When Rot is Good! Wood Decomposition in the Forests of Nova Scotia

Peter Duinker, January 2024

Shortly after Hurricane Juan blew through Halifax at the end of September 2003, HRM put together a "Point Pleasant Park Recovery Task Force" to oversee the clean-up of the blowdown in the park. As the planning for winter operations continued during that autumn, Blair Pardy of Parks Canada and I, both members of the Task Force, hatched an idea to leave untouched a small patch of the blowdown so people could observe the decomposition of the blowdown and the natural regeneration that would grow up through it. We wanted a hectare (which is 10K square metres) but were only successful in getting a patch of about a thousand square metres – still enough to observe the ecological processes that follow a blowdown (or windthrow) event. The reason for the Task Force to deny the larger patch was the low tolerance for a possible forest fire to run out of control – that could be a disaster for the southend of Halifax!

The chainsaws got into our designated patch for a short moment before the workers were stopped by supervisors. Only a couple of big blown-down trees were severed from their stumps, so we considered the patch to be essentially untouched following the hurricane. We did two things in quick order following the opening of the park in June 2004. First, one of my undergraduate students at Dalhousie University undertook measurements of downed woody material in several locations in the park. The blowdown patch, as expected, had the greatest volume of this material – about 300 m3/ha (this amount was also expected because the standing forest prior to the hurricane would have had about that amount of standing live wood, and none was removed).

The second thing we did was to petition for the blowdown patch to become a stop on the self-guided tour that was being set up through the park. I was asked to prepare a short audio recording for Stop 6 of the tour (see photo and this website: https://soundcloud.com/pointpleasantpark).

Needless to say, I have been observing the blowdown patch several times a year for the past twenty years (we have not re-measured the dead material). I was astonished early on at how quickly the tree trunks rotted (see the second photo). Of course, the fine materials such as twigs were gone first, and the last materials to rot through are the large tree trunks. You might ask what happens to all the carbon in the trees when they blow down and start rotting. The processes are complex, but at the risk of oversimplification, I will say here that some of it (doubtless most of it) goes to the atmosphere as carbon dioxide. The rest of it goes down into the forest floor and soil where the hard-to-decompose carbon materials contribute to the soil's organic matter and the quick-to-decompose materials become molecular (we call it dissolved organic carbon, shortened to DOC). Given enough rainfall (which we generally have plenty of in Halifax), the DOC will percolate down into the water table and eventually

make its way into a stream and perhaps subsequently to a wetland, river, lake, or the ocean. In Point Pleasant Park, it is a very short distance from anywhere to the ocean.

I find this rot sequence interesting on its own but it also has important practical implications. We had two important forest fires in HRM a few years after Hurricane Juan – the Porters Lake fire in 2008 (almost two thousand hectares, two houses lost) and the Spryfield fire in 2009 (about 800 hectares, 12 houses lost). To my knowledge (based on a fly-over about six months after the burn), the Porters Lake fire burned a lot of Juan blowdown. When we think of recent events, we are mindful of the so-called Tantallon fire in late May 2023. It burned no more than a thousand hectares but destroyed over 150 buildings. All three of these fires had abundant woody fuels, mostly deadwood. Some of the deadwood was still standing (called snags). Most was lying horizontally or nearly so, being blown down during the storms. There is also downed deadwood because of normal processes of short-lived trees like balsam fir dying and falling over. When the woods become dry due to low amounts of precipitation, all it takes is an errant spark to get a blaze started, with potentially disastrous consequences.

If we want to reduce the risk of devastating forest fire near buildings and other infrastructure, a key lever we have is to reduce fuel in the woods. A major part of this is to get fuels down close to the ground. This has two effects – one is to reduce so-called ladder fuels that can take a fire from ground level up to the tree crowns, and the other is to get the deadwood into a moister environment at or near the forest floor. Another thing we can do is remove the deadwood from the forest entirely, but deadwood is an important part of the forest ecosystem that supports a diverse array of species and supplies the soil with organic matter. In Truro's Victoria Park, some of the blowdown from Hurricane Fiona in autumn 2022 was removed but much of the remainder was chipped and spread on the forest floor.

With climate change, the rising temperatures are sure to accelerate decomposition rates of dead woody material. Droughts, though, can retard the decomposition process because the micro-organisms responsible for the breakdown of woody material need water to thrive. It could be that Nova Scotia's changing climate through the 21st century will be characterized by droughts that used to be rare but will become more frequent. Our annual precipitation amounts are expected to increase slightly, but the rain may be concentrated into large events such as the deluge we experienced in late July 2023. So, it seems prudent that the owners of woodland near dwellings and other buildings consider, as one part of an overall program of reducing wildfire risk to property, how to manage the woods for minimal fuel.

Home owners whose properties include woodland, or are adjacent to woodland, should be aware of two things. One is the FireSmart Program that has a website brimming with helpful resources - https://firesmartcanada.ca/. HRM supports FireSmart (https://www.halifax.ca/fire-police/fire/fire-prevention-safety/firesmart). The second is that HRM is beginning the process of working toward a Community Wildfire Prevention Strategy. Hopefully there will be public consultations on this during 2024.


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