

Exotic and Invasive Pests and Diseases

Goal: Monitor the resource for exotic and invasive pests and diseases

Exotic and invasive pests are plants, animals, insects, or diseases that are typically imported or released accidentally from other regions of the world. In their native lands, these species often have natural predators and other controls to keep populations and ecosystem damage at low, manageable levels. However, when introduced here without natural checks and balances, their populations increase dramatically and they can severely affect trees and ecosystems. The effects of invasive pests and diseases are directly correlated to a reduction in the quality of structural and functional urban forest benefits. Our global economy has set the stage for an increasing number of threats each year as more and more goods are shipped to the United States from overseas.

The city of Pittsburgh has experience with exotic and invasive pests. Like many cities, it experienced the devastating loss of many of its elm trees during the mid-1900s that came as a result of Dutch elm disease (DED). Since that time, the City has remained vigilant for threats from several exotic and invasive pests.

Current Conditions

While historic pest problems typically occurred one at a time, Pittsburgh is now faced with several real threats from exotic and invasive pests. While not a complete list, the primary focus is on the following threats:

Emerald Ash Borer (EAB)—First found in the Pittsburgh area in 2007, this destructive insect has claimed tens of millions of ash trees in Michigan since it was first discovered there in 2002. The small, metallic-green borer has spread to nearly all of the northeastern United States and has claimed millions of ash trees in Pennsylvania.

EAB is an obvious threat to ash trees in Pittsburgh. While there are only 387 ash located along city streets, there are thousands more in public parks and private woodlands and yards. When EAB strikes an area, it causes the total obliteration of all ash trees. The wood in ash trees that die from EAB becomes very brittle and poses a serious threat to public safety. Chemical treatment, while effective, is expensive and requires repeat applications until the threat of EAB is gone. Chemical treatments are typically reserved for select groups of ash trees while plans are made for removal and replanting of trees killed by the pest.

Oak Wilt—This destructive fungus is lethal to trees in the red oak group. It has claimed a large number of oaks and the City is taking an aggressive approach to treat and control its spread. There are approximately 1,757 oaks along public streets, and more located within manicured park areas, and still more within woodland areas and private property. While treatments exist, they require early diagnosis and treatment to be successful. Oak wilt typically attacks small pockets or groups of oak trees. Several parks and neighborhoods have been targeted for control measures.

Oriental Bittersweet—This invasive plant, native to Asia, is a climbing vine and trailing shrub capable of suppressing trees and shading out beneficial plants. It is believed to have been introduced as an ornamental plant and is still commonly cultivated which further promotes its spread. Its prolific distribution, primarily by birds and suckering, and tolerance to shade, make oriental bittersweet a considerable forest pest. It can have an adverse effect on a tree rooting capability by adding weight to the crown and increasing the chance for windthrow in a storm or blow-over during excessive snowfall. The human cultivation, biological properties, and wide distribution make oriental bittersweet difficult to effectively manage.

Tree-of-Heaven—Introduced by English settlers to the United States, tree-of-heaven was once a popular tree both for its resistance to pollution and supposed homeopathic properties. As a non-native species from China, tree-of-heaven poses an imminent threat to the biotic integrity of Pittsburgh's urban forests including its forested hillsides. Currently ranking as the sixth most prominent species and composing 5.3% of Pittsburgh's urban forest, tree-of-heaven has effectively naturalized and impacted natural forest succession (i-Tree Eco 2011). Its adaptive growth requirements, seed viability, and alleopathic nature make it a difficult-to-control pest that has infiltrated public and private lands.

Other Pests—Asian longhorned beetle (ALB) is another destructive borer that attacks a wide range of hardwood trees, primarily maple. While it has not been discovered in Pittsburgh, it is still considered a high-risk pest in the area by the United States Department of Agriculture.

While Dutch elm disease claimed thousands of elm trees in the past, the City has taken proactive steps to minimize its impact on the future population of elm in Pittsburgh. While elm have not been planted for years, many naturally occurring elm exist. Some landscapes in city parks are now seeing new elm planted that are DED-resistant cultivars. Several, invasive Norway maples in Schenley Park were removed and replaced with DED-resistant elm cultivars.

Other threats to Pittsburgh's urban forest include the hemlock woolly adelgid and gypsy moth. While neither of these pests currently have the destructive force as oak wilt or EAB, both are present in Pittsburgh.

Issues

- There is currently no unified plan for regular monitoring of exotic and invasive pests.
- No action plan exists for appropriate response to imminent or existing outbreaks.
- Future pests are difficult, if not impossible, to prepare for or to predict.
- The street tree population is dominated by maple.
- The largest portion of the urban forest is held on private land and difficult to monitor for pests.
- Exotic and invasive pests pose a significant risk to the urban forest in terms of structural value and resource extent.
- The public may be uninformed or unaware of exotic and invasive pest threats on their property.

Recommendations

- Identify the highest level, exotic pest threats and develop strategies for monitoring, control, removals, and replanting. Strategies should include information about utilization of limited resources and methods to secure funding to prevent or deal with existing pest issues.
- Utilize existing street tree inventory data to monitor public street trees for high-priority, exotic pest threat zones.
- Educate city staff, stakeholders, and the general public about exotic pest threats and provide information about identification and treatment options.
- Create citizen watch programs to assist with early detection of exotic pests. Dovetail these programs with additional education about urban forestry issues.
- Offer homeowner incentives to combat invasive species on private property.



*Oak leaves infected with oak wilt.
Photo from USDA Forest Service, Forest Insect
and Disease Leaflet #29, Oak Wilt.*



*An adult emerald ash borer and the destructive
galleries it creates on the tree trunk. Photo
from USDA Forest Service.*

Case Study: Exotic and Invasive Pests and Diseases

Oak Wilt Tree Removal Project in Frick Park

Project Description

Oak wilt is a fungal disease that threatens oak trees and has become a large issue in the Pittsburgh area. It is a particularly virulent disease, meaning it can spread rapidly within groves of oaks that are located in close proximity to one another. Oaks in woodland areas that become infected can spread the disease to adjacent oaks via root grafts or borers that fly from infected trees to healthy trees. Many of Pittsburgh's parks have woodland areas with heavy oak populations that are threatened by oak wilt. Frick Park is Pittsburgh's largest municipal park and covers 561 acres. It is located approximately four miles east of downtown Pittsburgh near the Squirrel Hill neighborhood. [79–83]

Accomplishments

In 2009, City staff realized that a grove of oak trees in Frick Park were infected with the oak wilt fungus, and the potential for rapid spread to nearby areas, including private land, was a major concern. A plan was developed to control this spread, eliminate the pocket of infected trees, and treat nearby trees to reduce the chance of spread.

Trees were removed from a two-acre grove within Frick Park located near Kensington Street in April 2010. While the removal of infected trees seems drastic, this practice known as “sanitation” is a commonly practiced and widely accepted means of treatment to reduce the chance of spreading the fungus. Other treatments included the use of vibratory plows to slice through the ground and sever any potential connection between roots of infected oaks and adjacent healthy oaks. The nearby remaining oaks at the periphery of the removal area were also treated with fungicide injections to further reduce the potential for spread. The chemical treatment is effective only in the very early stages of infection; thus, its use on the adjacent trees is appropriate, while treating oaks with advanced infections is not warranted.

City staff and the Pittsburgh Parks Conservancy jumped on the education opportunity this project created and heavily publicized the project and held on-site classes to demonstrate some of the treatments.

Lessons Learned

While the removal of two acres of trees on public lands in an urban area can create quite a stir, this example was successful in limiting the spread of the oak wilt fungus and provided valuable information about how to treat future infection pockets. It was also a reminder of the need for vigilance to identify infected trees early so that treatment can be performed on a smaller scale. Seizing the education opportunities provided on-site public observation of the devastating impact of exotic and invasive pests.



A 2007 aerial view of Frick Park prior to oak removal.



An aerial view of Frick Park after oak removal.

TREE PROTECTION DURING INFRASTRUCTURE IMPROVEMENTS

Goal: Protect trees and preserve their role in defining the City's character

One of the best ways to maintain or improve Pittsburgh's current tree canopy level of 42% is to ensure that the current population of trees is protected from harmful activities such as indiscriminate damage or removal during proposed construction. Large, established trees typically provide the most benefits to a community, but can also be the most challenging to protect. Trees often compete with other conflicting needs in urban areas. Nearby activities threaten trees directly and indirectly, and damage is often caused by those without adequate knowledge about tree biology.

Current Conditions

Despite the tree protection measures that are in place, the City continues to lose street trees from sidewalk work and other infrastructure improvements. There is language in the City Code that provides vague powers to the Pittsburgh Tree Commission for "protecting trees during construction and development"; however, it provides no specific authority or direction to do so (Title 4, Article XIII, Chapter 487). [16]

- **Public Trees**—Chapters 483 and 485 of Article XIII of the City Code contain language about protecting public trees from damage, including the authority to receive compensation from construction, excavation, gas leaks, and pet damage. But the language provides no direct authority to specific departments to effectively carry out this mandate. There is currently no clear authority for which departments respond to specific issues that impact public trees. [16]

No clear channels of communication exist between departments or agencies that would benefit from arboricultural expertise when permitted work threatens public trees, or when sidewalk or street improvements are planned. The City does not utilize a defined set of arboricultural standards when planning infrastructure improvements.

Utilizing standards and input from the City Forester would greatly reduce damage to public trees when these types of projects are planned. This step can also greatly improve public safety by removing trees that suffer traumatic root loss. [84]

Private Trees—Just as with public trees, City code provides no specific mandates for the protection of desirable trees on private property. The site plan review process Chapter 922 does require showing the location of woodlands and single trees that are 18 inches in diameter (at 4.5 feet above ground) and larger. However, there are no provisions mandating their protection. [16]

Chapter 918 of the City code also contains landscaping requirements that include language about tree planting on development sites, but the planting density is not related to the loss of trees on the site. [16]



Tree preservation of historic London plane in Schenley Plaza.

Issues

- Lack of enforcement of current city standards and codes.
- The public outreach campaign results suggest that trees contribute greatly to the character of the city and are, therefore, worth protecting and preserving.
- The potential for landslides is a major concern along the City's forested hillsides.
- The City lacks specifications and standards for the protection of public trees during repairs or improvements to existing infrastructure and the planning of new infrastructure.
- There is no clearly defined requirement or authority for specific departments to practice or enforce tree protection policies, specifications, or standards.
- The City lacks specific ordinance language that requires the protection of trees on private property.

Recommendations

- Update and enforce ordinances that protect existing tree resources both on public and private lands.
- Develop a set of arboricultural standards for all work that occurs near public trees. The standards should apply to permitted work by private contractors and municipal crews who perform any type of work that may impact trees.
- Develop ordinance protection for the City's forested hillsides.
- Create clear authority with an interagency and interdepartmental communication process for inspection, monitoring, and enforcement of protection of public trees during infrastructure improvements by public agencies, or permitted work on public rights-of-way near public trees.
- Create a dedicated account for funds from remediation and fines that is strictly for funding other tree-related projects.
- Incorporate tree protection best management practices and examples of poor practices in a public outreach campaign.
- Create a private property tree protection ordinance.

Case Study: Tree Protection During Infrastructure Improvements

Bakery Square Tree Protection

The protection of trees during redevelopment projects in major metropolitan areas requires good communication between the developer and municipal departments that include planning, public works, and forestry. While redevelopment can provide tremendous energy and vitality to an urban neighborhood, it does not have to be at the expense of neighborhood character. Thoughtful redevelopment recognizes the value of architectural design and the preservation of existing trees that often define a neighborhood. [85, 86]

Project Description

Bakery Square is a recent redevelopment project located six miles from downtown Pittsburgh at the northeast corner of Penn Avenue and East Liberty Boulevard. It is the site of the historic Nabisco Bakery and was blighted in 2006 after its last tenant left in 2004. In 2007, Walnut Capital purchased the site and began environmental remediation and site planning. While the vast majority of the site was redeveloped with private funding, there were grants and tax increment financing that assisted with environmental issues and traffic concerns. Adequate road access was critical to the project; however, several large-diameter oaks lined streets that were targeted for additional lanes and other improvements. It appeared that trees would be lost based on the original plans.

Accomplishments

Arborists with the Pittsburgh Forestry Division stepped in and began a dialogue with the development planning team. Issues included communicating the value of the mature oaks to the neighborhood and the potential value they could bring to the project itself. The project pursued LEED green building certification and the tree protection would complement this pursuit.

Over 25 oaks were preserved by adjusting the new road configuration. Each tree was evaluated and assigned specific needs to help with tolerating the nearby construction activities. Chemical treatments included the use of Cambistat, a growth regulator that also promotes the development of new tree roots.

Lessons Learned

The protection of mature trees around the project site adds greatly to the environmental benefits and helps to connect the new construction with the preserved architecture and surrounding neighborhood. The involvement of an arborist with the development planning team and City departments provides valuable input to project design. Creating and maintaining this type of communication is a positive step and opens the door to future planning efforts with an arborist's voice at the table.



Bakery Square Redevelopment Project.