

Forest Restoration in an Urban Context: *Problems and Approaches*

Society
of
American Foresters

February 16, 2017



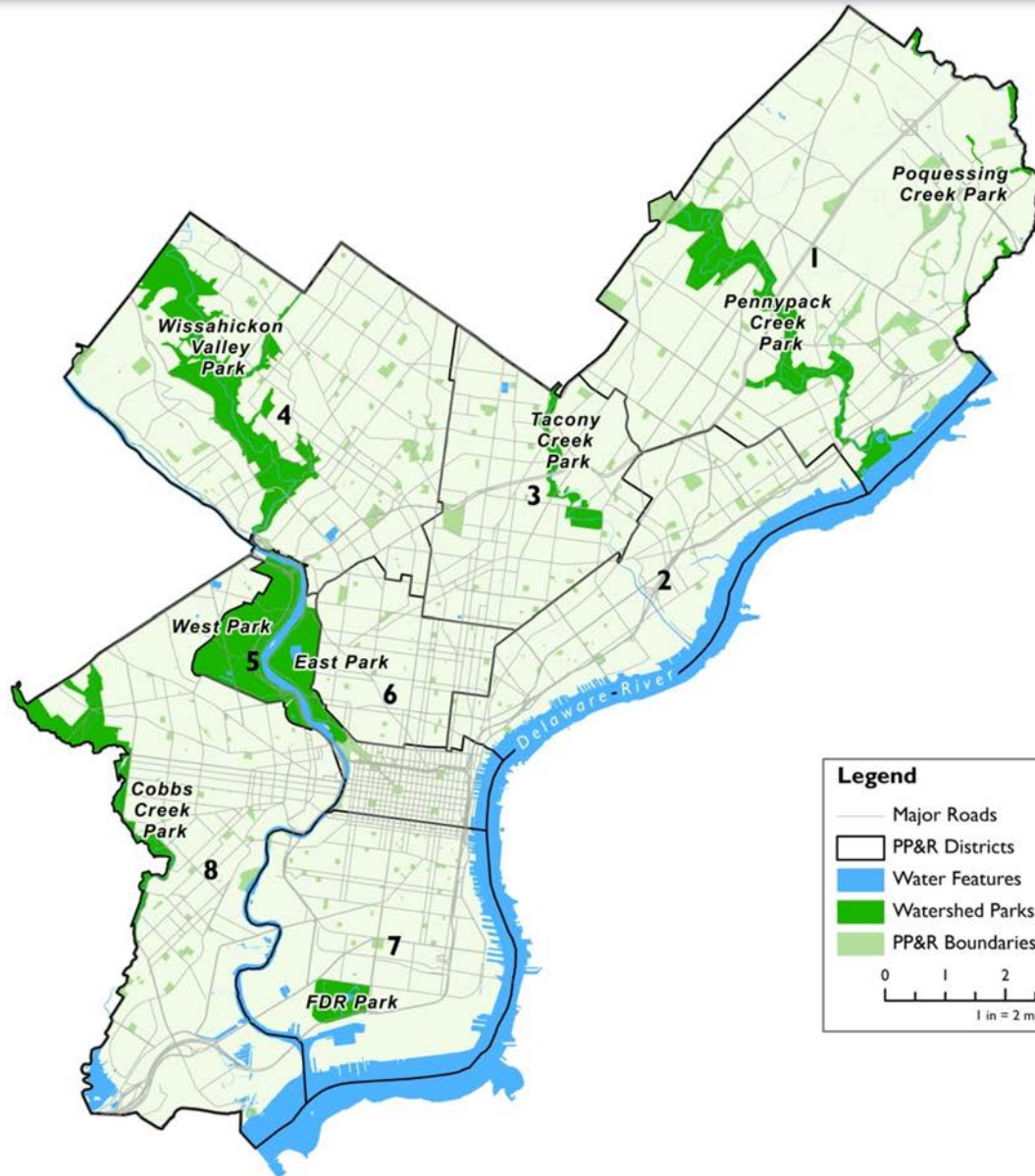
Tom Witmer, Operations Manager
Curtis Helm, Project Manager
PHILADELPHIA PARKS & RECREATION
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Philadelphia Parks

- City began acquiring land in 1855
- Fairmount Park formed in 1867
- 10,100 acres (11% of city land)
- 5,600 acres natural lands
- Most forests 100+ years old
- 215 miles of trails
- Other amenities




Scenery in Fairmount Park.



Legend

- Major Roads
- PP&R Districts
- Water Features
- Watershed Parks
- PP&R Boundaries

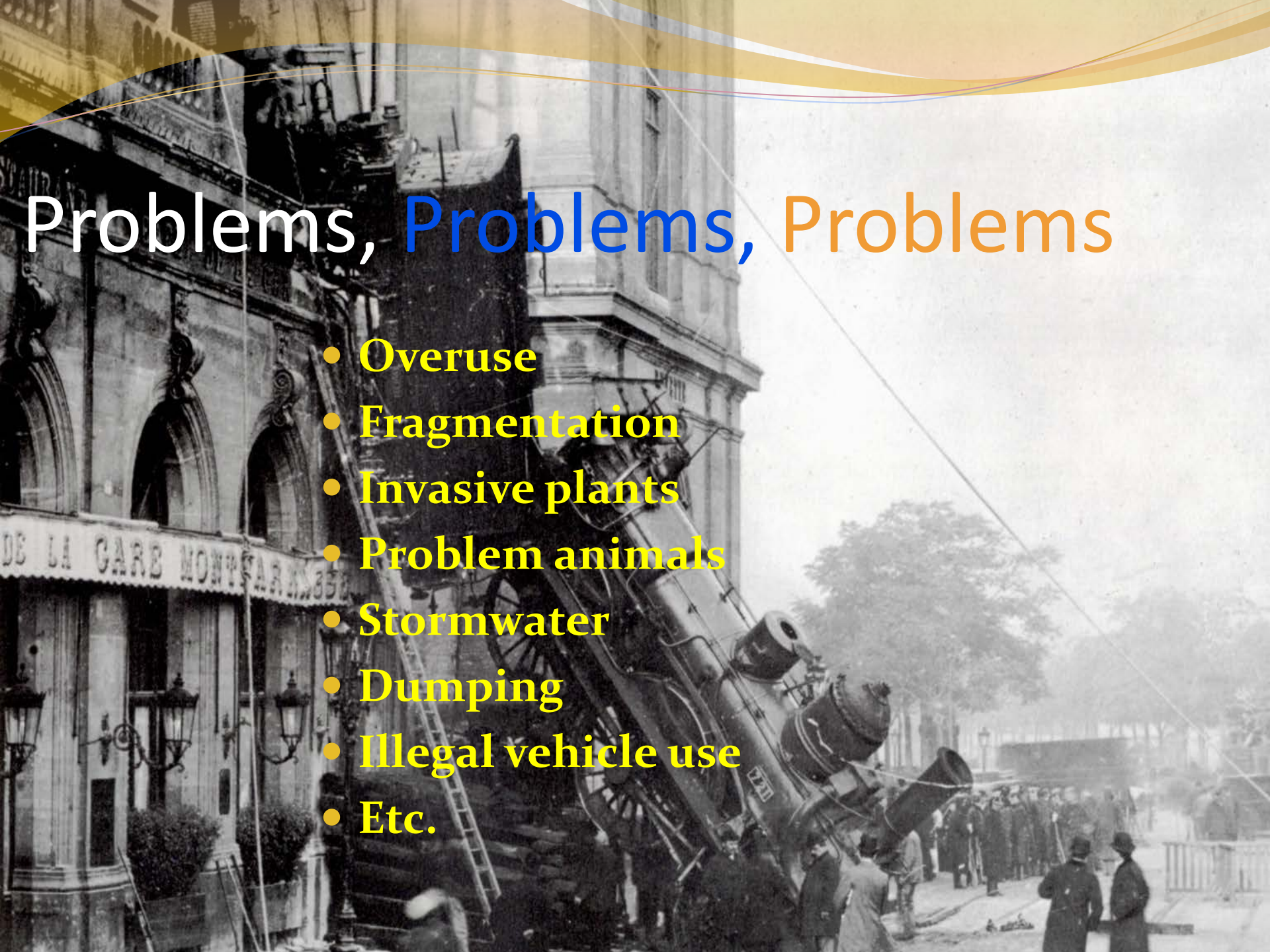
Date: 11/05/2012



0 1 2 4 Miles
1 in = 2 miles

Problems, Problems, Problems

- Overuse
- Fragmentation
- Invasive plants
- Problem animals
- Stormwater
- Dumping
- Illegal vehicle use
- Etc.

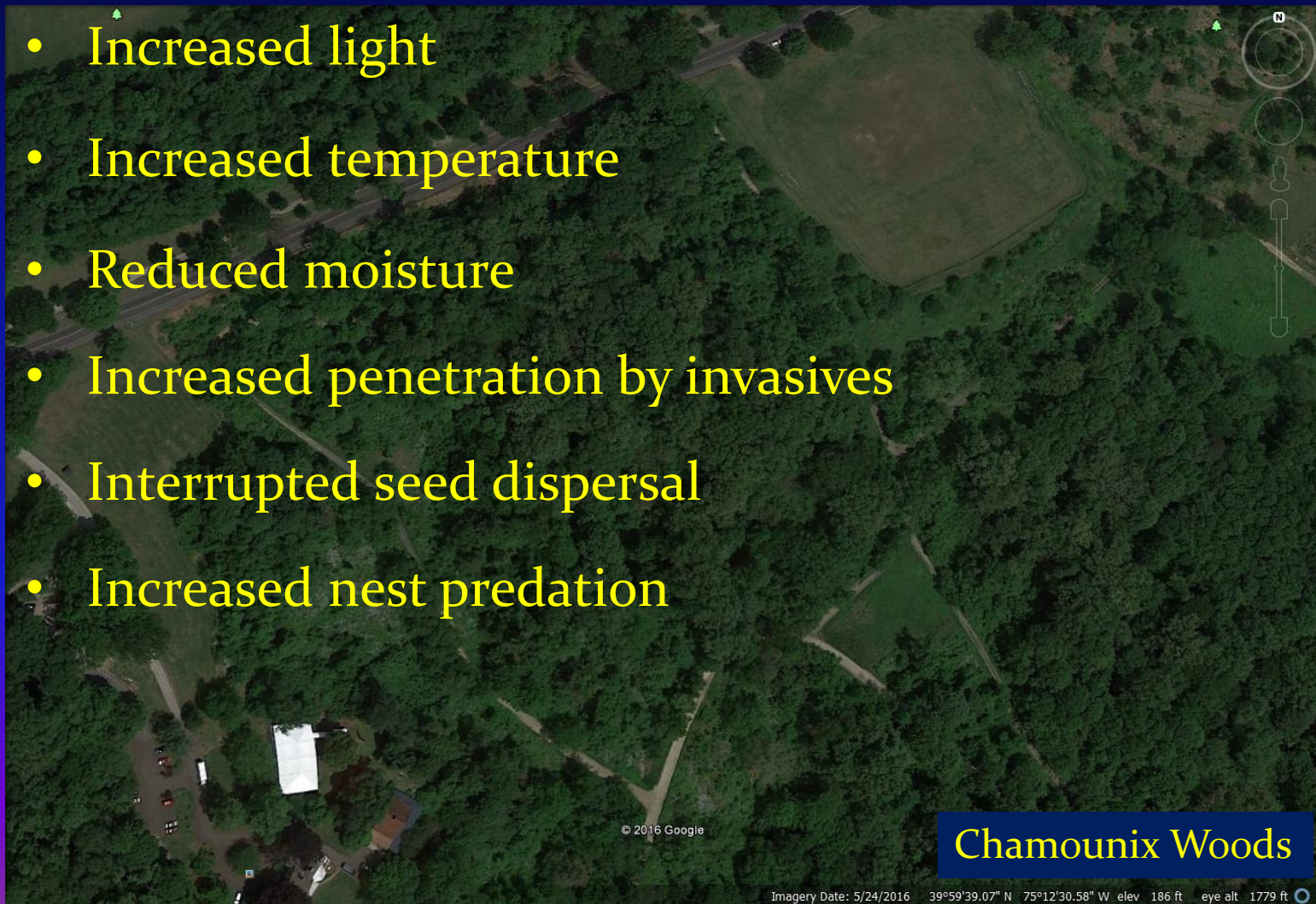


Human Impacts

- 1.5 million residents of Philadelphia
- 6+ million residents of the Greater Philadelphia metropolitan area.
- **Major Nearby Cities**
 - Camden, NJ
 - Wilmington, DE
- **Surrounding Counties**
 - Northeastern Maryland
 - Delaware
 - Southern New Jersey
 - Suburban Philadelphia
- **Assets also impacted by special events and recreational opportunities**

Fragmentation/edge effects

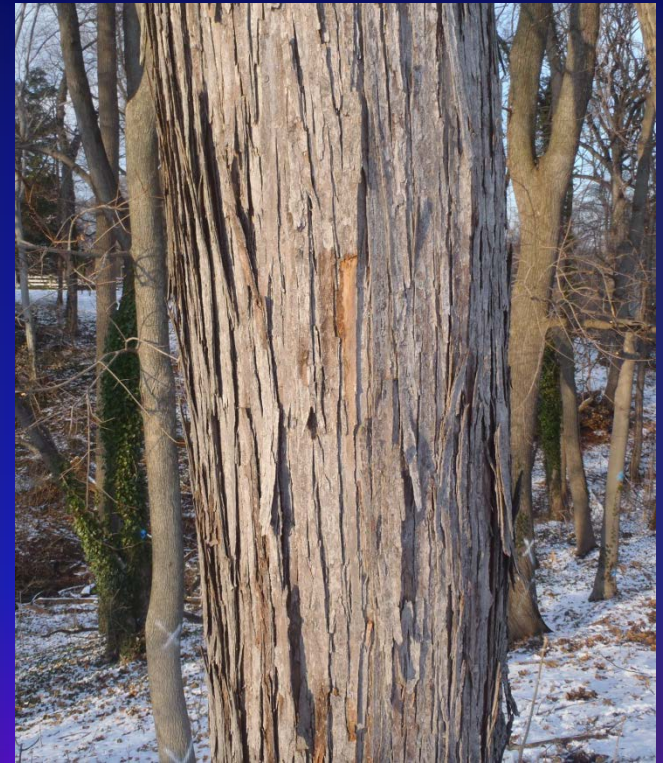
- Increased light
- Increased temperature
- Reduced moisture
- Increased penetration by invasives
- Interrupted seed dispersal
- Increased nest predation



Invasive Plants


CEDRELA

Chinese toon tree



KUDZU

Herbivory



Wissahickon Valley = 2,000 acres
Y2000 deer density = 87 per sq. mi.
Y2016 deer density = 16 per sq. mi.

Pennypack Park = 1,800 acres
Y2000 density = 129 per sq. mi.
Y2016 density = 86 per sq. mi.

Deer Cull Results:

Wissahickon Valley + Pennypack Park

<u>Year</u>	<u>Total # taken</u>	<u>Venison donated - lbs. (tons) *</u>
2000-01	429	13,670 (6.8)
2001-02	512	17,400 (8.7)
2002-03	110	3,930 (2.0)
2003-04	161	5,300 (2.7)
2004-05	126	3,400 (1.7)
2005-06	121	3,400 (1.7)
2006-07	124	2,700 (1.4)
2007-08	116	4,300 (2.2)
2008-09	109	4,100 (2.1)
2009-10	114	4,750 (2.4)
2010-11	72	2,905 (1.5)
2011-12	116	4,690 (2.3)
2012-13	169	8,330 (4.2)
2013-14	105	4,620 (2.3)
2014-15	101	4,950 (2.5)
2015-16	178	9,184 (4.6)
2016-17	?	
Totals	2,663	97,629 (48.8)

* Includes weight of deer taken in additional parks

Houston Deer Fence – 2016

6 years after fencing



Structure and Composition

Park forests

- well-established canopy – native species
- shrub layer of deer-resistant species
- other layers lacking
- seedling and sapling layers poor – few natives
- fragmented, extensive vine invasion

Earthworm excess

What they do

- Eliminate humus layer
- Constantly churn forest soils
- Increase pH, alter soil chemistry

What results

- Nutrient cycling is interrupted
- Capacity for the soil to transfer water and nutrients to plant roots is compromised
- Poor survival of some germinating native plants due to absence of fungi, moisture, and protection of humus
- Poor survival of forest plant species that prefer acidic soils
- Poor survival for native herbaceous species by disruption of root zones
- Increased disposition to non-native plant invasion
- Increased soil erosion



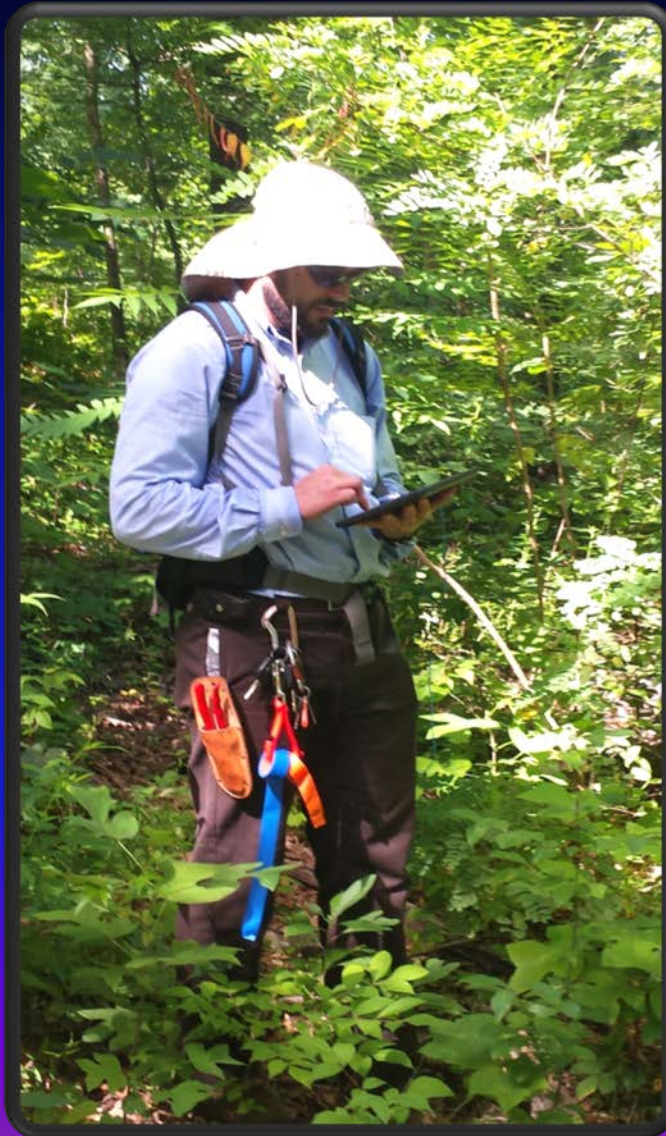
Forest Management

Reclamation and maintenance

- Wildlife enhancement
- Invasive plant control
- Pest & disease control
- Plant propagation and planting
- Stormwater management
- Trails – construction, maintenance and closures
- Site assessment, monitoring



Site Prep and Planning



Mark boundaries



Delineate wetlands, stand types

Haddington Woods- Existing Conditions

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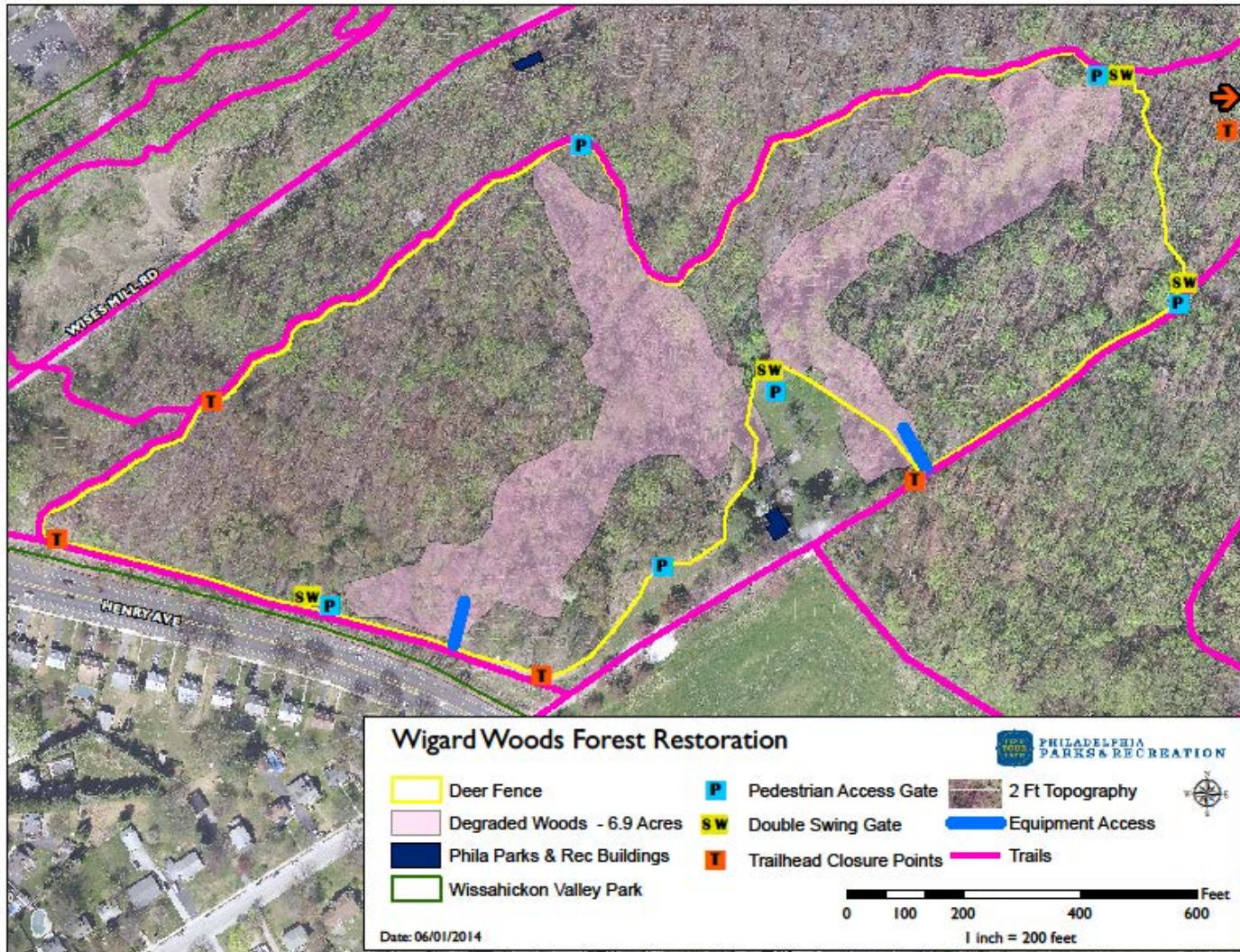


Mark “keep” or “leave” trees and shrubs



VERREE & SUSQUEHANNA ROADS

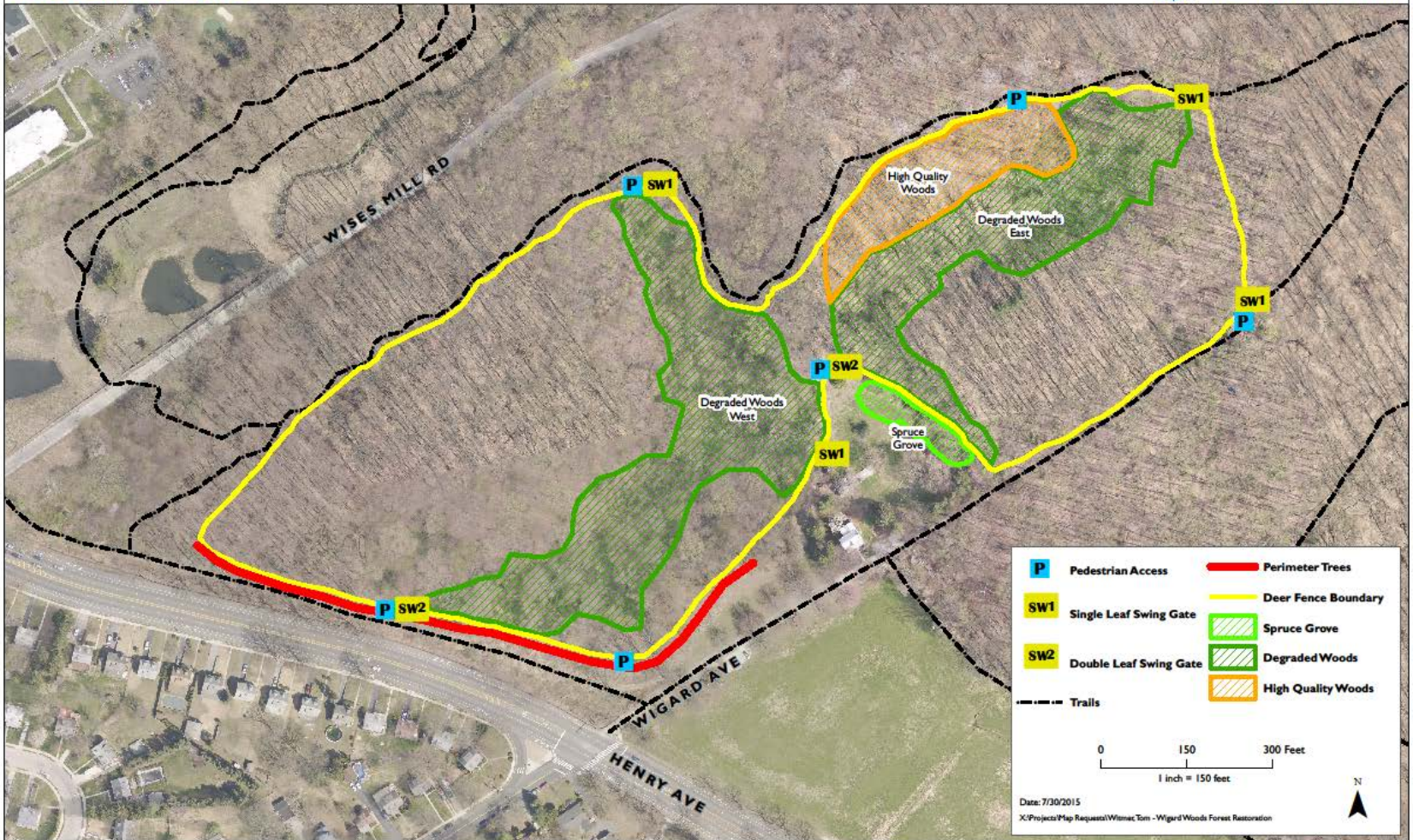
Create Base Maps



Produce planting map

Wigard Woods Access and Planting Plan

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Informational signage



Major Restoration Projects

- Haddington Woods – 26 acres
- Bocce I & II – 30 acres
- Wigard Woods – 23 acres
- Greenland Nursery – 10 acres
- Houston Meadow - (forest/grassland) – 49 acres
- Three Springs Hollow – 25 acres
- Carpenters Woods – 40 acres

Hydro - Axe



Skidder



Mountain Goat



Tree Chipping



Tub Grinding (rakings)



Forestry Mowers large/small



Seeding



Annual Ryegrass

Switch grass

Little bluestem

Broomsedge

Indian grass

Deertongue grass

Herbicide – tank truck



Herbicide - ATV



Herbicide – Basal Bark



NORWAY MAPLE

Chips sold for biomass/mulch



Salvage Locust logs



Trail Closures



The “Persuader”



“Habitat Logs”



Snags



Deer Fencing



Equipment and Pedestrian Access



Fence Signage



Culvert Gate



Tree Bark Protectors



Bocce Woods

Plant Delivery



Flag Plants Before Out-Planting



Stake Out Planting Areas



Plant Layout



Planting



Post Project Maintenance

First 3 years are critical
– 10 years to be “out of
the woods”

Invasive Plant Control
Mechanical – vine
removal

Herbicide - Foliar, cut
stem treat, basal bark

Staff, Contractors,
PowerCorpsPHL volunteers

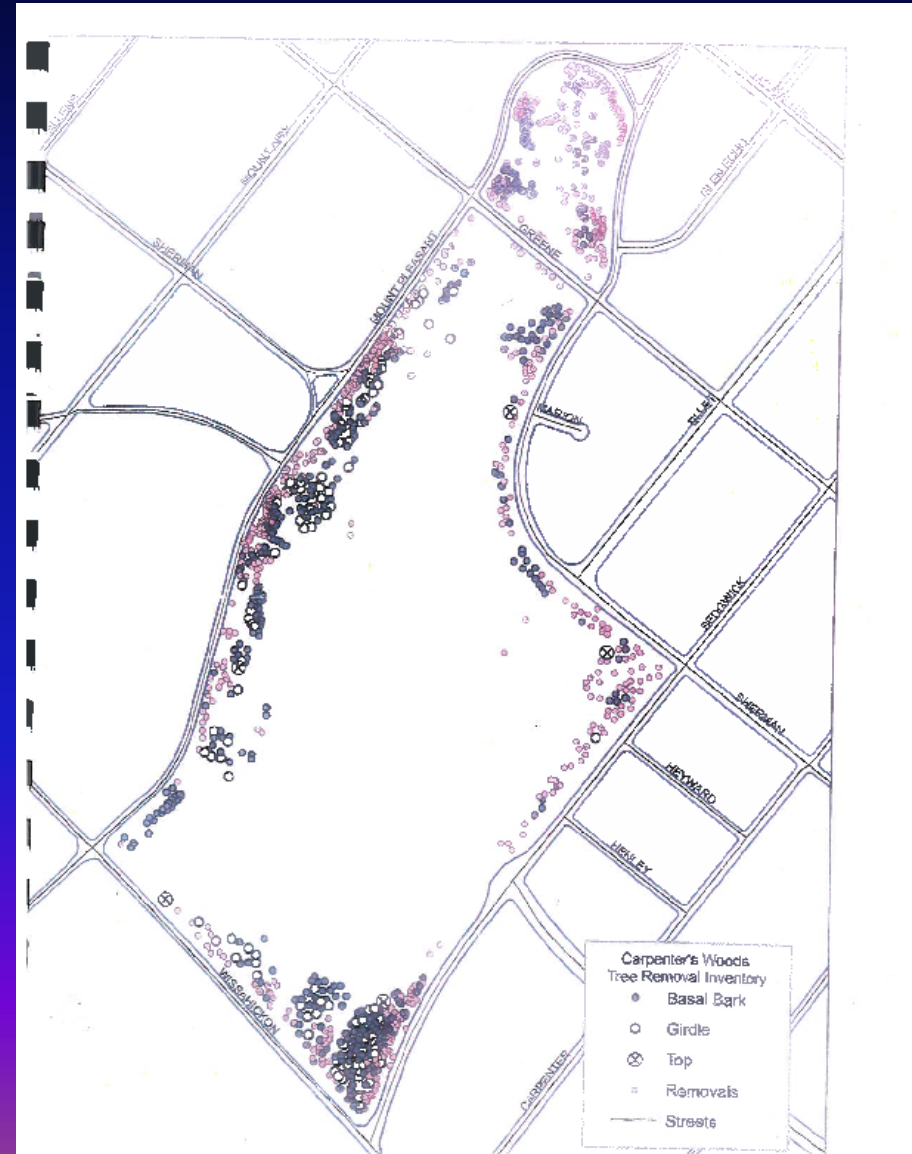


Carpenter's Woods

Norway maple Removal

Removed = 625

Basal Bark
Treatment = 563



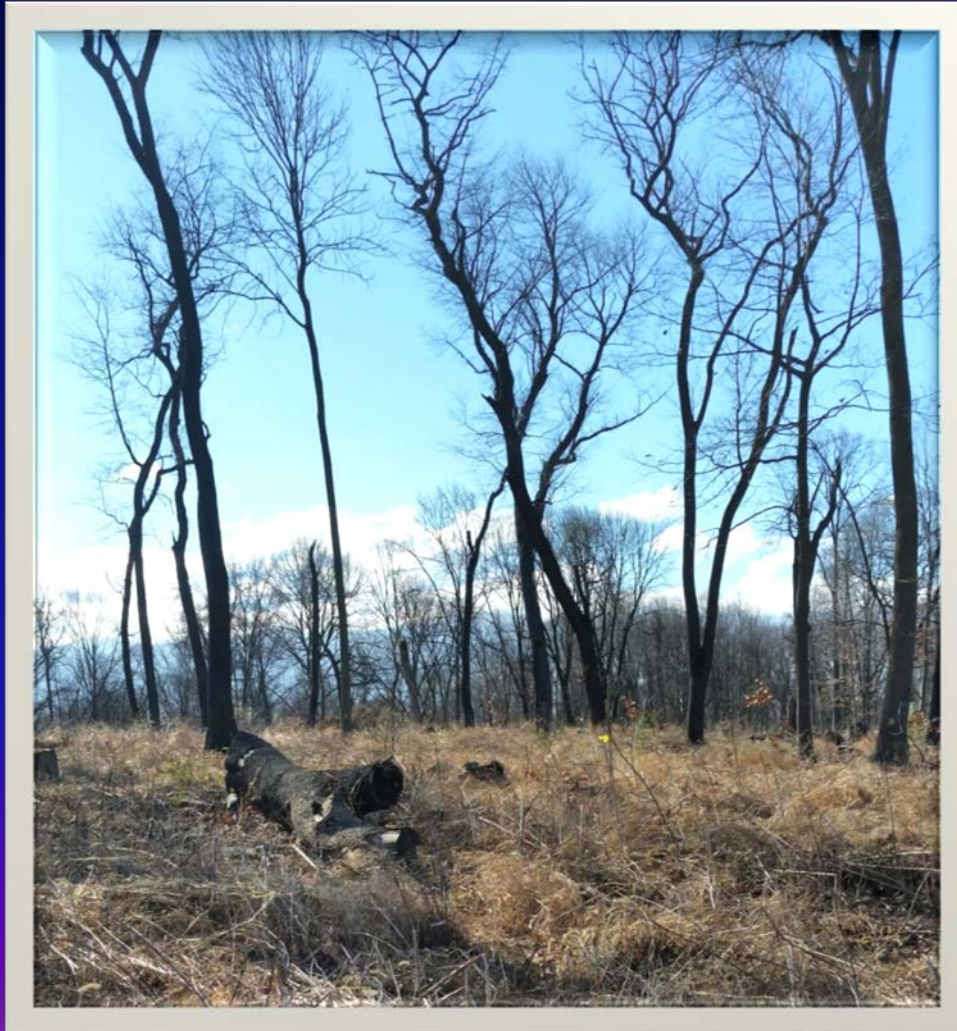
Haddington Woods – 2013 (pre-project)



Haddington Woods – March 2015



Haddington Woods - Feb 2017



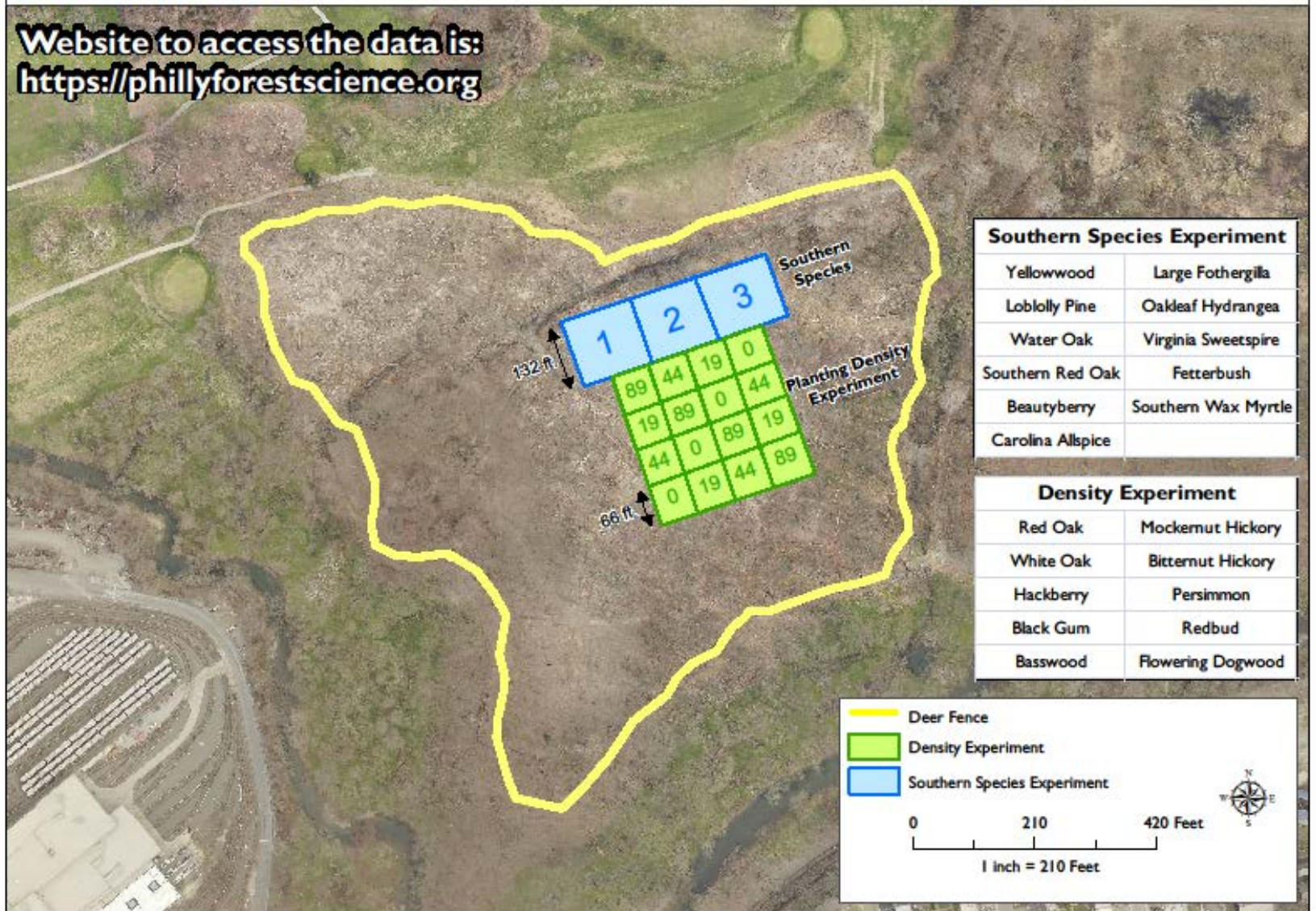
Haddington Woods

Experimental Plots



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Website to access the data is:
<https://phillyforestscience.org>



Climate Change affects decisions

- **Climate will change more rapidly than most trees ability to adapt to this change**
- **Species ranges are expected to shift & growth rates are expected to increase**
- **The 'de-coupling' of phenological events may reduce reproductive success of both plants and animals.**
- **Invasive species can be expected to play an even more significant role in a changing forest environment**

Emerald Ash Borer Confirmed for Philadelphia County

Your samples have been confirmed.

Your samples have been confirmed.

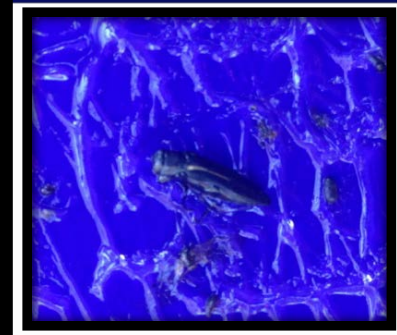
Spichlger, Sven-Erik [sspichiger@pa.gov]

Sent: Monday, June 27, 2016 7:49 AM

To: Curtis Helm

Your EAB were confirmed late Friday. Thank you for submitting the records.

Sven-Erik Spichlger | Entomology Program Manager
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Sustainable Reuse



Gene Hamilton,
Sawyer & National Treasure