Manmade Plant Communities in the CAP-LTER Area

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Sampling Design:

Central Arizona – Phoenix LTER: 6,400 km²

Dual-density, randomized tessellation-stratified sampling design

Total sample size: 206 plots (permissions for 204)

Urban: 91 plots
Desert: 73 plots
Agriculture: 23 plots
Transportation: 6 plots
"Mixed": 11 plots

Measurements:

Measurements for each perennial plant on each plot:
– N-S and E-W extent
– Height
– Height to pruning line
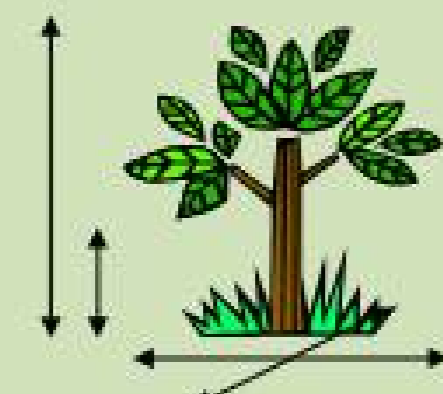
Surface cover was mapped

Cover for each species was calculated as % of pervious surface area

Statistical Procedures:

PC-ORD 4 (Multivariate Analysis of Ecological Data)
– Cluster analysis (Euclidean, Ward's)
– MRPP (Multi-Response Permutation Procedures) (Euclidean)
– NMS (Nonmetric Multidimensional Scaling) (Sorensen)
– Indicator Species Analysis (Dufrêne and Legendre 1997) (based on abundance and faithfulness)

Modeling

GARP
Base Layers: Elevation, Aspect, Slope, Soil Texture

Cluster Analysis
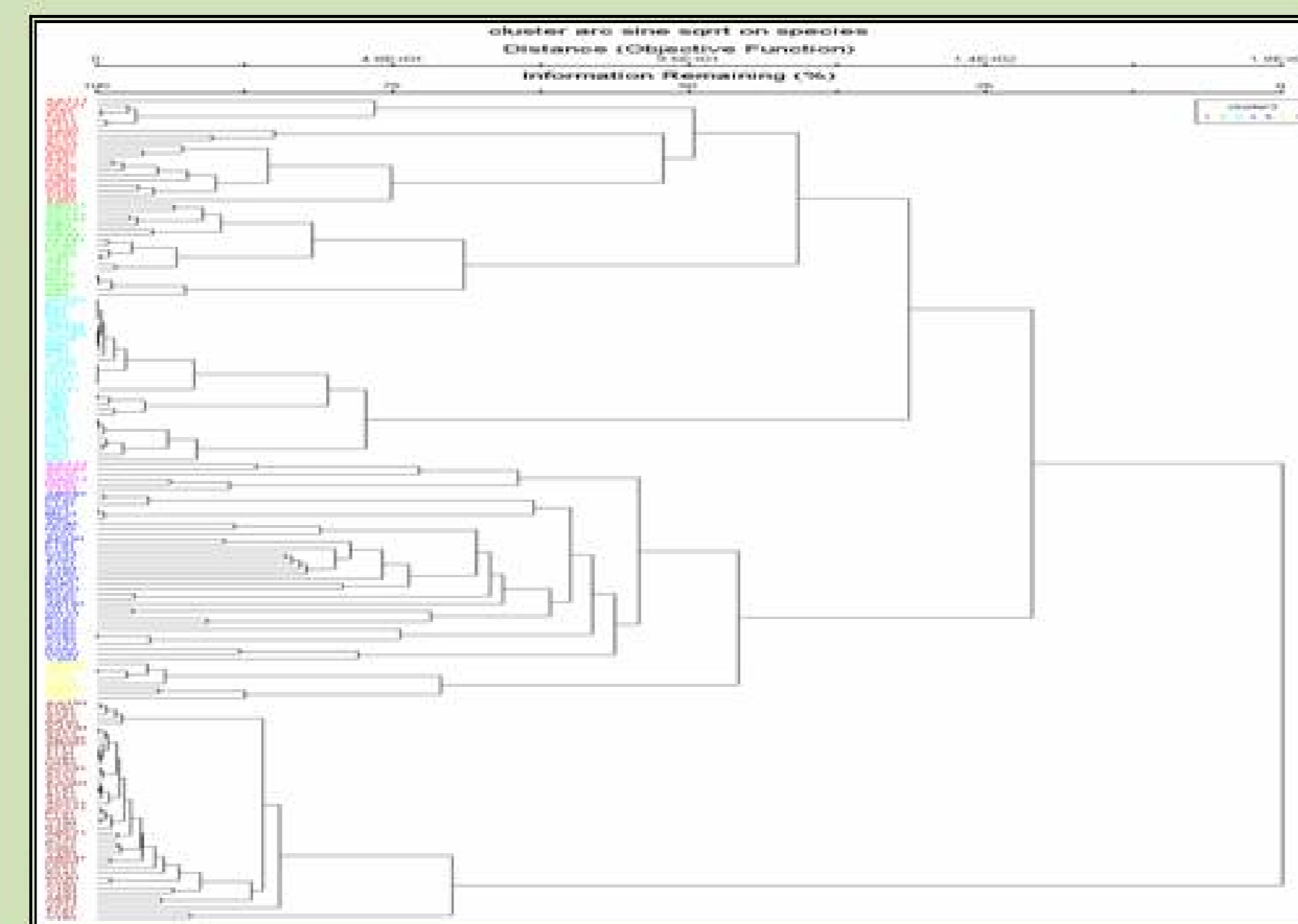
Seven clusters were defined in this analysis

Multi-Response Permutation Procedure (MRPP)

• For testing the hypothesis of no difference between the groups defined by cluster analysis.

• Distance measure: Euclidean

• Observed delta: 33.7

• Expected delta: 50.2

• Chance-corrected within-group agreement A=0.33 p<0.001

• The defined clusters are significantly different from each other

Ordination (NMS) of plots
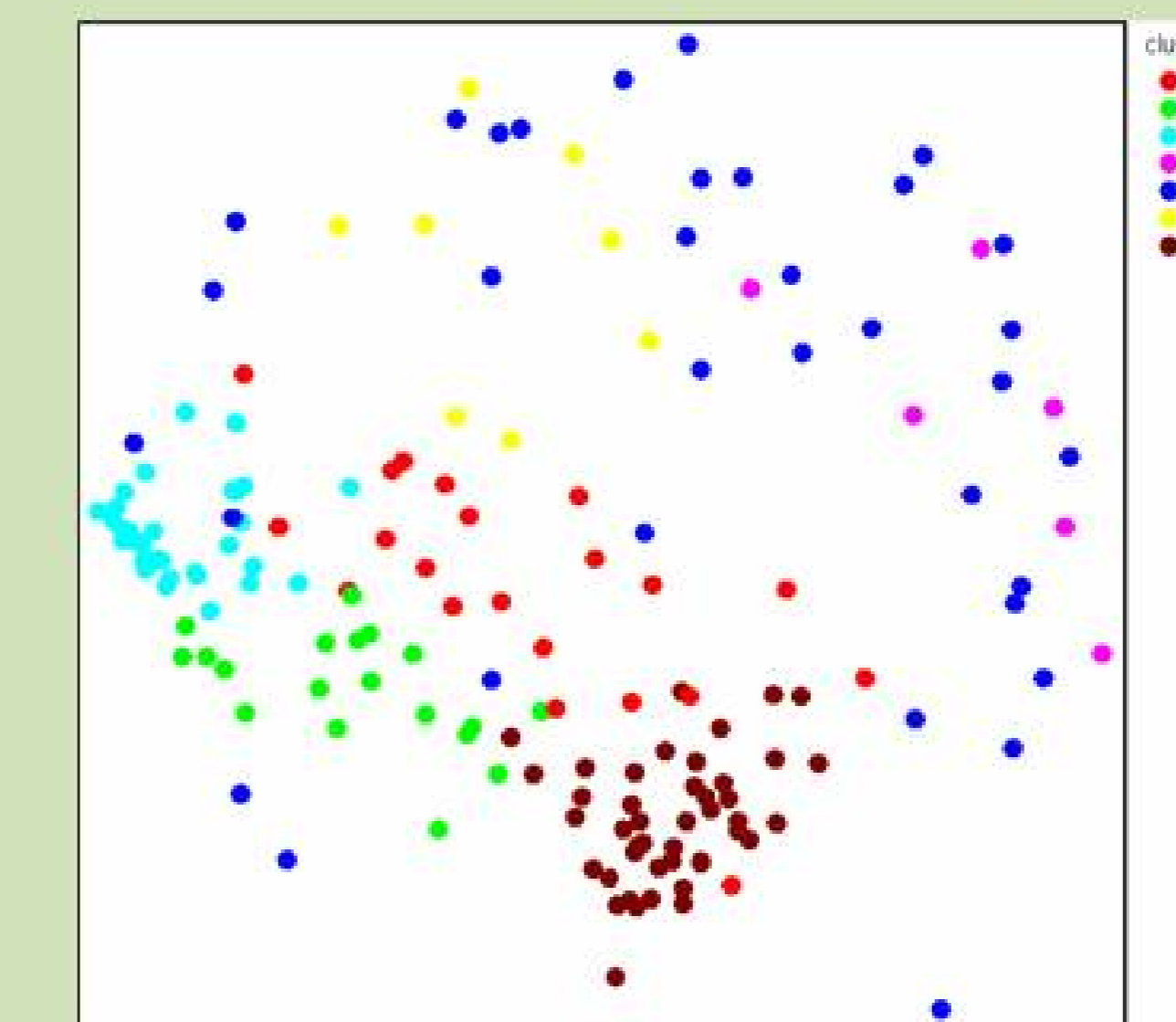
Clusters 1, 2, 3, and 7 are well defined groups. Clusters 4 and 6 are not overlapping with other either, while cluster 5 clearly is not a homogenous groups.

Conclusions

• 165 vegetated plots

• 120 perennial taxa (determined to genus level)
– Rare taxa removed from a total of 188

• 8.1 taxa per plot

• Beta diversity: 14.8

• 42 % average plant cover per plot

• 3 Clusters containing mostly desert plots
– With 8 urban sites included
– characterized by dominance of *Larrea, Ambrosia* or *Encelia*

• 4 Clusters containing mostly urban plots
– With 10 desert sites included
– Three clusters are dominated by the genera *Cynodon/Pinus/Morus, Prosopis,* and *Syagrus,* respectively, while a fourth urban sub-cluster was highly diverse with no clear indicator genus
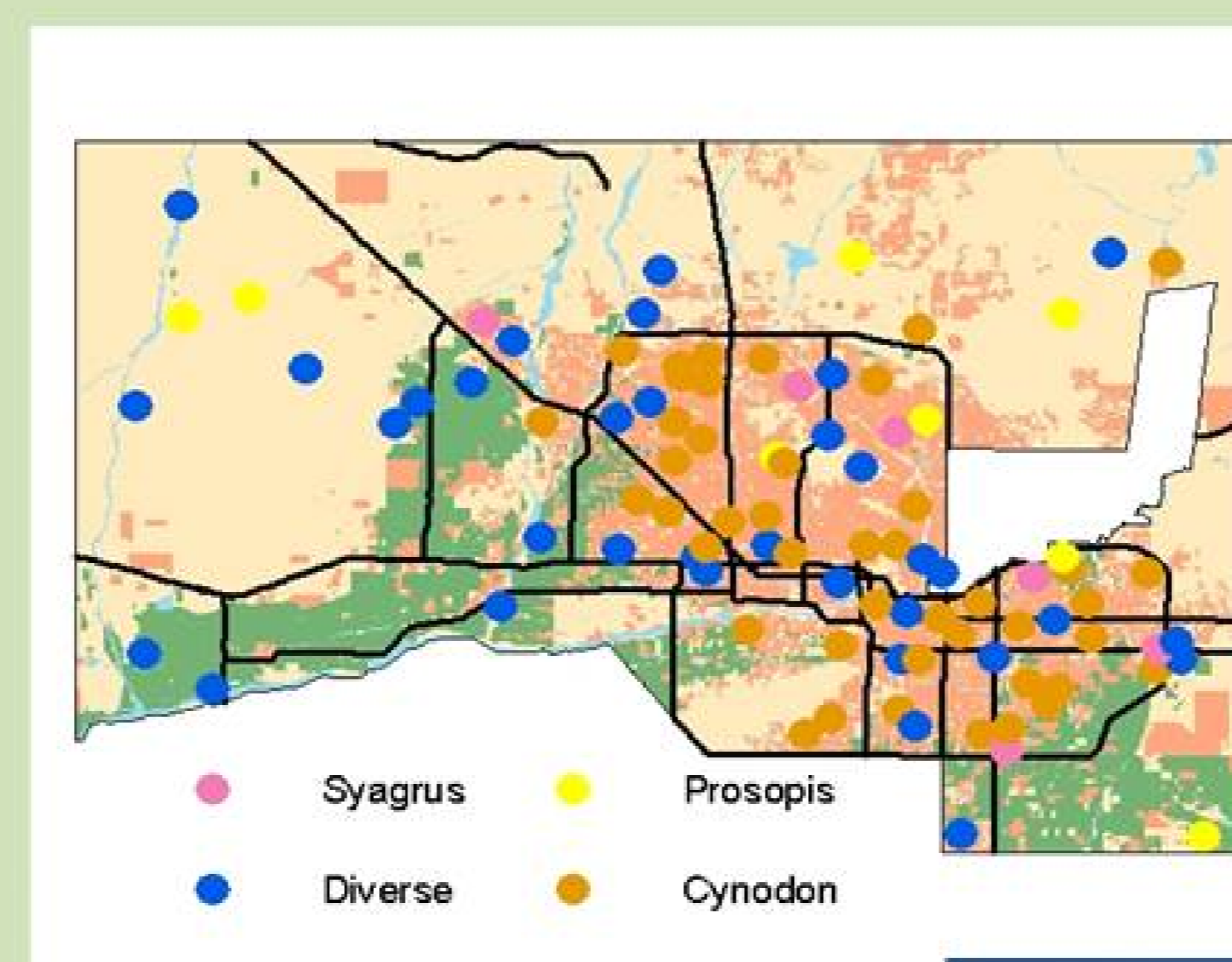
Desert Clusters

Foothills community
Ambrosia dominated
Larrea dominated
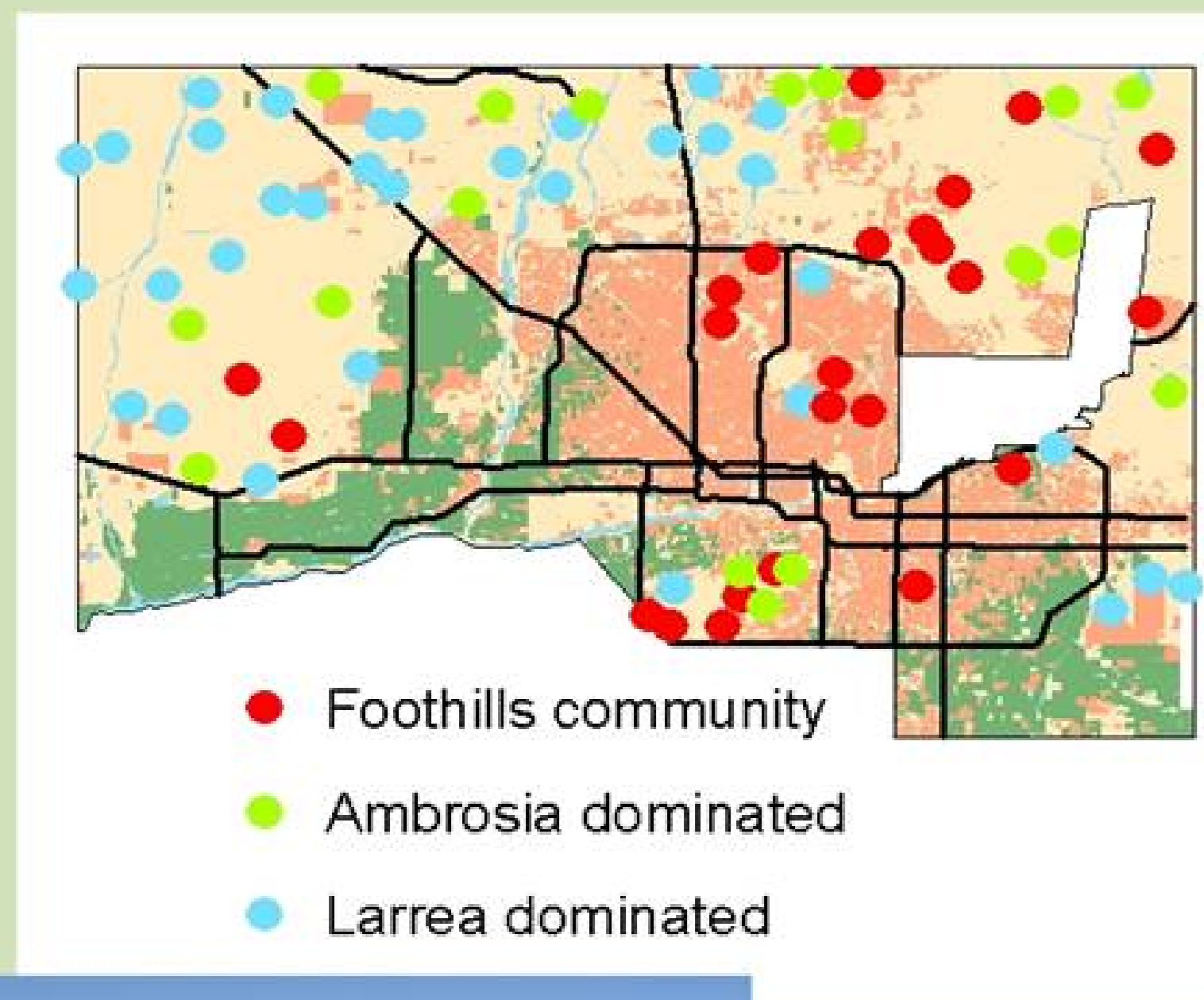
1. Brittle Bush / Palo Verde (Foothills community) n=21
    Encelia IV=70; *Parkinsonia* IV=43
2. Ragweed n=19
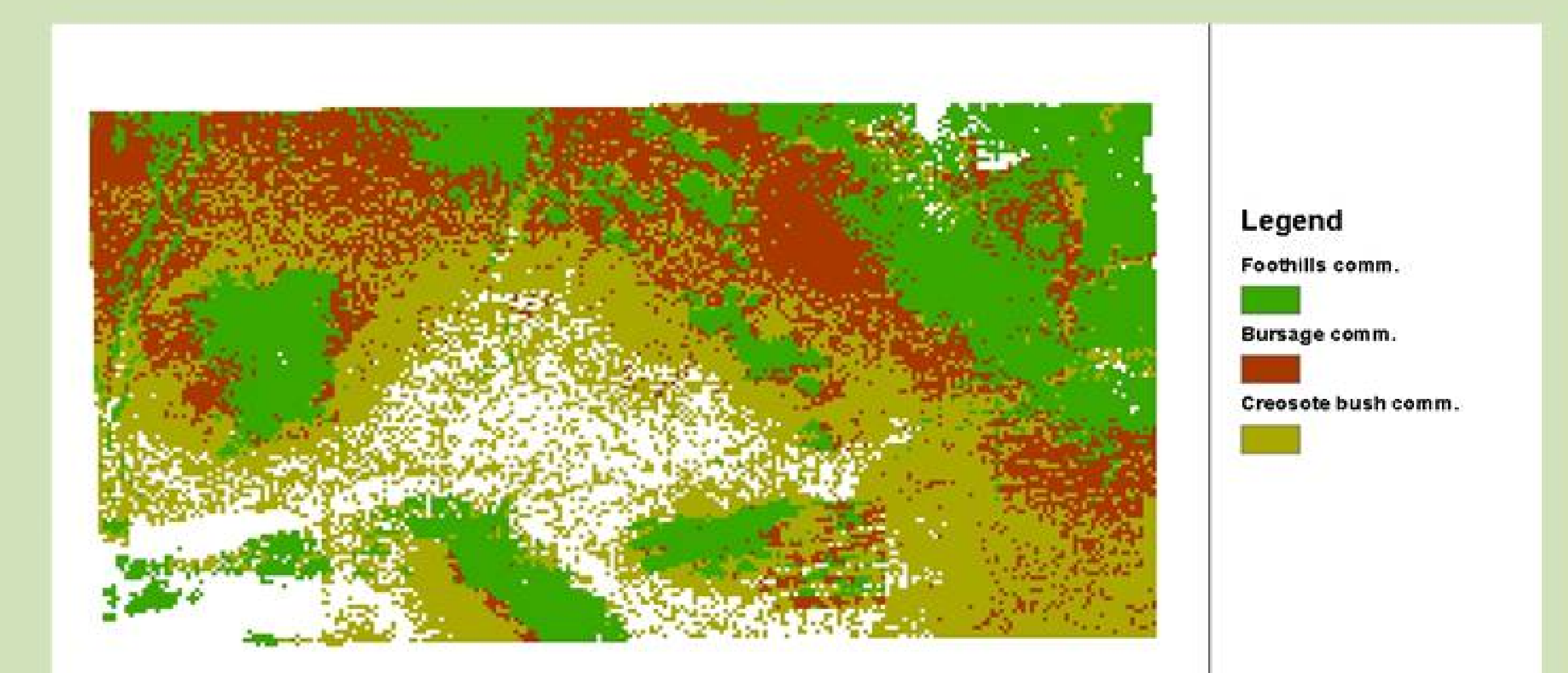   *Ambrosia* IV=68
3. Creosote Bush n=33
    Larrea IV=56

Urban Clusters

Syagrus   Prosopis
Diverse   Cynodon

4. Queen Palm n=6
    Syagrus (Arecastrum) IV=60
5. No real indicator, highly diverse n=34
    IV < 10
6. Mesquite n=8
    Prosopis IV=78
7. Grass n=44
    Cynodon IV=96

Modeled Vegetation Map for the Area

Legend
Foothills comm.
Bursage comm.
Creosote bush comm.

The Survey 200 dataset does not include examples of riparian vegetation. Therefore, the vegetation along river channels on this map have not been modeled correctly. Other datasets will be included to overcome this shortcoming.

Thanks to the Field Team