SWERI SOUTHWEST ECOLOGICAL RESTORATION INSTITUTES
Colorado State University | New Mexico Highlands University | Northern Arizona University

INTERMOUNTAIN WEST TRANSFORMATION NETWORK

Research Priorities on Post-Wildfire Forest Restoration and Recovery in the Western United States

By Kelly Jones, New Mexico State University; Kyle Rodman, Ecological Restoration Institute; Michael Roberts, New Mexico Forest & Water Restoration Institute, Marin Chambers, Colorado Forest Restoration Institute, Nicolena vonHedemann, Ecological Restoration Institute; Camille Stevens-Rumann, Colorado Forest Restoration Institute; Daniel Cadol, New Mexico Institute of Mining and Technology; Melinda Morgan, University of New Mexico

Background

The frequency, severity, and scale of extreme wildfire events are increasing globally, with regions like the western United States disproportionately affected. The global wildfire crisis has prompted research that focuses on evidence-informed management strategies before, during, and after fire. While still essential, the science around pre-fire mitigation and active fire management is more developed than research informing post-fire restoration and recovery. Therefore, there is an urgent need to identify key research areas that inform post-fire decision-making and promote social and ecological adaptation to fire.

In October 2024, 28 experts from diverse fields and expertise — including researchers and practitioners — gathered to identify key topics that could guide post-wildfire forest restoration and recovery efforts in the western US. The workshop followed a horizon-scan approach which included identifying, grouping, investigating, and scoring priority topics (Figure 1).

From an original set of 31 topics, experts identified 12 priorities that scored highest on two criteria: 1) greatest potential impact and 2) greatest time-sensitivity for advancing post-wildfire forest restoration and recovery in the western US.

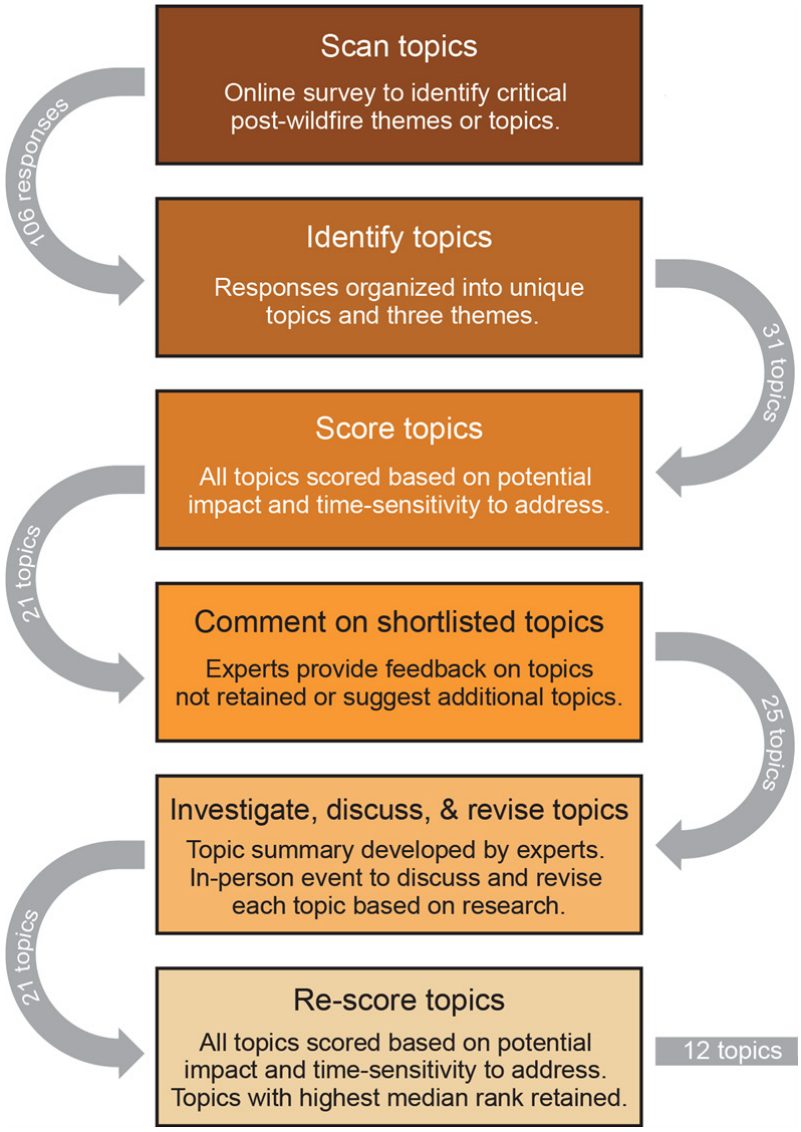

Figure 1. Horizon scan process followed for identifying and scoring research topics on post-wildfire forest restoration and recovery.

Key Findings

The 12 top-scoring topics and guiding questions included areas related to the social sciences, forest ecology and management, and hydrology (Table 1).

Table 1. The 12 priority topics and guiding questions identified for advancing research on post-wildfire forest restoration and recovery in the western US, grouped by overarching themes.

Topics and Guiding Questions		
Social Science	**Forest Ecology and Management**	**Hydrology**
Institutional coordination What formal and informal institutional structures and approaches are necessary to better integrate the response to wildfires and post-fire impacts across scale?	**Seed and seedlings** What strategies can be applied that lead to greater seedling survival, establishment, and growth in the field?	**Soil erosion mitigation** What pre- and post-fire management actions are most effective to mitigate soil loss and water turbidity post-fire?
Collaborative governance What types of collaborative governance structures and approaches can be developed to better prepare for wildfire recovery?	**Outplanting strategies** How do we optimize site selection and spatial patterns of outplantings to maintain/enhance ecosystem services in post-fire landscapes?	**Flood and debris flow mitigation** What pre- and post-fire management techniques are most effective to mitigate flooding and debris flow impacts through prevention and prediction?
Pre-fire planning How can pre-fire planning processes include post-fire preparation and lead to better post-fire recovery outcomes?	**Species and population sources for climate-informed reforestation** How can the understanding of how tree species and population sources influence forest resilience inform planting strategies in a changing climate?	**Post-fire water quantity and quality trajectory** What factors explain the post-fire trajectories of snowpack dynamics, water quantity, and water quality through time?
Community engagement and equity How can we design post-fire recovery processes to be equitable, inclusive, reflective of community values, and attentive to social justice issues?	**Prioritizing post-fire forest recovery trajectories** When, where, and how should we accept forest conversion, support natural regeneration, and/or intentionally perform reforestation?	
Workforce development How do we develop and maintain a restoration workforce?		

Conclusions and Implications

Developing a proactive and transformative response to the wildfire crisis facing the western US is essential to ensure the recovery and long-term resilience of ecosystems, ecosystem services, and the people affected by wildfire. This horizon scan relied on expert discussion and consensus to identify key research needs and knowledge gaps in post-wildfire forest restoration and recovery in the western US. Addressing these 12 topics would critically advance forest restoration and recovery by improving post-wildfire management and response. Advancing these topics will require interdisciplinary and convergent approaches to account for diverse societal perspectives and the potential impacts on social and ecological outcomes. Although focused on the contiguous western US, this analysis is relevant to other regions where both people and forests are impacted by extreme wildfire events.

This fact sheet summarizes information from the following publication:
Jones K.W., D.Cadol, M. Morgan, C. Stevens-Rumann, D. Agnew, O. Burney, J. Calabaza, M.E. Chambers, C.M. Edgeley, D. Falk, L.G. Hughes, C. Marsh, C.A. Schultz, L. McCarthy, R. Morrison, M. Montoya, J. Padowski, M. Piccarello, J.R. Pinto, J. Roach, M. Roberts, K. Rodman, J. Triepke, L. Tsinnajinnie, N. vonHedemann, A.J. Webster, W.C. Buettner, A. Fernandez Leger, A. Mineau, L. Rotche, G. Russell and J. Woolet. 2025. A horizon scan to inform research priorities on post-wildfire forest restoration and recovery in the western United States. Frontiers in Forest and Global Change, 8:1595886.

Contact: Kelly Jones, kwjones@nmsu.edu or Kyle Rodman, kyle.rodman@nau.edu

This research was funded by National Science Foundation Grant #2115169.