Appendix 1: Supplemental Methods

*Processing high-severity models*

Our first high-severity model (hsm) was the predicted Composite Burn Index (CBIp) for the 2011 Las Conchas fire only (hsm1: single burn), using a high-severity threshold of CBIp >= 225 that is the regional standard. Our second hsm was the cumulative predicted CBI from the 1996 Dome fire, the 1998 Oso fire, the 2000 Cerro Grande fire, and the 2011 Las Conchas fire, still using a high-severity threshold of CBIp >= 2.25 (hsm2: multi burn). The derivation of these two models followed the methods of Parks et al. (2019). Our third hsm is the inverse of a forest refugia layer developed using postfire 1m National Agriculture Imagery Program (NAIP) imagery, such that pixel values of 1 represented areas devoid of conifer cover (hsm3: treeless). Derivation of this model followed the methods of Walker et al. (2019). For consistent comparisons among models, we resampled the 1m refugia layer to a 30 m resolution using nearest neighbor resampling (r.resample) in the GRASS software program. All three raster high-severity models were then vectorized to determine patch size characteristics.

For each hsm, we implemented a series of simplifying operations on the vectorized high-severity patch layers in order to simplify vector geometry, speed processing times, and truncate the small patch end of the distribution where accuracy predicting high-severity effects is reduced (Miller and Quayle 2015). These operations were used to generate the null distribution of patch sizes for each scenario, which was then compared against simulated random patches (below). The first operation was to remove small patches <= 1 ha, and remove small holes within larger patches <= 1 ha. Because these vectorized patch layers were derived from 30 m rasters, this was equivalent to patches and holes of 11 contiguous pixels (0.99 ha) or less.

The second operation was to split larger (>100 ha) polygons (patches) at narrow pinch points, with the reasoning that narrow pinch points are functionally equivalent to patch edges from the perspective of seed dispersal, habitat corridors, and other ecological processes. To do this, we first buffered the edges of a given larger patch inward by a given buffer increment. Where this process resulted in splitting the single original patch into two or more new patches greater than 10 ha, we then expanded the edges of the smallest of the new patches (those > 10 ha) by a new increment slightly larger than the original increment, and split the original larger patch by the edge of the newly expanded smaller patch. This creates a boundary between two separate patches at a pinch point, and increases the number of patches in the layer by 1. We did this iteratively for every patch >100 ha until no new patches >10 ha were created by the given buffer increment, and then we expanded to a larger buffer increments. We did this process for increments of 15, 30, 60 and 120 m, in that order.

**References**

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