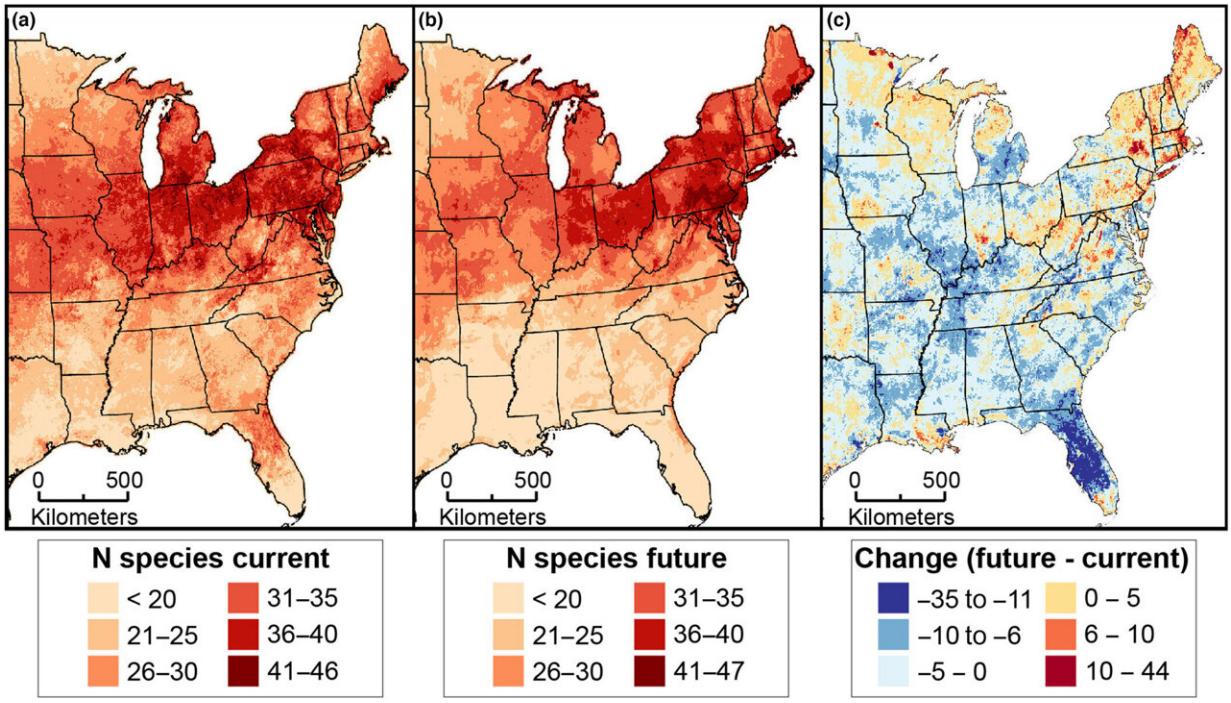
Study finds plant nurseries are exacerbating the climate-driven spread of 80% of invasive species

December 5 2023



The number (N) of invasive plant species with habitat identified as climatically suitable for abundant populations (≥5% cover) in the eastern contiguous United States given (a) current climatic conditions, (b) +2°C climate warming scenario and (c) the difference between +2°C and current climatic conditions. Credit: *Diversity and Distributions* (2023). DOI: 10.1111/ddi.13787

Researchers at the University of Massachusetts Amherst recently

published a pair of papers that, together, provide the most detailed maps to date of how 144 common invasive plants species will react to 2° Celsius of climate change in the eastern U.S., as well as the role that garden centers currently play in seeding future invasions.

Together, the papers, published in Diversity and Distributions and BioScience, and the publicly available maps, which track species at the county level, promise to give invasive species managers in the U.S. the tools they need to proactively coordinate their management efforts and adapt now for tomorrow's warmer climate.

Mapping future abundance

One of the major hurdles in addressing the threat of invasive species is in determining when and where a species crosses the line from being non-native to invasive. A single occurrence of, say, purple loosestrife does not make an invasion. Invasive plant managers need to know where a species is likely to take over, outcompeting native plants and altering the ecosystem.

Or, as Bethany Bradley, professor of environmental conservation at UMass Amherst and the senior author of both papers, puts it, "Managers have very few resources to control invasions, so we don't want to waste time focusing on species unlikely to become invasive in a given area. But the question of what will become invasive and where has been surprisingly tricky to answer."

"If we can proactively identify these species and the regions they are most likely to become abundant in as the climate warms, then we can head off a major ecological threat before it's too late," adds Annette Evans, a postdoctoral fellow at UMass Amherst's Northeast Climate Adaptation Science Center and lead author of the paper on abundance and future invasive hotspots.

To do so, the team combed through 14 current invasive species databases compiled by hundreds of natural resource managers in order to first pinpoint which species are currently abundant and where, geographically, those abundance hotpots occur.

They focused on the eastern U.S. (east of the 100th meridian, which runs from the middle of North Dakota through the center of Texas—a follow-up paper will focus on the western U.S.) and discovered that the hottest hotspots are around the Great Lakes, the mid-Atlantic, and along the northeastern coasts of Florida and Georgia. Each of these regions has the right mix of conditions to currently support abundant populations of more than 30 different invasive plants.

They then ran their data on 144 plants through a series of models that predicted where the hotspots would occur under 2°C of warming.

What they discovered is that most of the species will shift their ranges to the northeast by an average of 213 kilometers, a trend also reflected in shifts to abundance hotspot locations. In some states, warming temperatures will make currently unsuitable areas conducive for abundant infestations of up to 21 new plant species, and the range-shifting could exacerbate the effects of up to 40 currently abundant invasives. On the other hand, 62% of currently abundant invasive species will see a decrease in habitat for large populations in the eastern U.S.

But statistics aren't enough. "We've created something even more user-friendly," says Evans: a series of publicly available range maps for individual species, which can help plant managers triage which plants most need their attention, as well as state-specific watch lists.

How plant nurseries could seed invasion

"When people think of how invasive plant species spread, they might

assume species are moving because of birds or the wind dispersing seeds," says Evelyn M. Beaury, lead author of the paper on horticulture and invasive species, as well as a postdoctoral researcher at Princeton who completed this research as an extension to her graduate studies at UMass Amherst. "But commercial nurseries that sell hundreds of different invasives are actually the primary pathway of invasive plant introduction."

Though researchers have long known that invasives are linked to the horticulture trade, Beaury and her co-authors, including Evans and Bradley, wondered how often invasives are sold in the same area in which they are abundant. And how might nurseries be exacerbating the problem of climate-driven invasion?

It turns out that the answer to both questions is a lot.

Using a case study of 672 nurseries around the U.S. that sell a total of 89 invasive plant species and then running the results through the same models that the team used to predict future hotspots, Beaury, and her co-authors found that nurseries are currently sowing the seeds of invasion for more than 80% of the species studied. If left unchecked, the industry could facilitate the spread of 25 species into areas that become suitable with 2°C of warming.

Furthermore, 55% of the invasive species were sold within 21 kilometers (13 miles) of an observed invasion—the median distance people across the U.S. go to buy landscaping plants. In other words, everyday gardeners who buy plants at their local nurseries could unwittingly help perpetuate invasion and associated ecological harm in their literal backyards.

"But there's good news here," says Beaury. "This is the first time that we have real numbers to show the connection between plant nursery sales

and the spread of invasive species—including invasions that occur down the street from nurseries, as well as across state borders. Now that we have the data, we have an incredible opportunity to be proactive, to work with the industry, consumers, and plant managers to think more critically about how our gardens impact U.S. ecosystems."

The team has also put together a publicly available list of 24 commonly sold invasive plants with increased risk of spreading via climate change in the northeast, from butterfly bush to English ivy, to be avoided, and native alternatives, such as bottlebrush buckeye and wild blue phlox.

"These two papers together make it pretty clear that not only are we facilitating current invasions through the ornamental plant trade, but we are also facilitating future climate-driven invasion," says Bradley, "But with these papers, maps, and watchlists, we can pinpoint which species are most worrisome where, both now and in the coming decades. These are important new tools in invasive plant managers' toolboxes."

More information: Annette E. Evans et al, Shifting hotspots: Climate change projected to drive contractions and expansions of invasive plant abundance habitats, *Diversity and Distributions* (2023). DOI: 10.1111/ddi.13787

Evelyn M Beaury et al, Horticulture could facilitate invasive plant range infilling and range expansion with climate change, *BioScience* (2023). DOI: 10.1093/biosci/biad069

Provided by University of Massachusetts Amherst

https://phys.org/news/2023-12-nurseries-exacerbating-climate-driven-invasive-species.html