Resource Brief

National Park Service
U.S. Department of the Interior

National Capital Region
Inventory & Monitoring Network

Ash Trees Update - 2017

Key Points

- The non-native, invasive emerald ash borer (EAB) infests ash trees and is nearly 100% fatal.
- EAB is present in National Capital Region (NCR) parks and causing the death of thousands of ash trees.
- The loss of ash trees will have cascading effects on forest ecosystems and the plants and animals that live within them.
- Parks are managing damaged ash trees that pose a threat to structures, trails, and roadways.
- Federal agencies are exploring biological controls to combat EAB.

Background

Emerald ash borer (*Agrilus planipennis*) is an Asian beetle that targets ash tree species. The adult female lays its eggs on the tree's bark. After hatching, the larvae bore into the tree and begin feeding on tissues that transport water and sugar within the tree. The destruction of these tissues ultimately kills the tree. In areas of the U.S. where the beetle has been present since the early 2000s, EAB has been fatal to nearly 100% of ash trees.

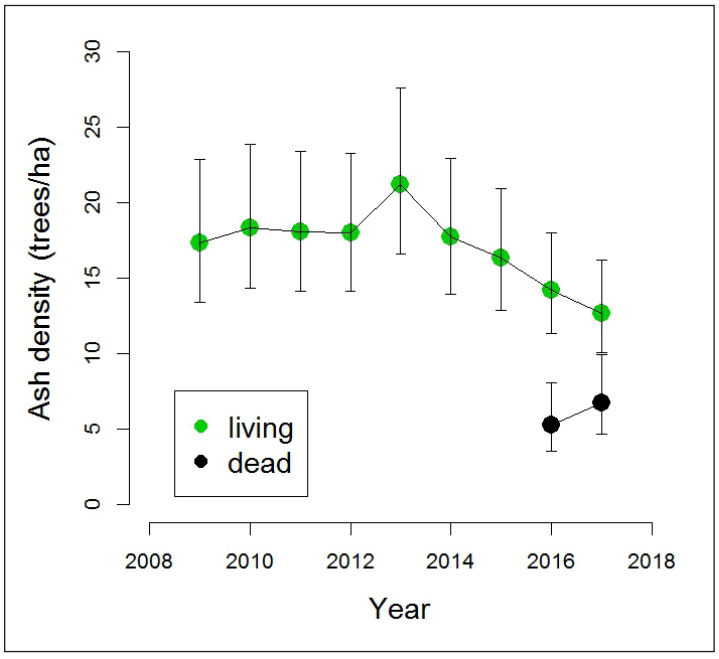


Figure 1. Ash tree density in national parks of the National Capital Region. Rolling four year periods are labelled by ending year (e.g., the 2009 data point shows average ash density for the 2006-2009 time period). Green dots represent living tree density. Black dots represent dead tree density (full 4-year data periods only available since 2016). Vertical lines show estimated error.



Photo: USDA Agricultural Research Service

A white ash leaflet

Ash Trees in 2017

We are now more than ten years into the EAB invasion of National Capital Region (NCR) forests, and ash tree density continues to decline (Figure 1). According to forest data collected by the National Capital Region Inventory and Monitoring Program (NCRN I&M), there were over 300,000 ash trees in NCR's national park forests before EAB's arrival. The most recent estimate of the NCR ash population suggests almost 100,000 trees have already been lost to the borer (Table 1). As more trees die, the density of standing dead trees (snags) has increased (Figure 1). We expect that the number of ash snags will peak in the next few years and then decline as standing dead trees ultimately fall to the forest floor. We will continue to track regional ash densities as the effects of the EAB infestation are felt in NCR forests.

Table 1. Change in estimated live ash tree populations. Error not shown, but can be larger for parks with fewer ash or fewer plots.

Park	# Plots	Live Ash 2010-2013	Live Ash 2014-2017	Percent Change
National Capital Parks - East	47	68,976	25,720	-63
GW Memorial Parkway	20	56,205	33,586	-40
Antietam National Battlefield	13	3,194	2,527	-21
Catoctin Mountain Park	49	48,440	38,752	-20
Monocacy National Battlefield	15	3,112	2,490	-20
Harpers Ferry National Historical Park	20	18,522	15,434	-17
Manassas National Battlefield Park	17	49,585	41,756	-16
C&O Canal National Historical Park	73	73,140	64,298	-12
Rock Creek Park	19	6,046	5,441	-10
Prince William Forest Park	145	7,647	7,647	0
Wolf Trap National Park for the Performing Arts	6	123	123	0
National Capital Region TOTAL	**426**	**334,990**	**237,774**	**-29**

Ash Saplings and Seedlings

NCRN monitors ash trees of all sizes, from seedlings, to saplings, to adult trees. The number of individuals in each of these size classes has changed in recent years (Figure 2). The decline in saplings has mirrored that of trees, whereas ash

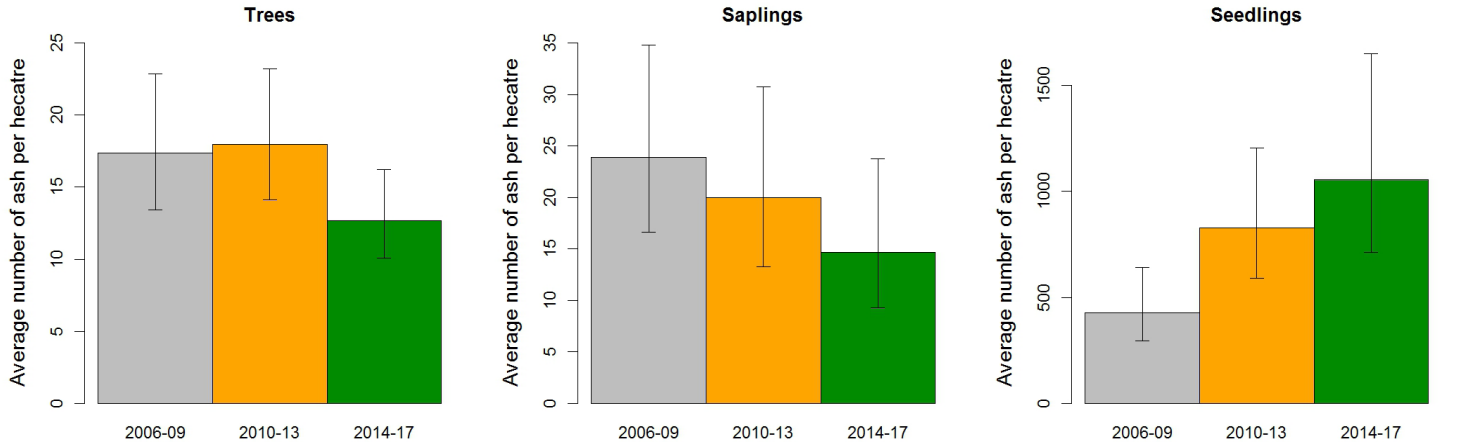


Figure 2. Ash density (individuals per hecatre) for trees, saplings, and seedlings at 3 time periods. NCRN I&M monitors forest vegetation on a four year rotation; each bar represents a full sample. Vertical lines show estimated error. Trees must be equal to or larger than 10 cm diameter at breast height (DBH). Saplings range between <10 cm and greater than or equal to 1 cm DBH. Seedlings are at least 15 cm tall but less than 1 cm DBH.

seedling density has spiked. This increase in ash seedlings may be fueled by a prolific seed production year (i.e., a mast year) or park deer management (i.e., reduced deer browse on seedlings). The uptick in seedling density may also reflect stressed canopy trees in decline—evidence of a last gap of activity and rush to reproduce before the tree dies—or a more favorable environment as dying canopy trees allow more light to reach the small seedlings on the forest floor.

Forest Changes with Ash Loss

In natural areas, the loss of ash from the forest canopy will increase light availability in interior forests, which may have cascading ecological effects ranging from increased tree growth rates to invasion by early successional native and non-native plant species.

Another effect of the loss of ash may be changes to or loss of ash-dependent insects. According to Douglas Tallamy's book "Bringing Nature Home" (2007), ash trees host 150 species of native moth and butterfly larva. Birds and other wildlife depend on these caterpillars for food. Ash seeds are also a food resource for a variety of birds and small mammals.

In the NCR, there are at least 27 insects that are restricted to ash species. In addition to Lepidoptera (butterflies and moths), they belong to the taxon Acari (a group of arachnids that contains mites and ticks), Coleoptera (beetles), Diptera (true flies), Hemiptera (true bugs such as the cicadas, aphids, planthoppers, leafhoppers, and shield bugs), and Hymenoptera (sawflies, wasps, bees, and ants). Another 13 insects in NCR are known to use only ash as a host.

Biological Controls

Although insecticides can be effective in protecting ash trees from EAB damage in unaffected areas, this labor intensive, individualistic approach isn't realistic for the thousands of ash trees in the NCR forests. However, all hope is not lost. The U.S. Department of Agriculture's Biocontrol Program is exploring biological control (biocontrol) options as a long-term management strategy for EAB. Biocontrols are natural enemies of a pest that target only that pest.

The main focus of biocontrol efforts has been on identifying parasitoid wasps that attack EAB in its native range. Parasitoids are highly specialized, stingless wasps that lay eggs on immature stages of a host insect. The immature wasp then feeds on the host insect (in this case, EAB) and kills it. Four species of parasitoid wasps from Asia have been identified as promising biocontrol agents, and as of 2017, wasps have been released in 25 states including Maryland, Virginia, West Virginia, and the District of Columbia. It is still too early to tell whether these parasitoid wasps will be able to provide sustained control of EAB populations, but there is some evidence that the parasitoids may be able to protect small ash trees, allowing the tree species to persist in the wild while other management options are developed. Learn more about the development of EAB biocontrols at: https://www.nrs.fs.fed.us/disturbance/invasive_species/eab/control_management/biological_control/.

Scientists are also observing native organisms that may be "learning" to attack EAB. Several native, parasitoid wasp species, for example, have been found attacking EAB larvae in the U.S., and several predatory native beetles have been observed to prey on EAB larvae.

Woodpeckers are also natural enemies of EAB. Research in the U.S. has found that woodpecker consumption can account for 35-40% of EAB mortality. These native birds may also play an important role in keeping EAB populations in check, particularly in conjunction with biocontrol agents.

Citations

Tallamy, Douglas. Brining Nature Home: How Native Plants Sustain Wildlife in Our Gardens. 2007. Timber Press. ISBN-10: 0881929921