



# NPScape Applications at Saguaro National Park

Quantifying and Interpreting Landscape Dynamics at  
Multiple Relevant Park Scales



# Goals



1. Prioritize I&M landscape indicators of special interest to Saguaro National Park
  - *What do we want to monitor?*
2. Determine relevant areas of analysis (AOAs) for evaluating the landscape indicators
  - *How do we define “landscape”?*
3. Quantify and interpret the meaning of landscape indicators for different AOAs
  - *What do the results mean?*

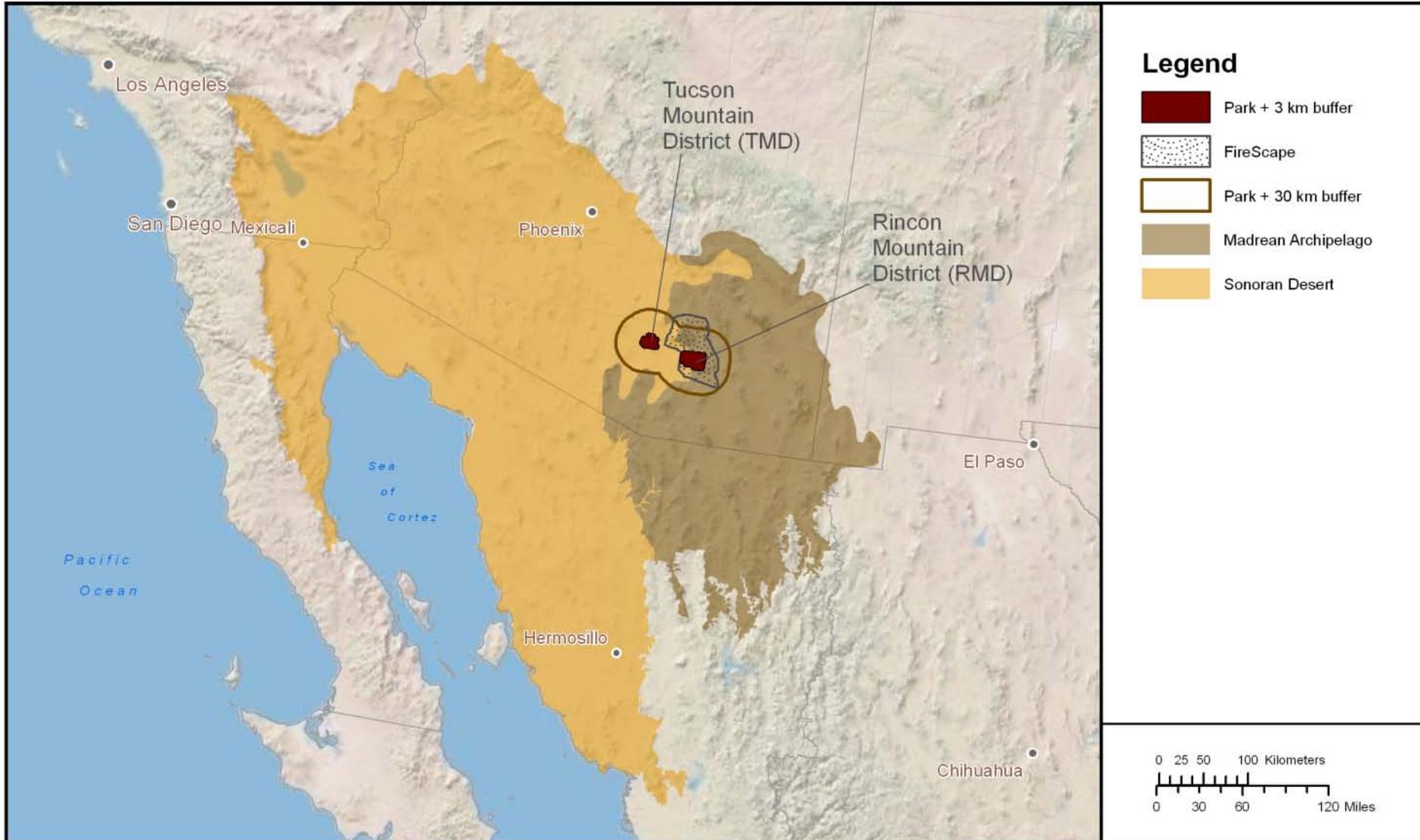
# Focal Species and Habitats



# A Park-Urban Interface



# Areas of analysis (AOAs)



# Focal Indicators by AOA



Category	Indicator	Area of analysis					
		RMD	TMD	Park + 30 km	FireScape	Sonoran Desert	Madrean Archipelago
Human driver	Housing density	X	X	X	X		
	Road density	X	X	X	X		
	Total population			X			
Natural systems	Land cover area by category			X	X	X	X
	Area density pattern by land cover category					X	X
Conservation context	Protected area			X	X	X	X
	Land ownership			X	X	X	X

# Key Questions

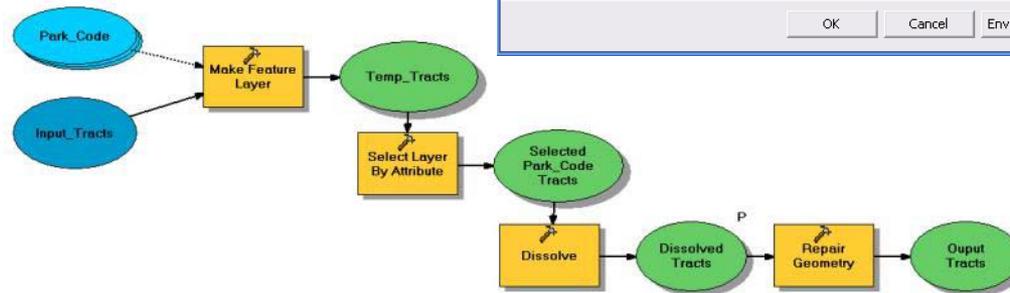
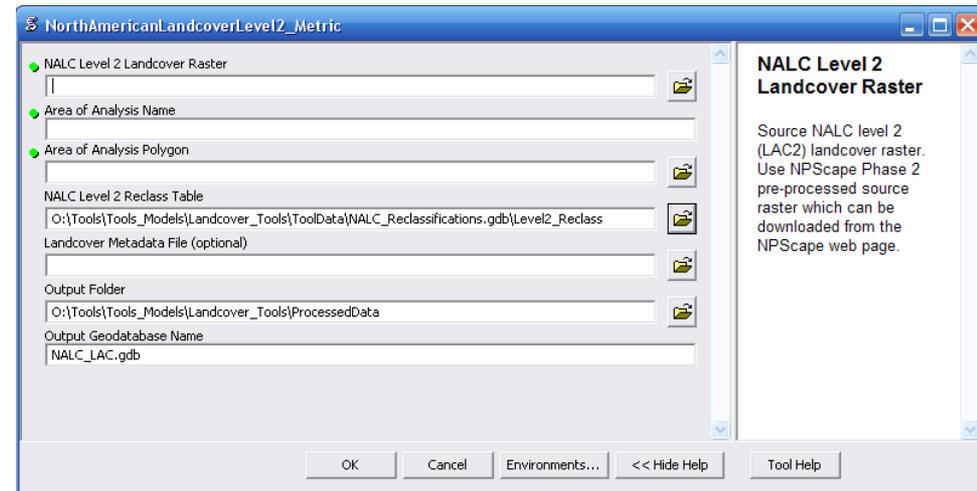


1. How do the Tucson (West) and Rincon (East) Mountain Districts of Saguaro National Park differ in terms of the human drivers affecting wilderness character (roads, housing, population)?
2. At an ecoregional scale, how are forest and grassland habitats distributed, and how are they connected both structurally and in terms of protected areas?
3. At the scale of Saguaro, where do important landscape corridors exist between the two park units and other wilderness areas?

# Methods: SOPs and Script Tools



Used NP Scape preprocessed source data, SOPs, and ArcGIS toolboxes to calculate landscape indicators for focal AOAs



```
# Load required toolboxes...
```

```
gp.AddToolbox("C:/arcgis/ArcToolbox/Toolboxes/Analysis Tools.tbx")
gp.AddToolbox("C:/arcgis/ArcToolbox/Toolboxes/Conversion Tools.tbx")
gp.AddToolbox("C:/arcgis/ArcToolbox/Toolboxes/Data Management Tools.tbx")
```

```
Output_Feature_Class = Output_Workspace_or_Feature_Dataset + "\\ " + NPS_Unit_Code + "_AOA_" + Layer_Suffix
nps_bound_all_albers_Layer = "nps_bound_all_albers_Layer"
```

```
# Process: Make Feature Layer...
```

```
Argument = "[UNIT_CODE] = '" + NPS_Unit_Code + "'"
gp.MakeFeatureLayer_management(Input_NPS_Feature_Class, nps_bound_all_albers_Layer, Argument, "", "UNIT_CODE UNIT_CODE VISIBLE NONE,
```

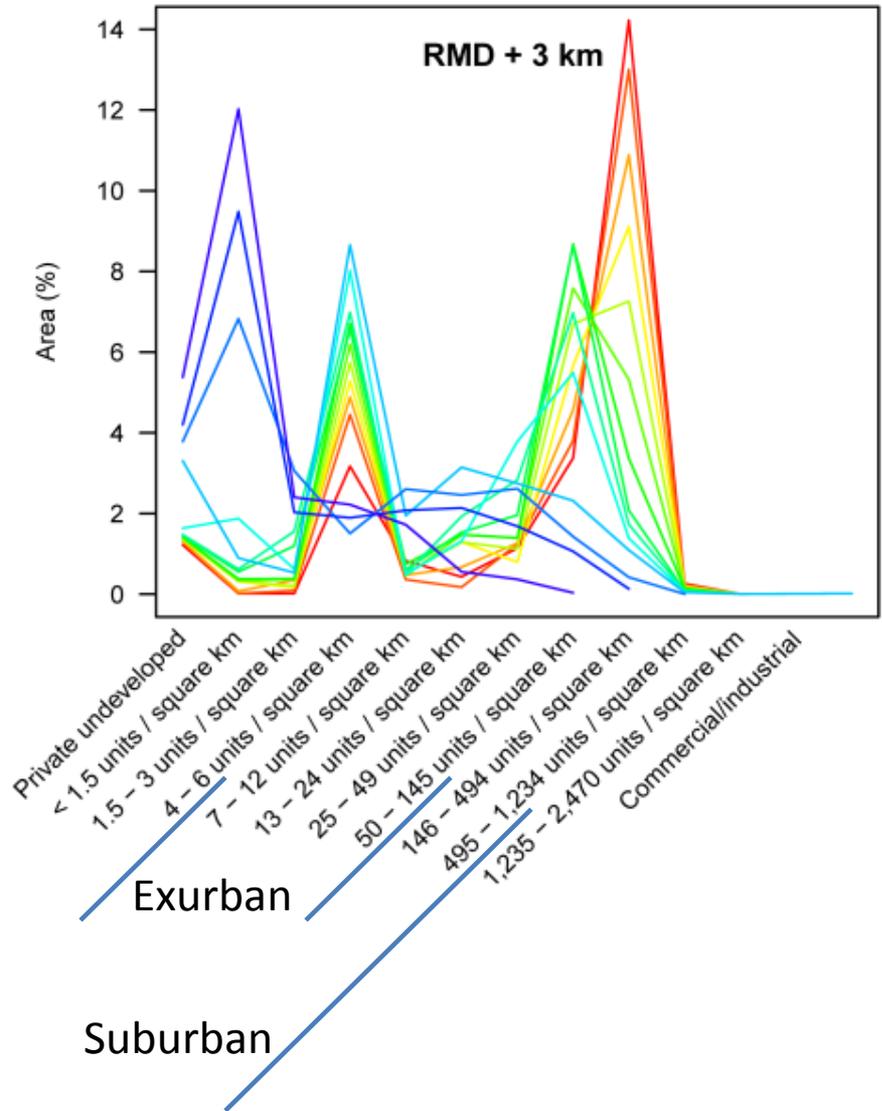
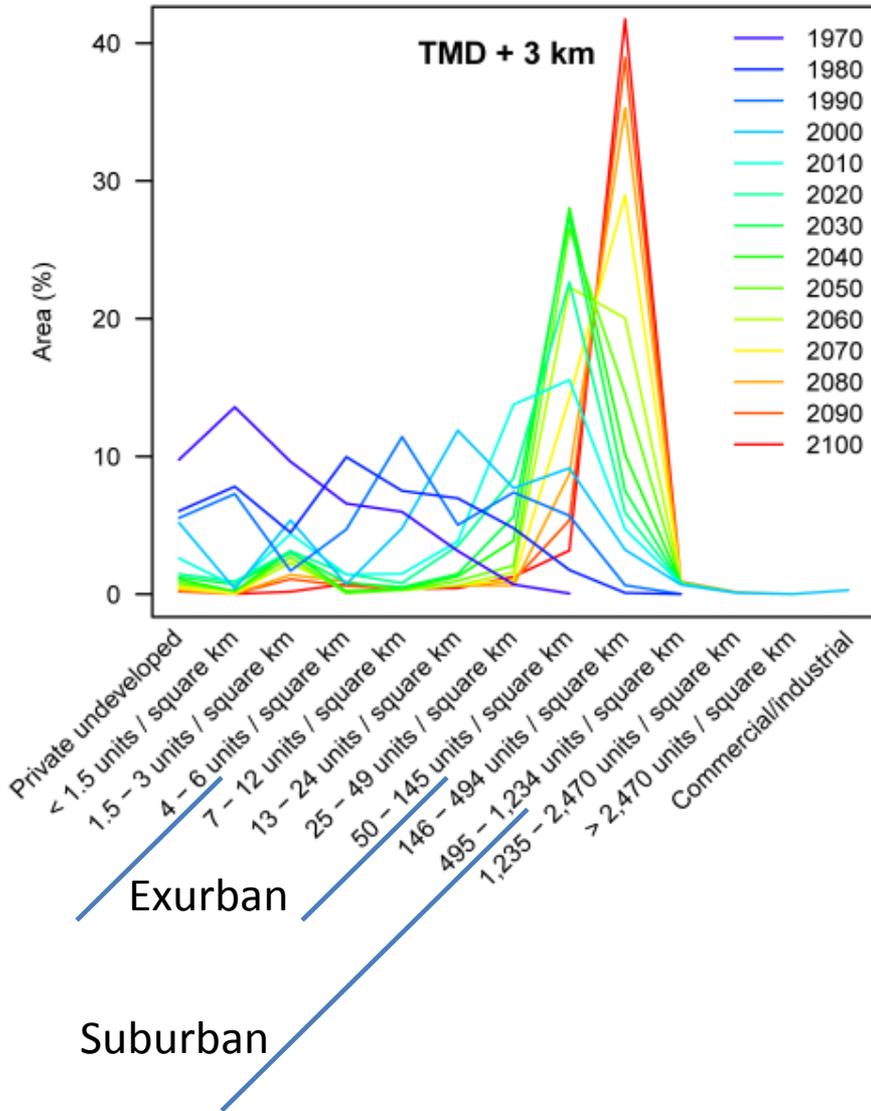
```
# Process: Create 30km Buffer...
```

```
gp.Buffer_analysis(nps_bound_all_albers_Layer, Output_Feature_Class, BufferArea, "FULL", "ROUND", "NONE", "")
```

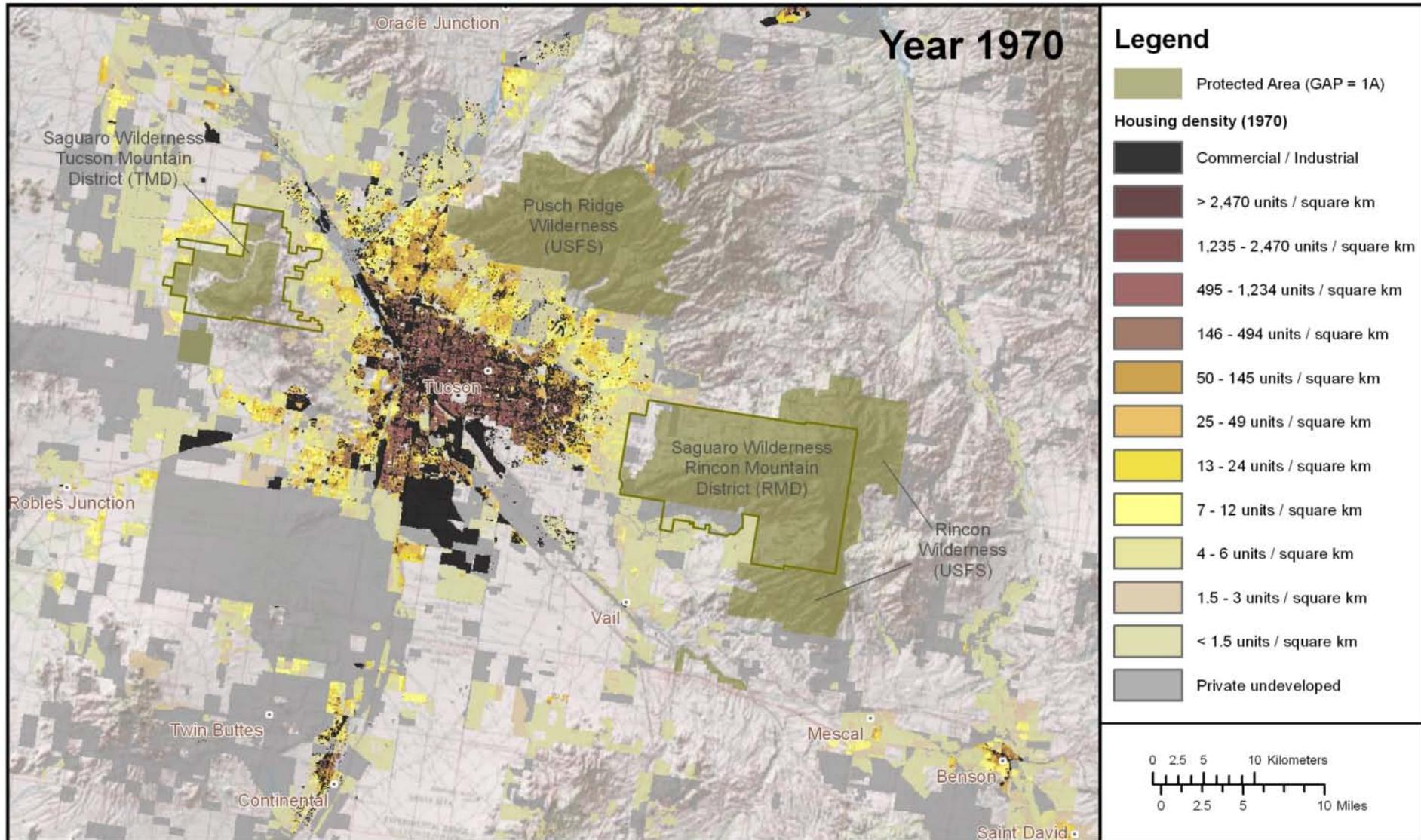
```
# Process: Add AOA_SQKM (4)...
```

```
gp.AddField_management(Output_Feature_Class, "AOA_SQKM", "DOUBLE", "8", "3", "", "", "NULLABLE", "NON_REQUIRED", "")
```

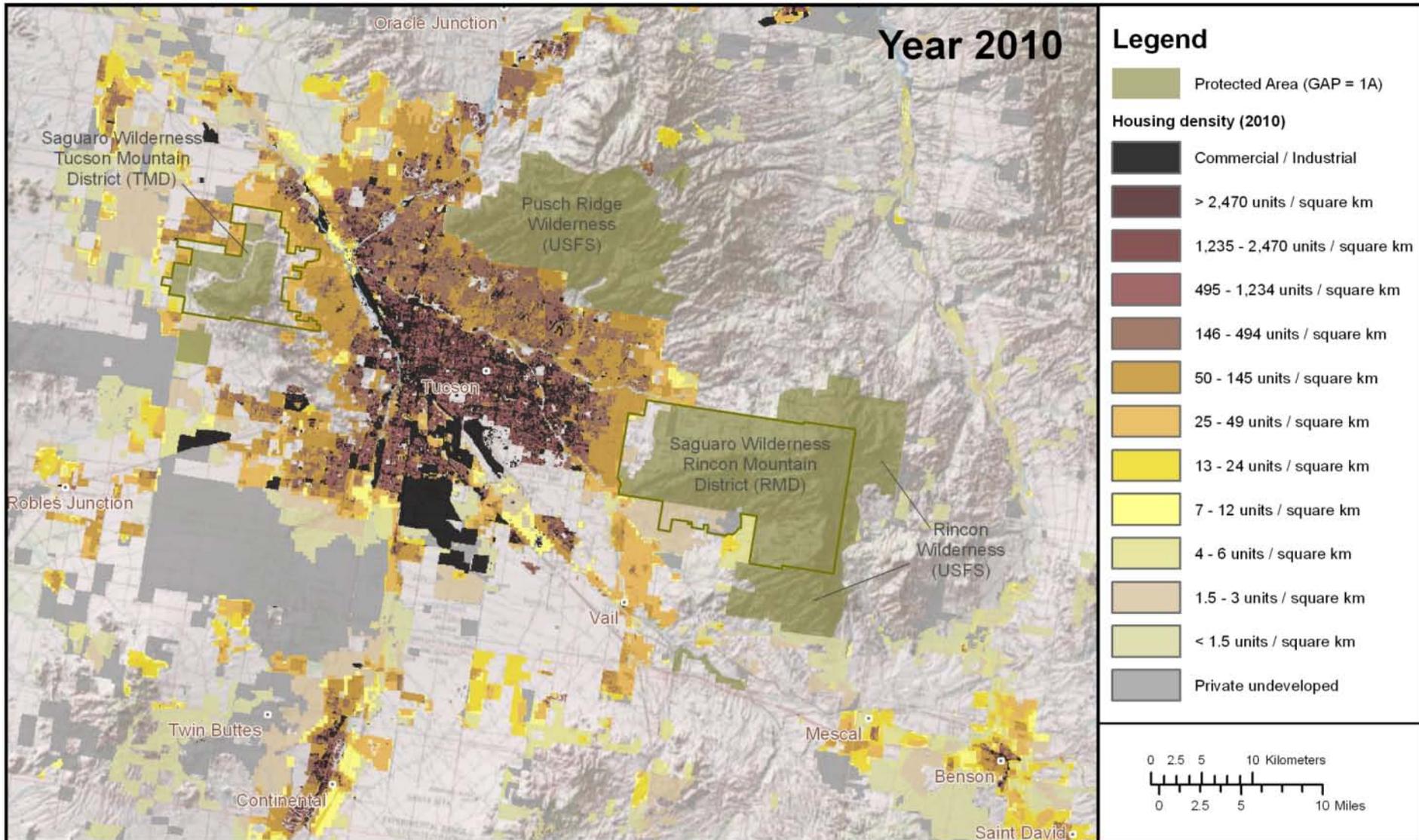
# TMD vs. RMD: Housing density



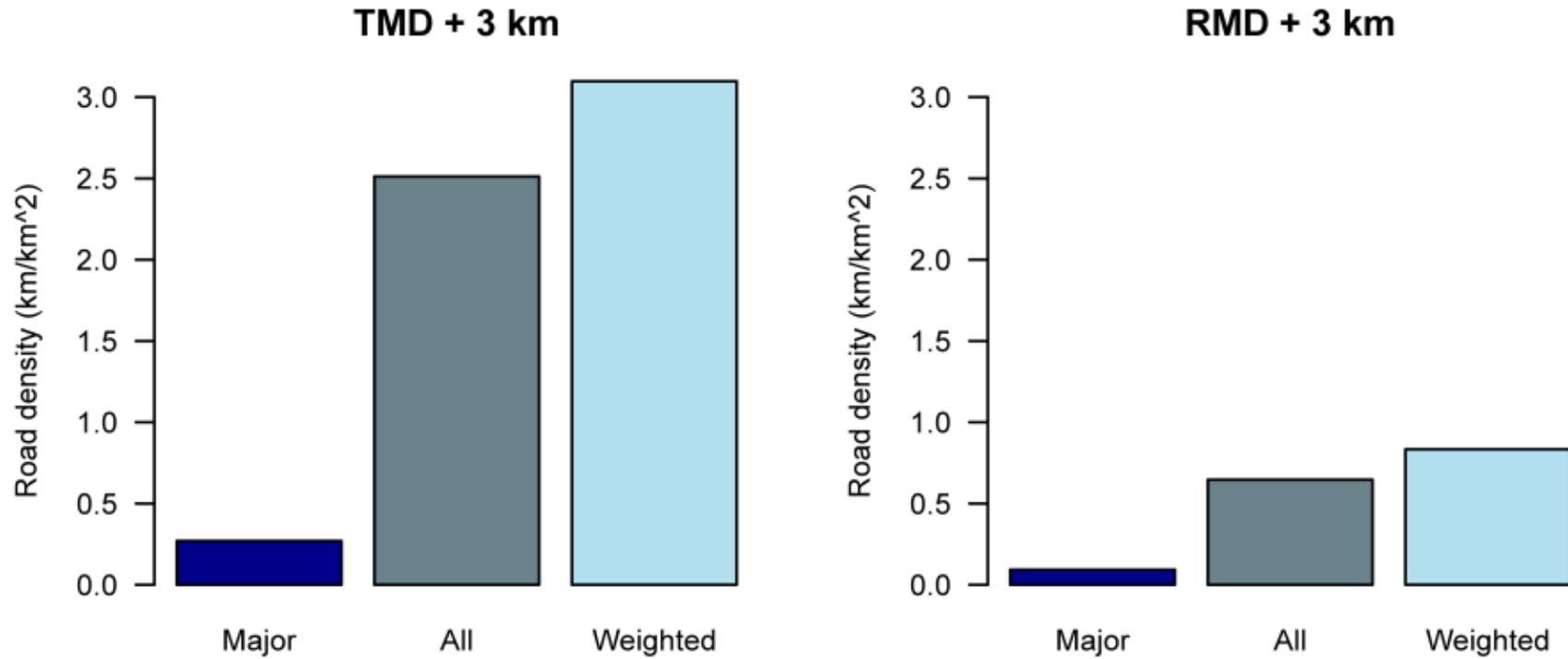
# TMD vs. RMD: Housing density - 1970



# TMD vs. RMD: Housing density - 2010

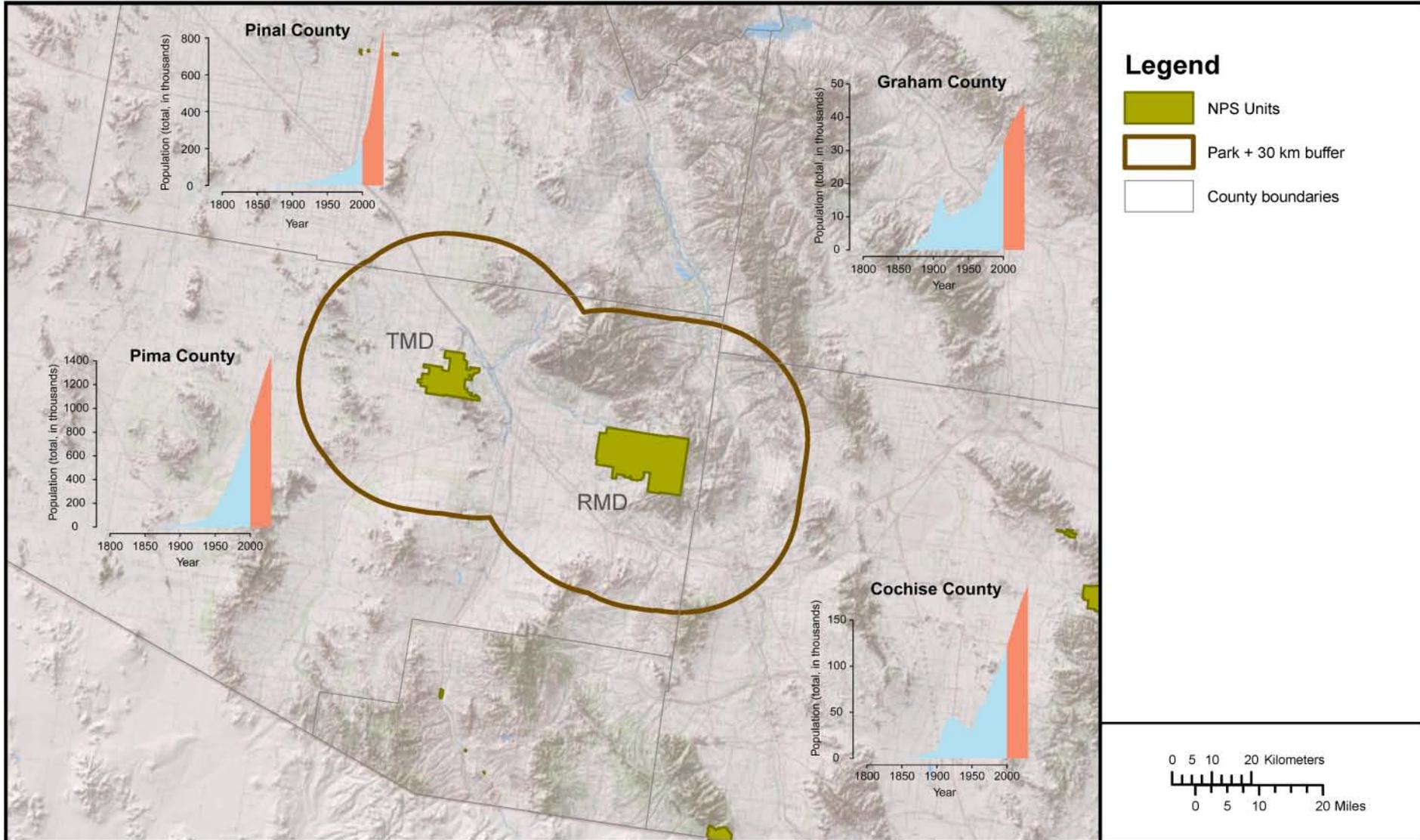


# TMD vs. RMD: Road density

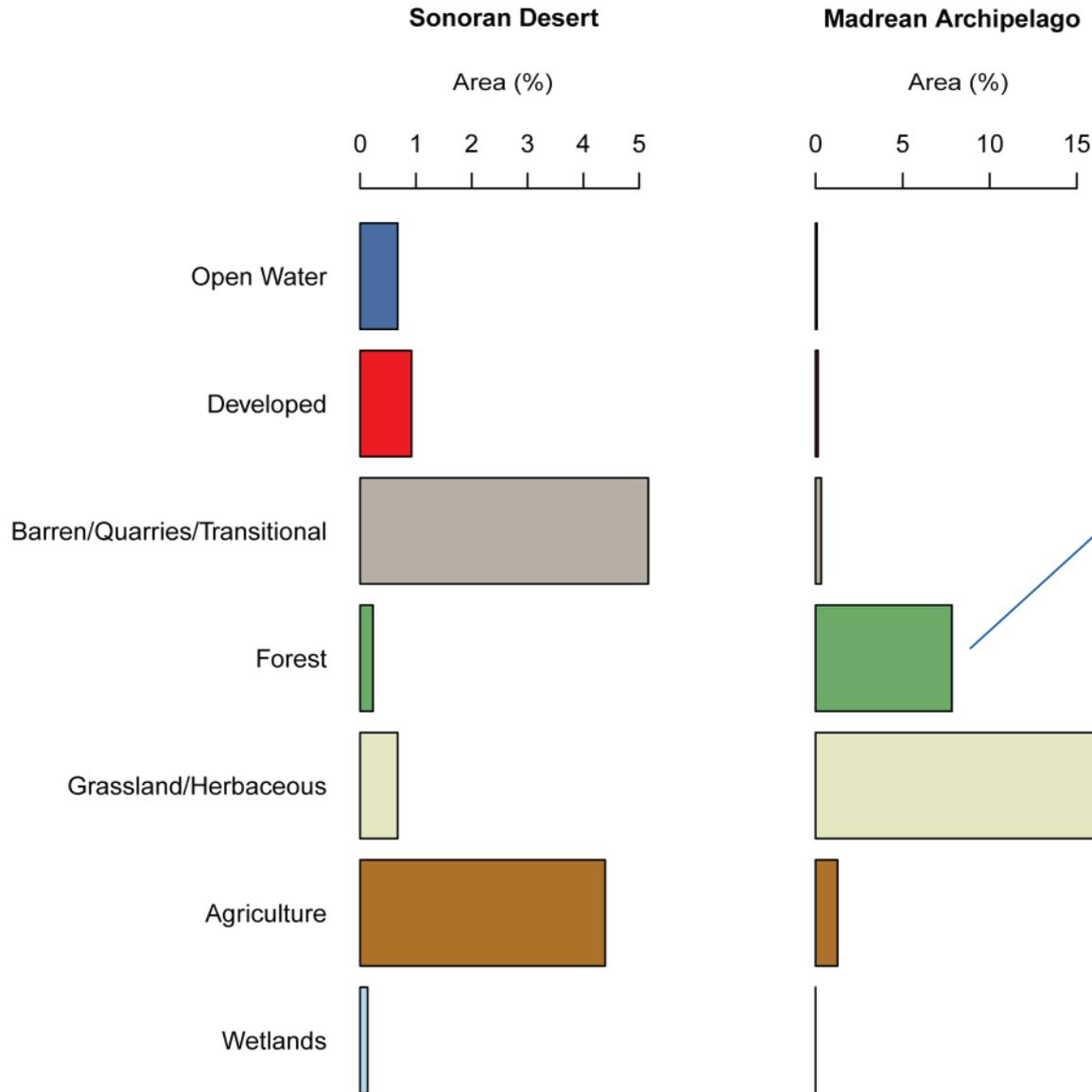


Road density is 3X greater around the TMD (West unit) compared to the RMD (East unit)

# TMD vs. RMD: Total population



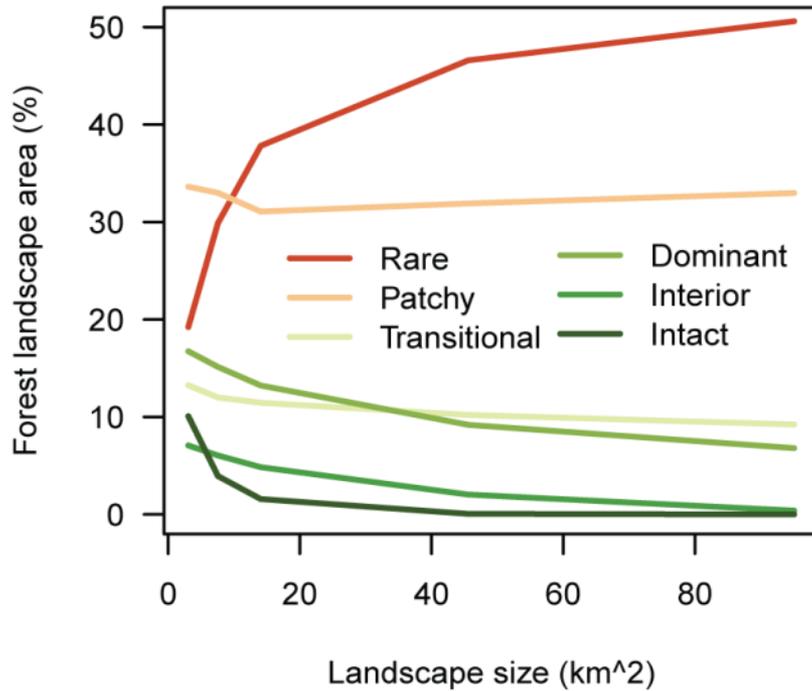
# Ecoregions: Land cover area



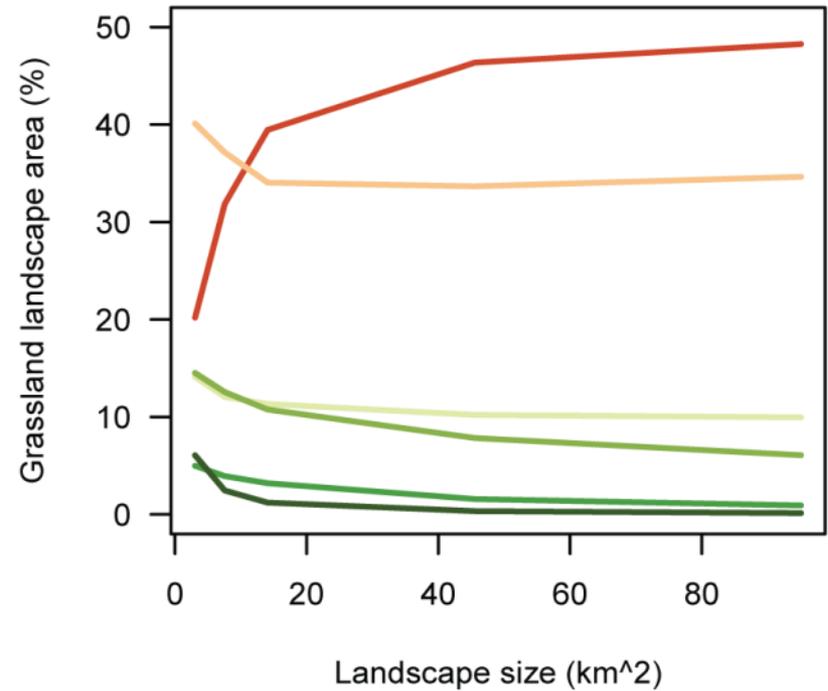
# Ecoregions: Area density pattern



### Madrean Archipelago – Forest

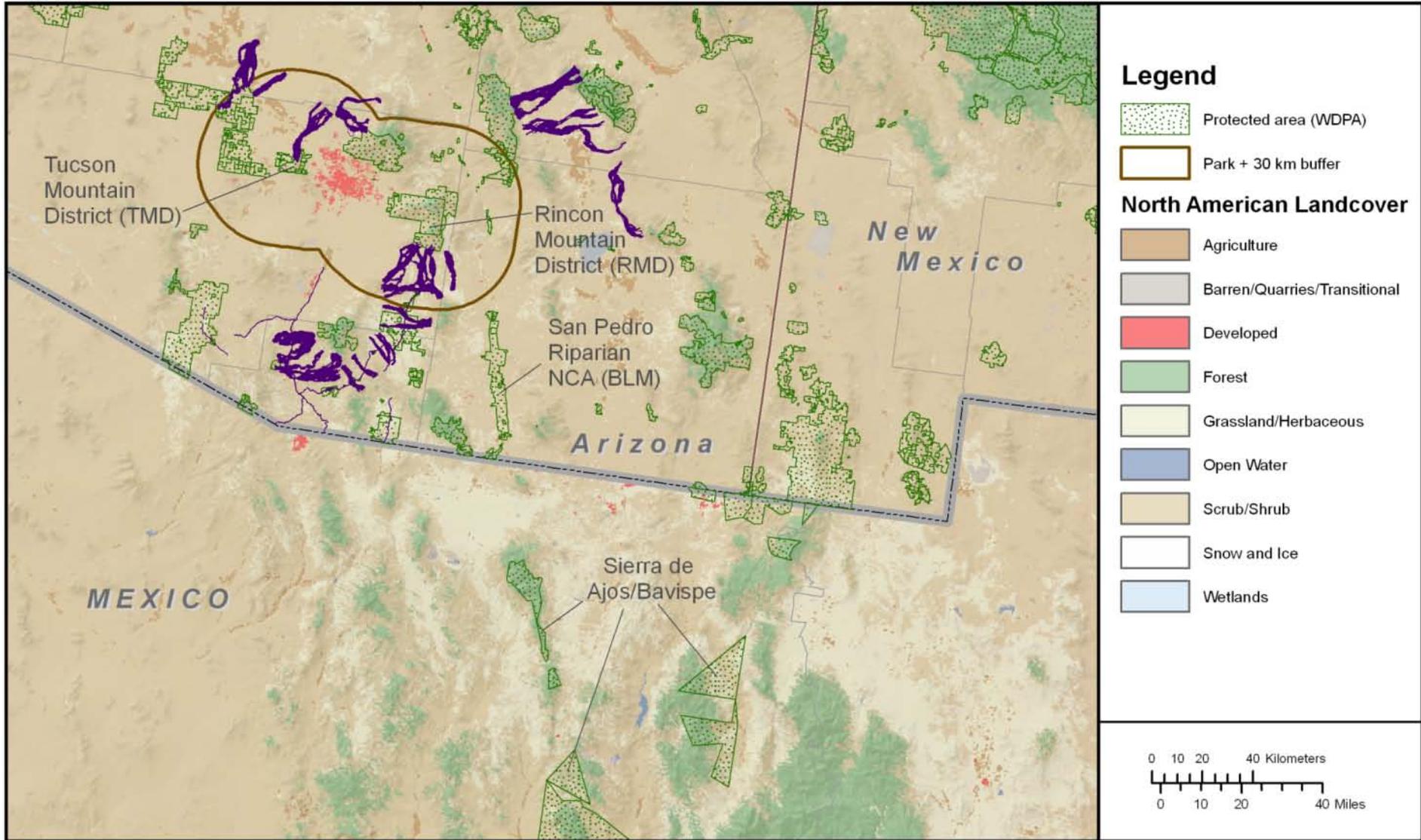


### Madrean Archipelago – Grassland

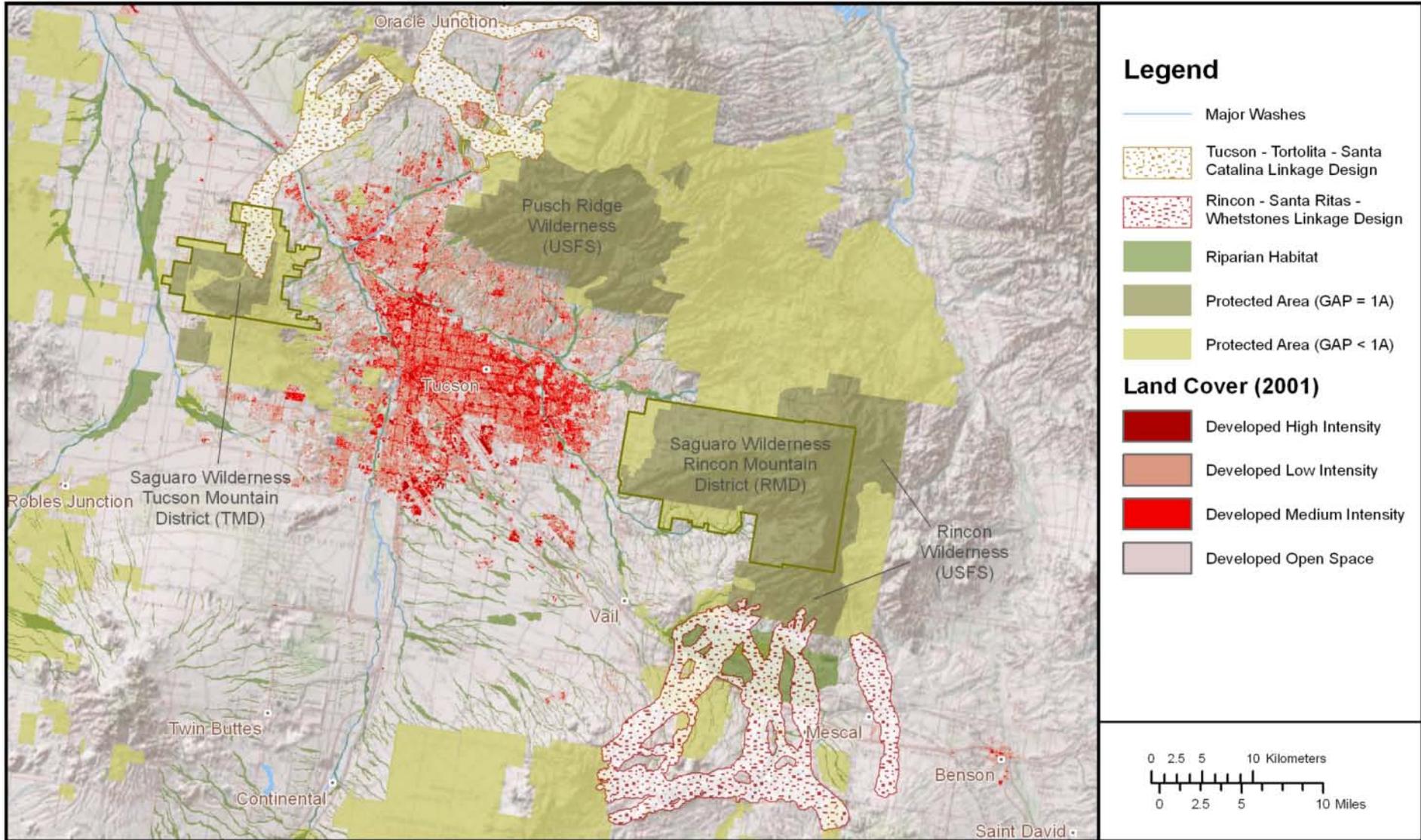


Photos from Arizona Missing Linkages, Beier et al. 2006

# Ecoregions: Conservation Context



# Saguaro National Park Landscape



# Summary: TMD vs. RMD



1. Compared to the RMD (East), TMD (West) has more suburban growth and 3X the road density.
2. Of four counties, Pima Co. is second in terms of rate of population growth but highest in total population (800,000 to 1.4 million in 2030).



# Summary: Ecoregions



1. The Madrean Archipelago ecoregion to the south and east contains 8-15% dominant to transitional forest and grassland habitats.
2. These are partially connected by Arizona Wildlife Linkage Assessment corridors
3. Other protected areas in northern Mexico afford additional opportunities for connectivity



# Summary: Saguaro Landscape



1. Saguaro units connected to the north through the Pusch Ridge Wilderness (USFS)
2. Additional connectivity through the wash and riparian habitats that traverse Tucson

