PARTNERING WITH BUSINESSES TO INCREASE THE URBAN TREE CANOPY

A means to continue saving energy, managing stormwater and cleaning the air in Minneapolis.

WHAT CAN A TREE DO FOR ME?

- "The net cooling effect of a young, healthy tree is equivalent to ten room-size air conditioners operating 20 hours a day." —*U.S. Department of Agriculture*

- "Trees properly placed around buildings can reduce air conditioning needs by 30 percent and can save 20–50 percent in energy used for heating." —*USDA Forest Service*

- "The planting of trees means improved water quality, resulting in less runoff and erosion. This allows more recharging of the ground water supply. Wooded areas help prevent the transport of sediment and chemicals into streams." —*USDA Forest Service*

- "In laboratory research, visual exposure to settings with trees has produced significant recovery from stress within five minutes, as indicated by changes in blood pressure and muscle tension." —*Dr. Roger S. Ulrich Texas A&M University*

- "There are about 60– to 200-million spaces along our city streets where trees could be planted. This translates to the potential to absorb 33 million more tons of CO^2 every year, and saving $4 billion in energy costs." —*National Wildlife Federation*

-From The Arbor Day Foundation website

I-TREE: LINKING URBAN FOREST BENEFITS, COSTS AND MANAGEMENT IN MINNEAPOLIS (2005)

Greatest benefits from:

- *storm water run-off reduction (Reduced storm water runoff of 447.5 million cubic feet annually or $9.1 million savings in control costs ($46/tree))*
- *energy savings (Total annual energy savings of $6.8 million or $34/tree)*
- *aesthetic/property value (Aesthetic and property value increases of $7.1 million or $36/tree)*

LOWER ENERGY COSTS

- ***(In Minneapolis, 2005: Total annual energy savings of $6.8 million or $34/tree)***

Trees modify and conserve building energy use in three principle ways:

- Shading reduces the amount of heat absorbed and stored by buildings.
- Evapotranspiration converts liquid water to water vapor and cools the air (The solar energy used in this process would otherwise result in heating the air.)
- Tree canopies slow down winds thereby reducing the amount of heat lost from a home, especially where conductivity is high (e.g., glass windows).
- In summer, trees shading east and west walls keep buildings cooler. In winter, allowing the sun to strike the southern side of a building can warm interior spaces.

CLEANER WATER

- ***(In Minneapolis, 2005: Reduced storm water runoff of 447.5 million cubic feet annually or $9.1 million savings in control costs $46/tree)***

- Stormwater run-off is the most prevalent water quality problem in the nation. One sugar maple tree can intercept 1763 gallons of stormwater run-off each year. Trees in the urban environment decrease the quantity of stormwater run-off and improve the quality of run-off that eventually reaches local lakes, streams, and reservoirs.
- The urban forest canopy, along with tree branches, bark, and mosses, captures and stores precipitation, delaying the onset of peak flows and reducing the total amount of run-off that reaches urban waterways via the storm drain system.
- Trees slow down stormwater run-off and promote groundwater infiltration.
- Trees take up water through their root systems and release it to the atmosphere through evapotranspiration, facilitating greater water storage potential in soils and increasing the amount of time before rainfall becomes run-off.
- Tree roots take up nutrients and potentially harmful chemicals from stormwater run-off. Pollutants are filtered out as water moves through the ground.

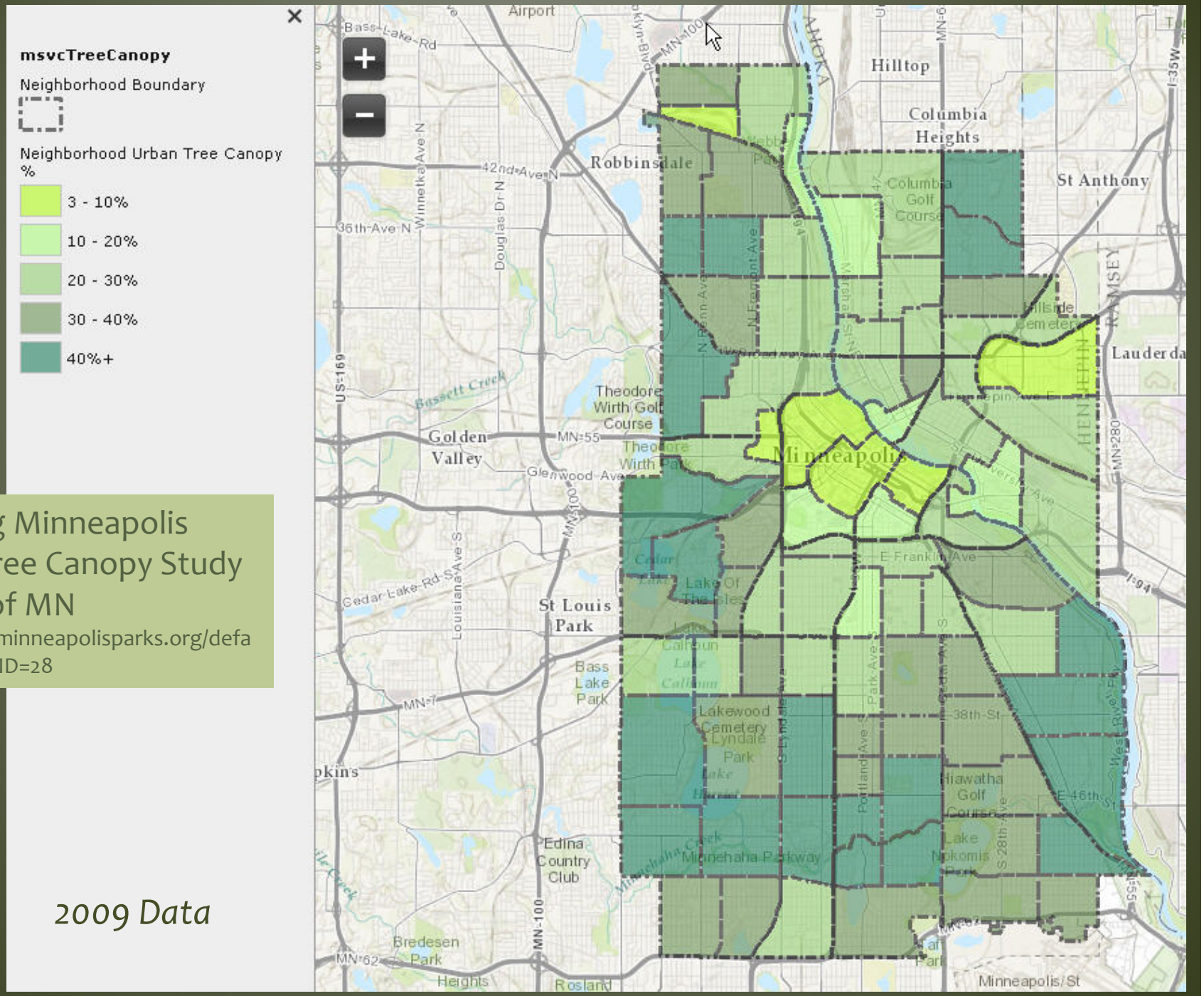
HEALTHIER AIR

The urban forest mitigates the health effects of pollution by:

- Absorbing pollutants like ozone, nitrogen dioxide and sulfur dioxide through leaves
- Intercepting particulate matter like dust, ash and smoke
- Releasing oxygen through photosynthesis
- Lowering air temperatures, reducing the production of ozone

REDUCED CARBON DIOXIDE LEVELS

- *One sugar maple reduces atmospheric carbon dioxide (CO_2) levels by 502 pounds per year.*
- *Trees sequester, or lock up, carbon in roots, trunks, branches, and leaves while growing, and in wood products after harvest.*

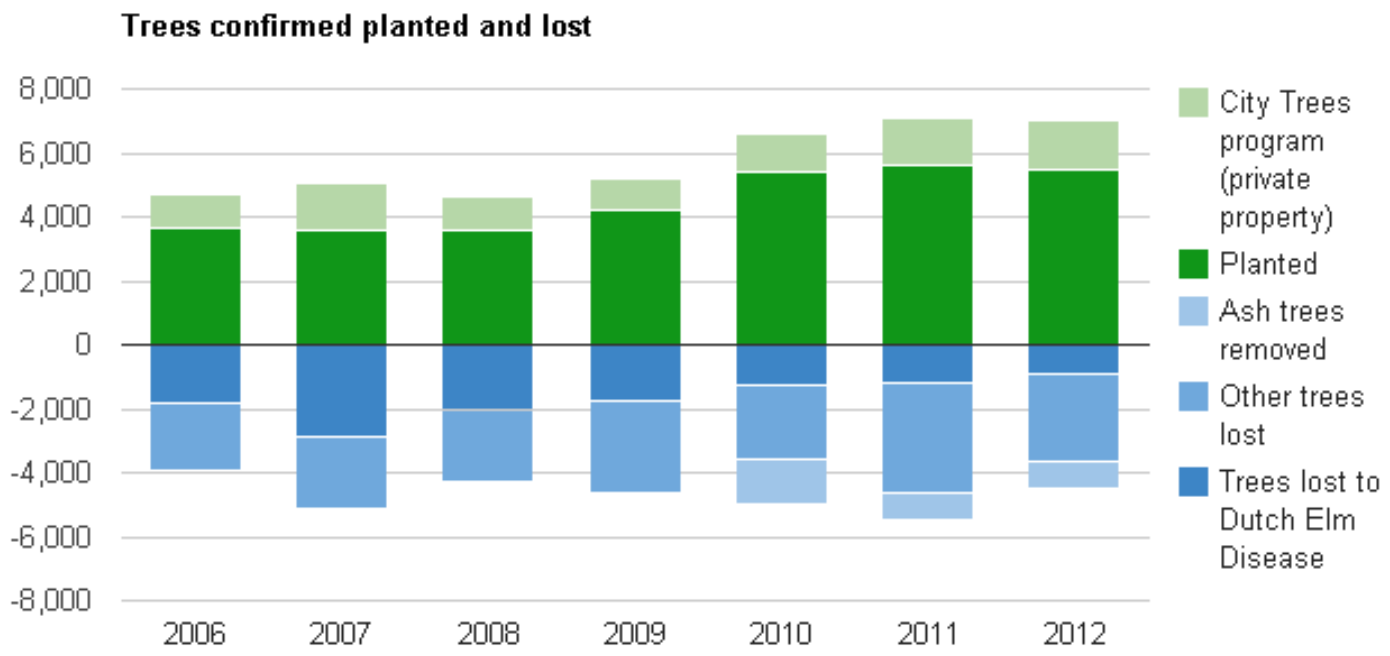


Mapping Minneapolis Urban Tree Canopy Study from U of MN

http://www.minneapolisparks.org/default.asp?PageID=28

2009 Data

Trees Lost and Planted



Since 2006, the MPRB has planted 31,000 trees on public land. With all the tree removals they have to do, we are still at a net loss of 1,500 trees annually for the past 7 years.

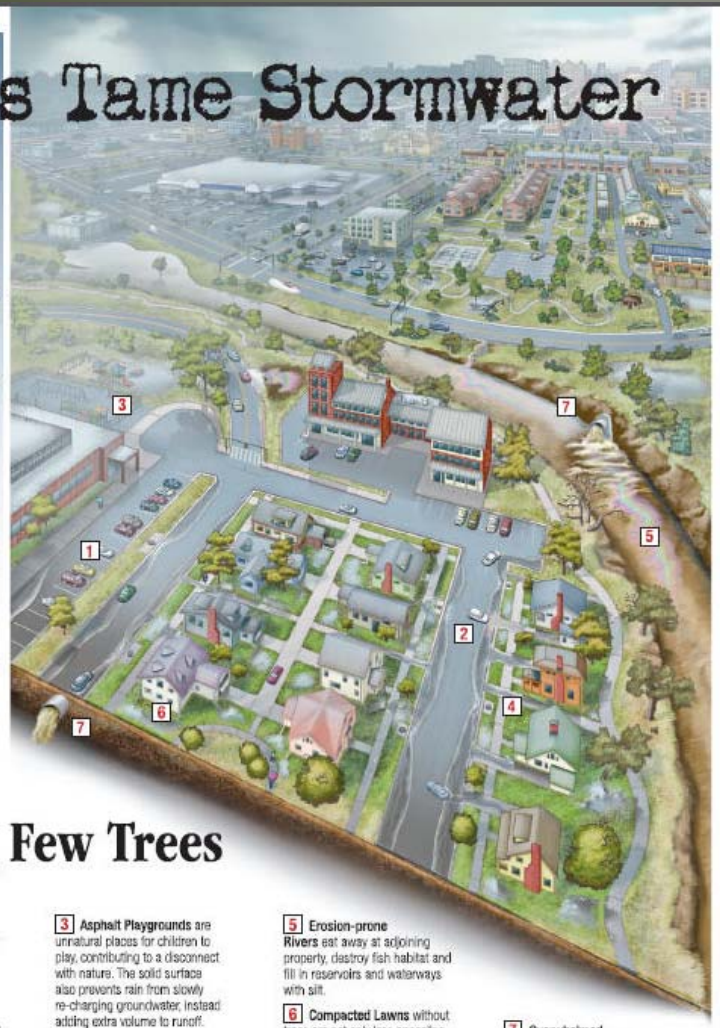
There are 200,000 ash trees in Minneapolis.

Tree Trust has helped plant 9,000 trees on private land.

Trees Tame Stormwater

RAIN REFRESHES THE LAND AND NOURISHES THE GREEN LANDSCAPE. But as houses, stores, schools, roads and parking lots spread and natural tree cover is lost, so is the absorbing effect of vegetation and soil. The welcome rain becomes costly stormwater runoff. Without the benefit of trees and vegetated infrastructure, waterways are polluted as oils, heavy metal particles and other harmful substances are washed away. Fish and wildlife suffer, drinking water becomes expensive or impossible to reclaim, property values are reduced, and our living environment is degraded.

Trees make a difference and every tree matters. It's never too late for municipalities, homeowners, businesses, and schools to plant abundant trees to retain more water on site, enhance percolation into the soil, reduce the expense of pipes and treatment plants, and protect environmental quality. For more information, including an interactive version of these pages, please visit **arborday.org/stormwater.**



Few Trees

1 Treeless Parking Lots are unsightly, add to stormwater runoff and are a source of heat that is not only uncomfortable but increases air pollution.

2 Treeless Streets deprive the community of social benefits and ecological services. Following storms, water rushes along the street sides.

3 Asphalt Playgrounds are unnatural places for children to play, contributing to a disconnect with nature. The solid surface also prevents rain from slowly re-charging groundwater, instead adding extra volume to runoff.

4 Treeless Homes and Yards reduce property values, increase energy costs and allow rainfall to rush into gutters.

5 Erosion-prone Rivers eat away at adjoining property, destroy fish habitat and fill in reservoirs and waterways with silt.

6 Compacted Lawns without trees are not only less appealing, they often can't soak up heavy rains fast enough. Excessive runoff flows across sidewalks and down driveways and streets.

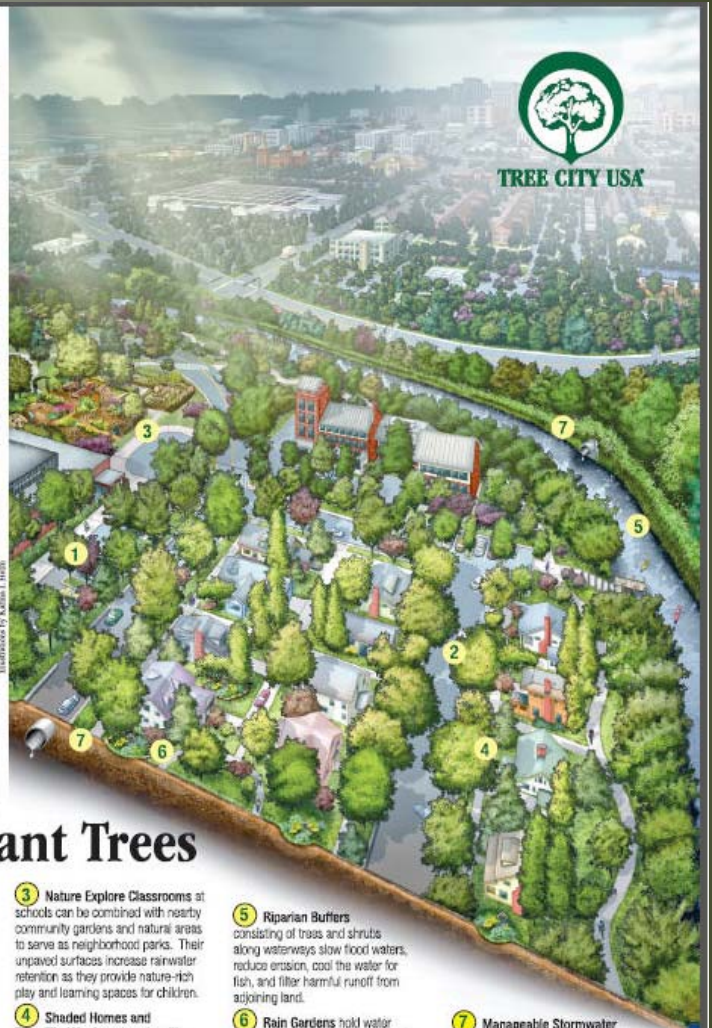
7 Overwhelmed Sewage Systems can lead to untreated sewage being swept into waterways. Upgrades are expensive, adding to local tax burdens.

Leaves break the force of falling rain and reduce soil erosion. They retain 2 – 7 percent or more of the water produced by a short downpour, allowing it to slowly evaporate back into the atmosphere. As leaves decompose on the ground, they help build a spongy layer of topsoil that retains water and contributes to plant growth.

Pervious Materials such as bricks, interlocking stones, honeycomb blocks, gravel, chips and porous asphalt are some of the ways to build parking lots, driveways, or walks that let rainwater enter the soil.

Tree Roots bind the soil and guard against erosion. They also take up quantities of water that would otherwise be added to runoff.

Illustration by Karina I. Hicks



TREE CITY USA

Abundant Trees

1 Well-Landscaped Parking Lots can be designed to slow storm runoff and beautify the community. They cool parked cars, reducing evaporated gasoline that contributes to air-polluting ozone. Tree shade also adds longevity to paved surfaces.

2 Tree-lined Streets retain large volumes of rainfall, reducing and cleansing runoff. They also increase property values, encourage shopping and business, reduce air pollution, calm traffic and lower noise levels.

3 Nature Explore Classrooms at schools can be combined with nearby community gardens and natural areas to serve as neighborhood parks. Their unpaved surfaces increase rainwater retention as they provide nature-rich play and learning spaces for children.

4 Shaded Homes and Tree-filled Yards make urban life more pleasant and provide practical benefits such as lower heating and air conditioning costs and increased re-sale values. The tree canopy is also a major contributor to stormwater runoff reduction.

5 Riparian Buffers consisting of trees and shrubs along waterways slow flood waters, reduce erosion, cool the water for fish, and filter harmful runoff from adjoining land.

6 Rain Gardens hold water onsite, reducing wasteful runoff and providing moisture for tree roots and flower beds. They also filter chemicals draining from walks, driveways and streets.

7 Manageable Stormwater Runoff results from abundant trees, multi-use catch basins and rain gardens, reduced impervious surfaces, and increased ground vegetation. The benefits are lower costs and a more livable, sustainable environment.

Arbor Day Foundation
arborday.org

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WHY SHOULD ENVIRONMENTAL SERVICES GET INVOLVED IN PLANTING TREES?

These are just some of the Sustainability Indicators for Minneapolis:

- *Reduce citywide greenhouse gas emissions by 15 percent by 2015, and 30 percent by 2025 using 2006 as a baseline.*
- *Reduce municipal operations greenhouse gas emissions by 1.5 percent annually.*
- *Reduce criteria air pollution levels in the Minneapolis area to health-based levels recommended by the Environmental Protection Agency Clean Air Scientific Advisory Committee.*
- *Reduce all monitored air toxins to levels within state health guidelines by 2015.*
- *Reduce pollutants in stormwater runoff, establish measurements of amounts being reduced, and determine the city's allocations of the reductions needed to bring impaired water bodies into compliance, all by 2015.*

Trees help with all of these indicators, not to mention…

THESE 2 SUSTAINABILITY INDICATORS:

- *Maintain the city's 31% tree canopy level through 2015.*
- *Plant at least 6,000 trees annually on public land by 2015.*

Planting trees is one of the Sustainability Indicators, and will help us achieve many other Indicators.

But, we've got our work cut out for us…

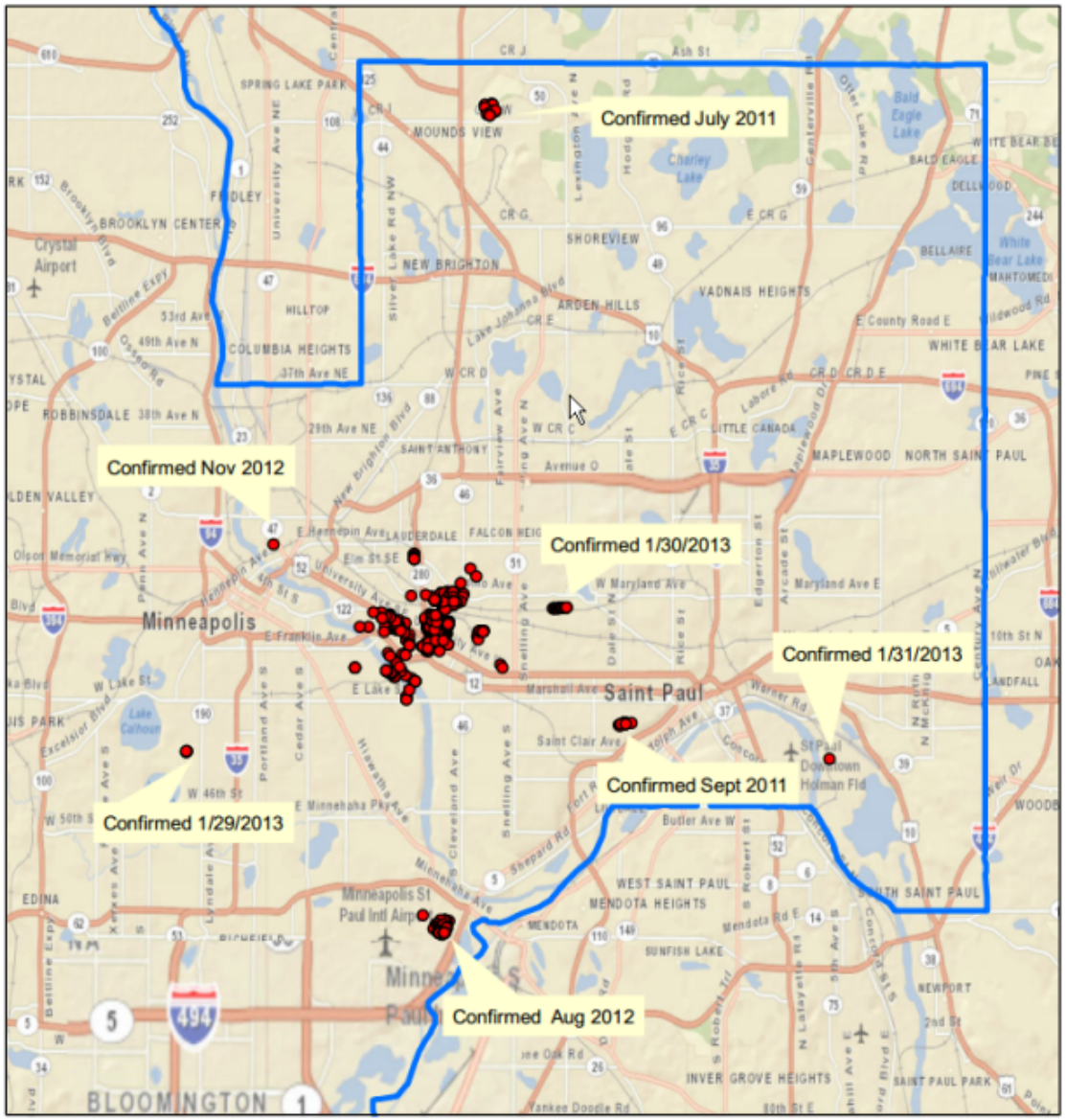
EMERALD ASH BORER

Eleven-year cycle: from introduction to large-scale ash death

Emerald Ash Borer was discovered in Prospect Park East River Road neighborhood in March 2010.

That was 3 years ago.

EAB Status
January 31, 2013



EAB Positive Tree

Quarantined Counties

N

0 1.75 3.5 Miles

MINNESOTA DEPARTMENT OF AGRICULTURE
PLANT PROTECTION

Area of detail highlighted in red

As of this writing, April 2012, there are many millions of dead standing trees in southwestern Michigan, much of Ohio, Indiana, and Illinois. And this scenario is coming soon to Wisconsin, Minnesota, Iowa, Pennsylvania, Maryland, and the east coast. Cities that were not prepared for this onslaught of dead ash trees are now dealing with tree limbs falling and the inability to either raise the dollars or find the skilled man power needed to remove the trees. Insurance companies are being hit with claims coming from trees falling on vehicles, buildings, and even people. A recent report showed that in a number of studied cities, where emerald ash borer has killed all the ash trees, heart attack rates and lung disease deaths are higher than before the ash died. With 10-25% of their urban canopy gone, air pollution is more prevalent.[9]

WHY SHOULD WE GIVE A (PCAB) BUSINESS A TREE?

The Minneapolis Park and Recreation Board (MPRB) plants trees on public land in the City AND:

- *Removes Ash trees (*In 2012, 879 unhealthy and declining ash trees were removed and replaced from boulevards and parks through a MDA grant to help combat emerald ash borer. This was about the same number as were removed in 2011.)
- *Has attempted to replace trees lost to the tornado, not to mention responding to other natural disasters*
- *Goals will be difficult to meet with a net loss of 1500 trees for the past 7 years and more ash trees dying every year (exponential growth of EAB)*
- *Maintains all the park land and boulevard trees*

MINNEAPOLIS BUSINESSES THAT PAY PCAB BILLS WERE EVALUATED AND…

- *They have the green space*
- *They will care for the tree*
- *They will benefit from energy savings and stormwater reducton/filtration*
- *They can help lessen the blow of EAB!*

OUR PLAN

- *PCAB businesses were analyzed for: green space or ability to support a tree and energy saving potential (from both the east and west)*
- *Tree Trust (a local non-profit) has the infrastructure to purchase, place and plant trees. Tree Trust does the annual Mpls and SLP tree sales. They've added 9,000 public trees to Mpls since 2006.*
- *Successful addition of over 160 trees to the UTC*
- *Repeat!*

SOURCES

- Minnesota Department of Agriculture:
http://www.mda.state.mn.us/plants/pestmanagement/eab.aspx

- Emerald Ash Borer:
http://www.emeraldashborer.info

- Minneapolis Park and Rec Board, Emerald Ash Borer
http://www.minneapolisparks.org/default.asp?PageID=1059

- Wikipedia
http://en.wikipedia.org/wiki/Emerald_ash_borer

- City of Ann Arbor, MI
http://www.a2gov.org/government/publicservices/fieldoperations/forestry/Pages/UrbanForestBenefits.aspx

- MPRB and USDA Forest Service
http://www.minneapolisparks.org/documents/caring/itree.pdf

- Minneapolis Urban Tree Canopy Study
http://www.minneapolisparks.org/default.asp?PageID=28