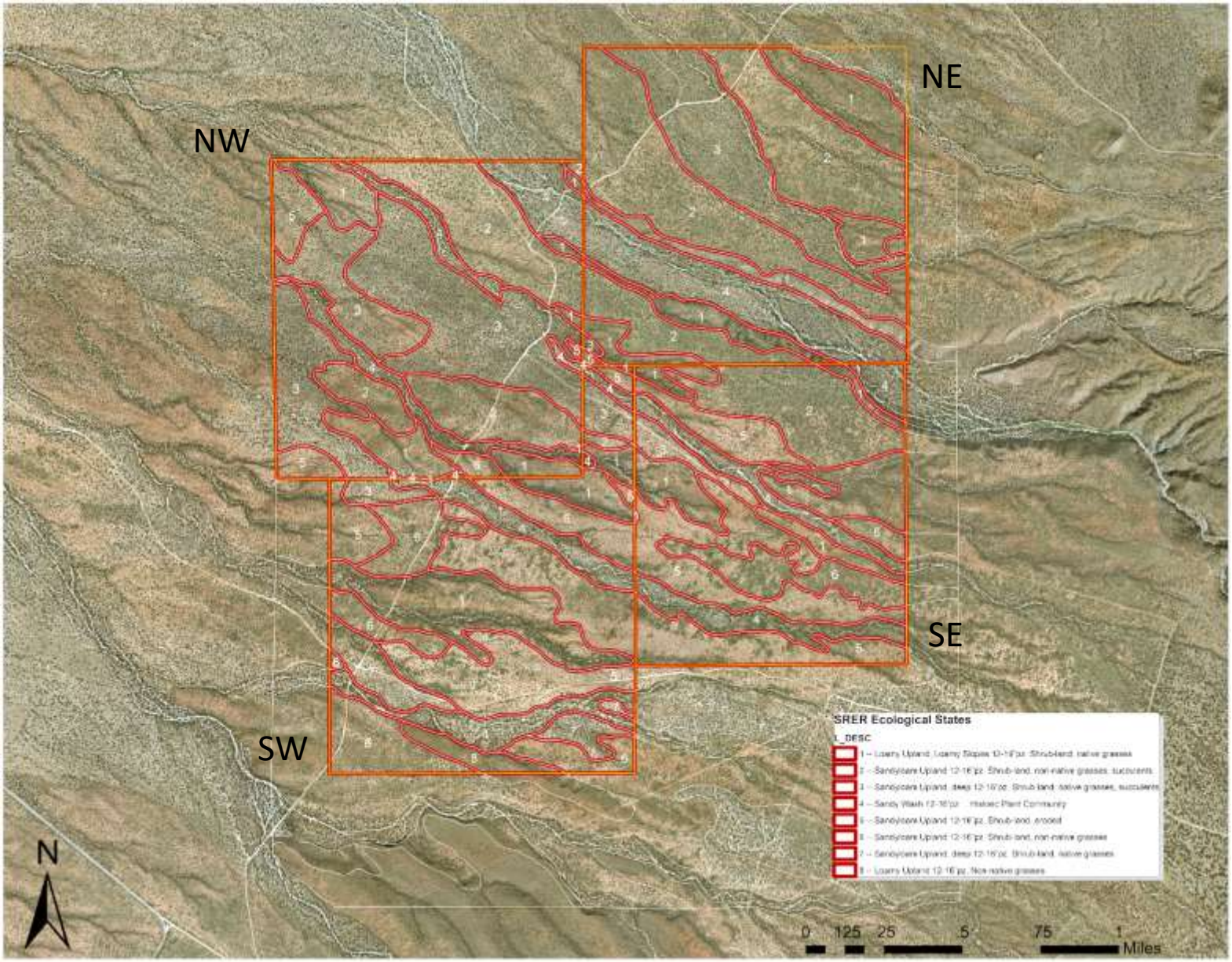
SRER, Roads, Water and Rain Gauge Locations



SRER, Fire history



Four sections on SRER in MLRA 41-3



Acres of Ecological State for four sections on SRER in MLRA 41-3

Map Unit	Ecological Site	Ecological State	NE Corner	NW Corner	SE Corner	SW Corner
1	Lo Upland/Lo Slopes	Large shrub / Native grass	129	70	98	122
2	Sandyloam Upland	Large shrub/exotic grass/succulents	300	222	85	4
3	Sandy Loam, Deep	Large shrub/native grass/succulents	116	212	17	25
4	Sandy Wash	Historic Plant Community	96	88	91	86
5	Sandyloam Upland	Large shrub / Eroded	1	41	189	205
6	Sandyloam Upland	Large shrub/exotic grass			46	116
7	Sandy Loam, Deep	Large shrub/native grass				45
8	Loamy Upland	Exotic grass				17
Total acres			**642**	**633**	**526**	**620**

Costs of Brush Management Alternatives

Mesquite Brush Management Costs			
Type	**Method**	**Additional info**	**$ per acre**
Mechanical	Grubbing	Wheel or track	$600
Mechanical	Root plow	Bulldozer wi. Plow	$700
Herbicide	Broadcast	Aerial - Sendero	$100
Herbicide	Selective*	Hand spray- Remedy	$1,000
Combination	Cut / spray	Chain saw and treat	$800
Fire	Prescibed burn	AZ SLD lead	$25
Seeding	Broadcast-natives	Tractor, seeder, drag	$325
* mesquite < 6 feet tall			

Site Evaluation and Brush Management Planning Exercise

- Four interdisciplinary teams
- Each assigned one section (NE, NW etc.)
- Budget for each team
- Arizona State Trust Land
- NRCS EQIP contract
- Must have all required clearances, surveys, etc.
- Must meet NRCS National Standard and NRCS AZ Specification
- Must meet County, State, Federal Laws and Regulations
- Plan must include as a minimum
  - Goal and objectives clearly stated
  - Pre and Post treatment cover / density (target species)
  - Maps and narratives showing areas to be treated, pattern of treatment and areas not to be treated
  - Monitoring plan, what to measure, timing, frequency to detect changes in plant community related to objectives
- Describe post treatment grazing management

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

BRUSH MANAGEMENT

(Ac.)

CODE 314

DEFINITION

The management or removal of woody (non-herbaceous or succulent) plants including those that are invasive and noxious.

Purpose

- Create the desired plant community consistent with the ecological site.
- Restore or release desired vegetative cover to protect soils, control erosion, reduce sediment, improve water quality or enhance stream flow.
- Maintain, modify, or enhance fish and wildlife habitat.
- Improve forage accessibility, quality and quantity for livestock and wildlife.
- Manage fuel loads to achieve desired conditions.

CONDITIONS WHERE PRACTICE APPLIES

On all lands except active cropland where the removal, reduction, or manipulation of woody (non-herbaceous or succulent) plants is desired.

This practice does not apply to removal of woody vegetation by prescribed fire (use Prescribed Burning (338)) or removal of woody vegetation to facilitate a land use change (use Land Clearing (460)).

CRITERIA

General Criteria Applicable to All Purposes

Brush management will be designed to achieve the desired plant community based on species composition, structure, density, and canopy (or foliar) cover or height.

Brush management will be applied in a manner to achieve the desired control of the target woody species and protection of desired species. This will be accomplished by mechanical, chemical, burning, or biological methods either alone or in combination. When prescribed burning is used as a method, the Prescribed Burning standard (338) will also be applied.

When the intent is to manage trees for silvicultural purposes, use Forest Stand Improvement (666).

NRCS will not develop biological or chemical treatment recommendations except for biological control utilizing grazing animals. In such cases, Prescribed Grazing (528) is used to ensure desired results are achieved and maintained. NRCS may provide clients with acceptable biological and/or chemical control references.

Follow-up treatments may be necessary to achieve objectives.

Additional Criteria for Creating the Desired Plant Community Consistent with the Ecological Site

Use applicable Ecological Site Description (ESD) State and Transition models, to develop specifications that are ecologically sound and defensible. Treatments must be congruent with dynamics of the ecological site(s) and keyed to state and plant community phases that have the potential and capability to support the desired plant community. If an ESD is not available, base specifications on the best approximation of the desired plant community composition, structure, and function.

Additional Criteria for Restoring or Releasing Desired Vegetative Cover to Protect Soils, Control Erosion, Reduce Sediment, Improve Water Quality or Enhance Stream Flow

Choose a method of control that results in the least amount of soil disturbance if soil erosion potential is high and revegetation is slow or uncertain leaving the site vulnerable to long-term exposure to soil loss.

In conjunction with other conservation practices, the number, sequence and timing of soil disturbing operations shall be managed to maintain soil loss within acceptable levels using approved erosion prediction technology.

Additional Criteria to Maintain, Modify or Enhance Fish and Wildlife Habitat

Brush management will be planned and applied in a manner to meet the habitat requirements for wildlife species of concern as determined by an approved habitat evaluation procedure.

Conduct treatments during periods of the year that accommodate reproduction and other life-cycle requirements of target wildlife and pollinator species and in accordance with specifications developed for Wetland Wildlife Habitat Management (644) and Upland Wildlife Habitat Management (645).

Additional Criteria to Improve Forage Accessibility, Quality and Quantity for Livestock and Wildlife

Timing and sequence of brush management shall be planned in coordination with specifications developed for Prescribed Grazing (528).

Additional Criteria to Manage Fuel Loads to Achieve Desired Conditions

Control undesirable woody plants in a manner that creates the desired plant community, including the desired fuel load, to reduce the risk of wildfire, facilitate the future application of prescribed fire.

CONSIDERATIONS

Consider using Integrated Pest Management (595) in support of brush management.

Consider the appropriate time period for treatment. Some brush management activities can be effective when applied within a single year; others may require multiple years of treatment(s) to achieve desired objectives.

Consider impacts and consequences to obligate species (species dependent on the target woody species) when significant changes are planned to existing and adjacent plant communities.

Consider impacts to wildlife food supplies, space, and cover availability when planning the method and amount of brush management.

State issued licenses may be required when using chemical pesticide treatments.

For air quality purposes, consider using chemical methods of brush management that minimize chemical drift and excessive chemical usage and consider mechanical methods of brush management that minimize the entrainment of particulate matter.

PLANS AND SPECIFICATIONS

Plans and specifications for the treatment option(s) selected by the decision maker will be recorded for each field or management unit where brush management will be applied.

Prepare brush management plans and specifications that conform to all applicable federal, state, and local laws. These documents will contain the following data as a minimum:

1. Goals and objectives clearly stated.
2. Pre-treatment cover or density of the target plant(s) and the planned post-treatment cover or density and desired efficacy.
3. Maps, drawings, and/or narratives detailing or identifying areas to be treated, pattern of treatment (if applicable), and areas that will not be disturbed.
4. A monitoring plan that identifies what should be measured (including timing and frequency) and that documents the changes in the plant community (compare with objectives) will be implemented.

For Mechanical Treatment Methods: Plans and specifications will include items 1 through 4, above, plus the following:

- Types of equipment and any modifications necessary to enable the equipment to adequately complete the job.

Bibliography

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