Supplemental material for:

How will climate change affect wildland fire severity in the western US?

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Table S1. Descriptions of the 20 CGMs used to model mid-century (2040-2069) fire severity under RCP 8.5.

| Model          | Climate institute                                                                 |
|----------------|-----------------------------------------------------------------------------------|
| BCC-CSM1-1     | Beijing Climate Center, China Meteorological Administration, China                |
| BCC-CSM1-1-M   | Beijing Climate Center, China Meteorological Administration, China                |
| BNU-ESM        | College of Global Change and Earth System Science, Beijing Normal University, China |
| CanESM2        | Canadian Centre for Climate Modeling and Analysis                                  |
| CCSM4          | National Center for Atmospheric Research, USA                                      |
| CNRM-CM5       | National Centre of Meteorological Research, France                                 |
| CSIRO-Mk3.6.0  | Commonwealth Scientific and Industrial Research Organization/Queensland Climate Change Centre of Excellence, Australia |
| GFDL-ESM2G     | NOAA Geophysical Fluid Dynamics Laboratory, USA                                    |
| GFDL-ESM2M     | NOAA Geophysical Fluid Dynamics Laboratory, USA                                    |
| HadGEM2-CC     | Met Office Hadley Center, UK                                                       |
| HadGEM2-ES     | Met Office Hadley Center, UK                                                       |
| INM-CM4        | Institute for Numerical Mathematics, Russia                                        |
| IPSL-CM5A-LR   | Institute Pierre-Simon Laplace, France                                            |
| IPSL-CM5A-MR   | Institute Pierre-Simon Laplace, France                                            |
| IPSL-CM5B-LR   | Institute Pierre-Simon Laplace, France                                            |
| MIROC5         | Atmosphere and Ocean Research Institute (The University of Tokyo), National Institute for Environmental Studies, and Japan Agency for Marine-Earth Science and Technology |
| MIROC-ESM      | Japan Agency for Marine-Earth Science and Technology, Atmosphere and Ocean Research Institute (The University of Tokyo), and National Institute for Environmental Studies |
| MIROC-ESM-CHEM | Japan Agency for Marine-Earth Science and Technology, Atmosphere and Ocean Research Institute (The University of Tokyo), and National Institute for Environmental Studies |
| MRI-CGCM3      | Meteorological Research Institute, Japan                                           |
| NorESM1-M      | Norwegian Climate Centre, Norway                                                   |
Figure S1. Nonlinear fit between dNBR and the composite burn index (CBI) for 1861 field plots (a). Linear fit between square-root transformed dNBR and CBI plots (b). Consequently, we square-root transformed dNBR in our models and assumed a linear relationship with CBI, thereby allowing us to more easily infer ecologically relevant CBI values in our predictions. dNBR and CBI data described in Parks et al. (2014a). R² = 0.63 for both plots.
Figure S2. Dissimilarity in climate from nearest of the 544 hexels used to build the model. Each of the five variables (AET, WD, PPT, SMO, and SWE) used to build the model were given a z-score (i.e., which has a mean of zero and the value represents the number of standard deviations from the mean). Using the z-scores for all variables, we calculated the Euclidean distance between each hexel used to build the model to all other hexels. The lowest Euclidean distance for each hexel is depicted in the map. Consequently, the hexels used to build the model are representative of much of the western US, with the notable exception of the wet regions of the Pacific Northwest.
Figure S3. Results using identical methods but fire severity is measured as the relativized burn ratio (RBR) (Parks et al. 2014a) instead of dNBR (compare to Figure 4). Predicted fire severity under observed (a) and mid-century climate (b). Mean change in fire severity among the 20 predictions (one prediction for each GCM) (c). Note the strength of this statistical model for RBR was weaker compared to the model using dNBR: correlation = 0.72 and cross-validated correlation = 0.60.