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Research Brief for Resource Managers

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Mastication Fuel Treatments Impact Chaparral Structure and Biodiversity

Brennan, T.J. and J.E. Keeley. 2017. Impacts of mastication fuel treatments on California chaparral vegetation structure and composition. Fire Ecology Vol:13-3 Pages 120-138.
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In hopes of mitigating the threat of wildland fire, mechanical mastication fuel treatments are routinely applied to chaparral vegetation. However, the impacts of these pre-fire treatments are poorly understood. So these authors answered the following four questions:

1. How does mastication affect community structure, diversity and composition?
2. How does mastication affect the native to non-native species ratio?
3. How does time since treatment affect chaparral structure and composition?
4. To what extent do masticated treatments mimic early post-fire succession?

By comparing 149, 10m X 100m masticated sites to an equal number of nearby, paired wildfire control sites (i.e., not pre-fire mastication treated; in the Angeles, Cleveland, Los Padres, and San Bernardino National Forests of southern California, USA), the authors found the masticated sites had reduced woody vegetation height and cover, along with an increase in herbaceous cover and diversity over time (Fig. 2). Further, non-

Management Implications:

- Mechanical mastication can alter shrub composition by favoring recruitment traits of one species at the expense of another. This can consequently make communities less resilient to future disturbances.
- Non-native grasses, which persist in masticated communities over time, have the capacity to alter fire dynamics as well as promote the conversion of native shrublands to shallow-rooted herbaceous systems.
- Inherent in the treatment is a surface layer of woody debris that if subjected to wildfire could result in prolonged soil heating with temperatures capable of damaging plant structures and killing soil stored seeds.
- Mechanical mastication is not a surrogate for wildfire in chaparral because it does not induce fire stimulated seed germination, which is necessary for a number of dominant shrub species as well as ephemeral post-fire endemics.
- Mastication fuel treatments in chaparral are not in alignment with resource conservation and thus should only be considered where the loss of natural resources is acceptable to mitigate the potential threat of wildfire.

native cover, density, and diversity were significantly higher in the masticated plots and did not exhibit a declining relationship with time-since- treatment over an eight year period after fire.

In contrast, a two year post-fire comparison showed that there were a number of similarities between the control and the masticated communities during the early recovery years. However, the masticated treatment plots still differed structurally in having a dense woody layer of woody treatment debris that was absent on burned sites (Fig. 3).

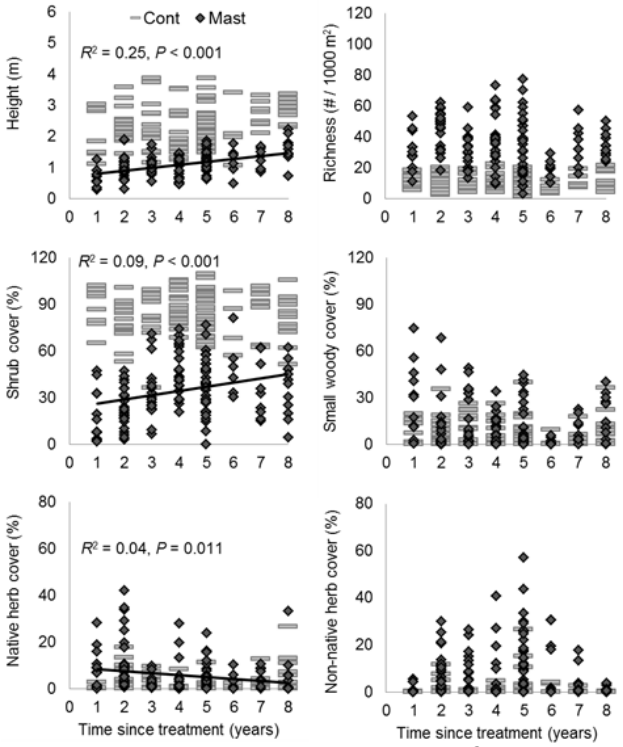

Figure 2. Stand height, richness (# / 1000 m^2), and cover (% ground surface covered) of plants in controls and masticated fuel treatments of chaparral in southern California by time since treatment year (n = 149) (2011-2012).

Figure 3. Comparison of one-year-old chaparral in a masticated treatment plot a) and a nearby post-fire plot b) in southern California. Both plots were disturbed on the same day when a spark from the masticator ignited a fire that burned through untreated vegetation in September of 2010. The masticated plot was covered with downed woody treatment debris which was absent from the post-fire plot where all dead biomass was consumed by the fire. The post-fire plot was dominated by *Ehrendorferia chrysantha*, a post-fire endemic, which was absent from the masticated plot only a couple of hundred meters away. Photo credit: Chelsea Morgan (2011).