Vines on Trees at Forest Edges *Resource Brief*

Importance

The abundance of climbing vines growing on trees in National Capital Region parks is on the rise (Matthews 2014). This pattern is also seen in many tropical forests, where a key cause of the increase in vines is forest fragmentation and the creation of edge habitat. These climbing vines have been shown to affect forest structure and composition.

We wanted to know if vines might have similar effects on temperate forests here in the National Capital Region (NCR). More specifically, we asked research questions related to tree growth rates, tree mortality, forest edges, and ecological differences between native versus non-native vine species.

Photo: NPS/Nortrup

Vines climb the forest edge at Rock Creek's Barnard Hill Park.

Monitoring

We analyzed a forest vegetation dataset collected in National Park Service units in the NCR. The data came from 403 plots visited twice between 2007 and 2014. Data included growth rates of trees larger than 10 cm diameter at breast height, tree status at each visit (living or dead), vine species climbing the trunk, and the presence of vines in the tree's crown.

Research Questions & Results

Question 1: Are climbing vines on trees becoming more common and is the pattern the same for native and non-native vine species?

Result 1: Between the sample periods ending in 2010 and 2014, the rate of trees with vines rose from 21.5% to 25.7%. At the same time, the percent of those vines on trees that were non-native invasive species (rather than native species) increased from 33% to 44%.

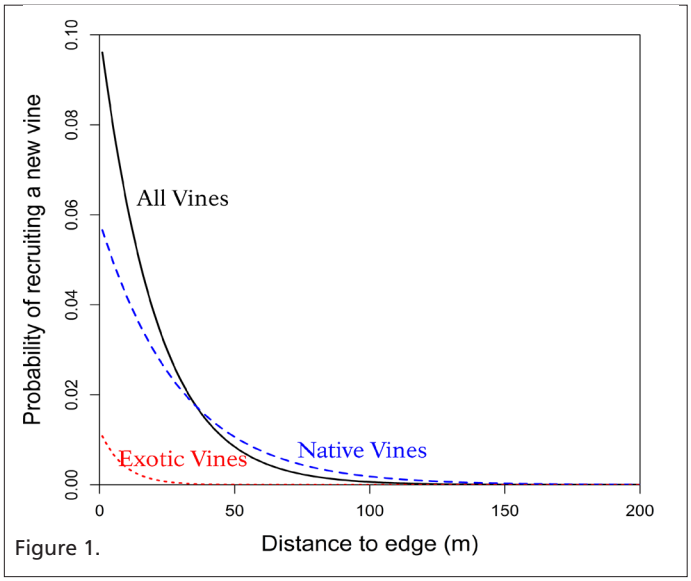

Figure 1.

Question 2: Are climbing vines more likely to spread to new trees if the tree is located near a forest edge?

Result 2: Recruitment of climbing vines on trees is greatest near forest edges. **Figure 1** shows the odds of a tree being used by a vine, based on its distance from the forest edge. Trees within 50 meters of a forest edge are particularly vulnerable to vine infestation. For non-native vines however, recruitment is constrained to a narrower zone near the forest edge.

Question 3: Do climbing vines on trees affect tree growth and mortality?

Result 3: For trees with vines that have grown

Photo: NPS/Coriell

Virginia creeper (*Parthenocissus quinquefolia*) climbing up a tree at C&O Canal National Historical Park.

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high enough to reach the tree's crown, tree growth is slowed. **Figure 2** shows that trees without vines in their crown generally had faster growth rates than those with vines in the crown. Tree location, either in interior forest or near a forest edge, had different effects for different sizes trees. With or without vines, small trees grew at faster rates in the increased light of forest edges. However, at a certain size they reached a tipping point and larger trees grew at a faster rate in the forest interior.

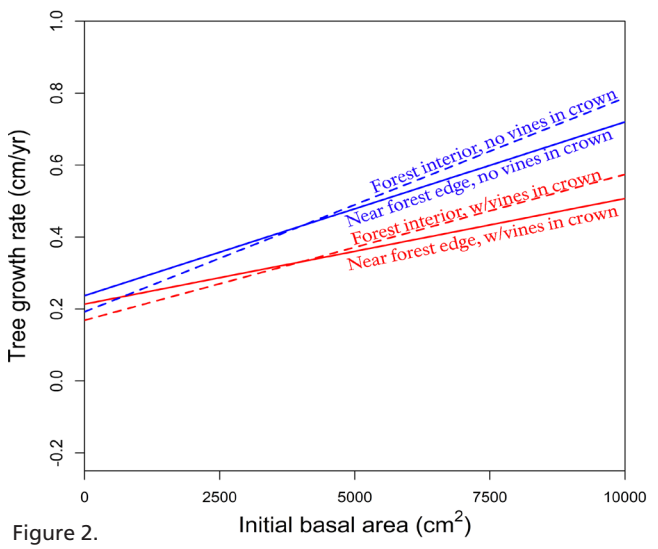

Figure 2.

In addition to affects on growth rates, risk of tree mortality is influenced by vines and proximity to a forest edge. The risk of mortality rises the closer the tree is to a forest edge, and the presence of a vine in the crown of the tree amplifies this risk (**Figure 3**).

Over time, the increase of climbing vines and higher tree

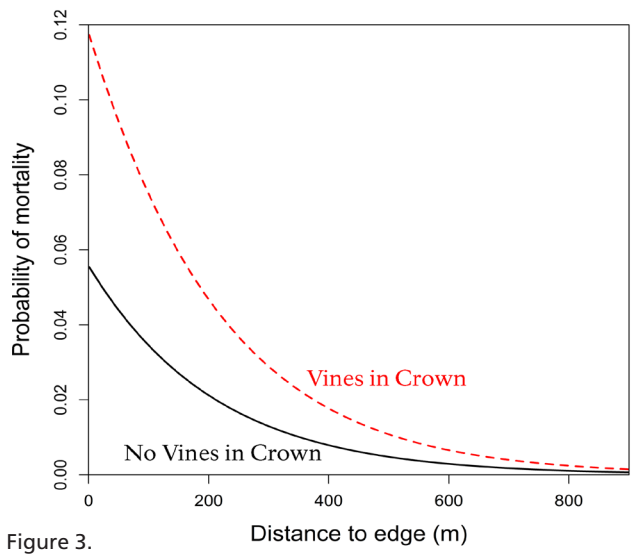

Figure 3.

mortality at forest edges may result in receding edges that shrink remnant forest patches. This is a grave threat, especially to small urban forests. Active management of climbing vines near forest edges may mitigate this threat.

References

Matthews, E, J.P. Schmit, and J.P. Campbell. 2016. Climbing vines and forest edges affect tree mortality in Mid-Atlantic forests. Forest Ecology and Management. 374:166-173. https://irma.nps.gov/DataStore/Reference/Profile/2230195

Matthews, E. and M. Nortrup. 2014. NCRN Resource Brief: Climbing Vines on the Rise. https://science.nature.nps.gov/im/units/NCRN/assets/docs/RBs/NCRN_Vines_2014.pdf