



# **THE GOOD, THE BAD, AND THE UGLY**

Spatial Analysis of the Interaction  
Between Saguaros and Buffelgrass

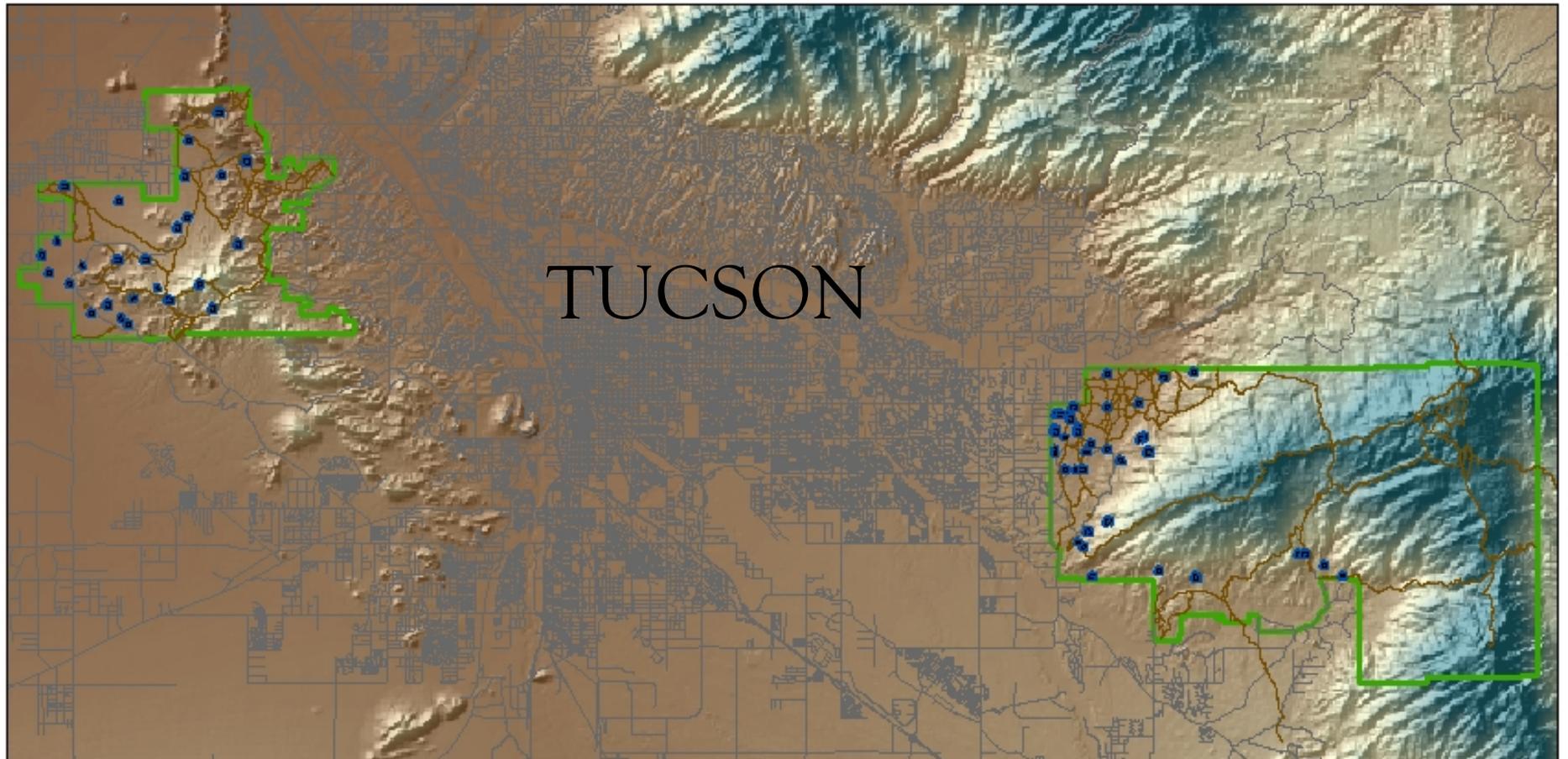
Becky MacEwen  
GIS Specialist

Saguaro National Park  
Tucson, AZ

NPS RIM  
April 2010

# SAGUARO NATIONAL PARK

- Where is it?
- Why was it created?

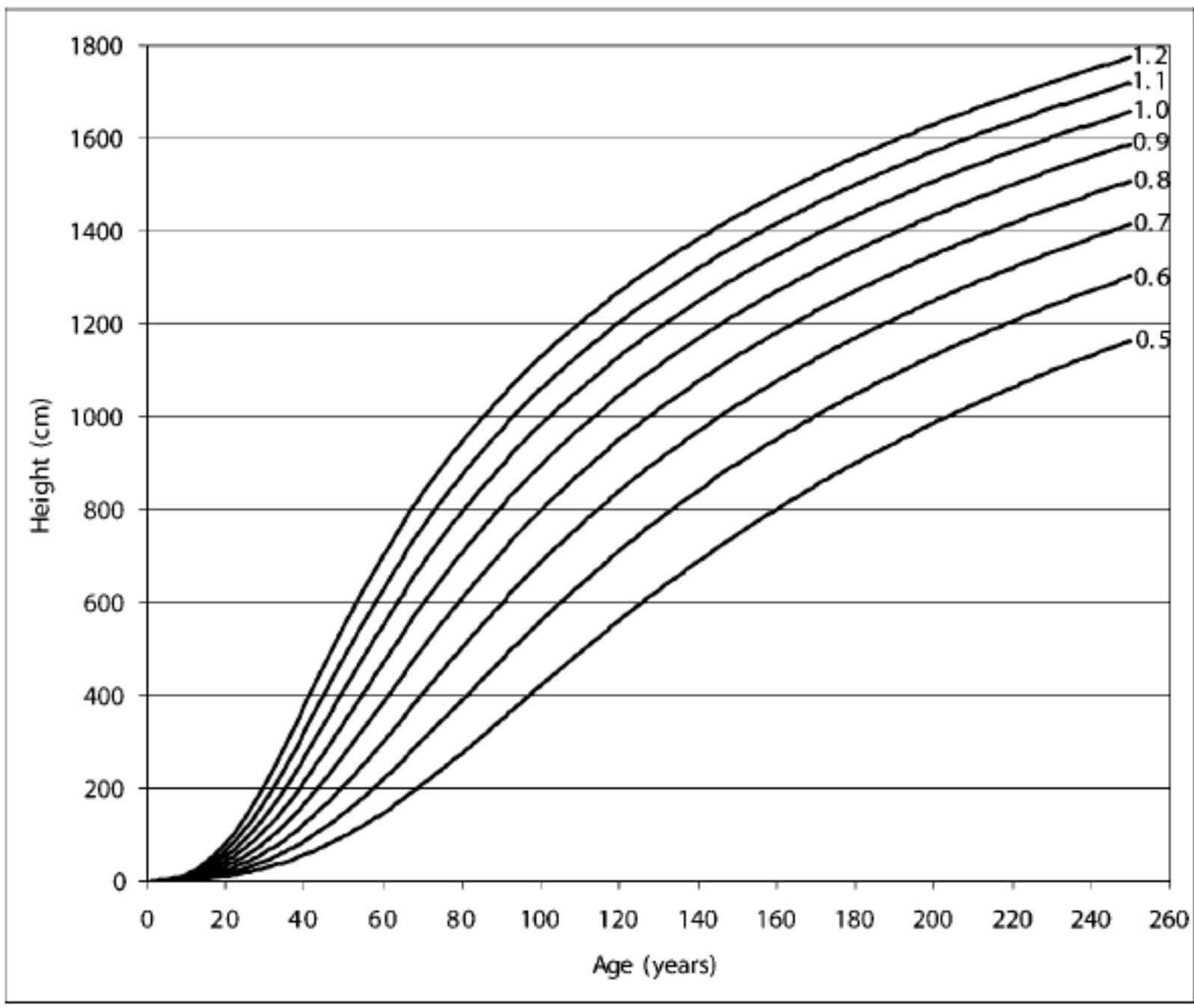


# THE GOOD

- What is the scientific name for Saguaro?  
*Carnegiea gigantea*
- Found only in Sonoran Desert
- Limited by temperature and elevation
- Long-lived and slow-growing



Saguaro



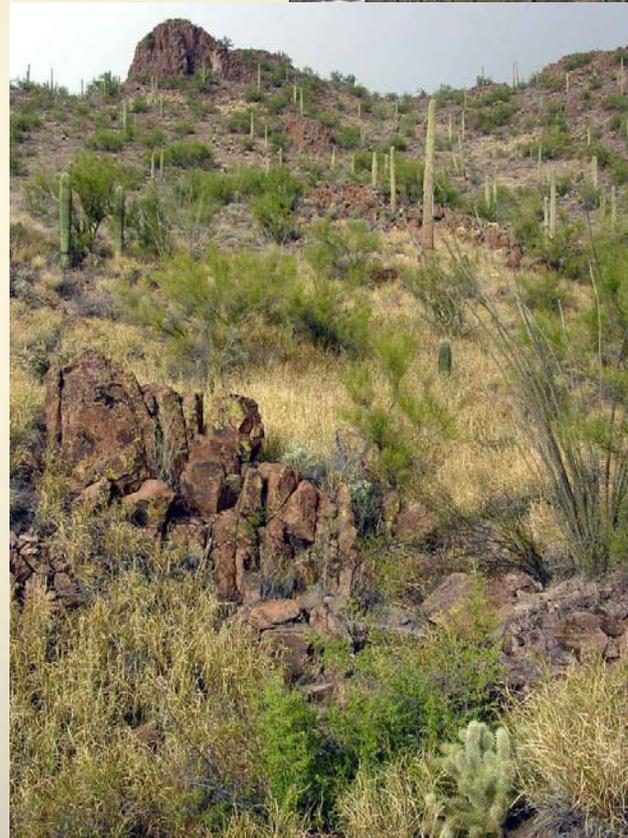
- What are its major threats?

- Disease

- Climate

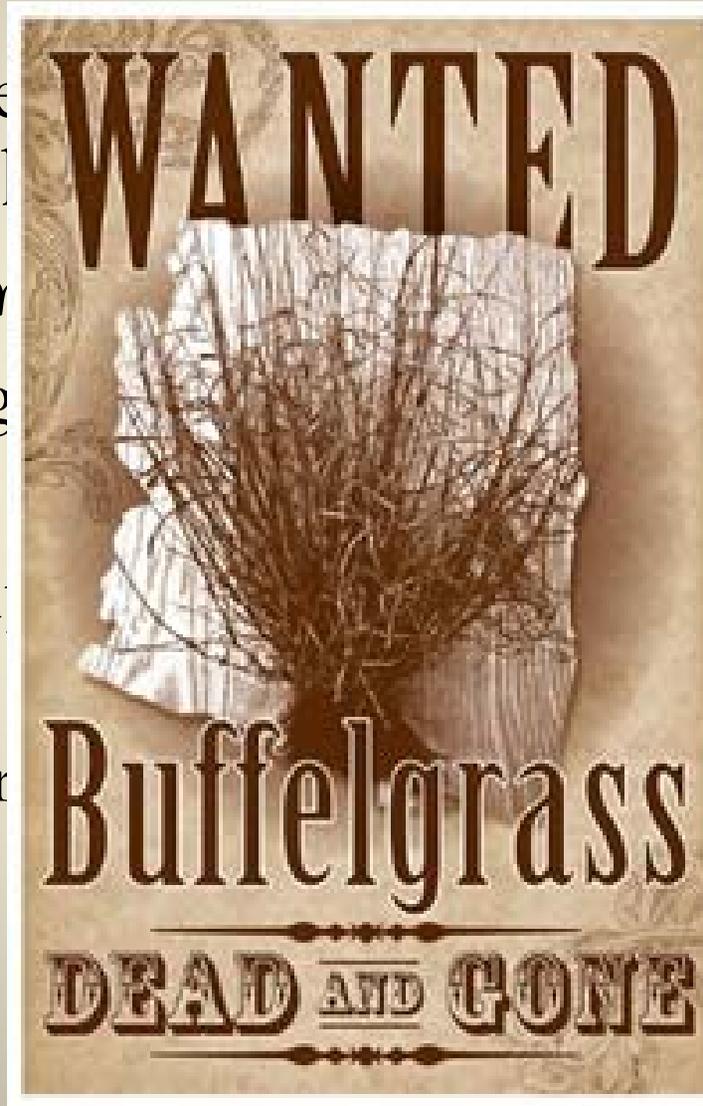
- Urbanization

- Exotic plants



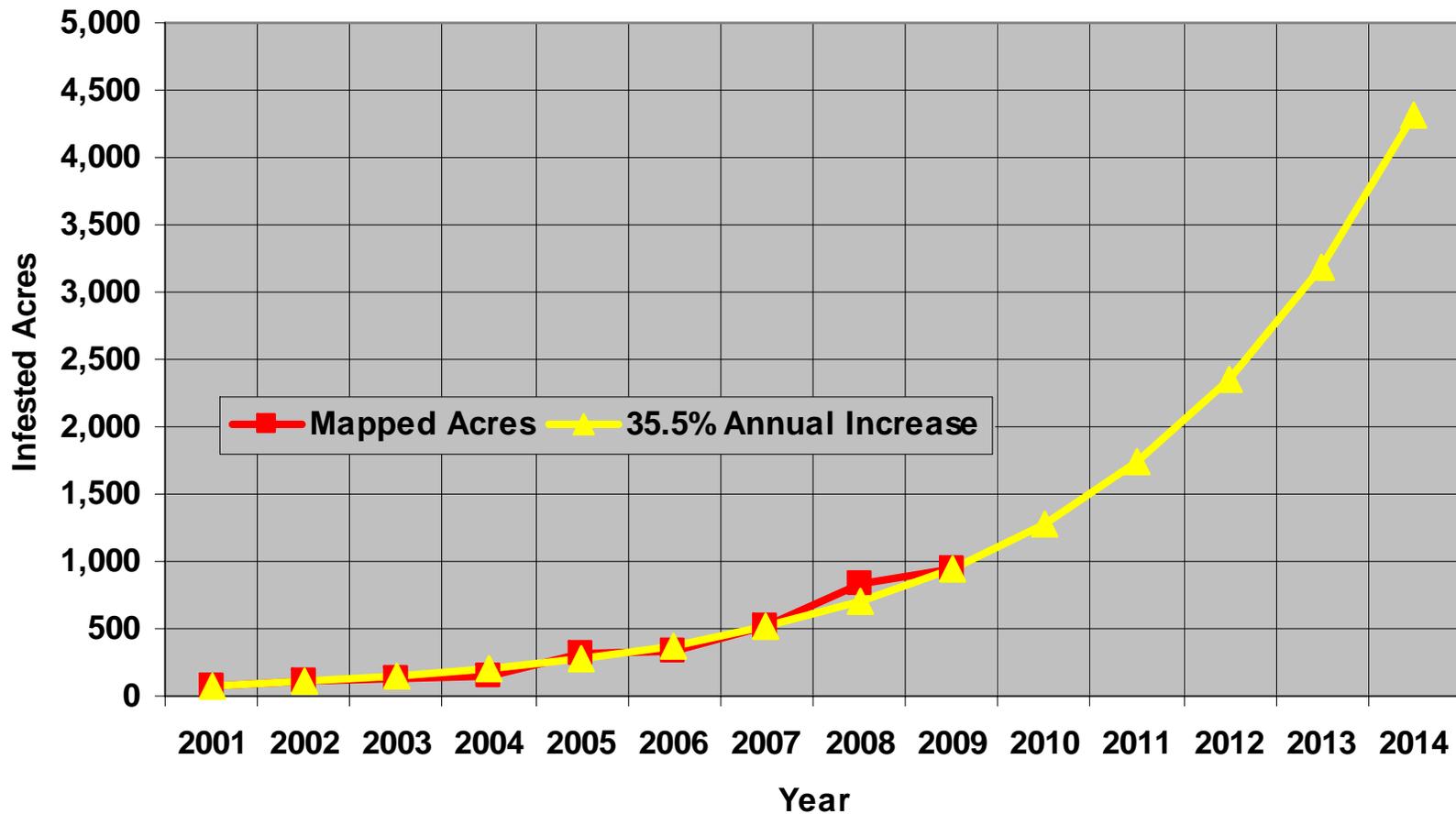
# THE BAD

- What is the scientific name for Buffelgrass?  
*Pennisetum ciliare*
- Non-native origin from Africa
- Limited by temperature and elevation
  - New frost-tolerant
- Short-lived fast-growing



1989

- Rate of spread
  - Doubling in 10 years

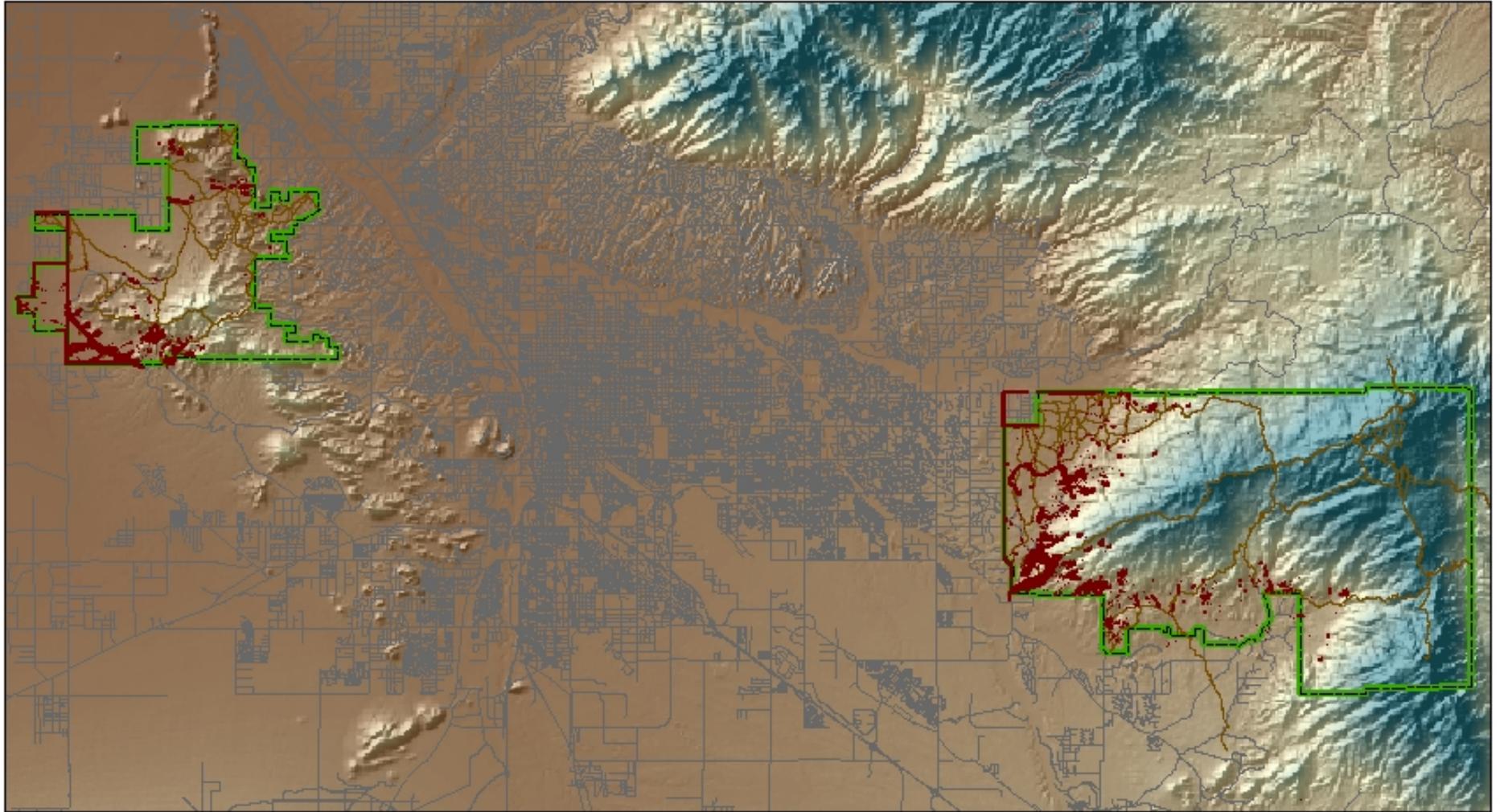


2000

Grows well on steep slopes, even south-facing



# 2000ac mapped and/or treated

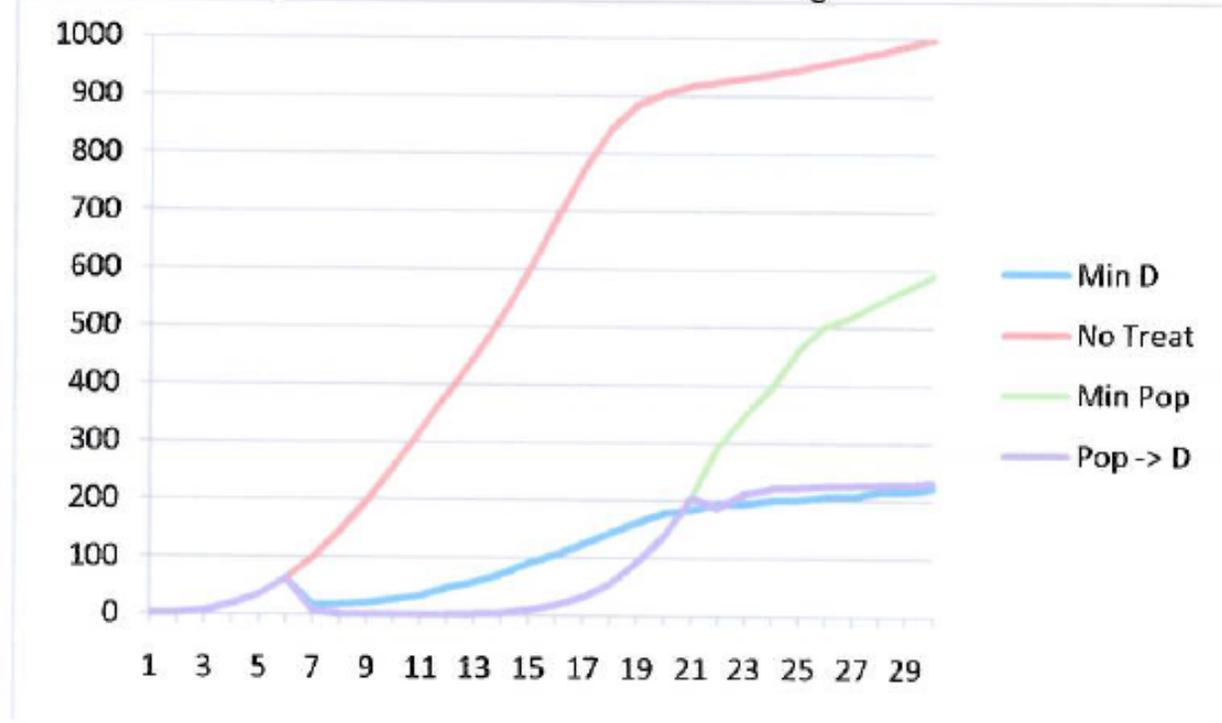


# THE UGLY





### Saguaro Damage Index with treatment starting at Year 6



**Min D:** minimize damage (static optimization)

**No Treat:** no treatment

**Min Pop:** minimize buffelgrass population (static optimization)

**Pop → D:** start with population minimization, then switch to damage minimization

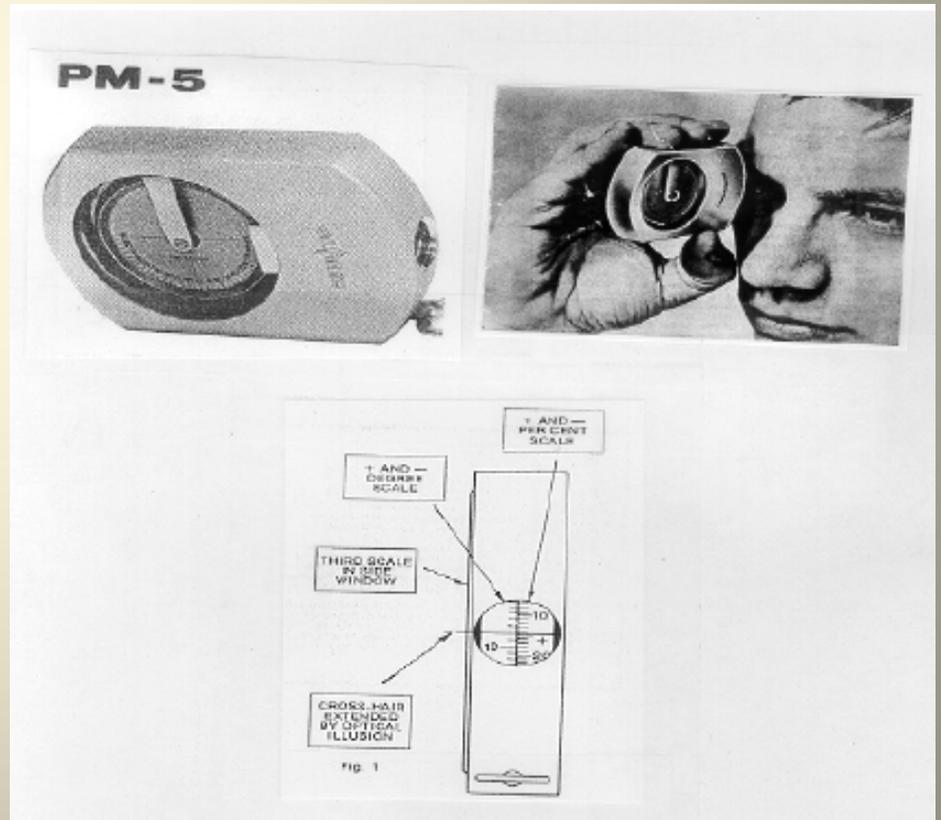
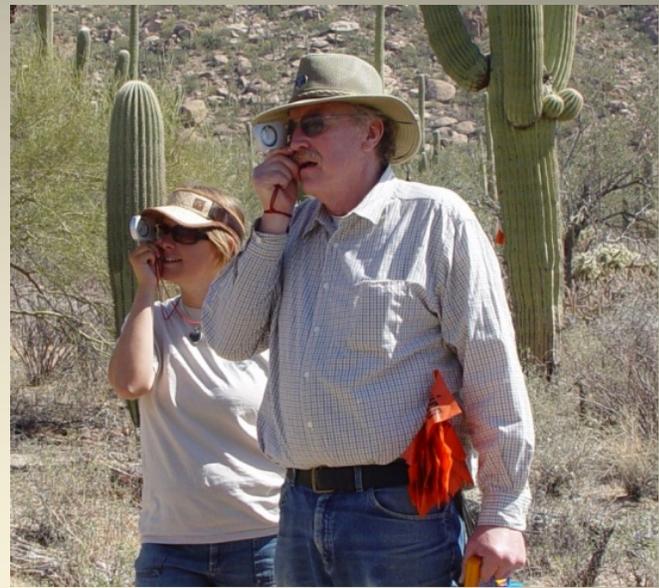


East Valley Tribune Photo

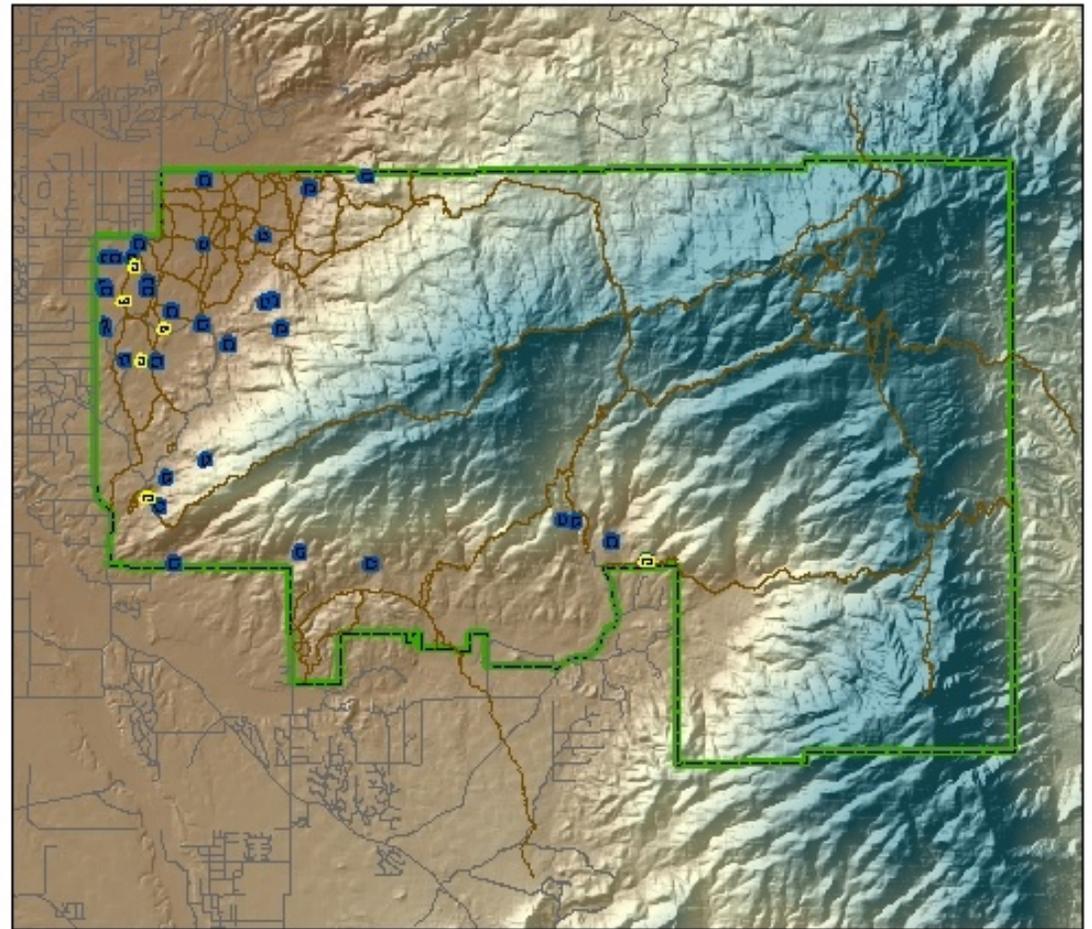
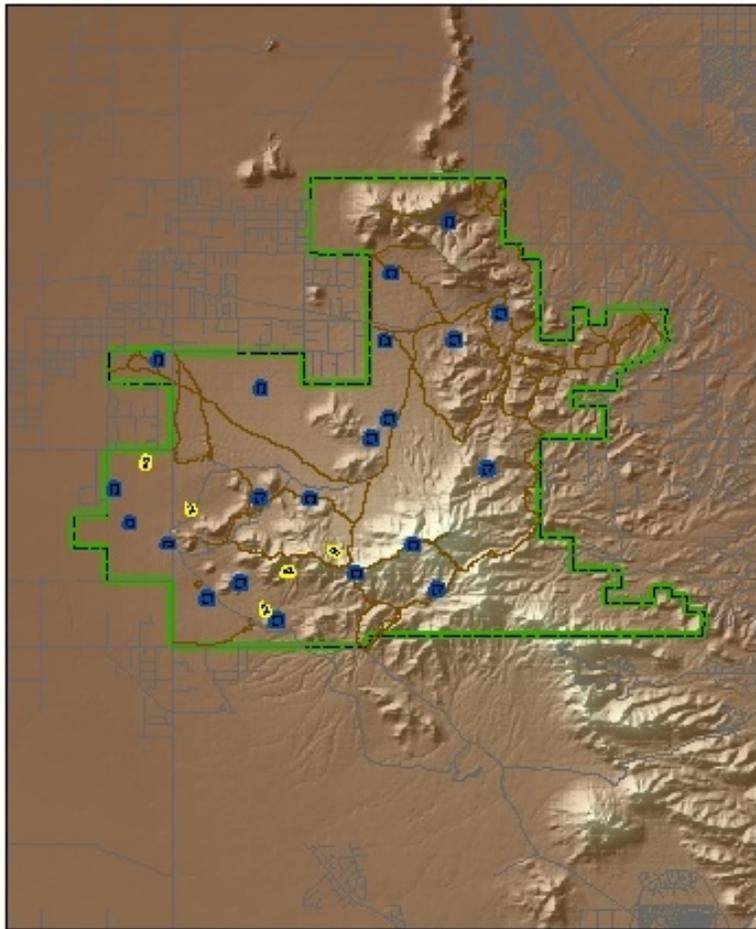
# SAGUARO CENSUS

- 64 Saguaro Plots
  - 11 were mapped in 1975
  - Some have been monitored since 1941

|              | 1941       | 1975       | 2001/2002   | 2009/2010     |
|--------------|------------|------------|-------------|---------------|
| <b>RMD</b>   |            |            |             |               |
| 41A          | 209        | 64         | 94          | 86+35         |
| 41B          | 187        | 40         | 174         | 187+12        |
| 41C          | 291        | 244        | 265         | 248+25        |
| 41D          | 106        | 44         | 162         |               |
| 41F          | 60         | 25         | 51          | 82+14         |
| 75M          |            | 226        | 286         |               |
| <b>TOTAL</b> | <b>853</b> | <b>643</b> | <b>1032</b> | <b>603+86</b> |
| <b>TMD</b>   |            |            |             |               |
| 71G          |            | 165        | 231         |               |
| 75H          |            | 322        | 331         |               |
| 75J          |            | 94         | 193         | 39+31         |
| 75K          |            | 104        | 193         |               |
| 75L          |            | 220        | 331         | 379+50        |
| <b>TOTAL</b> |            | <b>905</b> | <b>1279</b> | <b>418+81</b> |

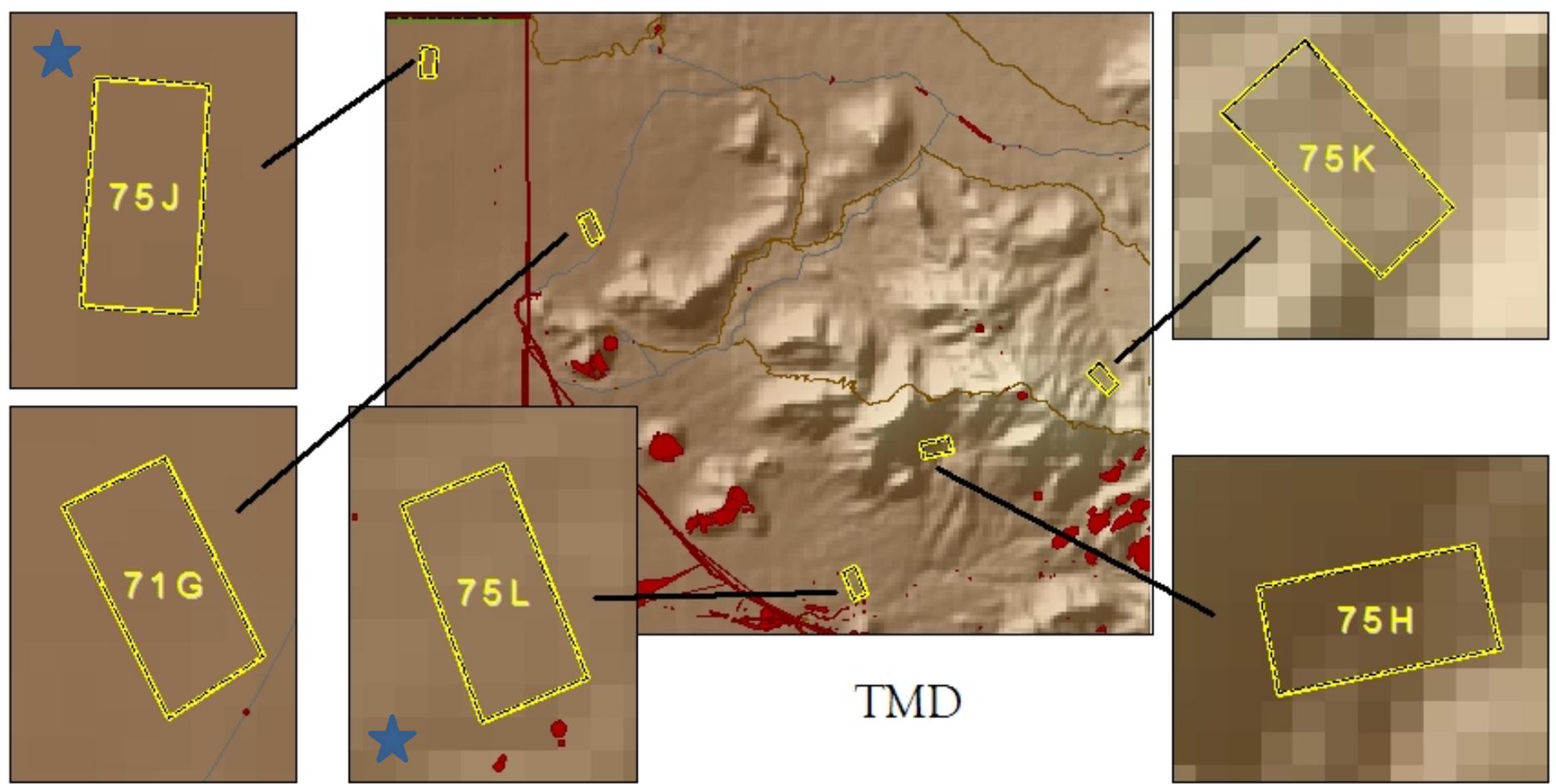


# Historic Saguaro Plots

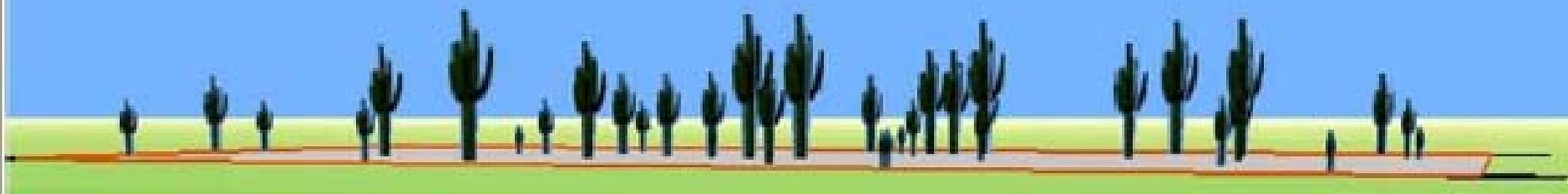


April 2010

# TMD PLOTS



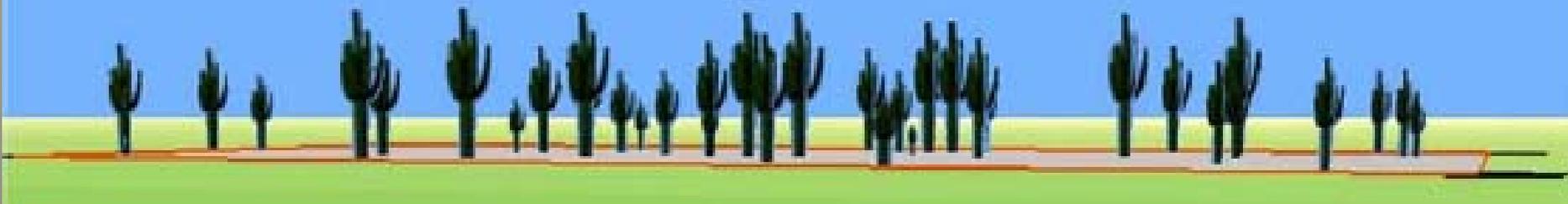
1975



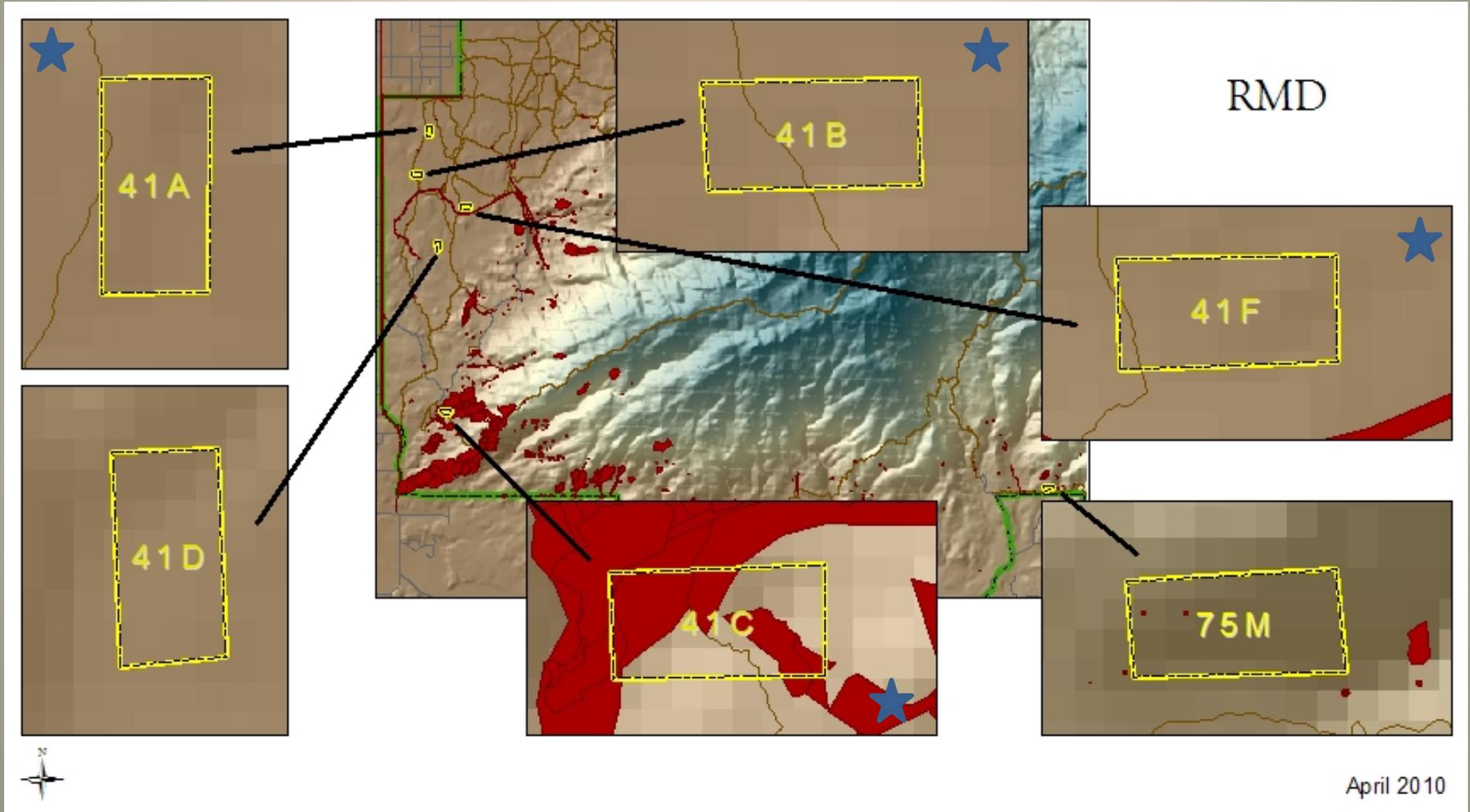
2001



2009



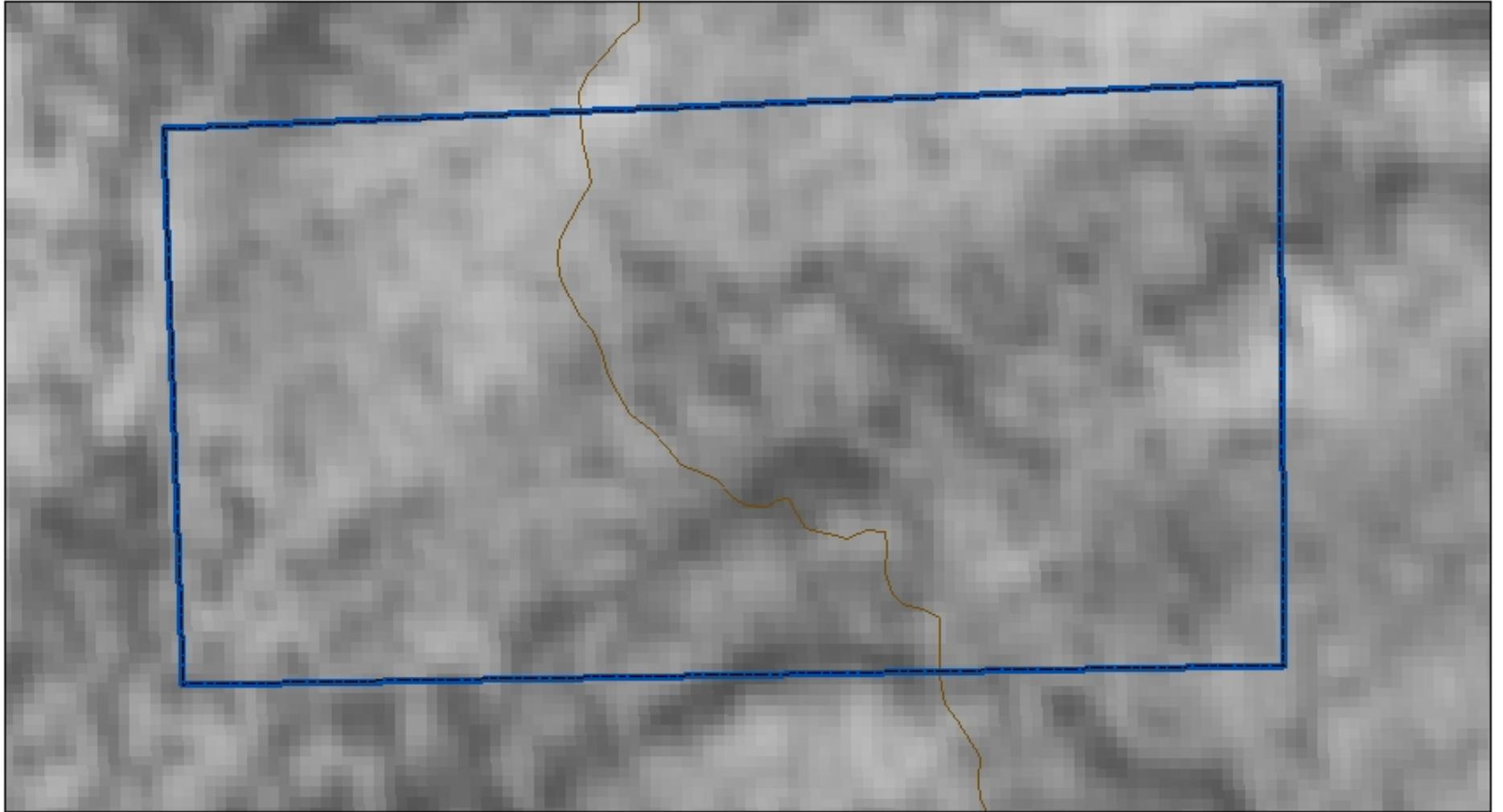
# RMD PLOTS



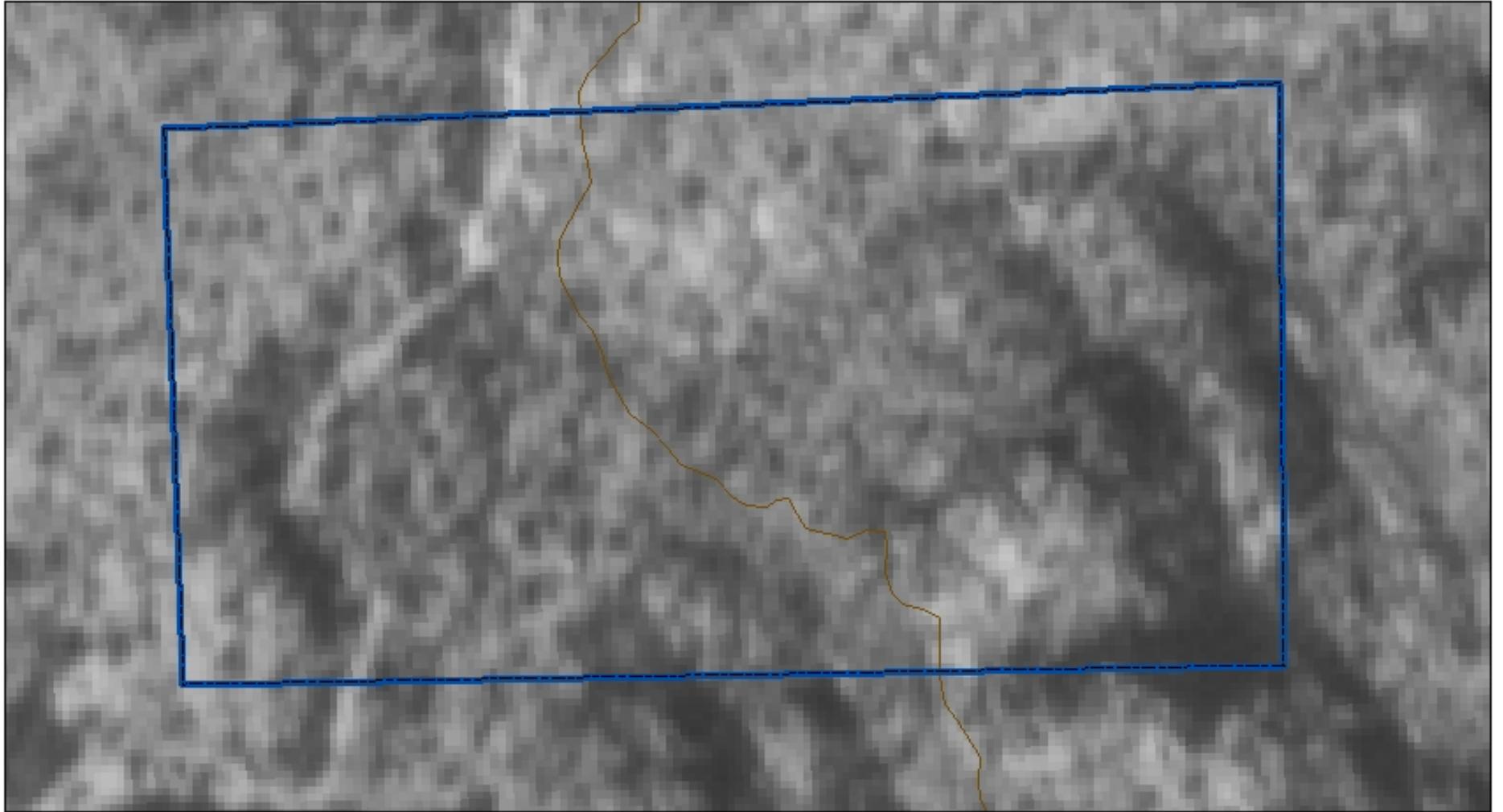
# Buffelgrass mapped on 41C



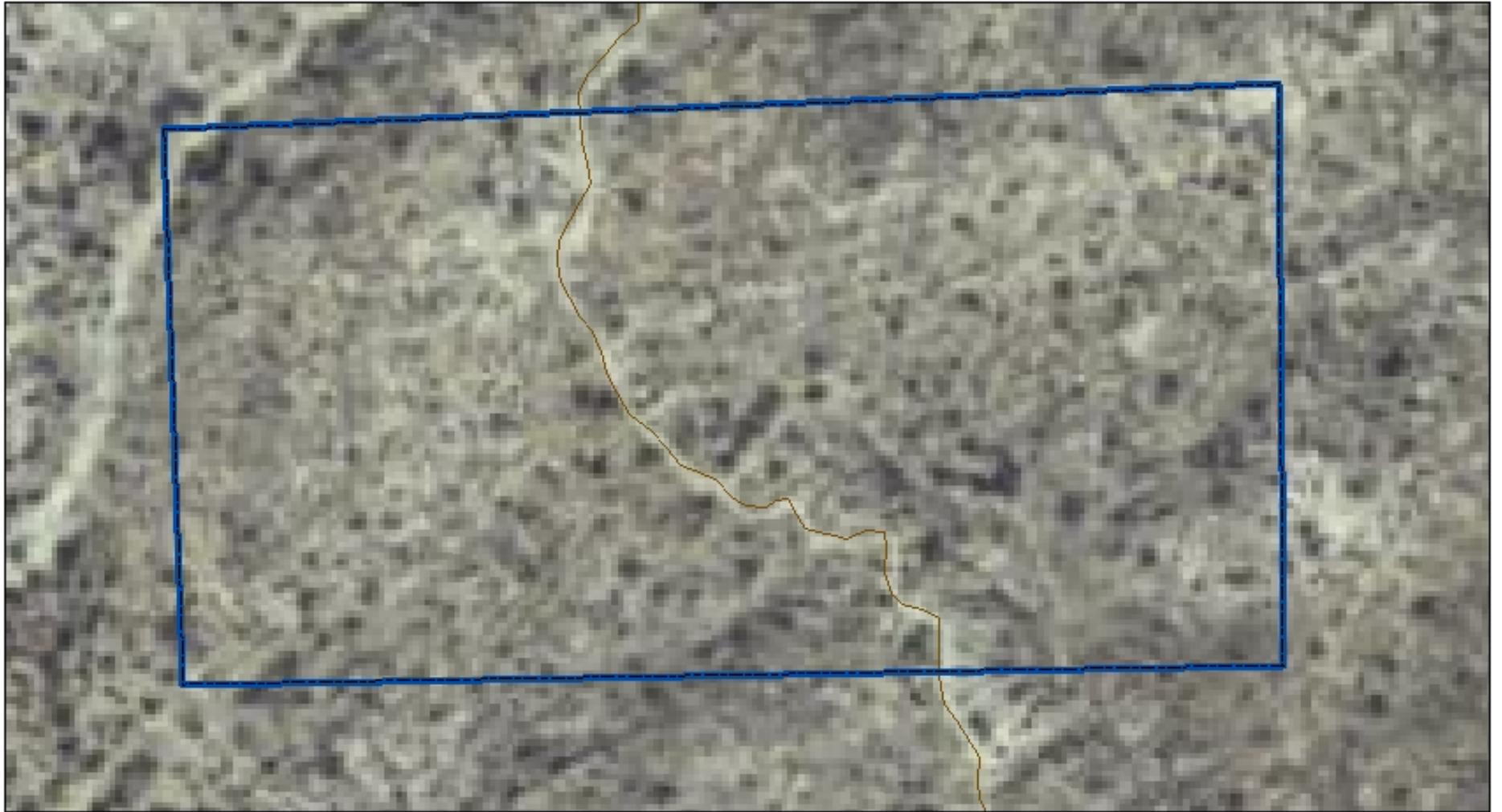
**1936**



**1974**



**2007**

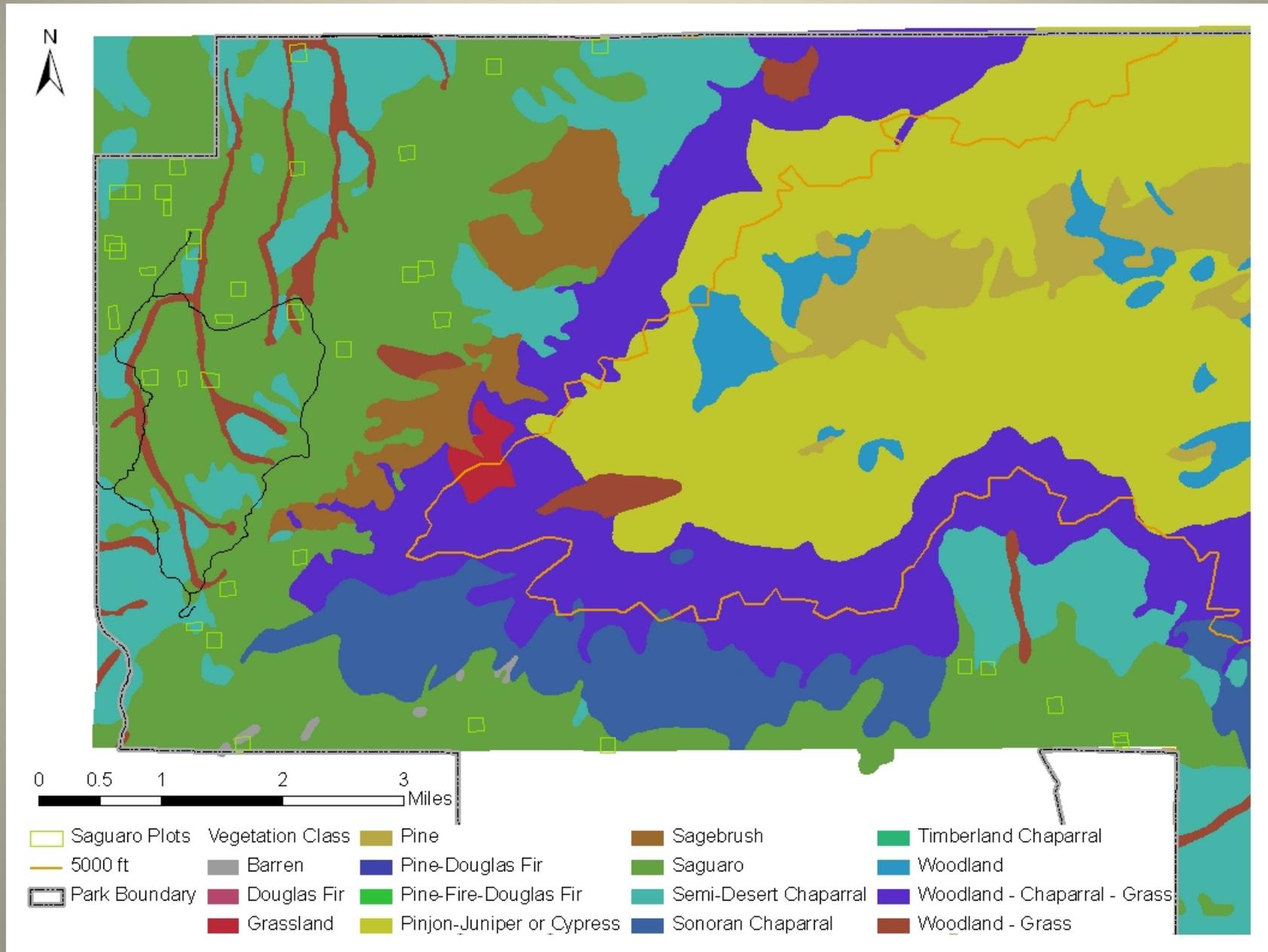


# CHALLENGES

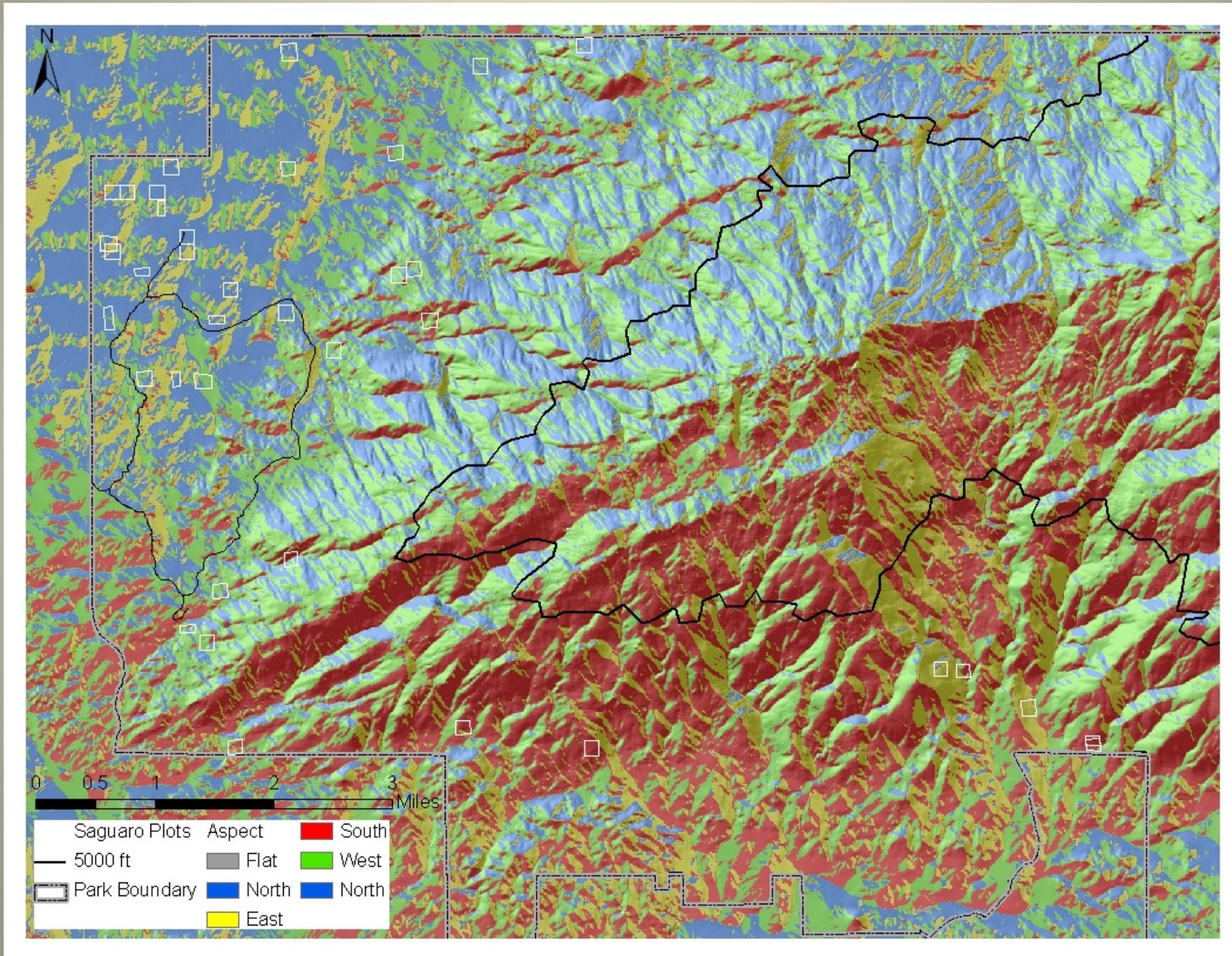
- Not finding buffelgrass on mapped plots
- Historic air photos not good enough resolution to show buffelgrass or saguaros
- Habitat and density?
- How do I show the spatial interaction?



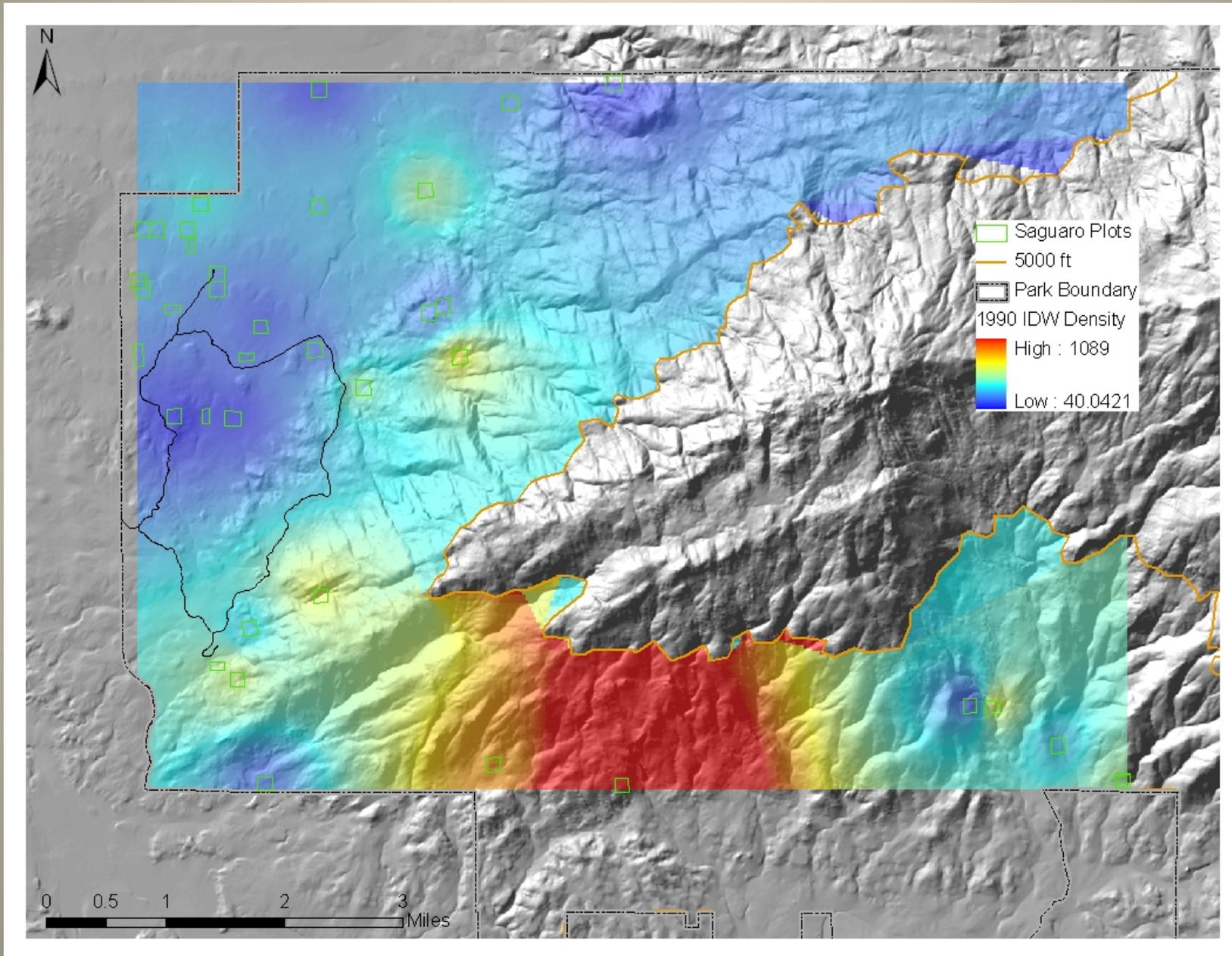
# VEGETATION TYPE



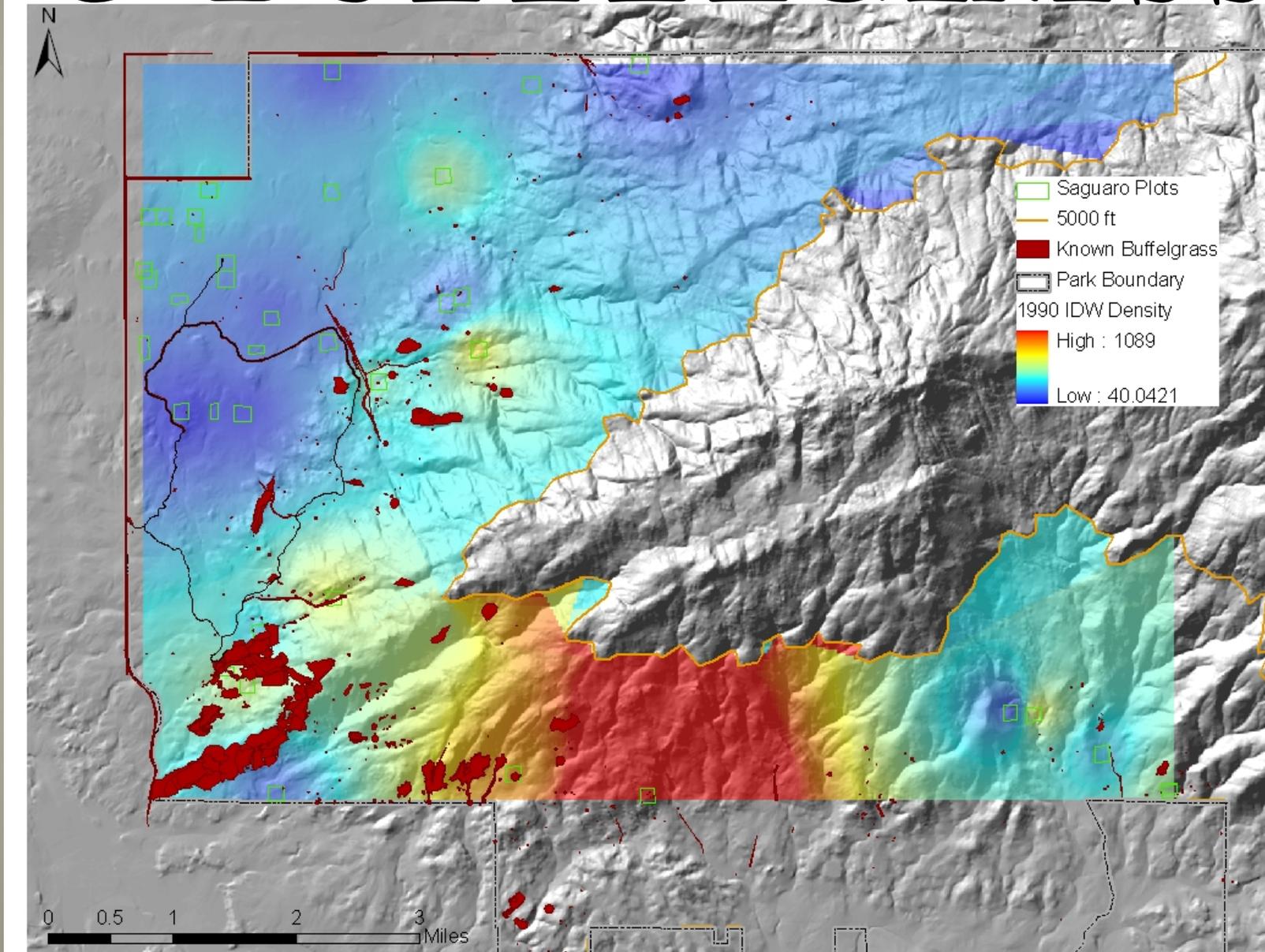
# ASPECT/ELEVATION



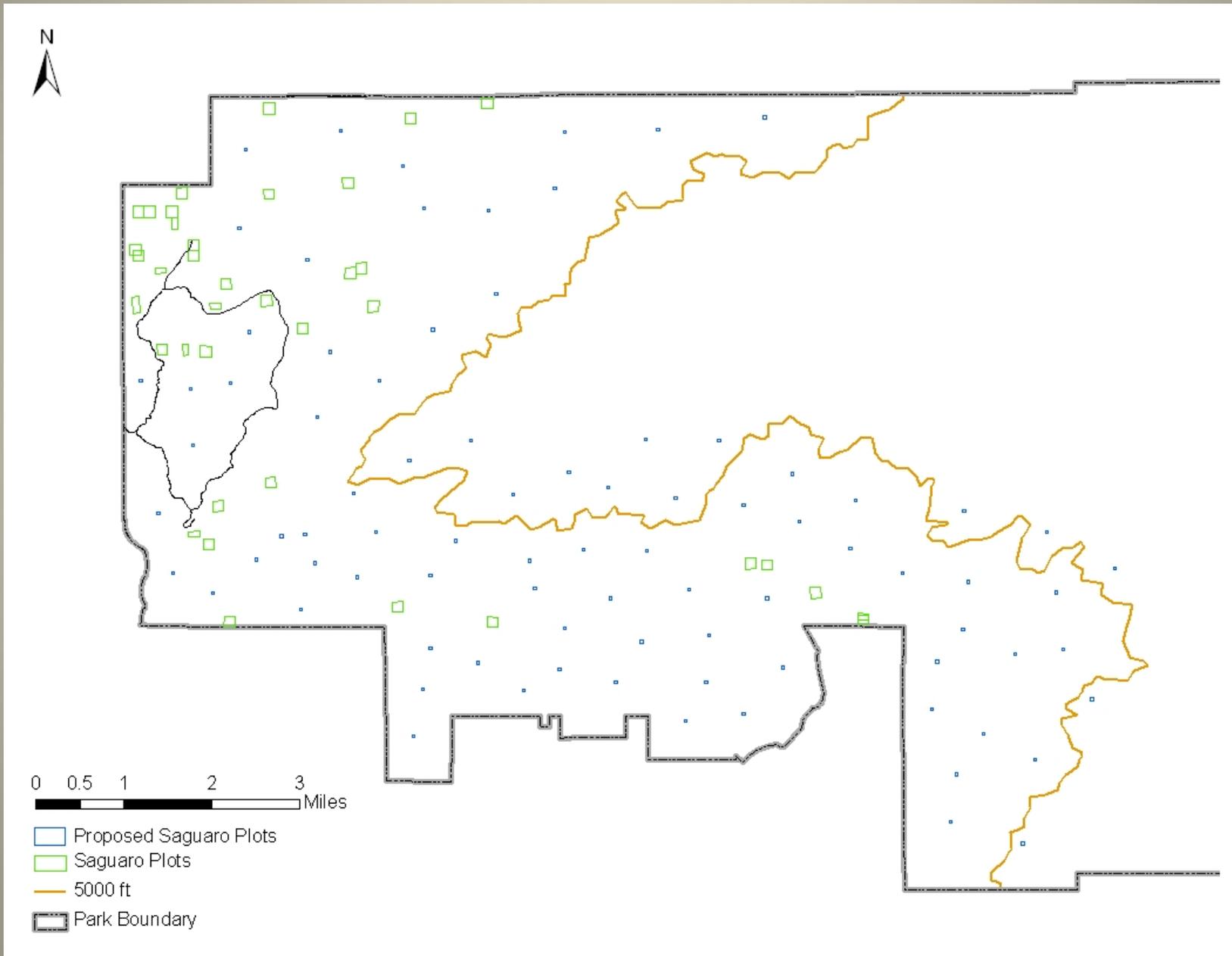
# 1990 DENSITY MAP



# 1990 DENSITY MAP & BUFFELGRASS



# MORE PLOTS



**ANY  
QUESTIONS/SUGGESTIONS/  
COMMENTS?**

