

Why You Should Manage, Regulate, and Partner to Eliminate Japanese Knotweed from your Community

By Brian Colleran, MS, PWS, CERP

In my role as a Conservation Commissioner, I'm always looking for ways to use what I know most effectively, share new sources of insight with fellow board members, and make the best use of meeting time. In that spirit, while I'm completing a publication for a peer-reviewed journal on the invasive species Japanese knotweed, I'd like to share my findings with you. The primary take away is that the growth of these plants and how they are managed can influence a community's flood preparedness, climate resiliency, municipal fiscal planning, emergency planning, and the ecological integrity of rivers and nearby lands (among other things), to varying degrees and at several scales. Conservation commissioners are well positioned and invited to put these findings to use. The language used in 310 CMR 10.00 is broad enough to encompass this updated understanding of Japanese knotweed I present. Based on my understanding of this plant and its impacts, knotweeds may be regulated using thirteen different sections of 310 CMR 10.00, and this new knowledge influences how nine terms in 310 CMR 10.04 are to be best defined. But this may be getting ahead of things. To understand the influence of these plants on waterways, and how they relate to the 310 CMR 10.00, has taken me most of the last decade, and began with a disaster. I was living in Vermont during Tropical Storm Irene in 2011. I was getting married soon, and my in-laws had come up to help

with some of the last minute details. They had rented a house in Waitsfield, VT, and we were visiting the day of the storm. When the rain let up at the end of the day, we went out for some air, and quickly learned we missed a lot. Every road out of the valley we were in was closed, and our venues had all been hit hard. Luckily for us, Vermonters are a hardy lot, and our wedding went off memorably.



In this photo, the rocks protect the knotweed infested bank from the main current, which should both slow the water and any associated erosion. Nevertheless, there is a large hole underneath this stand of knotweed, and bank erosion continues downstream of the knotweed until the edge of the photo.

The following summer I was hired by the State of Vermont to develop and execute an early detection and rapid response management protocol for an invasive species that had been spread by Irene: Japanese knotweed. The plant was a known invasive, having been introduced to the Northeast in the late 19th century, though it hadn't been a major focus of previous management. It seemed to spread following floods, that much was known. I also learned that it was a notorious invasive species in Europe and had an especially bad reputation in the United Kingdom. Knotweeds grew so thick that they choked waterways, leading to wholesale elimination of native flora, while also acting like a dam, resulting in floodwaters backing up. In the U.K., it could also be found growing through homes, walls, and streets, and caused significant problems during land sales. In addition, all the plants were the same sex. Every plant was a descendent of a clipping from the original plant brought to England for the horticulture trade. Seedlings could be grown in a greenhouse, and Japanese knotweed could hybridize successfully with other invasive knotweeds, but pure Japanese knotweed wasn't really showing any successful reproduction in the wild. I found this puzzling but didn't think much of it.

To succeed in my role with Vermont, aimed at controlling the spread of this plant, I first needed to locate the infestations. I toured the state's rivers looking for signs of Japanese knot-

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weed and found it in many places, especially just upstream of, or re-growing in and around some of the bigger roadside washouts. To manage the plant, I was luckily able to secure the work of three Vermont Youth Conservation Corps crews, and several volunteer workdays over the course of the field season. With their help, several thousand knotweed plants were targeted and eliminated. Together, we were able to determine the best methods for finding them, getting them out of the ground, and uncovered some important insights.




In this photo a lone knotweed deposited by Irene's floodwaters is pictured near the end of its second growing season. New shoots are already emerging from its spreading rhizomes. Following a flood, locations like these, where the flood waters deposited other debris, such as sand, are excellent places to find new knotweed. Even after two full growing seasons, plants like this can be easily removed by hand.

Seventy percent of the plants growing up after the flood were growing from pieces of rhizomes that had washed downstream. Rhizomes are root-like underground stems. Of the thousands of plants we pulled out of the ground, seventy percent of those propagules had been underground, somewhere upstream. The crews and I also noticed that using our hands was the best way to get the whole plant out of the ground. We would use a spade to loosen the soil around a new plant, then reach into what was usually still loose sand deposited by the flood, and feel the many smaller rhizomes growing from the original propagules. We could pick it up, shake the soil loose, and easily confirm whether we had the whole plant or not. The plants could be easily removed because those rhizomes weren't roots, and therefore didn't have the root hairs that would normally help the plant stay connected to the soil. I immediately suspected these two details were connected and might even be connected to discovering so much knotweed around the blowouts seen during my initial survey work. Based on these observations, Emily Secor, a University of Vermont undergraduate, agreed to collect field data and investigate my questions the following summer. Emily discovered some interesting data suggesting that knotweed-covered streambanks were more likely to erode than streambanks with no vegetation; however, she didn't have enough data for her analysis to be statistically significant. It was close though. Close enough that I kept checking for new scientific literature on knotweed, feeling certain that someone would soon publish work supporting Emily's findings. Occasionally, a paper would be published that contained circumstantial evidence of Japanese knotweed's erosive powers, but none that ever addressed the topic directly.


It took a trip to Chile in 2019 to convince me that I needed to stop waiting for someone else to publish their work. While in Puerto Natales, the gateway to Torres del Paine National Park, I found Japanese knotweed. It's currently the southernmost population in the world, and hundreds of miles south of its nearest known kin. Conversations with a Conservation Ecology professor about this discovery illuminated the fact that others needed access to my insights on this plant, combining the work published since Emily's field research, Emily's results, and my own experience with Japanese knotweed. The research published after Emily's work included the following facts: Stream sediment loads increase downstream of knotweed stands after rainfall events, and there is four times more silt on the stream bottom downstream of knotweed patches than upstream. Turbidity following storms is higher (77 vs. 54 NTU (nephelometric turbidity unit)) in incised stream reaches where knotweed is growing. Over 9.5 months, there was 29 cm more erosion at incised knotweed-infested banks, and 9 cm at non-incised banks; and over 3 months knotweed-infested banks lost four times as much soil as forested banks, and the erosion was concentrated at the bottom of the bank. Finally, knotweed-related erosion increases during the winter months. These results were generated by different studies, in different locations, but they all show a similar trend. In conjunction with my experiences after Irene, these findings are worrisome. Taken together, this information means that Japanese knotweeds destabilize riverbanks, while also exacerbating and amplifying erosive forces. Stands of Japanese knotweed are sudden bank failures waiting to happen.

I worry about the damage these plants will cause to our roads



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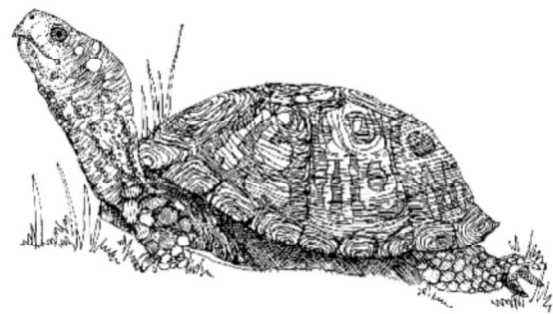
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and rivers when the next big storm comes through. With all the infrastructure built on riverbanks, knotweed-induced sudden bank failures could be devastating. This might not only cause structures to collapse on the bank above, such as a road or home, but this erosion will likely generate hundreds, if not thousands, of propagules that will grow into new knotweed plants downstream. Eventually, these plants will choke out the native vegetation in downstream riparian forests and floodplains and increase the destructive effects of this infestation during the next flood. The effects of this species, and the positive feedback loop between it and increased erosion and damage during storms, are not limited to ecological problems, or road repairs. It could severely strain municipal budgets, as emergency repairs along rivers occur much more frequently than they would otherwise be expected to, and road failings during floods also makes the jobs of firefighters, police, and EMT's more difficult, as they must navigate routes impacted by knotweed-induced road and bank failures. By addressing any infestations of this plant, and using the tools in 310 CMR 10.00, conservation commissioners have an opportunity to make their town more climate resilient, fiscally sound, and ecologically robust.



In this photo, the knotweed stand has slid downhill. The surrounding vegetation is strongly rooted on this slope, while the knotweed's underground rhizomes are not strong enough to have prevented this downhill slide.



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