AMSET Comments following review of issues related to East Bay Hills Hazardous Fire Risk Reduction Draft EIS

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September 27, 2013

It's evident that the current condition of natural fuels in the wildland urban interface of the East Bay Hills poses a significant risk from wildland fire. Given the increased fire risk brought by the presence of eucalyptus trees in the East Bay Hills, complete removal of this species would seem to be an effective means of reducing such risk. However, complete removal of overstory trees can introduce changes to the environment which increase fire behavior in undesirable ways. First, the removal of the overstory, is likely to result in rapid establishment of native and non-native herbaceous and brush communities, bringing an increase in available surface fuels. Secondly, removal of the overstory will result in changes to environmental factors which are known to cause increases in fire behavior.

Background

The East Bay Hills, like many areas throughout California, are prone to fire which is a natural disturbance force that has shaped the landscape. The East Bay Hills are prone to fast moving, high intensity fires, due to the occurrence of natural shrublands, dominated by naturally occurring coyote brush (*Baccharis pilularison)*, as well as highly flammable blue gum eucalyptus *(Eucalyptus globulus)*, a non-native species which was introduced to the area in the early 1900's. It's our understanding after review of the Draft EIS, and associated comments, that the project proposes to mitigate the risk of wildland fires in the East Bay Hills wildland urban interface by removal of most or all of the eucalyptus overstory within the project area.

Non-native eucalyptus found in the project area undoubtedly contributes to high risk wildfires in this area. Features of bluegum eucalyptus that promote fire spread include heavy litter fall, and flammable oils in the foliage. The bark catches fire readily, and deciduous bark streamers and lichen epiphytes tend to carry fire into the canopy which tends to send out flying embers that area carried by the wind and result in the development of spot fires that ignite in advance of the fire's leading edge (Ashton 1981). While acknowledging these significant issues, there are undesirable effects of removing the eucalyptus overstory which deserve careful consideration.

Increase in Brush

A cursory literature review indicates that removal of eucalyptus stands in the East Bay Hills is likely to result in a colonization of those sites by a combination of native and non-native herbaceous and chaparral communities (native Baccharis, and invasive broom species). A study by Keeley (2005) shows that shrublands are expanding in the San Francisco East Bay region due to limited environmental controls from fire and grazing. According to Keeley's study, fire has never been frequent enough to act as a significant factor limiting brush communities in the area. He states that in the past, grazing pressure has been the force keeping brushlands in check. With reduced grazing pressure during the latter half of the 20^{th} century, grassland communities are being replaced by brushland communities.

Overstory trees limit the ability of understory species to become established by limiting sunlight, moisture, and nutrient resources that are required. Removal of the eucalyptus overstory would increase sunlight, and reduce the competition for moisture and nutrients. Without significant controls in place the result would likely be rapid introduction and expansion of brushland species, and thus, increases in live surface fuel loading into areas where the eucalyptus overstory is removed.

Increase in Fire Behavior

Increases in live surface fuel loads result in increases in potential surface fire behavior. According to Russell and McBride (2003), the natural succession from grasslands to Baccharis shrublands in the East Bay Hills indicates a dramatic increase in fire hazard for those areas. On productive sites, Baccharis often exceeds two meters high (Russell and Thompkins, 2005). According to The U.S. Fire Administration Technical Report on the 1991 East Bay Hills Fire, brush fuel types played a significant role in the progression of the fire: "The brushland would probably make up a large portion of the available fuel, particularly in the northeastern portion of the fire area."

Managing Wildland Fuels

Wildfires pose major risks to people property and ecosystem attributes in many parts of the world. While there are many different facets of management aimed at reducing wildfire risk, the treatment of natural fuel is pivotal to this aim (Reinhardt et al., 2008). Fuel treatments are designed to alter the arrangement and quantity of fuel in order to reduce the likelihood of ignition, rate of spread and intensity of wildfires. Methods vary from clearing vegetation, mechanical thinning of trees to prescribed fire.

Creating more fire resilient stands implies a three-part process of reducing surface fuels, reducing ladder fuels, and reducing crown density (Agee and Skinner 2005). Harvest alone only treats the ladder and canopy fuels and does little to address the surface fuels which are typically the primary carrier of an advancing fire. Slashing, combined with biomass utilization or grapple-piling and pile burning are also effective methods of treating surface fuels, both natural and activity created. However, it is not as effective in reducing the fine fuel loading (the smallest branchwood material) as is prescribed fire.

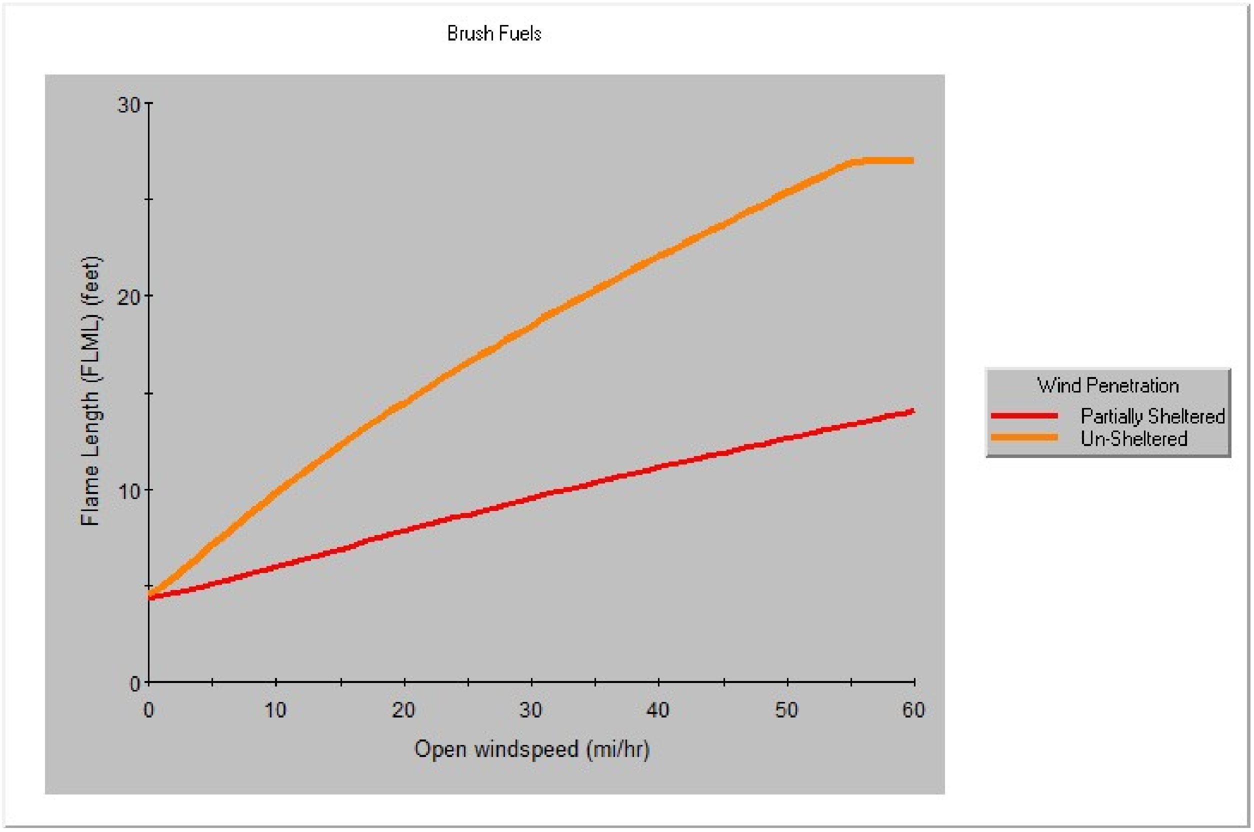
The effectiveness of treatment in reducing fuels and altering fire behavior is dependent on the type and intensity of treatment. The length of individual treatment effectiveness for these types of fuel treatments will range from 7 to 15 years dependent on initial treatment levels (Finney et al. 2007, Graham et al. 2004). Fuel reduction activities that include the use of prescribed fire are generally the most successful in reducing fuels (Graham et al. 1999).

In areas dominated by eucalyptus, studies in Australia suggested that the amount of fine fuel (<6 mm diameter) available on the forest floor (i.e. fuel consumed by the fire) was the most significant fuel variable affecting the behavior of fires in eucalyptus forests. These authors claimed that the rate of spread of the head fire is directly proportional to the load of fine fuel consumed. If the rate of spread is directly proportional to fuel load, then reducing the fuel load by half, halves the rate of spread and reduces the intensity of the fire fourfold. This relationship between fuel load, rate of spread, and fire intensity has provided a simple but powerful argument to support fuel reduction burning in eucalyptus forests for more than 50 years. (Gould et al. 2011). In the Berkeley–Oakland Hills, fuel buildup occurs very rapidly, 95% of equilibrium reached in 27 years in un-managed eucalyptus stands (Agee, 1973). To maintain low fuel levels a fuel reduction program should be implemented.

From a fire behavior standpoint commercial thinning from below that would target smaller diameter trees leaving the largest dominate trees on the landscape, followed by surface and ladder fuel treatments provides the highest level of reduction in potential fire behavior. These treatments and combinations of these treatments would break up the horizontal and vertical continuity from the surface fuels to the canopy fuels, by increasing canopy base height, and reducing canopy bulk density thus reducing the likelihood of crown fire ignition. Aerial fuels separated from surface fuels by large gaps are more difficult to ignite, thus requiring higher intensity surface fires, surface fires of longer duration, or ignition from spotting to ignite the crowns, and of course wind.

Removal of the eucalyptus overstory would reduce the amount of shading on surface fuels, increase the wind speeds to the forest floor, reduce the relative humidity at the forest floor, increase the fuel temperature, and reduce fuel moisture. These factors may increase the probability of ignition over current conditions.

Furthermore, complete removal of the eucalyptus overstory would result in increases in wind speed which result in a more severe range of fire behavior effects as previously mentioned above. The following illustration is an example of predicted or anticipated flame length for a partially sheltered and an un-sheltered brush fuel model to illustrate lower wind speeds for a thinned stand versus higher wind speeds found with complete removal of eucalyptus trees.



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