

## **Case Study 4: Shrub systems in Southwest Wyoming and Southwest Arizona**

### **Trend:**

- LANDFIRE FRCC in Wyoming Big Sagebrush in southwest Wyoming shows moderate to high departure and sharp boundaries between adjacent subsections.
- FRCC in desert shrub systems in southwestern Arizona is ubiquitously low, even though significant impact from invasive plants is expected.

### **Theme:**

- LANDFIRE FRCC can appear correct even when the underlying data is suspect.
- Insufficient plot data can lead to the inability of LANDFIRE FRCC to detect potentially important trends in vegetation, such as invasive plants.

### **Conclusion:**

LANDFIRE FRCC shows moderate to high departure and sharp boundaries between subsections in Wyoming Big Sagebrush in southwest Wyoming because:

- Low variability in LANDFIRE Cover and Height produced a very strong dominance of SClass C, which was very different than reference conditions.
- FRCC was not the result of conifer or invasion as expected by modelers.
- FRCC was assigned different values between adjacent subsections because of the departure threshold between moderate and high FRCC. The differences in departure are slight between subsections.

LANDFIRE FRCC was lower than expected in desert shrub systems in southwest Arizona because:

- A lack of plots representing invasive annual grasses led to under-representation of exotics in both areas of the case study.
- The large areas dominated by one BpS require large areas to be mapped to exotics to show greater departure.

### **Discussion:**

LANDFIRE FRCC was ubiquitously low in desert shrub systems in southwest Arizona for a few important reasons (Figure 1). This area was dominated strongly by a single BpS (Figure 2). This area was also represented by only a few very large subsections. In both these cases, the percent of an SClass in the current conditions used for calculating FRCC corresponds to a very large area in the landscape. Thus a very large area would need to be occupied by SClasses that are very different from reference conditions to show departure in this system.

Invasive plants, such as red brome, were mapped in very limited areas (Figure 3). This is primarily because very few exotics plots were available for training the exotics mapping process (Figure 5). The few available exotics plots were generally scattered around Zone 20, which further decreased the ability of classification and prediction methods to predict

large areas to exotics. Thus while both modelers and reviewers noted significant impacts of exotic plants in this area, the existing methods for mapping exotics were unable to capture this trend due to their reliance on training plot data.

Both the current and reference conditions for this BpS are dominated strongly by SClass C, which is described as low cover, medium shrubs (Figure 3). The strong dominance of SClass C is driven by the strong dominance of low cover, medium shrubs in the LANDFIRE Cover and Height layers used for SClass mapping (Figure 4). The low variability in both these layers is likely the result of the availability of very few training plots. In contrast to Case Study 2, where high departure was driven by current and reference conditions that were strongly dominated by different SClasses in the maritime Douglas-fir - western hemlock systems in the Pacific Northwest, in desert shrub systems of southwest Arizona, low departure results from the strong similarity between reference and current conditions.

LANDFIRE FRCC in Wyoming Big Sagebrush is moderate to high in southwest Wyoming (Figure 1). This high departure is driven primarily by the strong dominance of SClass C in the LANDFIRE SClass layer (Figure 3). Low cover, dwarf shrubs were ubiquitous in the LANDFIRE Cover and Height layers used for SClass mapping (Figure 7). In contrast, the reference conditions predicted dominance of moderate cover, short shrubs, which resulted in moderate to high levels of departure when reference conditions were compared to current. SClass review highlighted apparent problems with the height layer, but did not indicate that cover was potentially erroneous. Thus the dwarf shrubs were assigned to SClass C instead of SClass B, which would have been assigned if the SClass rules were interpreted literally; this demonstrates the potential ability of SClass review to help overcome potential mapping error to produce the final SClass layer. However, it is possible that the combination of cover and height are insufficient to correctly distinguish successional status in this system.

While conifer and cheatgrass invasion were identified as major contributors to higher departure in this system, both are restricted to small areas in the SClass layer. Relatively few cheatgrass plots resulted in only small areas being assigned to exotics for SClass mapping, and even smaller areas were shown to have conifer encroachment on this system. It is possible that the major contributors to FRCC in this system are under-represented, and that an apparently reasonable measurement of FRCC is driven instead by potential error in the canopy height and cover layers used for SClass mapping.

One important feature of LANDFIRE FRCC in Wyoming Sagebrush in southwest Wyoming is the sharp contrast in FRCC between adjacent subsections. For example, the largest subsection is assigned FRCC III, whereas several surrounding subsections are assigned FRCC II (Figure 1). However, the departure layer reveals that the differences between these subsections are subtle (Figure 6), and differences in FRCC are purely the result of the classification breaks used to classify departure into FRCC. The largest subsection in this system is assigned a departure value of 69 (FRCC III), whereas departure adjacent subsections range from 57-66%.

<b>Zone</b>	<b>BpS unit</b> (Error! Reference source not found.)	<b>Dominant FRCC</b> (Figure 1)	<b>Dominant Fire Regime Group</b>	<b>Reference or Current?</b>	<b>Dominant Sclass</b> (Figure 4)	<b>Dominant Cover</b> (Figures 5,6)	<b>Dominant Height</b> (Figures 5, 6)	<b>SClass instructions from review</b>
<b>14</b>	<b>11090:</b> Sonoran Paloverde-Mixed Cacti Desert Scrub	I	V	RC	C	10-20%	Medium Shrubs (1 - 2.9m)	<ul style="list-style-type: none"> <li>• Departure expected due to invasive plants</li> </ul>
				CC	C	10-20%	Medium Shrubs (1 - 2.9m)	
<b>22</b>	<b>10802:</b> Inter-Mountain Basins Big Sagebrush Shrubland - Wyoming Big Sagebrush	II-III	IV	RC	D	30-60%	Short Shrubs (0.5-0.9m)	<ul style="list-style-type: none"> <li>• Departure expected due to conifer and cheatgrass invasion</li> <li>• Move low cover, dwarf shrubs to C instead of B</li> <li>• Not much expected currently in D</li> </ul>
				CC	C	10-20%	Dwarf Shrubs (<0.5m)	

## Case Study 4: Southwest Arizona & Southwest Wyoming

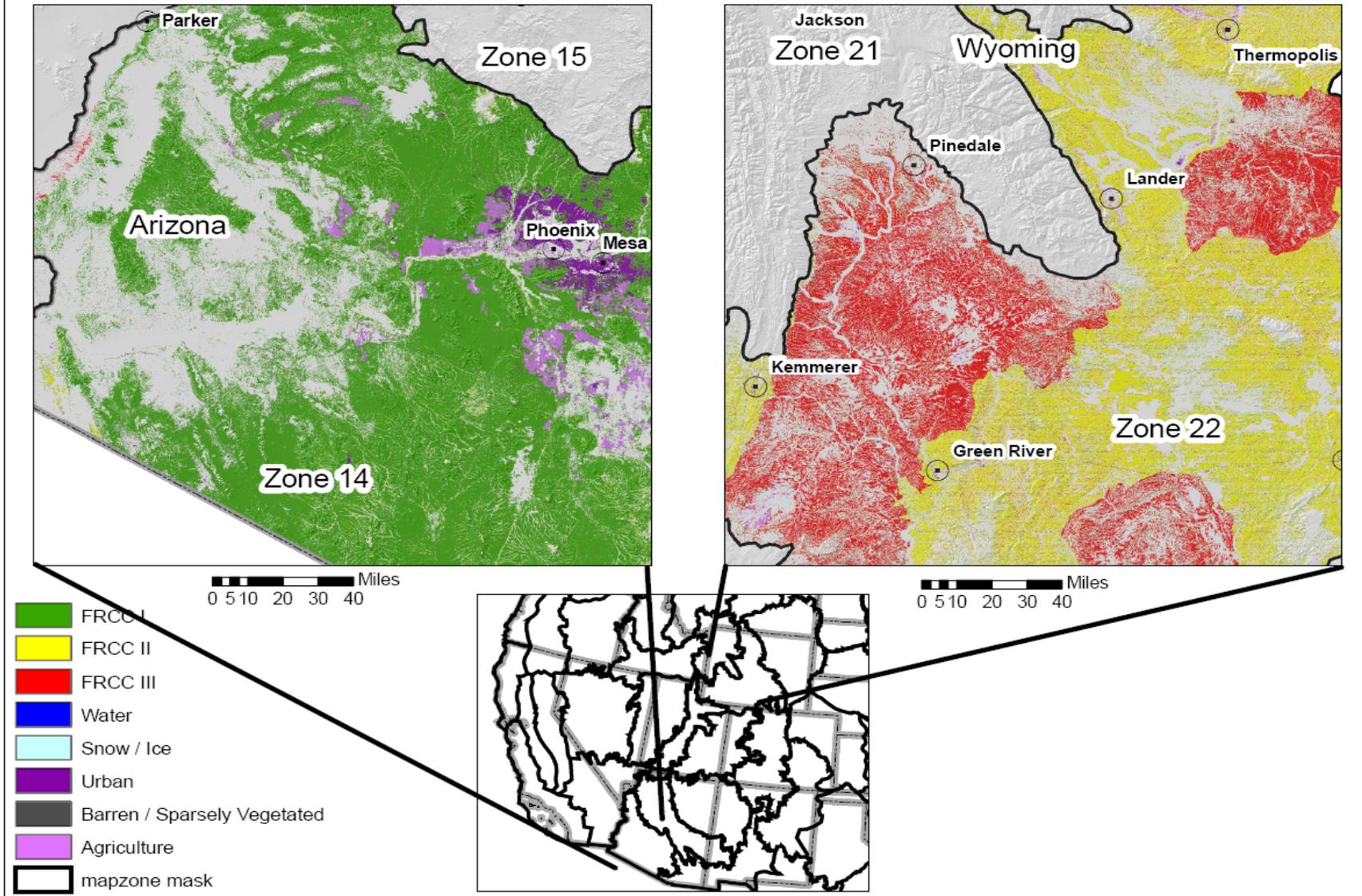
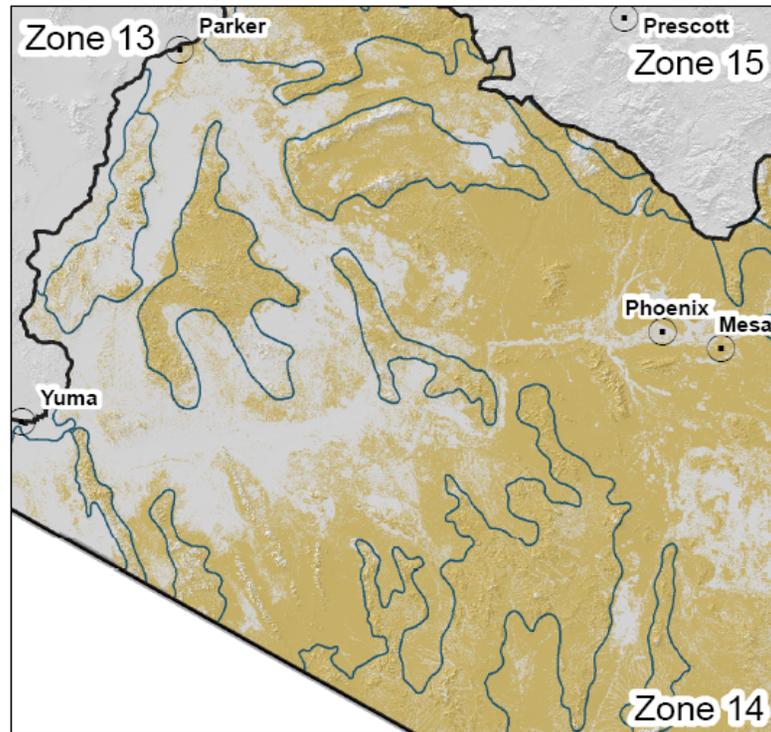


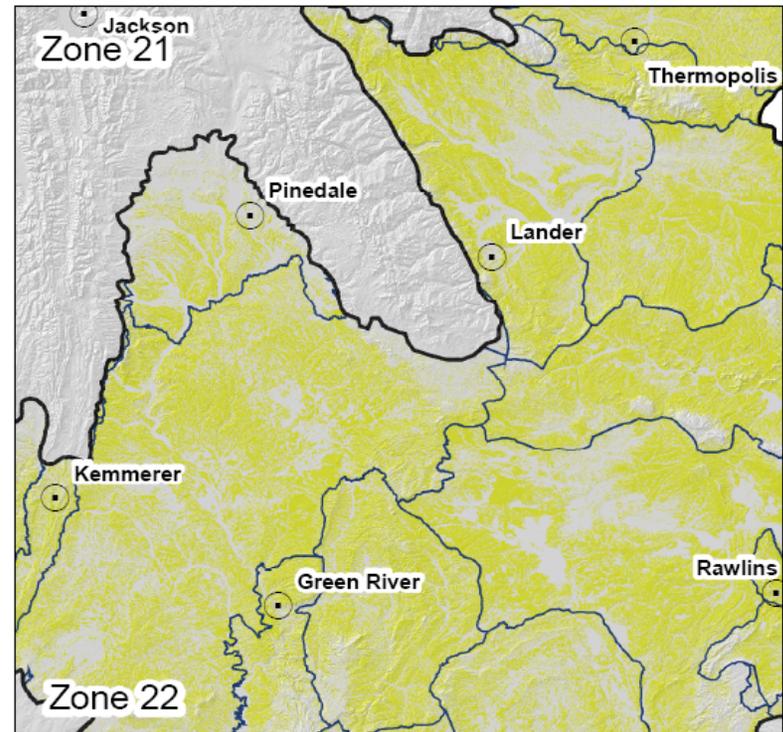
Figure 1: LANDFIRE FRCC for desert shrub systems in Zone 14 in southwestern Arizona and sagebrush systems in Zone 22 in southwestern Wyoming.

## Case Study 4: Southwest Arizona & Southwest Wyoming



### Zone 14 BPS

11090: Sonoran Paloverde-Mixed Cacti Desert Scrub



### Zone 22 BPS

10802: Inter-Mountain Basins Big Sagebrush Shrubland - Wyoming Big Sagebrush

Figure 2: LANDFIRE BpS for desert shrub systems in Zone 14 and sagebrush systems in Zone 22.

## Case Study 4: Southwest Arizona & Southwest Wyoming

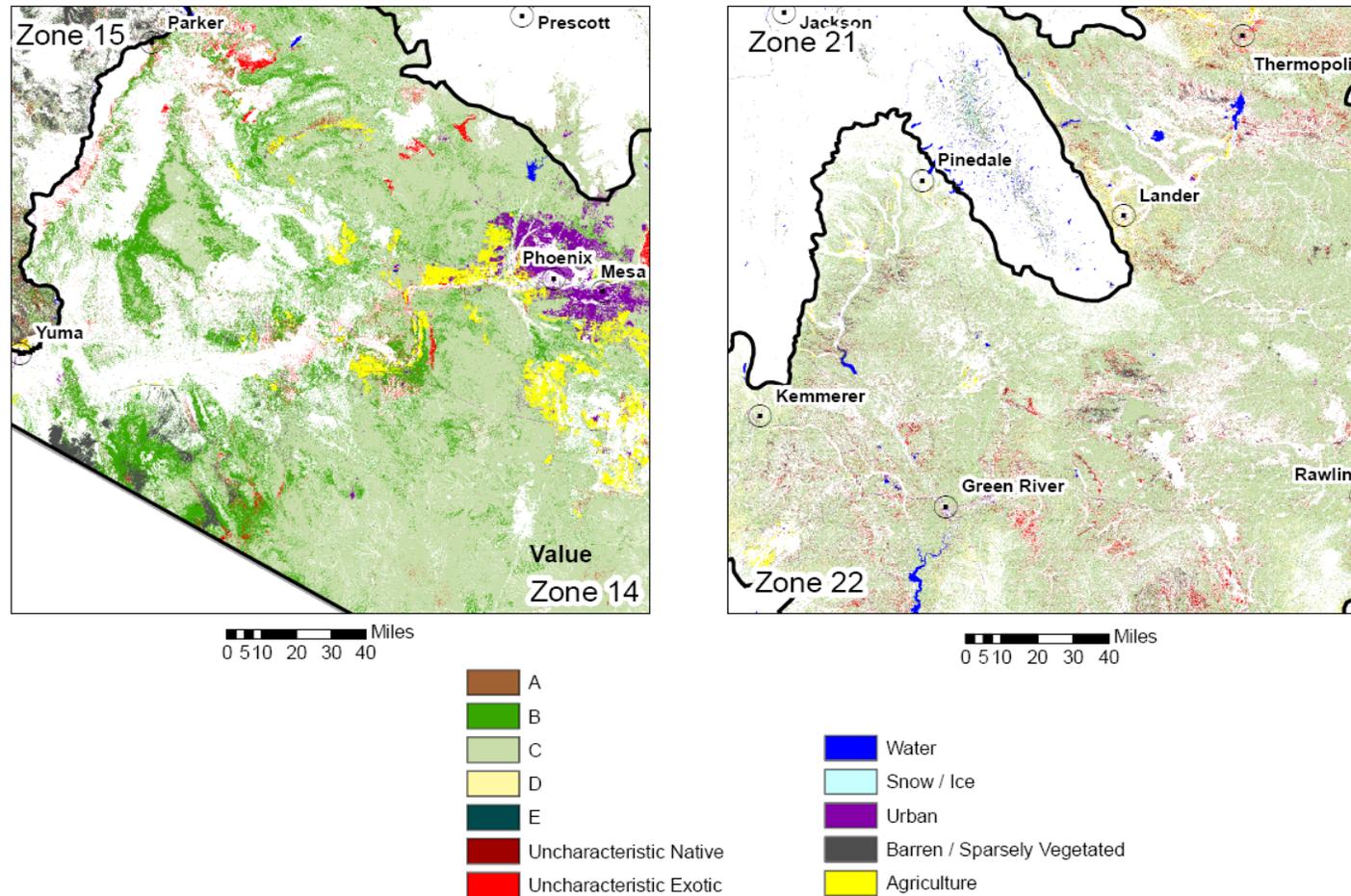
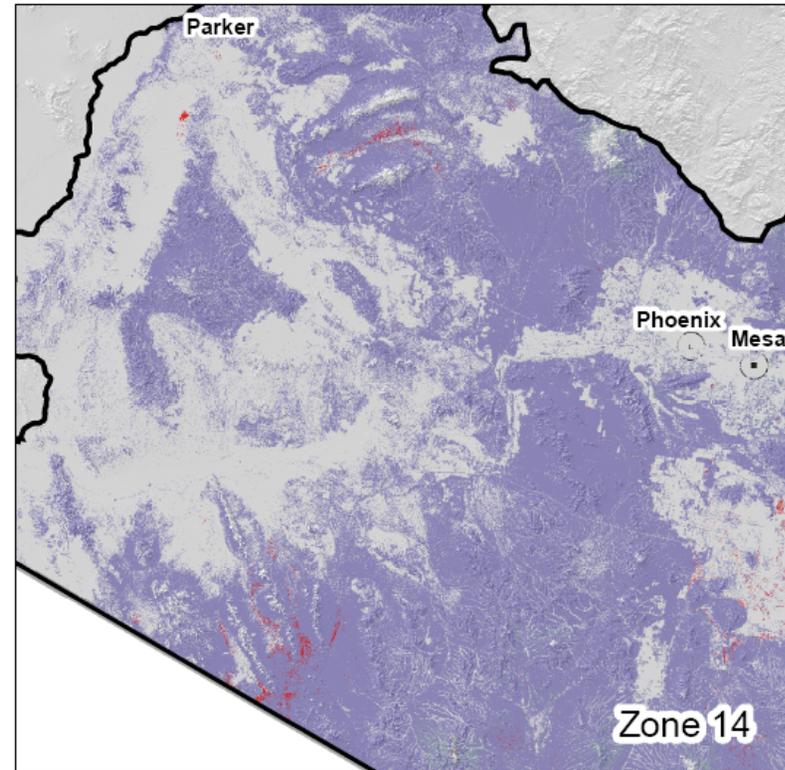
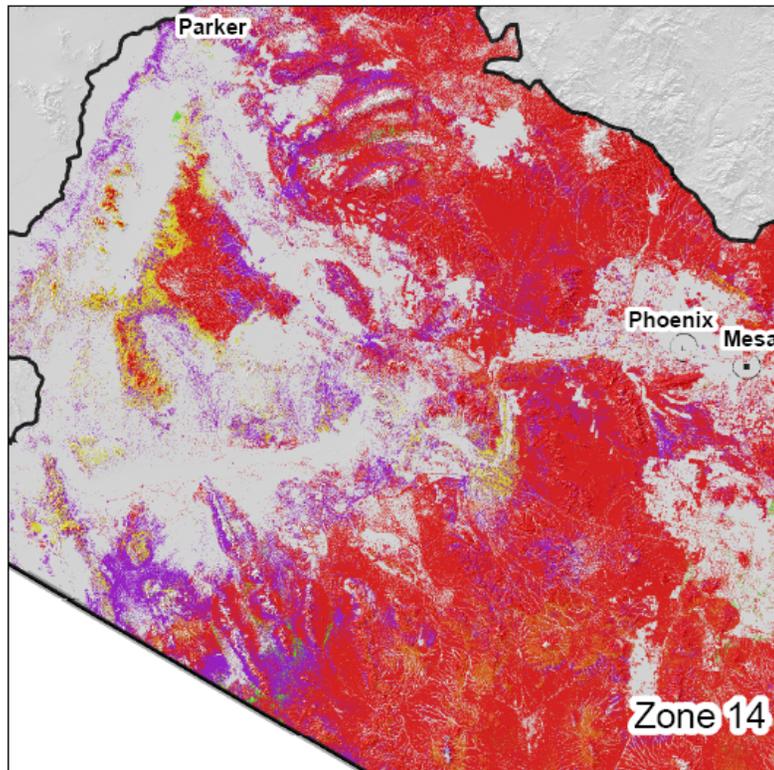


Figure 3: LANDFIRE SClass for desert shrub systems in Zone 14 and sagebrush systems in Zone 22.

## Case Study 4: Southwest Arizona & Southwest Wyoming



### Canopy Height

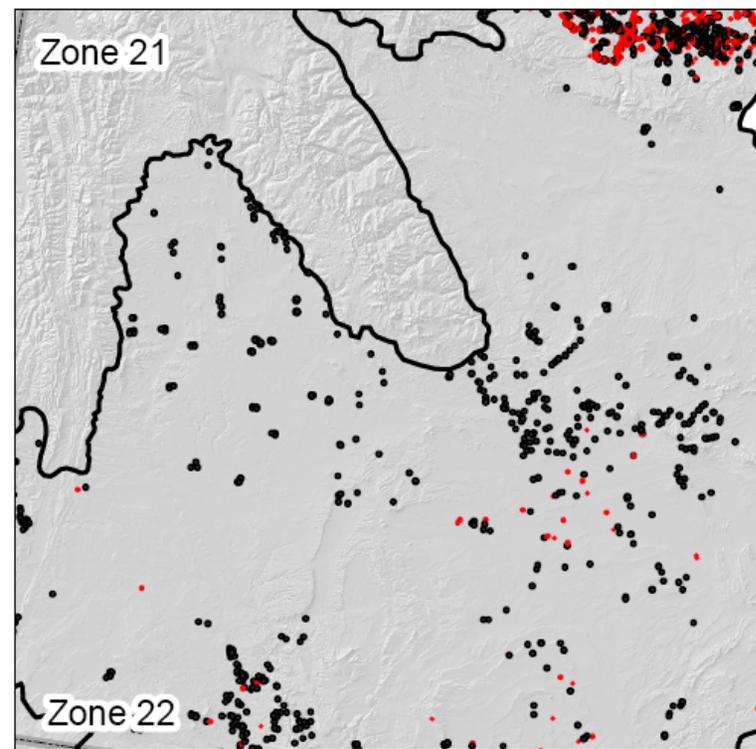
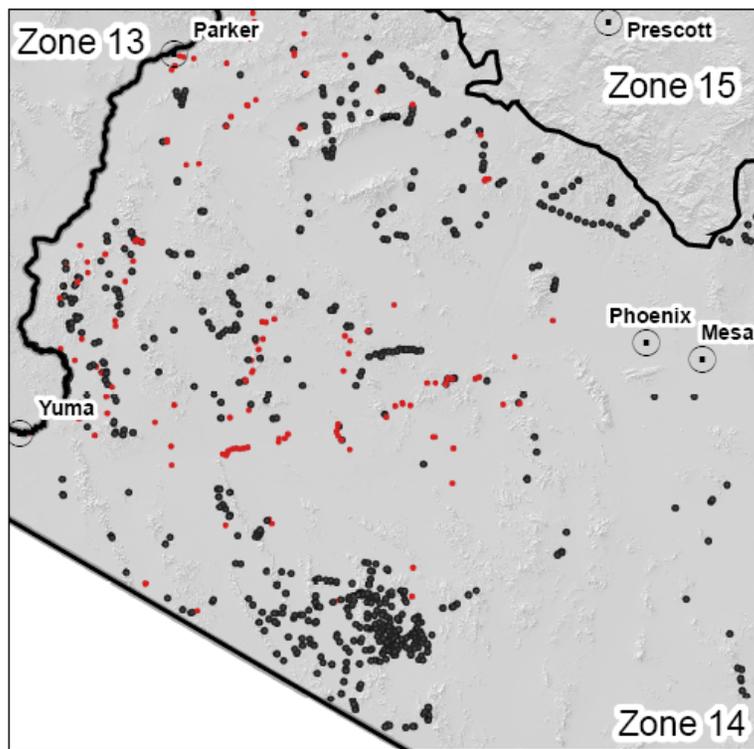


### Canopy Cover



Figure 4: LANDFIRE Canopy Height and Cover for desert shrub systems in Zone 14.

## Case Study 4: Southwest Arizona & Southwest Wyoming



### Exotics Training Plots

- Non-Exotics
- Exotics

Figure 5: LANDFIRE Exotics training plots for desert shrub systems in Zone 14 and sagebrush systems in Zone 22.

## Case Study 4: Southwest Arizona & Southwest Wyoming

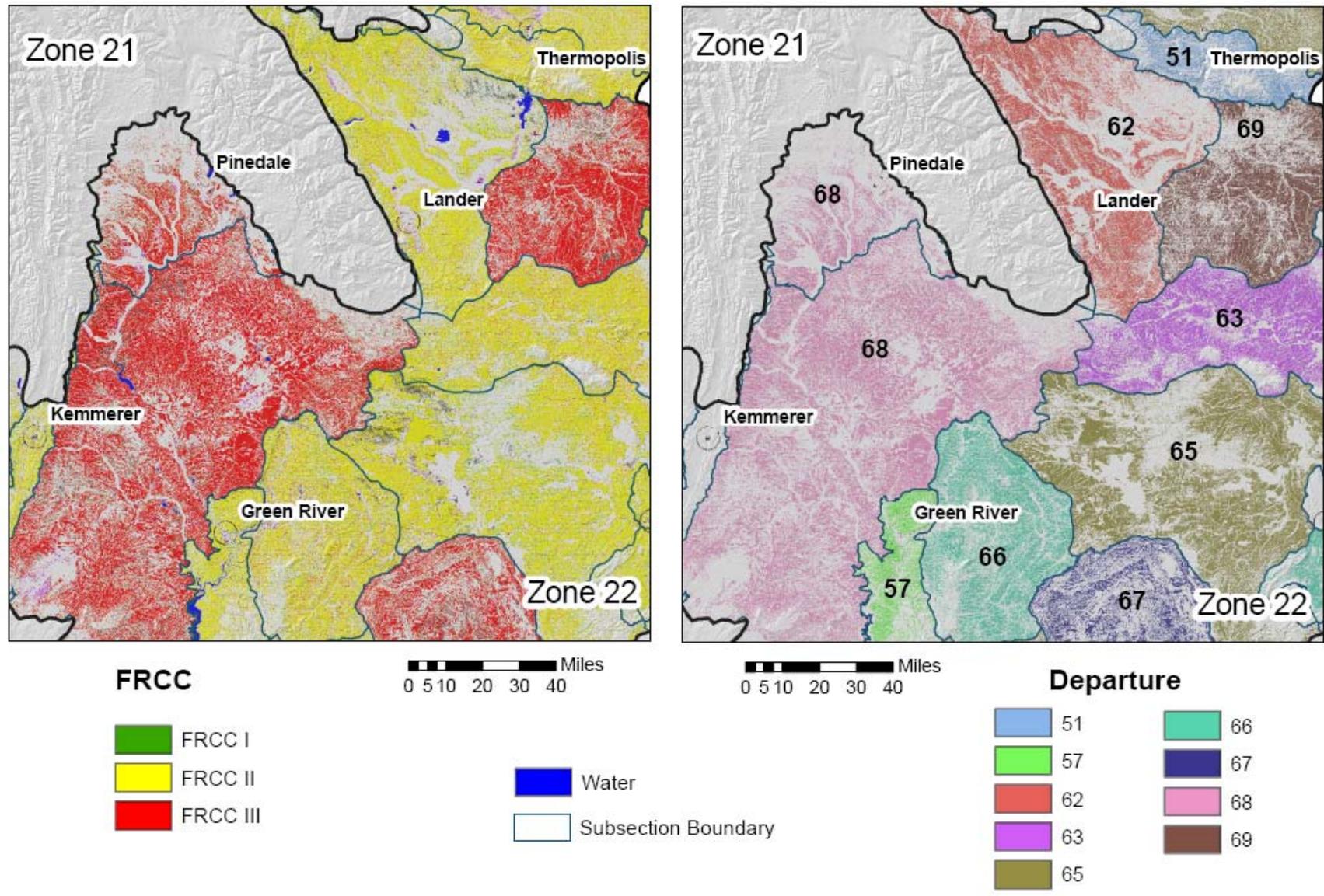
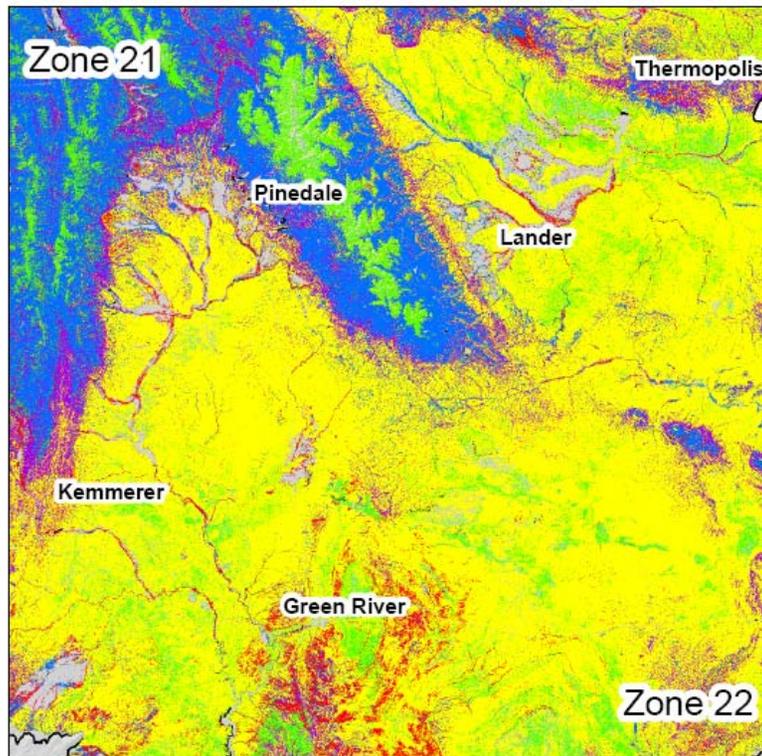
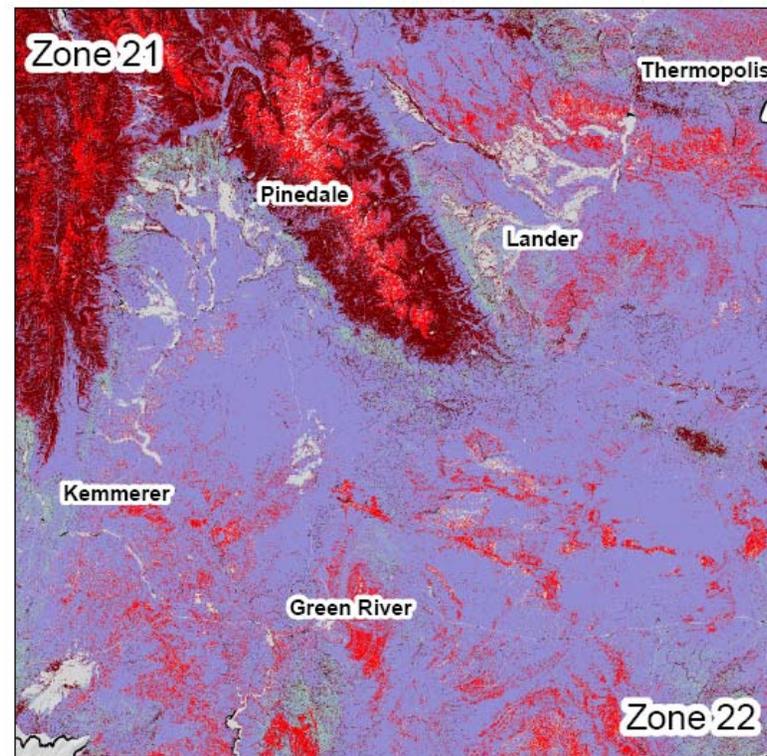


Figure 6: LANDFIRE FRCC versus Departure for sagebrush systems in Zone 22.

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### Canopy Height



### Canopy Cover



Figure 7: LANDFIRE Canopy Height and Cover for sagebrush systems in Zone 22.

