Research Summary: Getting Pestier: Climate Change is Increasing Impacts From Forest Pests

On Behalf Of Northeast RISCC Management Network

Simler-Williamson, A. B., Rizzo, D. M., & Cobb, R. C. (2019). Interacting effects of global change on forest pest and pathogen dynamics. Annual Review of Ecology, Evolution, and Systematics, 50, 381-403.

Forest pests and climate change are both stressing forests on their own, but what about the compounding stress of experiencing both at once? Will climate change worsen forest pest impacts? Simler-Williamson et al. synthesized research putting the interactive effects of forest pests and pathogens into the context of a changing climate.

Summary:

Non-native insects and pathogens (e.g. fungi) have huge impacts on forest composition and function, and the Northeastern U.S. is an invasion hotspot. Global trade is responsible for introducing new pests to forest ecosystems, but climate change can worsen pest problems through effects on the pest or its host trees. Range shifts of pests, including those native to the U.S., with warmer temperatures can allow them to switch to new host species or infect new, susceptible populations. Warmer temperatures can allow pests to overwinter and grow larger populations, enhance movement, or increase reproduction, causing more severe or widespread damage. Climate change can increase drought leading to stressed trees that are more susceptible to pest attacks. Finally, the timing of events (phenology, e.g. leaf-out, caterpillar emergence) can change with climate change, which may either increase or decrease the effects of pests, depending on whether pest and host phenology become more or less synchronous.

Take-home points:

- Climate change can worsen forest pest impacts by contributing to the introduction of new pests by making pests more damaging, or by increasing tree stress.
- Insects and pathogens can expand their range quickly because they have short generation times and high spread rates. Host tree range shifts will happen more gradually, but may also result in trees encountering novel pests.

Management implications:

- Managers can reduce pest movement between stands of trees through policies to limit firewood movement.
- To limit pest species (e.g. Southern Pine Beetle) creating breaks between stands can reduce spread.
- Promoting diverse forests (both biologically and structurally) can reduce overall pest impacts and promote forest resilience.
- For pests that target stressed trees, thinning forests can reduce competition and individual tree stress.