# Research Brief
## Stemming The Tide

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North America's lands and waters are under attack. When we think about the plight of our nation's forests, wildfires, clearcutting, and drought may spring to mind, but American pinelands now face another, perhaps more threatening enemy — the mountain pine beetle.

Although native to the continent, this small and unassuming red bug is spreading beyond its natural range to inflict damage and devastation. Increasingly warm winters allow generations of the beetle that would ordinarily be killed off to thrive and reproduce from one year to the next. Canadian foresters are standing guard as the mountain pine beetle sits on the doorstep of the country's vast Northern Boreal Forest, more than one billion acres of intact forestlands. The beetle could sweep across the continent, leaving a swath of dead trees in its wake.

As the pine beetle attacks our natural heritage on land, the ruinous sea squirt is besieging our coastlines. These marine monsters hitchhike their way into our bays, harbors, and coastal waters via boats, fishing gear, and other artificial objects and establish colonies that rapidly expand outward to cover native species and habitat. In addition to reducing native biodiversity, sea squirts also crowd out commercially important fish, sea scallops, shellfish, and other species.

Invasive species are a major threat to global biodiversity, second only to habitat destruction. These are but two examples of the thousands of intruders that plague forests, coastal waters, wetlands, prairies, and other ecosystems across the U.S. and around the world.

"Invasive species find their way into new habitats via every vector imaginable — from hitching rides on ships and planes to the purposeful importation of an apparently desirable food source or garden species," says Science and Policy Analyst Roxanne Thomas, who leads ELI's Invasive Species Program. "As the onset of climate change begins to warm water and air temperatures, pests like the mountain pine beetle will find it easier to move from one habitat to the next. Invasive species problems are not only ubiquitous, affecting every type of ecosystem and all levels of human society, but also present challenges at every level of governance."

The Invasive Species Program is taking on the epidemic through an array of projects that attack and defend against these pests. Roxanne and her team are examining how inconsistent societal and legal structures burden efforts to detect and intervene early. Dr. Kathryn Mengerink, Director of ELI's Ocean Program and part of the invasives team, adds, "Once invasive species have settled into an environment, eradication may be nearly impossible and managers may have to make tough decisions about the lesser of two evils — invasive species impacts or the economic and environmental costs of control techniques. Early detection and rapid response is key."

Invasive species do not adhere to political jurisdictions, making comprehensive efforts to detect early and respond effectively anything but simple. As Staff Attorney Read Porter says, "Current invasive species laws are fragmented and often lack the flexibility that state and federal officials need to respond to infestations in a timely manner. Moreover, exotic species often require draconian control technologies that conflict with more general environmental laws. It's important for states to recognize and resolve these potential conflicts before pests get a foothold so that the response can be effective."

Working with The Nature Conservancy, Read is looking at states with pilot programs to identify obstacles to coordinated early detection and rapid response. With funding from the Munson Foundation, Marisla Foundation, and Dr. Lucy Waletzky, Read is also studying the laws that affect invasive species prevention efforts in both the Chesapeake Bay region and the state of Florida.

ELI is working to stem the tide of aquatic invasive species through a two-year project examining water law throughout the United States. Senior Attorney James McElfish and Dr. Mengerink are studying how states manage aquatic invasive species under the Clean Water Act's Total Maximum Daily Load program. Supported by the Great Lakes Protection Fund, ELI recently analyzed laws in the Great Lakes states that regulate ships' ballast water discharges, a common vector for intruders.

ELI also brought together leading climate and invasive scientists to pinpoint the most pressing needs facing aquatic invasive managers in the face of global warming. Roxanne and her staff are exploring how invasives policy can be linked with the national climate policies likely to develop over the next five to ten years.

"Climate change will add another level of complexity and uncertainty to a problem that is already fairly complex and uncertain," says Roxanne, "but we've got to start addressing the issue. I'm really excited about the work we're doing and the direction we're going."