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Wildfire-Driven Forest Conversion in Western North American Landscapes

Figure 4. Exceptionally large high-severity patches in a frequent-fire forest type. (a) The postfire landscape of the Hayman fire in Colorado; (b) distribution of distances from high-severity patches to surviving tree seed sources within the burn perimeter. Fifteen years after a fire, Chambers and colleagues (2016) found that sites less than 50 meters from tree seed sources were not recovering toward prefire forest densities, and most of this landscape is now dominated by shrubs and herbs. Photograph: O. Rhoades. The data are from Jonathan D. Coop.

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Changing disturbance regimes and climate can overcome forest ecosystem resilience. Following high-severity fire, forest recovery may be compromised by lack of tree seed sources, warmer and drier postfire climate, or short-interval reburning. A potential outcome of the loss of resilience is the conversion of the prefire forest to a different forest type or nonforest vegetation. Conversion implies major, extensive, and enduring changes in dominant species, life forms, or functions, with impacts on ecosystem services.

KEY FINDINGS:

- Wildfire-driven forest conversion occurs when ecological resilience of forests to wildfire is overcome, leading to extensive and enduring areas of altered vegetation.
- Conversion is initiated by high-severity fire that removes areas of mature trees, and is maintained by a range of processes that impede tree regeneration, including distant tree seed sources, short-interval fires, or unfavorable postfire climate, further shaped by fire-vegetation feedbacks.
- Management and conservation efforts should align with expectations of increasing forest vulnerability to conversion. In an era of change, the forest that was there before the fire may not return.

Research

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