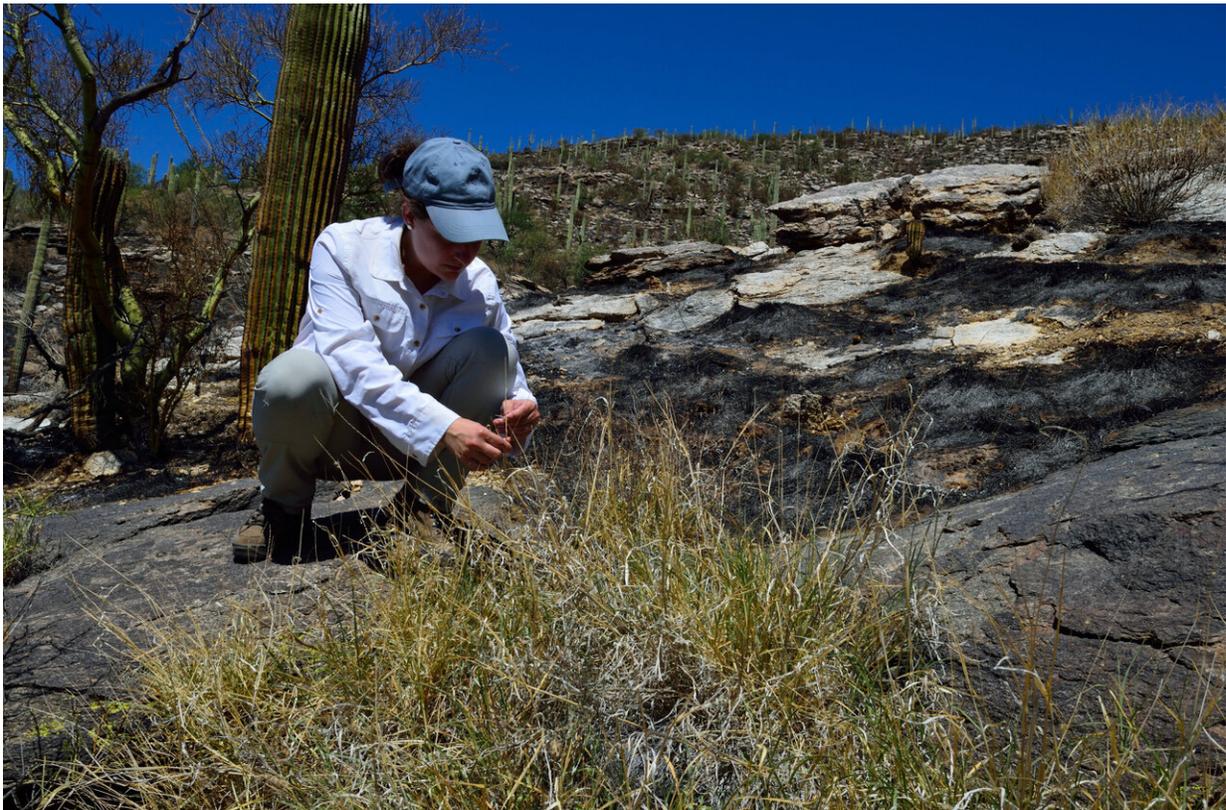


National-scale study shows that invasive grasses promote wildfire

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UMass Amherst researcher Emily Fusco examining a burned hillside of buffelgrass in Arizona. Credit: UMass Amherst/Bradley lab

In a first national-scale analysis, ecologists at the University of Massachusetts Amherst, with colleagues at the University of Colorado-

Boulder, report that across the United States, invasive grasses can double the number of fires.

One [species](#), invasive cheatgrass, has a long, well-earned reputation as a firestarter, making wildfires worse and more common. It is now clear that this effect is much more pervasive than a [single species](#), they report. The new analysis finds at least seven other non-[native grasses](#) can increase wildfire risk around the country, some doubling or even tripling the likelihood of fires in grass-invaded areas. Details are now online in the Latest Articles from *Proceedings of the National Academy of Sciences*.

Post-doctoral researcher and lead author Emily Fusco, says, "In the southeast pine systems there is cogon grass, while in the desert southwest there is buffelgrass. In eastern temperate forests we have japanese stiltgrass, and in the Great Basin we have medusahead. These regions are all ecologically distinct, and these grasses seem to be impacting [fire](#) in all of them."

She worked with associate professor Bethany Bradley and statistician John Finn at UMass Amherst, and Jennifer Balch and Chelsea Nagy at UC-Boulder on the analysis. They quantified impacts of invasive grasses on fire occurrence, size and frequency at a regional scale in the lower 48 states, the first pyrogeographic study to look at many species across the entire country, Fusco says.

"Most of the work on this question has been on a small scale, studying fuel loads or fire intensity in one plot versus another plot of a few acres, or in one ecosystem in one national park," Fusco said. That's in part because until recently, the [big data](#), tools, and computational power needed to run these kinds of analyses haven't been widely available, she explains.

Her team started by compiling a list of fire-starting suspects, relying on the Invasive Plant Atlas of the U.S., other scientific literature and a database called the Fire Effects Information System. They identified 12 invasive grass species for which there was enough data to map out "invaded" and "uninvaded" areas in pixels of 500 x 500 meters (roughly 62 acres). Then, they used fire records to compare fire occurrence, size and frequency between invaded and uninvaded areas, from 2000-2015.

The authors report that eight of the grasses, including cheatgrass (*Bromus tectorum*), significantly altered something about the region fire regimes of ecosystems they invaded—increasing the frequency of fires, for example. Where Common Mediterranean grass (*Schismus barbatus*) invaded, fire occurrence more than tripled. Invasion by silk reed (*Neyraudia reynaudiana*), buffelgrass (*Pennisetum ciliare*) and cogon [grass](#) (*Imperata cylindrica*) all increased fire frequency, and the presence of the flammable invaders increased [fire occurrence](#) by between 27 and 230 percent.

Senior author Bradley says, "This work shows that invasive species are one of the 'big three' ways that people are changing fire regimes—[climate change](#) more than doubles the likelihood of fire, human ignitions triple the fire season and now we can add invasive species fueling fires."

She and her colleagues say their paper also suggests another possible tool that could be used to mitigate wildfire in some places: controlling invasive species. People have helped invasive grasses take root in the United States both deliberately and accidentally by promoting their use for forage and as ornamentals, or transporting "hitchhiker seeds" in hay and seed mixes. Human-caused disturbances to native ecosystems also promote the spread of the grasses and enable the accumulation of enough fuel to carry fires, they explain.

Fusco says, "I think one of the most important messages is that in the places affected, fire management and [invasive species](#) management need to be done together, and where these managers are distinct groups, they would benefit from closer collaboration. And, looking at future fire risk modeling, we should definitely be including [invasive grasses](#), and their likely spread, in the mix."

This analysis supported by the National Science Foundation is the first step in a larger project the team is investigating. For example, Fusco and Nagy are in Arizona assessing the combined impacts of invasive buffelgrass and fire on Sonoran Desert ecosystems.

More information: Emily J. Fusco et al., "Invasive grasses increase fire occurrence and frequency across US ecoregions," *PNAS* (2019). www.pnas.org/cgi/doi/10.1073/pnas.1908253116

Provided by University of Massachusetts Amherst

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