CALIFORNIA LICENSED FORESTERS ASSOCIATION

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3/4/2019

J. Keith Gilless, Chair
State Board of Forestry and Fire Protection
P.O. Box 944246
Sacramento, CA 94244-2460

Re: 1052.4 Emergency Notice for Fuel Hazard Reduction

To Whom It May Concern:

The following analysis and comment has been prepared to assist the Forest Practice Committee in responding to the letter presented by CFA, which requested that the Board consider making revisions to the Emergency Notice for Fuel Hazard Reduction regarding post-harvest stocking levels. Thank you for your consideration.

Respectfully submitted,

Harlan Tranmer, President
California Licensed Foresters Association

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Analysis based on:
Stephens, S. L., J. M. Lydersen, B. M. Collins, D. L. Fry, and M. D. Meyer. 2015. Historical and current landscape-scale ponderosa pine and mixed conifer forest structure in the Southern Sierra Nevada. Ecosphere 6(5):79. http://dx.doi.org/10.1890/ES14-00379.1

Abstract. Many managers today are tasked with restoring forests to mitigate the potential for uncharacteristically severe fire. One challenge to this mandate is the lack of large-scale reference information on forest structure prior to impacts from Euro-American settlement. **We used a robust 1911 historical dataset that covers a large geographic extent (>10,000 ha) and has unbiased sampling locations to compare past and current forest conditions for ponderosa pine and mixed conifer forests in the southern Sierra Nevada.** The 1911 dataset contained records from 18,052 trees in 378 sampled transects, totaling just over 300 ha in transect area. Forest structure was highly variable in 1911 and shrubs were found in 54% of transects. **Total tree basal area ranged from 1 to 60 m^2/ha [4-260 ft^2/ac] and tree density from 2 to 170/ha [<1-69 per acre] (based on trees >30 cm dbh [12 inches dbh]).** K-means cluster analysis divided transects into four groups: mixed conifer-high basal area (MC High BA), mixed conifer-average basal area (MC Ave BA), mixed conifer-average basal area-high shrubs (MC Ave BA Shrubs), and ponderosa pine (Pond Pine). **The percentage of this 1911 landscape that experienced high severity fire was low and varied from 1–3% in mixed conifer forests and 4–6% in ponderosa pine forests.** **Comparing forest inventory data from 1911 to the present indicates that current forests have changed drastically, particularly in tree density, canopy cover, the density of large trees, dominance of white fir in mixed conifer forests, and the similarity of tree basal area in contemporary ponderosa pine and mixed conifer forests. Average forest canopy cover increased from 25–49% in mixed conifer forests, and from 12–49% in ponderosa pine forests from 1911 to the present;** canopy cover in current forest types is similar but in 1911 mixed conifer forests had twice the canopy cover as ponderosa pine forests. **Current forest restoration goals in the southern Sierra Nevada are often skewed toward the higher range of these historical values, which will limit the effectiveness of these treatments if the objective is to produce resilient forest ecosystems into the future.**

(Emphasis added.)

See next page for a table of comparative stand conditions that can inform stocking, density, tree size, and canopy cover standards for our discussion, at least for inland forest types.

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Table 6. Historical and contemporary forest structure for two major forest types in Kern National Forest study area. Historical forest structure is based on historical systematic timber survey transects conducted in 1911; contemporary structure is based on Forest Inventory and Analysis (FIA) plots measured between 2001 and 2008. Asterisks indicate statistical significance by forest type between 1911 and FIA (*P < 0.05, **P < 0.01, ***P < 0.001). Values are presented as mean ± SD.

	Mixed conifer		Ponderosa pine	
Characteristic	1911	FIA	1911	FIA
N (plots)	221	270	157	124
Basal area (m^2 ha^{-1})				
Fir	10.2 ± 8.8	16.1*** ± 22.3	2.0 ± 3.4	2.8 ± 8.3
Incense-cedar	10.7 ± 6.2	5.1*** ± 9.0	2.1 ± 2.8	3.0 ± 6.2
Sugar pine	3.2 ± 3.3	2.9 ± 5.2	0.6 ± 1.1	1.0 ± 4.8
Ponderosa pine	5.3 ± 4.7	6.6* ± 9.5	6.5 ± 4.5	8.7* ± 9.8
Other	NA	4.1 ± 8.7	NA	3.7 ± 7.4
Total†	29.5 ± 9.9	30.8 ± 24.0	11.2 ± 5.1	15.6** ± 13.8
Tree density (ha^{-1})				
30.4–61.0 cm dbh	41.0 ± 21.8	103.9*** ± 79.1	11.8 ± 8.9	95.3*** ± 86.3
61.1–91.4 cm dbh	17.3 ± 8.2	20.7* ± 18.9	6.6 ± 4.4	11.2*** ± 12.5
> 91.4 cm dbh	16.7 ± 9.2	8.7*** ± 10.9	6.9 ± 4.1	2.2*** ± 5.0
Total	75.0 ± 26.9	133.3*** ± 85.0	25.2 ± 12.1	108.6*** ± 88.0
Canopy cover (%)	25.2 ± 7.1	49.1* ± 19.9	12.1 ± 5.1	49.2* ± 22.5

† Does not include other species to maintain consistency with 1911 inventory.

Converted to imperial units by A. Eggleton; basal area by species omitted.

	Mixed Conifer		Ponderosa Pine	
Characteristic	1911	FIA	1911	FIA
N (plots)	221	270	157	124
Basal Area (ft^2/ac)				
Total ƚ	128.5 ± 43.1	134.2 ± 104.5	48.8 ± 22.2	68.0** ± 60.1
Tree density (per acre)				
12"-24" dbh	16.6 ± 8.8	42.1*** ± 32.0	4.8 ± 3.6	38.6*** ± 34.9
24.1"-36" dbh	7.0 ± 3.3	8.4* ± 7.7	2.7 ± 1.8	4.5*** ± 5.1
>36" dbh	6.8 ± 3.7	3.5*** ± 4.4	2.8 ± 1.7	0.9*** ± 2.0
Total	30.4 ± 10.9	54.0*** ± 34.4	10.2 ± 4.9	44.0*** ± 35.6
Canopy cover (%)	25.2 ± 7.1	49.1* ± 19.9	12.1 ± 5.1	49.2* ± 22.5

ƚ Does not include "other" species to maintain consistency with 1911 inventory

Important points illustrated in the tables above:

1. **Basal area within the Ponderosa Pine**
   According to this study, the historic *average* basal area of ponderosa pine stands was approximately 50 square feet per acre. This supports the suggestion for a lower stocking standard at least in stands that are >50% ponderosa pine by basal area, instead of the current standards listed in 1052.4(d)(4) which reference the commercial thinning and selection standards of 14 CCR 913. Even within the mixed conifer

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the historic average was approximately 130 square feet, but as the paper aptly states "current forest restoration goals in the southern Sierra Nevada are often skewed toward the higher range of these historical values, which will limit the effectiveness of these treatments if the objective is to produce resilient forest ecosystems into the future."

2. **Total trees per acre**
   This study only includes trees greater than 12" DBH in calculation of trees per acre. The reported historical TPAs were very low. While we would not suggest mimicking this condition, it seems that current standard (1052.4(d)(3)(B) that there shall be no more than 200 trees per acre DBH is probably too high to affect fire behavior.

3. **Canopy cover**
   Note that the FIA data indicates that on average, stands within the Southern Sierra Nevada are already at approximately 50% canopy cover, the currently listed maximum standard in 1052.4(d)(3)(A). Therefore, many stands have no ability to be treated per this standard. Stephens et al found that in 1911 in the Southern Sierra Nevada, average canopy cover was observed at 12% and 25% in ponderosa pine and mixed conifer types, respectively. Five other studies on historic stand structures throughout the west referenced by Stephens et al reported values of 13-27% canopy cover in historical western pine and mixed conifer forests. It is recommended that the minimum canopy closure be more reflective of historic conditions, even at least the high end of the range. One standard deviation above the average canopy cover for the historic mixed conifer data presented by Stephens et al would be approximately 30% canopy closure.

In order to utilize the Emergency Notice for Fuel Hazard in an effective manner, CLFA provides the following scenario for revisions to the stocking standards as well as canopy closure requirements contained within 1052.4(d). This scenario does not encompass all situations, we appreciate the importance of diversity across the landscape, and the need for various habitat types, forest structures and common fire behavior types. When considering the evidence provided through peer-reviewed scientific research, the Emergency Notice should reflect a base minimum of 50 square feet, which is allowable with a THP or MTHP-FHR. If the Board is concerned about the wholesale application of this lower standard, one way to balance it would be to have it apply in stands in which the average stand diameter is less than or equal to 24" at dbh. This modification would allow for the use of the Emergency Notice in plantation-type stands, many of which cannot be feasibly treated for both horizontal and vertical fuel continutity, and create an effective fuelbreak, with the current standard following the commercial thin type requirement. The benefits for this level of stocking, in stands that experience vigorous growth following release, creates a safer, defensible space for firefighting efforts. It also allows for longer-term viability as a fuel break, and with consistent treatment, can be effective long-term fuels treatments.

In the case that the Board feels the need to balance the allowance of a 50 square foot minimum basal area, stands with an average diameter greater than 24" inches at dbh could be treated instead to a 75 square foot standard. This would make the Emergency Notice a much more effective tool than the current standard for creating fuelbreaks in stands with a larger average diameter. The current standards are much too high to be effective in the stands that are comprised of these tree sizes. These stands have the possibility for recruitment of larger trees, yet often have canopy closure that is minimally affected by removal of only smaller sized trees,

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typically classified as ladder fuels. The standard of 75 square feet is lower than currently required, but also allows Maximum Sustained Production, as growth on residual trees is increased due to reduced nutrient competition.

The importance to allow for the cutting of larger trees is to promote an increase in Canopy Base Height (CBH) (which is one of the most effective ways to reduce the probability of torching and spread of fire into tree crowns) but also to reduce the horizontal continuity between larger, more established canopies that require greater modification in order to effectively prevent crown to crown travel of fire. The Emergency Notice as written already promotes the recruitment of larger trees in 14 CCR 1052.4(d) Vegetation Treatments. It states "Tree removal shall target understory trees. The residual stand shall consist primarily of healthy and vigorous dominant and co-dominant trees from the pre-harvest stand." However, there is no current standard for addressing dead, dying, and otherwise hazardous trees to the infrastructure listed in 1052.4(c). Additionally, the current standards assume that the largest trees are always healthy and desirable to be left in the stand. A revision stating that the largest trees are required to be retained only if healthy would be helpful in maintaining the longevity of these fuel treatments, reducing the input of future large fuels in the stand from mortality, and protecting the assets listed in 1052.4(c).

In order to reflect the changes in stocking, canopy closure must also be revised and we suggest that the standards are revised to more closely reflect historical conditions. Canopy closure has drastically increased in forested systems since the inception of fire exclusion. Historic canopy closure as presented by Stephens et al 2015 is recommended as a guide to obtain fire resilience and effective fuels conditions for firefighting efforts. The current standards are much too high to slow fire rates of spread or provide a safe location for suppression efforts and are much higher than illustrated historical levels. In the data presented by Stephens et al (2015), the highest historical value for canopy cover percentage in fire resilient stands was less than 30% in all stand types, and even lower in most stand types.

Modification to stands that have at present experienced over 100 years of fire suppression should be treated to promote fire resilience, reduce competition, increase growth and recruitment of large trees, and allow for management and protection of dynamic stand types and ages for the benefit of all forest use in the future. As Stephens et al states, "Current forest restoration goals in the southern Sierra Nevada are often skewed toward the higher range of these historical values, which will limit the effectiveness of these treatments if the objective is to produce resilient forest ecosystems into the future." We are proposing these revisions to inform standards for fuelbreaks with historic forest conditions which did not support the types of high severity wildfire that former Governor Brown dubbed "the new normal". If we do not accept the "new normal" for our society, then there is indeed an Emergency need for the creation of fuel breaks and defensible zones.