

Cook Property Forest Assessment

Assessor – Mathew Cocking, forester

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Overview

This assessment covers lands owned or operated by Driz Cook. The landowner objectives are to develop the property for outdoor education and learning with students, to encourage or mimic natural ecological processes (such as fire), restore and maintain stand structure and composition representative of the natural history of the site, and improve or sustain overall resilience of resources and ecosystems on the property. The property encompasses one parcel totaling approximately 40 acres in the vicinity of Seven Oaks in the San Bernardino Mountains of California. The parcel is split by a road that accesses a USFS fire station and is surrounded by USFS land. No permanently flowing water exists on the property, however, the landowner does have a goal of developing a well. There are currently no structures on the property. The only infrastructure is an old perimeter fence in disrepair, and a network of seasonal trails and skid roads. The landowner is not aware of any historic sites or artifacts existing or every having been discovered on the property.

The assessment

This assessment is based on data from 35 randomly placed 0.05 acre forest inventory plots across the site and technical expertise of the assessor. Vegetation was mapped by observed composition or type across the entire parcel, and data was collected in all vegetation types totaling more than one acre in area. The assessment provides an ecological or silvicultural description of all vegetation types on the property as well as proposed alternative treatments and maintenance requirements for specific identified units.

Historic Reference and Context

The site occurs above 5000 feet in the San Bernardino Mountains west of Big Bear near Seven Oaks and along a tributary to the Santa Ana River. The property is dominated by a mix of Jeffrey pine (*Pinus jeffreyi*) woodland, sagebrush, chaparral, black oak (*Quercus kelloggii*), and live oak woodland. Dry oak and Jeffrey pine forest types of the Southern California Mountains and Sierra Nevada are similar in composition and ecology. These forest types include a mixture of large statured pines, oaks (*Quercus*), and incense cedar (*Libocedrus decurrens*). The understory is dominated by a variety of shrubs including sagebrush, mountain mahogany, manzanita, scrub oak, and chemise. Jeffrey pine forest types are dry and the climate they occur in is one that perpetuates frequent fires in summer, and tree dormancy in winter with precipitation generally falling as snow during winter months. The pre-European American era context for this forest type is one involving frequent fires either set by tribal peoples or by naturally occurring lightning. Frequent fires played a critical role over several thousand years in shaping and maintaining these ecosystems, resulting in forest structures and species adaptations that provided resilience to these recurring fires. Post-European American contact resulted in the loss of tribal burning practices and introduction of livestock and logging practices. These activities often dramatically altered forest structure and composition during the 19th and early 20th centuries, as large trees were removed

and non-native European grass species were introduced to facilitate grazing. Following the establishment of the US Forest Service early in the 20th century, natural and human lit forest fires have been successfully suppressed for many decades. This has generally resulted in a substantial increase in the density of vegetation and number of trees per acre in Jeffrey pine woodlands and associated habitats in California; pre-disposing them to altered fire effects when fires do occur and often greater than normal tree mortality due to fire. The specific grazing and logging history of the property assessed was not researched for this document, however the presence of larger stumps across the site indicates that there was some timber extraction in the past 50 years, although the timing is unclear. An old perimeter fence may be an indication of historic grazing. The last occurrence of forest fire on the property is not known, although it has likely been more than 50 years since any fire has burned the area. Pre-European forest density in this forest type was likely generally less than 60 trees per acre, with widely spaced overstory pines and California black oaks that were able to survive frequent low intensity fires. The understory was likely composed of a mix of perennial grasses and scattered sagebrush and chaparral species.

Vegetation Type Analysis

The property can be described using five distinct vegetation types. These are scrub oak chaparral, chamise chaparral, planted Coulter pine (*Pinus coulteri*), Jeffrey pine – sagebrush savannah, and live oak woodland. Each of these are described below. In addition, about 1.5 acres of the property is taken up by a road surface, and another 0.3 acres by a dry creek bed wash with little vegetation.

Jeffrey Pine – Sagebrush Savannah

This vegetation type takes up more area than any other vegetation type on the property. In this assessment it has been termed “savannah” due to the naturally low density of overstory trees, especially pines, observed on this site. Canopy cover is variable but appears to generally be 30% or less. Primary tree species in this vegetation type are Jeffrey pine and California black oak. Canyon live oak (*Quercus chrysolepis*) and interior live oak (*Quercus wislizeni*) also occur but are subdominant to Jeffrey pine and black oak. Canyon live oak and interior live oak also appear to be increasing in this zone in the past 50 years (see figure 1). Jeffrey pine density appears to be near the historic reference at about 40-50 trees per acre on this site. However, small diameter live oaks account for 70% of the average tree density, indicating their dramatic increase in numbers in recent decades. The understory is dominated by a variety of shrubs. Most common shrubs are sagebrush (*Artemisia* sp.), manzanita (*Manzanita* sp.), and skunk bush (*Rhus aromatica*).



Plot Inventory Comparison to Reference Site

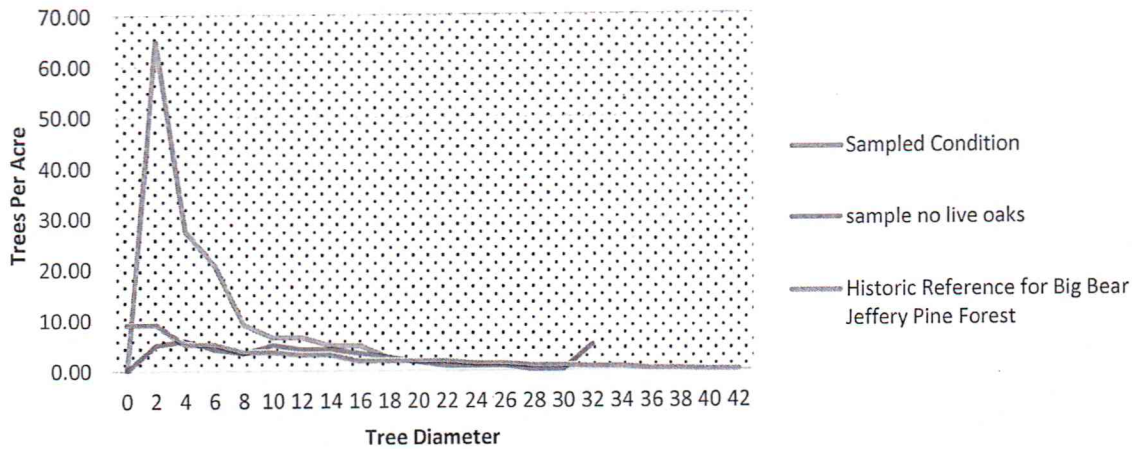
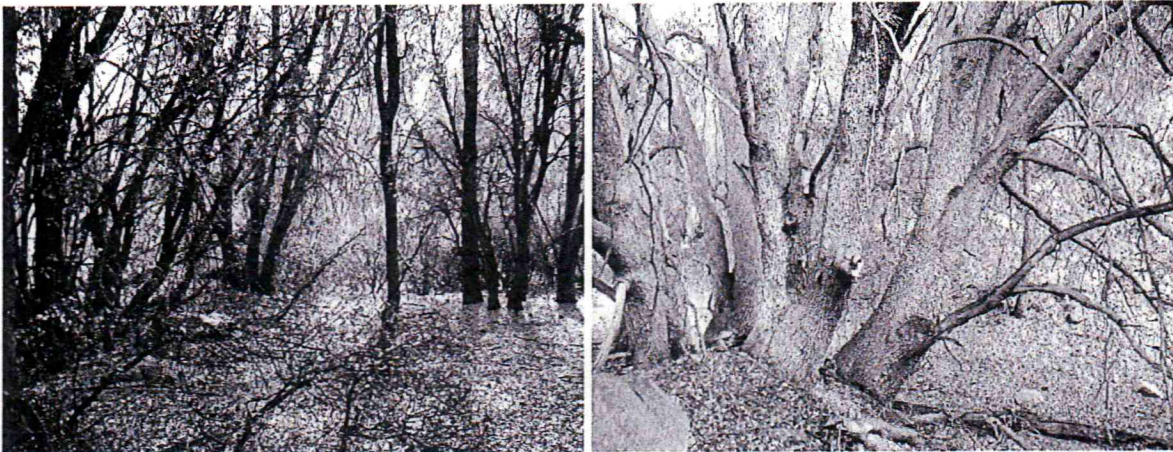


Figure 1) Average density of sampled trees for the Jeffrey pine savannah forest type excluding live oaks (blue line), including live oaks (grey line), and compared with the historic reference density for the forest type (red line). When live oaks are removed from the sample data (blue line), the density by diameter classes of other tree species sampled (primarily Jeffrey pine and California black oak) conforms well to the historic reference forest density profile (red line). Therefore, live oaks appear to account for the large discrepancy between the average sampled density for the site and the expected historic reference density for generally smaller diameter classes (0-12 inches in diameter). One explanation for this is that live oaks are regenerating at a rapid rate while Jeffrey pine and California black oak are not.

Live Oak Woodland

This vegetation type is the second most common on the property, and is associated with dry creek bed areas. The primary tree species in this type is canyon live oak. Interior live oak and Jeffrey pine are also present but less common. One young sugar pine was found in this zone. Canopy cover ranges from 30% to 100%, and average tree density is 286 tree stems per acre (for stems over 1 inch diameter). Canyon live oak and interior live oak also appear to be increasing in density in this zone in the past 50 years. The understory is populated infrequently by shrubs and more commonly by shrub formed interior live oak.



Scrub Oak Chaparral

This vegetation type occurs on rocky or shallower soils on the property and is generally not forested but takes on a chaparral structure composed of scrub oaks (*Quercus berberidifolia*), and stunted interior live oak. These habitats are also co-dominated by tall shrubs such as mountain mahogany (*Cercocarpus betuloides*), chamise (*Adenostoma fasciculatum*), and manzanita. Canopy cover ranges from 70% to 100%.



Chamise Chaparral

This vegetation type occurs on one small area of a steep slope on the property (and occurs in abundance off the northern and western borders of the property) and is not forested. It is dominated by chamise (*Adenostoma fasciculatum*) and other chaparral species. Canopy cover ranges from 70% to 100%.

Planted Coulter Pine

This vegetation type occurs only in the northwestern corner of the property where a Coulter pine planting along Radford Camp Road overlapped with the property. Coulter pine does not appear to be naturally occurring at this site, but is planted densely in the northwest corner of the property and also in other locations along the south border of the property also along Radford Camp Road. The persistence of Coulter pine at this site is unclear since Coulter pine regeneration was not observed.

Treatment Considerations

Jeffrey Pine – Sagebrush Savannah

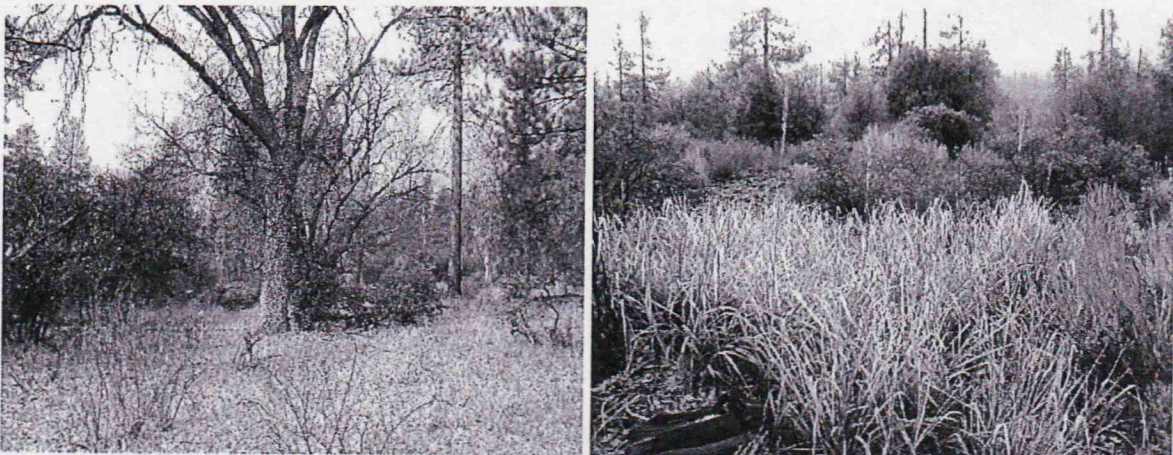
The primary concern for this stand is the increase in live oaks occurring throughout. Most live oaks in this stand type are still young, with the exception of a few larger canyon live oaks. All black oaks in this stand appear to be much older than the majority of live oaks. Jeffrey pines over 30 inches within this stand are also older than smaller diameter live oaks. This increased density of live oaks is concerning in the event of a future fire, and would likely increase fire intensity in many parts of the stand. This could result in above normal Jeffrey pine and black oak mortality if a fire were to occur. In addition to live oak, shrubs are abundant in this stand type due to low tree density and ample sunlight. High shrub cover (>50%) in many areas may also pre-dispose this stand to higher fire intensities if it were to burn. Buildup of pine bark and needle duff around the base of larger pines (observed depth of 8-12 inches) also presents a mortality risk to larger stature pines due to smoldering in the event of a fire.

Over time it is unclear whether live oaks will be able to replace California black oak and Jeffrey pine. California black oak has been known to be replaced by other invading native species in a span of as little as 50 years in other parts of its range due to lack of naturally occurring fire to hold invasions back. Jeffrey pine is also a sun loving species and is adversely affected by increased shade. However, the stature of live oaks is not expected to exceed the height of Jeffrey pine or black oak on this site, therefore, the greater threat to these two species is likely the increased possibility of higher intensity fire than mortality due to overtopping and shade.

An additional concern for Jeffrey pine and California black oak is regeneration. While trees in small diameter classes (<6 inches) were observed for Jeffrey pine, none were observed during the site visit for California black oak. This is likely a result of grazing pressure by native grazers (deer, small mammals, and birds) who eat both the acorns and the freshly germinated shoots, keeping germinated black oak acorns from attaining sapling size. Jeffrey pine mortality in smaller size classes was also observed in several inventory plots as a result of beetle pests. While the amount of mortality observed was not unnatural, the combination of mortality or lack of regeneration with growing space taken up by live oaks may limit long term persistence of black oak and Jeffrey pine on this site if a major disturbance or assistance by planting does not occur.

In the event of a wildfire, invading live oaks are likely to persist by re-sprouting from their root crowns, and would continue to occupy the site and increase in the stand. Multiple, short interval fire disturbances or treatments (such as herbicide) that kill the roots of live oaks are the only mechanisms by which the increased density of live oaks can be brought back to a more historic range of variability wherein less invasive maintenance would become effective.

Understory grasses were less common than sagebrush and associated sage community shrubs. However some areas were dominated by healthy stands of native grass (pictured below). This association could be enhanced by limiting establishment of shrubs in some areas, or by following shrub removal treatments with native grass planting in specific areas. Good candidate areas would be those underneath large black oaks and Jeffrey pines. One grass species was observed and not identified in two locations in the Jeffrey pine – sagebrush savannah stand type (pictured below). If invasive, removal measures should be planned.



(Left) stand of healthy grass under California black oak; (right) unidentified, large stature grass species.

Resource Concerns: Stand compositional shift to live oak, long-term stand health and resilience to wildfire, non-existent California black oak regeneration (no saplings observed).

Recommended actions: A forest stand improvement project focusing on reduction of small diameter canyon live oaks and interior live oaks would be an initial step toward restoring a more historic stand structure. This could be performed with mechanized equipment, by chain saws or other hand tools, or a combination of both. Follow up treatments will be needed to control re-sprouting of live oaks. Live oak sprouts could be treated by hand every spring (and might eventually die), or can be more effectively treated with a systemic herbicide immediately after being cut. Initial stand treatment should be designed to focus around existing California black oak and Jeffrey pine trees to buffer them from a future fire disturbance. All young live oaks, brush and pines under 10 inches in diameter should be removed from 2 times the width of each overstory tree's dripline. Pines should be limbed to at least 12 feet or to two thirds the tree height for trees less than 20 feet tall. The landowner might also consider implementing a phased approach to removal of duff layers around the trunks of larger pines. Fine roots can grow into the duff layer, and a sudden removal of large amounts of duff can weaken or stress pines. Removing duff in increments over the course of a few years would have less potential impact on individual pine health. Once duff is reduced to several inches or less, pines should stand a better chance of not being girdling by smoldering duff fires during wildfire.

A maintenance plan for controlling re-sprouting live oaks and shrubs, and further invasion by live oaks should be developed for this habitat type. Prescribed burning, while operationally difficult, is a more natural method for performing regular maintenance and can be extremely effective while benefiting overall habitat conditions and ecosystem health. If desired, a more in-depth analysis of understory plants and health could be pursued and incorporated into overall ecosystem management.

Live Oak Woodlands

Live oak woodlands on the property contain many well-formed and larger stature canyon live oaks. Interior live oak and canyon live oak may also be increasing in density in this stand type. Stem density is high (over 200 stems per acre), however, stems are organized in clumping patterns (as re-sprouts from a previous disturbance or simply due to natural habit). These clumps often have many stems connected to the same root system. This characteristic was commonplace throughout woodland stands on the property and likely inflated stem counts in this stand type. Of the two live oak species present, canyon live oak has much greater size potential and when old is more likely to survive low-intensity fires without being top-killed. High stem density could limit the survival of larger oaks and occasional Jeffrey pines in this stand if a fire were to occur.

Resource Concerns: Long-term stand health and resilience to wildfire due to increasing stem density.

Recommended actions: A forest stand improvement project focusing on reduction of small diameter canyon live oaks and interior live oaks would be an initial step toward restoring a more fire resilient stand structure. This could be performed with mechanized equipment, by chain saws or other hand tools, or a combination of both. Treatments should be focused within and slightly beyond the dripline of existing larger oaks (> 14 inches in diameter). Limbs less than 6 inches in diameter should be removed from retained oaks up to 8 feet. A proportion of multi-stemmed canyon live oaks within the woodland stands should be reduced to fewer stems to encourage height and diameter growth into one or several stems.

Scrub Oak and Chamise Chaparral

These stand types do not cover a large percentage of the property and appear to be functioning within their expected natural range of variability. No significant issues were observed. On the northwest portion of the property, parts of this habitat type have had vegetation pruned and thinned. This has caused a major re-sprouting event both from root crowns and along the trunks of limbed live oaks and scrub oaks. Chaparral vegetation types are adapted to burn with very high intensity and crowded, dense

stand conditions are natural and expected. Alteration of stand conditions, such as has been performed on the northwest part of the property, may change projected fire behavior so that a chaparral crown fire is less likely during a fire. This is an important goal when considering defense of homes and infrastructure, but in natural settings this effort lacks a definable usefulness. In addition to being naturally thick, these ecosystems provide exceptional wildlife cover and nesting habitat if left to grow unhindered. Over the long-term (50+years) if a fire disturbance does not occur, stands could be re-evaluated for health and vigor.

Resource Concerns: None.

Recommended actions: None.

Planted Coulter Pine

This forest type only covers a small corner of the property and was not sampled. This tree species does not appear to have historically occurred on this property, but does occur naturally at slightly lower elevations in the San Bernardino Mountains. Therefore removal of these trees would not pose any significant environmental impact to the property. Alternatively, the pines could be left as is since they cover less than a 1 acre area. The pines have already been limbed up due to their proximity to Radford Camp Road. Regeneration of Coulter pine was not observed, and invasion potential of this species seems minimal. If a fire occurs, however, the site should be monitored for post-fire Coulter pine regeneration.

Resource Concerns: Pines not endemic to site.

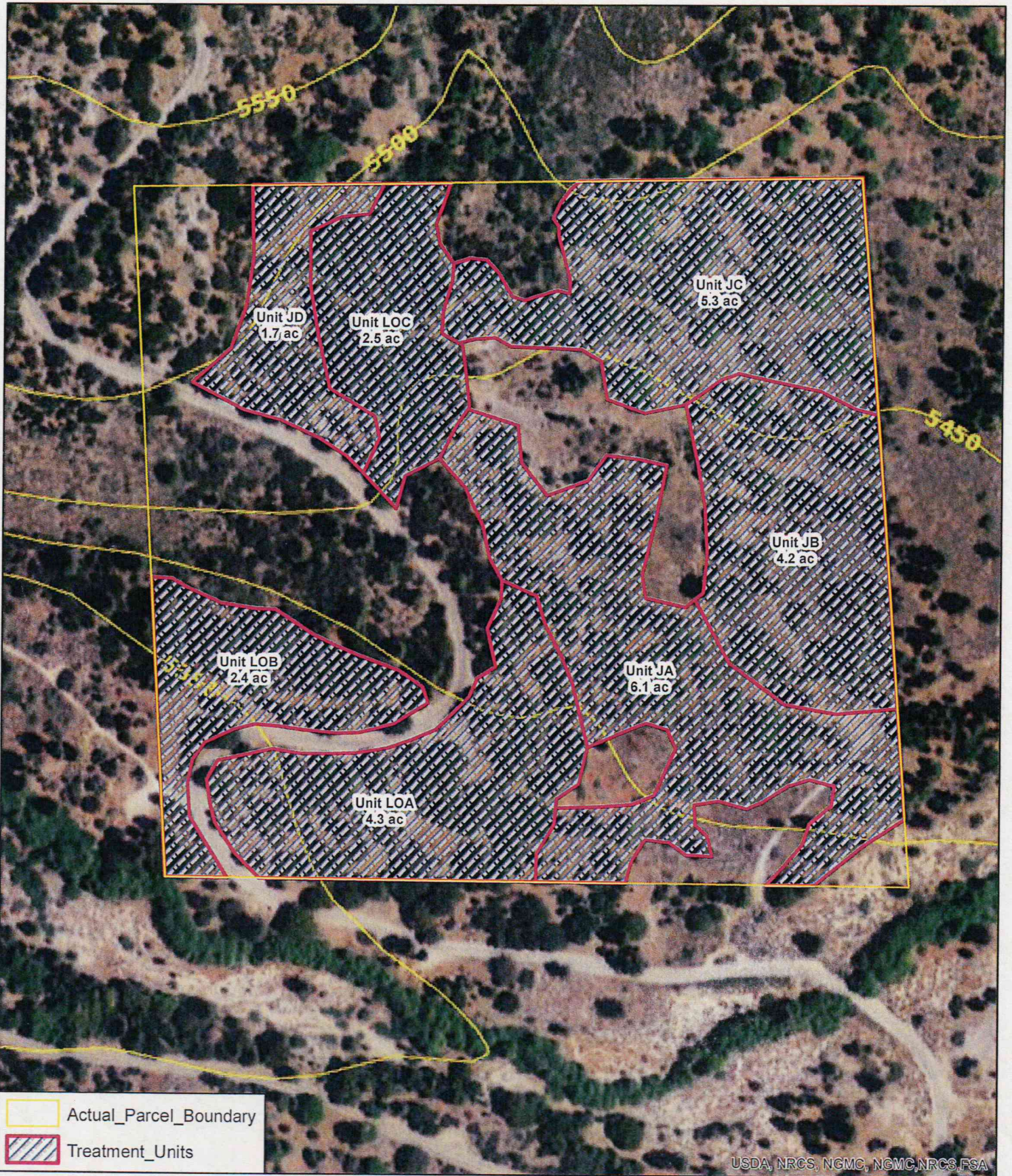
Recommended actions: None.

Treatment Units

The property has been divided into a series of treatment units organized by vegetation stand type for areas with most pressing resource concerns. These are Jeffrey pine savannah units JA, JB, JC and JD; and live oak woodland units LOA, LOB and LOC. Non-forested areas were excluded from possible treatment (see attached map).

Treatment Unit Map

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Vegetation Type Map

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GMC, NGMC, NRCS, FSA

