**Supplemental Info**

To investigate the relationship between our stand-replacing decay coefficient (SDC) metric and other spatial statistics, we calculated two metrics of patch complexity typically used in the FRAGSTATS software package (McGarigal and Marks 1995). Specifically, we calculated the area-weighted mean shape index (AWMSI) and the area-weighted mean patch fractal dimension (AWMPFD), two metrics that provide information on patch complexity while remaining fairly insensitive to the spatial grain or extent of the landscape (Wu et al. 2002). The mean shape index (*MSI*) is calculated over *n* patches within a fire as

where *P* is the patch perimeter and *A* is the patch area; the MSI is functionally equivalent to the mean edge:area ratio of all patches. The *AWMSI* is then the area-weighted MSI. Similarly, the mean patch fractal dimension (MPFD) is calculated over *n* patches within a fire as

and the AWMPFD is then the area-weighted MPFD.

We found a correlation between SDC and AWMSI (on a log scale), but not between SDC and AWMPFD (Fig. S1). However, the relationship between SDC and AWMSI is less consistent for more simply-shaped (lower AWMSI) patches; for instance, two fires with a similar ln(AWMSI) of -4.6 can have quite different SDC values, such as ln(SDC) = -5.28 for the 2008 Venture fire and ln(SDC) = -6.19 for the 2015 Castle fire (Fig. S1). This small difference on the log scale is equivalent to the difference between a fire with approximately 20 ha circular patches (Venture fire) and a fire with approximately 100 ha circular patches (Castle fire) (Fig. 2). Thus, the SDC appears to simultaneously give an indication of patch complexity (Fig. S1, Fig. 3), patch size (Fig. 2), fire size (Fig. 5b) and percent stand-replacing (Fig. 5c), making it a convenient single metric by which to compare fires that vary in multiple spatial dimensions.



**Figure S1**: Relationship between SDC and Area-weighted Mean Shape Index (AWMSI, A) and Area-weighted Mean Patch Fractal Dimension (AWMPFD, B) among the 483 sampled fires.

Citations

McGarigal, K., and B. J. Marks. 1995. FRAGSTATS: spatial pattern analysis program for quantifying landscape structure. USDA Forest Service General Technical Report PNW-GTR-351. USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Wu, J., W. Shen, W. Sun, and P. T. Tueller. 2002. Empirical patterns of the effects of changing scale on landscape metrics. Landscape Ecology **17**:761-782.