Land managers and conservation biologists have been concerned by the rapid rate of environmental change in the Modoc Plateau and adjacent northwest Great Basin. In order to create a baseline for ecosystem monitoring and management in this region, CDFW, BLM, and CNPS selected a contiguous area of 1.1 million acres to produce a high-resolution vegetation classification and map. Vegetation surveys were conducted in 2016 and a preliminary analysis resulted in the assignment of 65 Associations nested within 46 Alliances. This classification helps identify geographic and ecological settings where management problems tend to be extreme. Observed effects include type-conversion of high-diversity native shrublands to low-diversity non-native annual grasses, and a rapid increase in western juniper colonization, which replaces sagebrush shrublands. In the high elevations, formerly extensive woodlands of Ponderosa pine, Jeffery pine, and mountain mahogany are being eliminated by intense fires and are being replaced by seral shrublands and grasses. This is an interim report; further sampling in the spring and summer of 2017 will refine the classification, and detailed vegetation mapping will follow in 2018.

Figure 1: 373 vegetation surveys were collected in summer 2016 across public lands.

Figure 2: Management concerns are directly related to vegetation type in much of the Modoc.

Figure 3: Medusa-head and type-conversion of the Likely Tableland low sagebrush.

Figure 4: Positive effects of fire. Although land managers have been concerned that the extensive fires of the past few years would negatively impact the landscape, it appears that the most fire-affected areas now show a gain in native vegetation.

Figure 5: High elevation post-fire succession. Although less prone to type-conversion, many higher elevation sites in the Modoc Plateau have experienced more intense fires in the past several decades than in recent historic times. 3a) Extensive areas of Cercocarpus ledifolius and Abies concolor have burned in large fires such as the 2012 Rush Fire. 3b) These have been replaced by stands of obligate seed-banking shrubs like Crambeis ruthelius and reseeding non-native shrubs such as Primus virginiana, Heliosdiscus discolor, and Siphocarpus rotundifolius.

Figure 6: Poorly understood vernal pools and seasonal wetlands. The seasonal wetlands of the Modoc Plateau are floristically transitional between California and Columbia Plateau vegetation types, and several are rare and/or endemic. Summer 2016 sampling identified at least one group of vernal pool vegetation (Muhlenbergia richardsonii – Downingia spp. Provisional Association). Further sampling in the spring of 2017 is needed to clarify relationships. 6a) The shoreline of a temporary lake is dominated by Muhlenbergia richardsonii, but contains California vernal pool species such as Downingia bacigalupii, Navarretia leucocephala, Cuscuta howellii, and Polycarpus brevissimus. 6b) Large drying playa-pool with Taraxa tannatifolius.

Conclusion

The introduction of non-native plants, rangeland practices, recent increase in fire frequencies, and regional climatic shifts have significantly changed the vegetation of the Modoc Plateau. The most heavily altered vegetation types are those from the drier, lower elevations of the study area. These alterations come in two forms:

- Invasive, exotic, largely annual grasses and forbs dominating the herbaceous layer. These provide nearly continuous flashy fuels, encouraging frequent fires that can quickly “type-convert” historic Artemisia shrublands of high species diversity to low-diversity annual grasslands.

- Increasing Juniperus occidentalis presence in areas formerly occupied by Artemisia shrublands or native grasslands. The increase in juniper cover has been significant in the past 100+ years, shading existing vegetation and reducing the cover and density of both woody and herbaceous forage plants for wildlife and non-native ungulates. In contrast, the higher elevation and more arid southeast regions of the study area seem to respond to fire and other disturbance by regenerating historically non-native or obligate seed-banking species, rather than increasing non-native vegetation.

How Vegetation Classification Informs Ecological Trends and Land Management on the Modoc Plateau, California

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