

Why Did THAT Tree Die?

Introduction to a New Article Series on the Halifax Tree Project Website

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2021-09-24

Trees in the woods, especially in mixed-age, mixed-species woodlands that have regenerated naturally, are constantly dying. The life history of trees is more r-selected than K-selected (I'll use these terms even if they have fallen out of regular use). K-selection refers to species like humans and cattle with a relatively low number of large offspring, high parental care, late independence from parents, long lifespan, and low early mortality. r-selection, on the other hand, refers to species of, say, fish, trees, and insects that have large numbers of small offspring, low parental care, early or immediate independence from parents, short lifespans (for most or all offspring), and high early mortality.

If you track the abundance of trees, including first-year seedlings, in a naturally regenerated site following some kind of disturbance (for example, Point Pleasant Park after Hurricane Juan in 2003), the normal pattern is for there to be, within a few years, tens of thousands of new trees per hectare (10,000 square metres) [see photo]. Within a few decades there might be just a few thousands of maturing trees, and by the time the new stand reaches early maturity, we might count the number of trees in the hundreds, not thousands, per hectare. The death of a lot of young trees in the woods is a totally natural phenomenon.

It's an opposite thing for planted trees in both woodland and urban settings. In the woods, if managers or owners choose to plant trees for regeneration, they want high rates of survivorship - after all, they probably had to buy the seedlings and then pay for planting services. It's normal to want survival rates of planted seedlings as high as 80-90%.

In the city, especially in the context of landscaping trees along streets and in parks and private yards, the normal approach is to plant relatively large specimens purchased at a nursery or garden centre. You could buy a seedling in a small pot, a one-metre-tall sapling in a larger pot, a 2-3-metre tall sapling in yet a larger pot, or even a 3-5-metre tall sapling where the root ball is wire-caged and wrapped in burlap. These latter are usually reserved for professional plantings. The prices might range from a few tens of dollars through a few hundred dollars. Since the large planting stock needs to be installed by professionals because they are so heavy [see photo], the installed price might be as high as 500 to a thousand dollars.

Planting of trees in the city is anything but natural in the sense of species and cultivar selection, stock production, stock transportation, planting locations, planting techniques, and early maintenance. In natural regeneration, we get what nature gives us and if we don't like it we can intervene with species editing, fill-planting, and other techniques. When we plant, we have so many choices to make and we want every tree installed to live a long and healthy life.

However, we still witness the premature death of young planted trees in various settings across the urban environment. Some level of mortality is expectable, but too much becomes intolerable. Dead trees in the streets, for example, look terrible [see photo] and represent a significant loss of money given that a street tree might cost 500-1000 dollars installed. Dead trees on private property also usually cost considerable money and labour to install and their owners can become attached to them almost like pets. For me, though, there is an even greater loss. If we have chosen well the location for a new planted tree, our hope and expectation is that the tree will spring into a strong growth pattern rather quickly and soon start providing all the ecosystem services we know that trees provide (see the companion article series on urban-tree values - <https://www.halifaxtreeproject.com/urbantreevalues>). If after some years or a few decades the tree dies, we have lost all that future time of enjoying the ecosystem services of a mature tree and must start over again.

To give an example of this, I recall a large mature street tree falling on a house on Vernon St. during Hurricane Juan. The tree damaged the house to some degree. In the following year (2004), the city ground the stump and planted a new tree in the same spot - this one a Freeman maple. That tree grew like it was on steroids. I followed its development closely because I walked past it and marvelled every day on my way to and from work. By 2019, it had a trunk diameter of almost 40 cm and a height of almost 15 m. This tree was delivering big-time on ecosystem services. Then Hurricane Dorian came in September 2019 and blew the Freeman down onto the same house. This time no damage because the crown was relatively light as the top came to rest on the house [see photo].

Why did that tree die 15 years after planting? It seemed so healthy and destined for greatness and longevity. I think the tree was enjoying a nutrient-rich site and put too many resources into crown development while leaving root development impaired. The tree had too small a rooting anchor for the size of its crown. Unfortunate. Now, two years after the event, the site is still unplanted and that's a shame because that site has the potential to grow a tree for a long time during which it would be providing ecosystem services. Tree foliage delivers ecosystem services - no tree foliage, no ecosystem services. When we fill a canopy void with a new tree, we want decades upon decades of benefits from the tree we installed.

This article series looks at the myriad reasons a tree might die. Sometimes the cause is clear - like the ash trees along Waterfront Drive in Bedford (next to DeWolf Park) that are dying because of the invasive alien insect species called emerald ash borer. At other times the cause is not clear - even upon close inspection, we would still be guessing. With the articles in this series, we want to examine, one by one, the most common causes of death of urban trees. We hope this series has general learning interest to readers but also might help some people take action to remove a specific potential cause of death of a tree and prolong its life. Here is our start-up list for the articles. If readers want to add to the list, by all means send me an email: pnduinker@gmail.com.

Old age
Windthrow
Storm damage
Drought

Nutrient deficiencies
Diseases
Insects
Mammal damage
Vandalism
Toxins and pollutants
Inhospitable site and insufficient soil
Mechanical damage
More??



Point Pleasant Park after Hurricane Juan in 2003. Photo Source: Peter N. Duinker



Street tree planting. Photo Source: Peter N. Duinker



A snag or dead standing tree. Photo Source: Peter N. Duinker



Fallen Freeman maple following Hurricane Dorian in 2019. Photo Source: Peter N. Duinker