**Running Head**

**Title**

Trends in spatial patterns of stand-replacing fire in California mixed-conifer forests, 1984-2015

**Authors**

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**Introduction**

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**Methods**

For our analysis we selected all wildfires in California that burned between 1984 and 2015 where the following criteria were met: 1) at least 80 ha in size, 2) predominantly (>50%) in yellow pine or mixed-conifer forest according to the CALVEG classification scheme ([Keeler-Wolf 2007](#_ENREF_1)), 3) occurring in northwestern California, the southern Cascades, or the Sierra Nevada, 4) predominantly (>50%) on land managed by either the US Forest Service or the US Park Service, and 5) having a mapped burn-severity classification layer available. These criteria led us to a sample size of 477 fires. For each fire we defined the location of stand-replacing fire the set of polygons mapped as >90% basal area mortality using the thresholds in Relative differenced Normalized Burn Ratio (RdNBR) from pre- and post-fire LANDSAT imagery described in [Miller et al. (2009)](#_ENREF_2) and available at (url).

We calculated the stand-replacing decay coefficient (SDC) for each fire following the methods of Collins et al. (2017). SDC is defined by the following equation:

where *P* is the proportion of the original stand-replacing area in the fire that exceeds a given buffer distance inward from the patch edge (*D*), and *SDC* is a free parameter fit by nonlinear least squares estimation that simultaneously describes the size and complexity of stand-replacing area (Collins et al. 2017). We reasoned that not all edges are biologically equivalent, as outer edges of stand-replacing patches would be more likely to contribute conifer seed into the patch than edges of very small internal “holes” within stand-replacing patches that were mapped as <90% basal area mortality but most often were mapped as having >75% basal area mortality. Therefore we filled in any “holes” of 9 contiguous 30 m pixels (0.81 ha) or smaller, and considered these part of the stand-replacing patch when calculating SDC.

For each fire

**Results**

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**Discussion**

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**Acknowledgments**

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**Literature Cited**

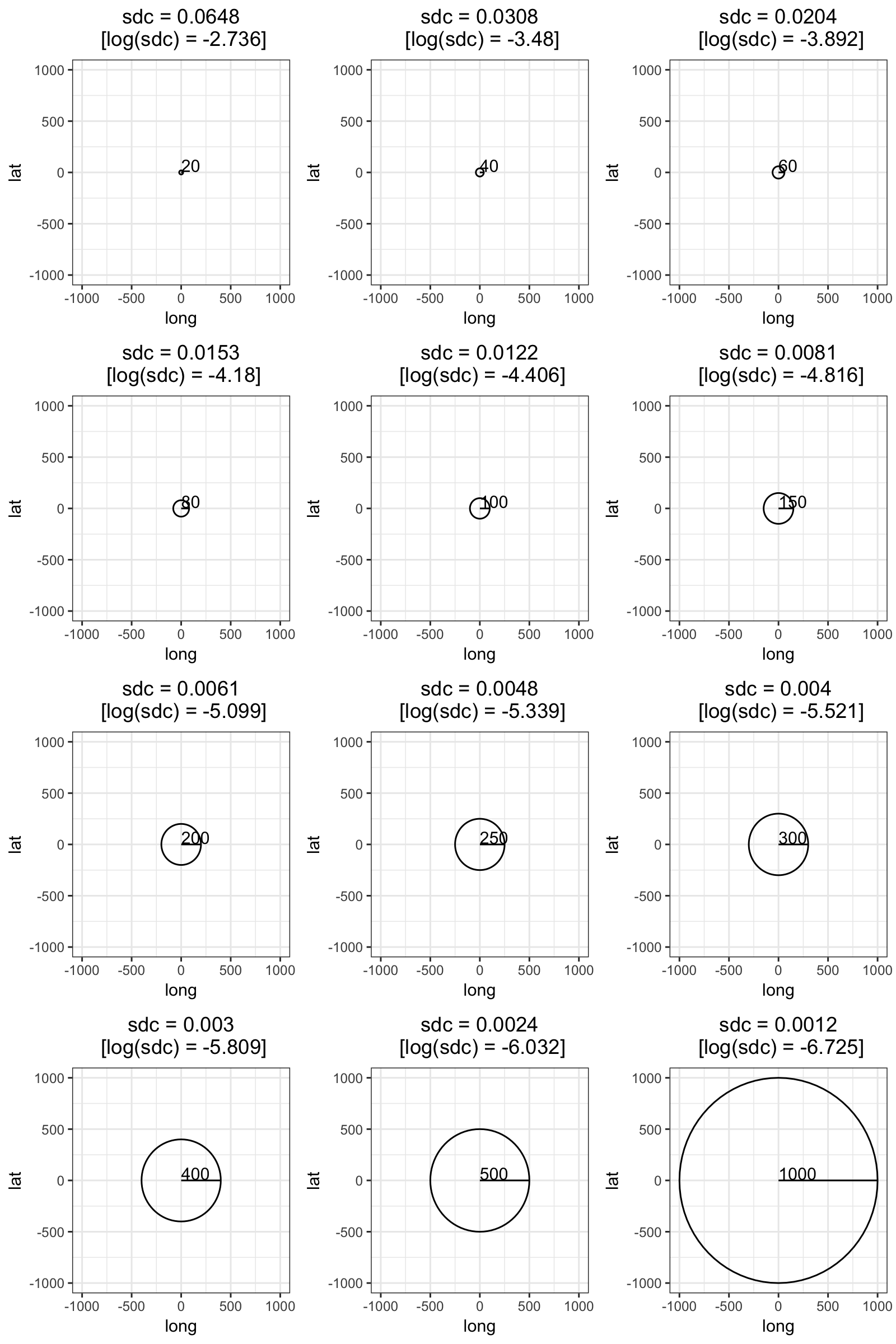
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Miller, J. D., E. E. Knapp, C. H. Key, C. N. Skinner, C. J. Isbell, R. M. Creasy, and J. W. Sherlock. 2009. Calibration and validation of the relative differenced Normalized Burn Ratio (RdNBR) to three measures of fire severity in the Sierra Nevada and Klamath Mountains, California, USA. Remote Sensing of Environment **113**:645-656.

**Table 1**

|  | **Model #** | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Model AIC  /coefficients** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| AIC | 890.12 | 890.73 | 890.86 | 890.87 | 891.17 | 891.18 | 891.2 | 891.37 | 891.72 | 891.84 |
| (Intercept) | -4.986 | -5.005 | -4.978 | -4.982 | -4.998 | -5.01 | -4.998 | -4.981 | -5.003 | -4.988 |
| agencyUSF | 0.386 | 0.387 | 0.422 | 0.412 | 0.42 | 0.46 | 0.388 | 0.387 | 0.411 | 0.4 |
| agencyNPS | 0.483 | 0.512 | 0.481 | 0.475 | 0.508 | 0.536 | 0.517 | 0.494 | 0.506 | 0.486 |
| classWFU | 0.193 | 0.211 | 0.176 | 0.185 | 0.195 | 0.196 | 0.2 | 0.184 | 0.205 | 0.193 |
| max\_tmmx\_std | -0.053 | -0.046 | -0.11 | -0.044 | -0.047 |  | -0.054 | -0.11 | -0.037 | -0.048 |
| fire\_year\_std | -0.121 | -0.053 |  | -0.119 |  |  |  |  | -0.048 | -0.13 |
| max\_bi\_std |  |  | 0.076 | 0.085 | -0.042 | -0.049 |  |  | -0.031 |  |
| max\_tmmn\_std | 0.082 |  | -0.047 | -0.035 |  |  |  | 0.068 |  | 0.094 |
| min\_rmax\_std |  |  |  |  |  |  |  |  |  | 0.019 |

**Figure 1**: Range of possible SDC values as a function of patch radius

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**Figure 2**: Regression tree based off model 2 (Table 1). Values in ovals are ln-transformed SDC values.

