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Rocky Mountain Research Station

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FireCLIME VA: A New Fire and Climate Vulnerability Assessment Tool for the U.S. Southwest

Identifying The Most Vulnerable Ecosystems

Driven by warmer and drier weather, Southwestern forest ecosystems are undergoing longer fire seasons with larger and more severe fires. Fire regimes have also been altered by human land use patterns, fire exclusion, and widespread exotic grass invasions. In the Southwest, land managers are working to adapt land management strategies.

According to Megan Friggens, a research ecologist for the Rocky Mountain Research Station in Albuquerque, New Mexico, one such question is, "Which of the forest types I manage is most vulnerable to change?" Another is, "Which treatments are most effective for reducing vulnerability under future climates?"

In response, Friggens and colleagues developed the Southwest FireCLIME Vulnerability Assessment (VA) tool, which "scores" ecosystems based on current and future expected climate-fire-vegetation relationships as they relate to user inputs about desired future conditions. FireCLIME VA helps land managers compare management strategies that may be most effective for reducing risk under changing climate conditions.

Providing Critical Information

By identifying which fire regime and ecosystem components are likely to be most affected by climate and which treatments are able to mitigate impacts," Friggens says, "FireCLIME VA provides information about changing fire regimes and fuel conditions. It allows users to compare management strategies under various climate scenarios and to gauge the potential effectiveness of those strategies. The VA tool makes this process practical and predictable."

FireCLIME VA requires detailed information on desired future conditions, which can be obtained through discussions, project planning documents, or

A fire effects monitoring crew observes a prescribed fire in the Jemez Mountains of New Mexico. (Photo: Rachel Loehman, USGS.)

other sources. This information is used as a baseline to determine whether future climate, fire, or vegetation changes will have negative or positive impacts. "The collective impact of expected changes represents ecosystem vulnerability," Friggens explains, adding, "management options are assessed in terms of their ability to reduce expected negative impacts."

FireCLIME VA is being used by several national forests, including the Santa Fe and Lincoln National Forests in New Mexico. These efforts will help prioritize management strategies by specific ecosystem or locations. Craig Wilcox, a retired forest restoration program manager for the Lincoln National Forest, said: "FireCLIME VA was useful in evaluating the effects of a restoration project. We wanted to quantify how our work was going to hold up in light of climate change and expected wildfire. FireCLIME VA indicated that we were moving in the right direction, although there were some challenges that remained."

Part Of A Bigger Project

FireCLIME VA, which can be found at https://swfireclime.org/vulnerability-assessment, is part of a larger toolkit called Southwest FireCLIME. Found at https://swfireclime.org, this toolkit was funded by the Joint Fire Sciences Program (https://www.firescience.gov/JFSP_program_info.cfm), a partnership that includes several Federal agencies, including the Forest Service. In addition to the VA tool, Southwestern FireCLIME includes synthesis, modeling, and adaptation tools, as well as an extensive bibliography, according to RMRS partner and FireCLIME VA co-developer Andi Thode, a professor of fire ecology and management at Northern Arizona University's School of Forestry in Flagstaff, Arizona. "The big idea for FireCLIME," Thode says, "was to see what's out there for climate and science resources in the Southwest and then take all of that and provide something to managers."

A macro-enabled Excel file, the FireCLIME VA is a rapid and flexible system for assessing ecosystem vulnerability to climate-fire interactions. (Images: USDA Forest Service, Southwestern FireCLIME.)

Management Implications

- The FireCLIME VA tool, found at https://swfireclime.org/vulnerability-assessment, is a new resource that allows land managers to compare management strategies under various climate scenarios and to gauge the potential effectiveness of those strategies for reducing undesirable impacts of climate on wildfire regimes and resulting impacts of wildfire on natural ecosystems.
- FireCLIME was developed to provide decisionmakers with consolidated resources for identifying critical ecosystem vulnerabilities to changing climate and fire regimes to adapt management approaches.
- The tool can accept a range of data inputs, which allow users to easily compare various fire-climate outcomes for one or more ecosystems of interest.
- FireCLIME VA is part of a larger toolkit called Southwest FireCLIME, located at https://swfireclime.org.

Further Reading

- Friggens, M.; Loehman, R.; Thode, A.; Flatley, W.; Evans, A.; Bunn, W.; Wilcox, C.; Mueller, S.; Yocom, L.; Falk, D. 2019. User guide to the FireCLIME Vulnerability Assessment (VA) tool: a rapid and flexible system for assessing ecosystem vulnerability to climate-fire interactions. Gen. Tech. Rep. RMRS-GTR-395. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 42 p. https://www.fs.usda.gov/rmrs/publications/user-guide-fireclime-vulnerability-assessment-va-tool-rapid-and-flexible-system.

LEAD SCIENTIST

Megan Friggens is a research ecologist for the Rocky Mountain Research Station in Albuquerque, New Mexico. Her research interests include landscape scale analysis and modeling of disturbance processes (fire, drought, land conversion, pathogens, and parasites); climate change impacts on vulnerable species and habitats; wildlife disease ecology; and conservation biology. Connect with Megan at: https://www.fs.usda.gov/rmrs/people/meganfriggens.

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