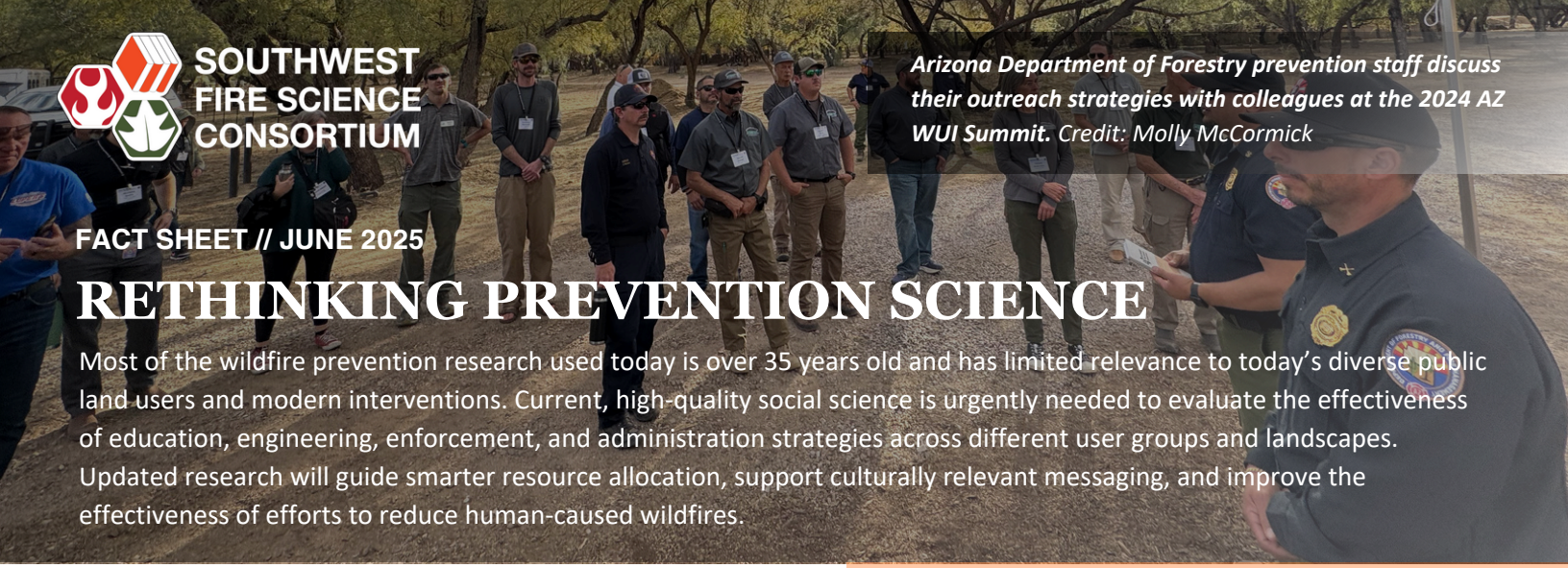
SOUTHWEST FIRE SCIENCE CONSORTIUM



Arizona Department of Forestry prevention staff discuss their outreach strategies with colleagues at the 2024 AZ WUI Summit. Credit: Molly McCormick

FACT SHEET // JUNE 2025

RETHINKING PREVENTION SCIENCE

Most of the wildfire prevention research used today is over 35 years old and has limited relevance to today's diverse public land users and modern interventions. Current, high-quality social science is urgently needed to evaluate the effectiveness of education, engineering, enforcement, and administration strategies across different user groups and landscapes. Updated research will guide smarter resource allocation, support culturally relevant messaging, and improve the effectiveness of efforts to reduce human-caused wildfires.

WHAT'S MISSING?

Outdated research hampers modern wildfire prevention

Most wildfires are caused by humans, yet **research informing prevention remains rooted in pre-1990 studies**. These older findings do not reflect today's new technologies or the realities of increasingly diverse recreationalists, creating a critical knowledge gap. As land use patterns and public engagement with wildlands evolve, so must the evidence base that guides fire prevention strategies

Need for User-Specific Understanding

The makeup of public land users has shifted dramatically in recent decades. Yet little research addresses how distinct existing and emergent groups—such as hunters, OHV users, and multilingual visitors—respond to prevention messaging. **Tailoring messages to specific audiences could significantly enhance compliance and engagement.**

Technology in fire prevention. Knowledge gaps remain about the effectiveness of digital tools like this social media card used by New Mexico prevention staff during the 2020 fire season.
Credit: Forest Stewards Guild

KEY FINDINGS

1. ***Audience Diversity:*** There is a **lack of understanding regarding the response of underrepresented user groups** (e.g., motorized recreationists, hunters) to fire prevention efforts. Tailoring interventions based on demographic factors (e.g., local vs. international visitors, minority groups) is essential for broader impact.

2. ***Message Framing & Communication***: The effectiveness of modern communication tools like social media and electronic road signs is not fully explored. **Agencies should experiment with these platforms** to optimize message delivery, particularly through partnerships with local businesses and nonprofits.

3. ***Impact & Measurement***: **Longitudinal studies** on the lasting effects of interventions, especially in reducing human-caused ignitions, are needed. **Developing standardized metrics** will help track progress and refine strategies.

4. ***Behavioral Dynamics***: **Recreation displacement during fire restrictions may shift risk to other areas.** Understanding these patterns can improve prevention efforts. Additionally, enforcement data, such as citation trends, can help identify areas where strategies need adjustment.

5. ***Systemic, Sustained Investment***: **Identifying barriers to prevention investment**, particularly across different land management agencies, is critical for ensuring consistent and effective funding for wildfire prevention.

This fact sheet was created by Gabe Kohler, Annie Elko and Molly McCormick.

WHAT'S MISSING?

Limited Evidence on What Works

A core issue is the **lack of systematical evaluation** of prevention strategies. Many existing campaigns rely on previous practices or anecdotal success rather than concrete data. Without rigorous analysis, agencies cannot confidently scale successful efforts or retire ineffective ones. Sound evidence is needed to determine which prevention actions truly change behavior.

Unclear Impact of Enforcement

Enforcement is a key prevention tool—ranging from fire bans to citations—but its **long-term effects are underexplored**. Early findings suggest combining education with enforcement improves outcomes, but more research is needed to refine how these tools are applied across different landscapes and populations.

Long-Term and Inclusive Studies Needed

Most available studies are short-term and narrowly focused, often centered on national forests in California. This limits relevance elsewhere. **Research must also expand** to include Tribal lands, Bureau of Land Management lands, and other underrepresented areas. **Longitudinal studies** are especially critical to evaluate whether prevention strategies deliver lasting reductions in wildfire incidents.

Examples of user-specific fire prevention.
Left and Middle: One less spark, one less wildfire
Upper Right: Digital campaign used by the Firearm Industry Trade Association
Lower Right: Smokeybear.com

FUTURE RESEARCH QUESTIONS

The following outlines key knowledge gaps to guide further research aimed at improving wildfire prevention and reducing human-caused ignitions on public lands.

- **User Group Diversity:** Which interventions are most effective for diverse and underrepresented public land users (e.g., motorized recreationists, hunters, day use visitors)?
- **Demographic Factors:** How do demographic variables affect intervention preferences and outcomes (e.g., international visitors versus locals, minority groups)?
- **Long-Term Effects:** What are the sustained impacts of interventions on human-caused ignition rates?
- **Message Framing:** How effective and salient is modern messaging across public land user groups and locations?
- **Locality Differences:** How do communication needs differ between local and non-local public land users (e.g., language barriers, fire prevention knowledge)?
- **Partnership Roles:** What roles can agencies and community partners (e.g., businesses, non-profits, interest groups, fire departments) play in implementing and sharing prevention messaging?
- **Land Type Coverage:** How do strategies and outcomes vary across public land types (e.g., National Parks, Tribal lands, Bureau of Land Management)?
- **Enforcement Insights:** What can enforcement data (e.g., citation locations or recipient demographics) reveal about effective strategy placement and content?
- **Effectiveness Metrics:** What consistent metrics can track intervention success across scales?
- **Comparative Studies:** How do strategies vary across locations, user groups, or approaches - what are the tradeoffs of arise?
- **Investment Barriers:** What limits investment in prevention, and how do barriers differ across land management agencies, communities, and the private sector?

CONCLUSION:

It's time to rethink prevention science

The science of wildfire prevention must evolve alongside the threats it seeks to address. **Modern, inclusive, and long-term studies** are essential to guide effective interventions across varied public lands and communities. **Closing these research gaps** will strengthen agencies' ability to reduce human-caused wildfires through smarter, evidence-based practices.

Fire restriction signage on the Tonto National Forest. *Credit: Tonto National Forest*

Read more on the science related to this summary:
Edgeley, C.M., Evans, A.M., Devenport, S.E., Kohler, G., Zamudio, Z.M. and DeGrandpre, W.D. (2025). Preventing human-caused wildfire ignitions on public lands: a review of best practices. Forest Science, in press

NAU NORTHERN ARIZONA UNIVERSITY
School of Forestry

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JOINT FIRE SCIENCE PROGRAM