NCASI Fact Sheet
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IMPACT. SCIENCE. SOLUTIONS.

Invasive Species in US Forests: Risks and Information Needs

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Introduction

Invasive species are non-native organisms that can cause significant negative economic and/or ecological effects across large landscapes. Invasive plants can reduce forest productivity, inhibit regeneration, and increase fire risk; invasive insects and pathogens can damage and kill trees. Over the past 200 years, hundreds of invasive species have become established in the United States, with estimated damages exceeding $150 million per year in the forest sector (Lovett et al. 2016). Previous invasions have functionally eliminated a keystone species in eastern North American forests, the American chestnut (*Castanea dentata*), and currently threaten to eliminate ash (*Fraxinus* spp.), redbay (*Persea borbonia*), eastern hemlock (*Tsuga canadensis*), and other tree species.

Risks to Forestry

Commercial forestry in the US is annually a $437 billion industry (Pelkki and Sherman 2020). In the South, southern yellow pines (*Pinus* spp.), mainly loblolly (*P. taeda*), comprise the bulk of wood fiber. In the West, Douglas fir (*Pseudotsuga menziesii*) is the dominant commercial species, along with ponderosa pine (*P. ponderosa*). Invasives incrementally add to damage and mortality for commercial species. A new major pest or pathogen affecting these and a few other tree species, with further accumulation of damaging invasives, could greatly damage fiber supply.

The rate of spread of invasive species has increased over the past several decades due to growth in international trade and transportation. While there are organizations that screen cargo at US ports, current screening is inadequate, as is timely response following detection of problematic species. Because a species is difficult or impossible to eradicate once it becomes established, screening and bio-sanitation at US borders are critical.

Research on invasive species has not kept pace with increasing threats. Institutional capacity to address the challenge has been decreasing, with the number of forest health positions in the US Forest Service in steep decline since 1985 (McGinley et al. 2019). Forest products companies have also lost scientific staff since 2000, as have university forestry departments. Across these organizations, roughly 160 scientific positions have been eliminated, although the forest sector has continued to produce important innovations (Homyack et al. 2021).

Caption: Trunk of a dead tree damaged by emerald ash borer

Caption: emerald ash borer

Information Gaps

Because extermination of an invasive pest or pathogen that is already established is nearly impossible, the most cost-effective solutions involve phytosanitary approaches. For major commercial tree species, early warning of potential risks can be determined by examining plantings from overseas (e.g., China) for pests or pathogens that may cause major damage

in the US. A few such sentinel studies are currently ongoing (e.g., Gao et al. 2017).

Caption: diseased forest

There is the potential for pest-resistant dunnage to reduce the survival of pests and pathogens on cargo, but this avenue of defense has not yet been fully researched. Screening using eDNA has the potential to detect problematic species. Because using fumigants such as methyl bromide has become more restricted, live plants (especially rooted plants) pose a unique threat. Methods for sterilizing cut flowers and rooted plants are needed. There are currently few methods for sanitizing imported logs and chips, and research could lead to development of more options. For established invasives, silvicultural options such as thinning and genome/species selection for planting have the potential to reduce mortality and growth losses. The potential also exists to control, though not eliminate, insect outbreaks using novel biological control agents. Research on all of these topics is needed.

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For more information contact:

info@ncasi.org