Forest understory fuels flames

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AgriLife Research studies the need to control invasive plants surrounding trees

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COLLEGE STATION – Texas A&M AgriLife Research scientists in the Texas A&M University departments of fish and wildlife and ecosystem sciences and management are proactively looking at ways to preserve forests in the southeastern U.S., including East Texas.

While most people notice the large trees that fill forests, these researchers are looking at the lower brush, known as the understory, that tends to add fuel to the flames if a forest catches fire, according to Dr. Bill Rogers, AgriLife Research professor in College Station.

This post oak overstory in Central Texas has the evergreen privet understory. (Texas A&M AgriLife Research photo by Dr. Bill Rogers)

Rogers said they are particularly concerned about Chinese and European privets, a shrub brought to the U.S. in the late 1800s as an ornamental, but now considered an aggressive invasive plant.

“Biotic invasions have impacted ecosystems worldwide, and one of the greatest current challenges facing forest ecosystem management in the southern U.S. is the control of range expansions by invasive plant species,” he said. “Among the more worrisome concerns related to invasive shrubs is their role as ‘ladder fuels,’ which increase the risk of crown fires.”

Chinese and European privets grow as a thicket, and their evergreen characteristics typically result in a lack of flammability, said Dr. Hsiao-Hsuan “Rose” Wang, AgriLife Research assistant research scientist in College Station.

However, Wang said, their integrated analytical and simulation modeling efforts suggest that the uniformity of these thickets during times of drought may feed the crown fires that are most devastating and kill trees in a forest.

The research and outcomes of their study and modeling are covered in a recently published paper, “Range expansion of invasive shrubs: implication for crown fire risk in forestlands of the southern USA,” in Annals of Botany-Plants found at http://aobpla.oxfordjournals.org/.

The paper is authored by Wang and Rogers, as well as Dr. Bill Grant, Texas A&M’s department of wildlife and fisheries sciences professor, and Dr. Carissa Wonkka, a former graduate student of Rogers now at the University of Nebraska-Lincoln.

In their research, the team found that more than half of all reported wildland fires in the nation, including 42 percent of all large wildland fires, occur in the southern U.S., producing tremendous ecological, economic and social consequences.

And because so little of this landscape is owned by the federal government and most southern property is private,

state agencies are responsible for the vast majority of fire protection efforts in these regions, they stated.

Consequently, efforts to reduce the costs associated with fire events, mitigate potential unplanned fire impacts and better predict future fire occurrences are greatly needed, Rogers said.

More reliable predictions of the speed and scope of invasive privet range expansion and associated crown fire threats are critically needed to improve the management of these invasions and their potential effects on crown fire risk, Wang said, but such predictions remain a challenge due to modeling and data limitations.

She explained their research is a hybrid modeling effort combining the analytical techniques and simulation models that assess potential range expansion of invasive privet shrubs and their association with crown fire in forests of Mississippi and Alabama, primarily.

“These invasive shrubs are widespread in forests of East Texas and even in the post oak savannas of Central Texas as well,” Rogers said. “We believe our findings in Mississippi and Alabama are likely to be equally, and potentially more, valid in these areas of our state due to increased encroachment and thicketization that occurs as these non-native shrubs spread.

“Additionally, Texas has a greater propensity for drought events that may lead to unplanned wildfires,” he said. “So we are hoping these findings will lead to forest managers and fire-fighting personnel being more proactive in managing fuels that could contribute to crown-fire events.”

Wang said she believes their modeling framework will also have broad applicability to other invasive plant species in a variety of ecosystems.

“This should provide vital information for predicting and potentially mitigating invasive species impacts on native ecosystems worldwide,” she said.

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