i-Tree tools for estimating and reporting pest detection, vulnerability, and damage forecasting

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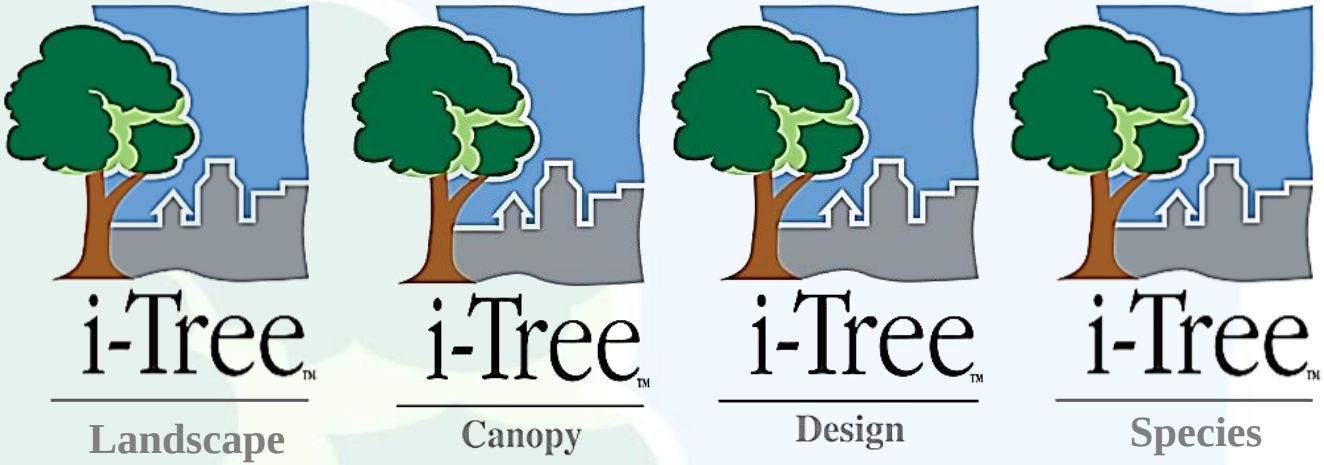
The 2016 i-Tree Suite of Tools

Web-based, run in your browser



Installed on a Windows desktop or laptop

www.itreetools.org

i-Tree is a Cooperative Initiative among these partners

DAVEY · Arbor Day Foundation · SMA Society of Municipal Arborists · ISA · Casey Trees · ESF State University of New York College of Environmental Science and Forestry

i-Tree tools for pest analysis

- i-Tree Eco and Streets - Pest Detection Protocol (i-PED)
- i-Tree Eco - Pest susceptibility reporting
- i-Tree Eco - Forecast pest activity scenarios
- i-Tree Landscape - Pest activity maps
- i-Tree Species – Pest host information

i-Ped – Pest detection

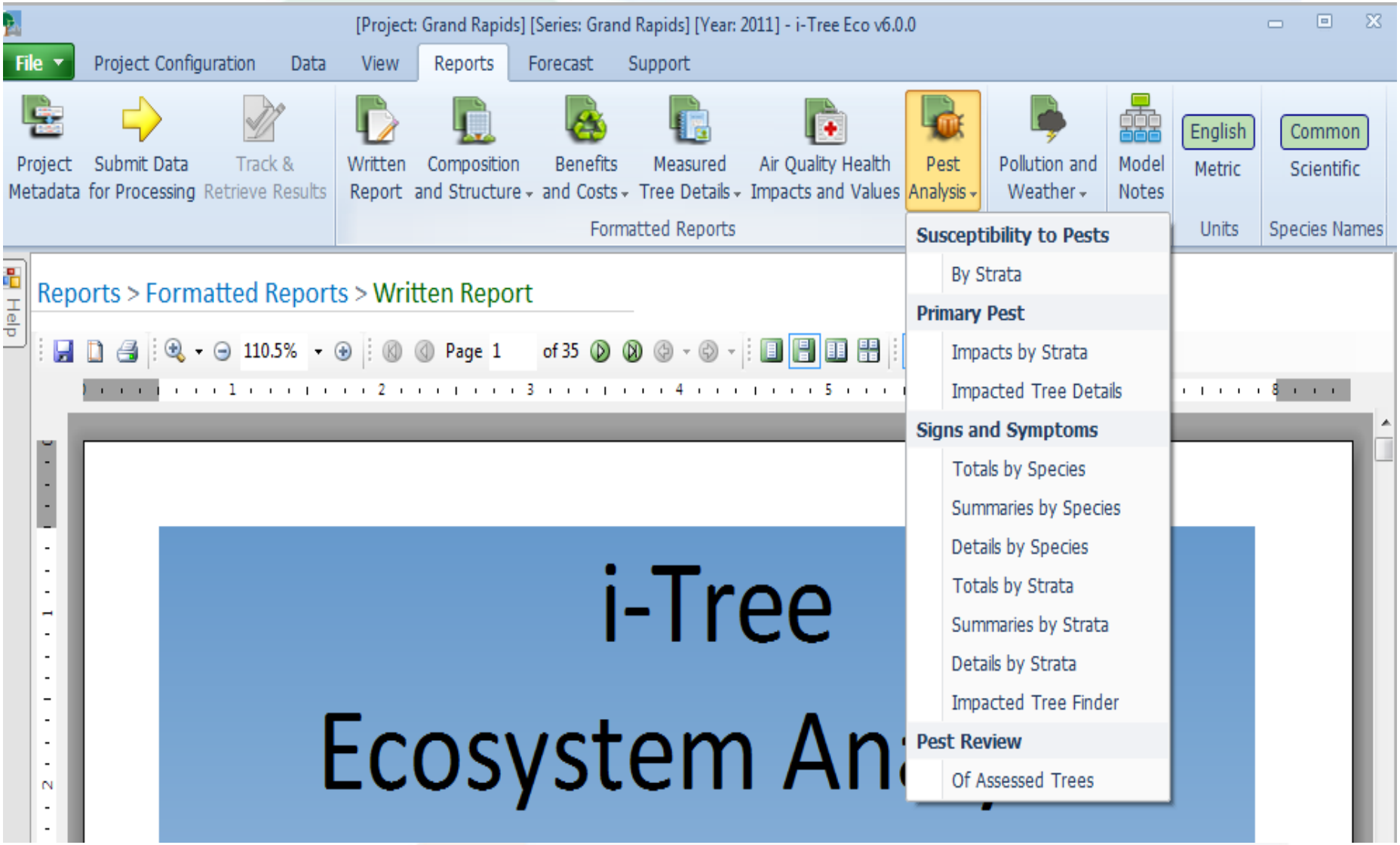
- Intended to establish an accepted protocol for long-term national urban pest detection and monitoring.
- Method to document signs and symptoms of tree pests and diseases as part of an i-Tree Eco or Streets project.

www.itreetools.org/iped

i-Ped – Pest detection

- Tree health information recorded in the field
  - *Signs and symptoms of tree stress*
    - dieback, epicormic sprouts, wilted foliaged, environmental stress, or human stress
  - *Signs and symptoms of foliage/twigs*
    - defoliation, discolored foliage, abnormal foliage, or insect signs and extent of foliage affected
  - *Signs and symptoms of branches/bole*
    - signs and symptoms of insects or diseases on the branches/bole and location of signs or symptoms

i-Ped – Pest detection



i-Ped – Pest detection

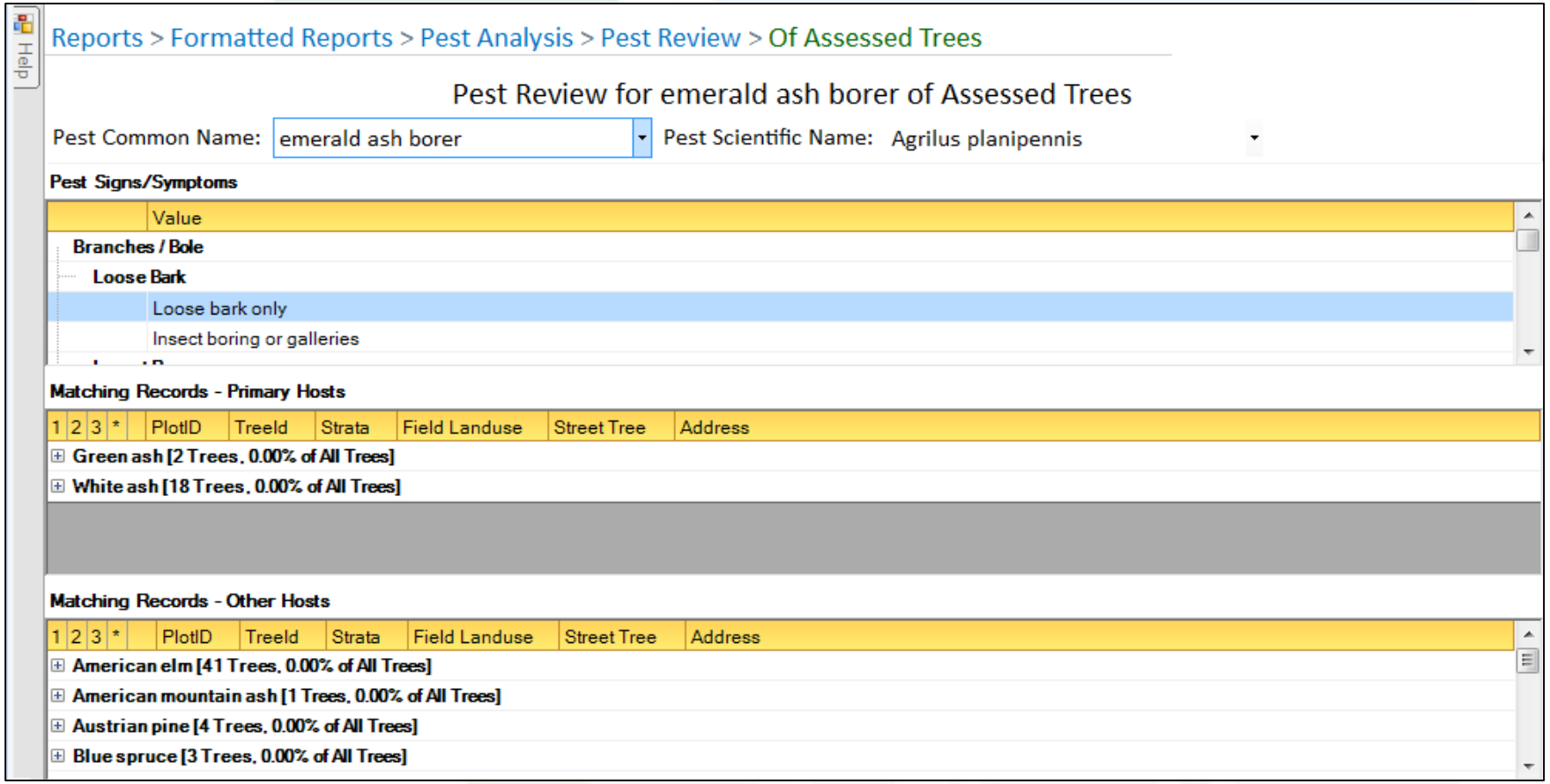
Primary Pest - Impacts by Strata

Location: Grand Rapids, Kent, Michigan, United States of America
Project: Grand Rapids, Series: Grand Rapids, Year: 2011
Generated: 11/11/2016

Strata	Primary Pest	Population Estimate	SE	% of Strata	% of All Trees	% of Pest Affected Trees
Commercial	Unknown	4,075	2,376	9.09	0.32	2.19
	emerald ash borer	1,019	1,018	2.27	0.08	0.55
Government	Unknown	4,299	2,405	1.52	0.34	2.31
	emerald ash borer	4,299	3,164	1.52	0.34	2.31
	pine shoot beetle	5,732	5,730	2.02	0.45	3.08
	Dutch elm disease (novi-ulmi)	1,433	1,432	0.51	0.11	0.77
Industrial	Unknown	3,511	2,540	5.55	0.27	1.89

Impacts of pests detected in your area based on signs and symptoms recorded in the field

i-Ped – Pest detection



Pest review of signs, symptoms, associated pests and affected species

i-Tree Eco - Pest susceptibility

Susceptibility to Pests By Strata

Location: Grand Rapids, Kent, Michigan, United States of America
Project: Grand Rapids, Series: Grand Rapids, Year: 2011
Generated: 11/10/2016

		Number of Trees		Structural Value ($)		Leaf Area (%)		Leaf Area (ac)	
Pest Name	Strata	Susceptible	Not Susceptible	Susceptible	Not Susceptible	Susceptible	Not Susceptible	Susceptible	Not Susceptible
Aspen Leafminer	Commercial	0	44,824	0	34,354,403	0.0	2.8	0.0	786.8
	Government	54,452	229,272	6,015,803	199,097,508	0.3	18.6	72.8	5,223.7
	Industrial	14,046	49,160	129,736	27,330,120	0.1	2.5	22.5	711.1
	Other	834	109,269	9,384	53,957,790	0.0	9.8	1.1	2,736.1
	Residential	9,945	771,467	2,935,446	467,034,622	0.7	65.2	199.9	18,260.3
	Total	**79,277**	**1,203,993**	**9,090,368**	**781,774,443**	**1**	**99**	**296.3**	**27,718.1**
Asian Longhorned Beetle	Commercial	5,094	39,731	1,140,461	33,213,942	0.1	2.7	33.1	753.8
	Government	151,893	131,832	103,440,401	101,672,909	9.6	9.4	2,676.7	2,619.9
	Industrial	39,797	23,410	9,324,320	18,135,535	1.2	1.5	324.8	408.8

Tree susceptibility to pests and associated loss

36 Pests
Based on pest host data

i-Tree Eco - Pest susceptibility

IX. Potential Pest Impacts

Various insects and diseases can infest urban forests, potentially killing trees and reducing the health, structural value and sustainability of the urban forest. As pests tend to have differing tree hosts, the potential damage or risk of each pest will differ among cities. Thirty-six pests were analyzed for their potential impact and compared with pest range maps (Forest Health Technology Enterprise Team 2014) for the conterminous United States to determine their proximity to Kent County. Twelve of the thirty-six pests analyzed are located within the county. For a complete analysis of all pests, see Appendix VII.

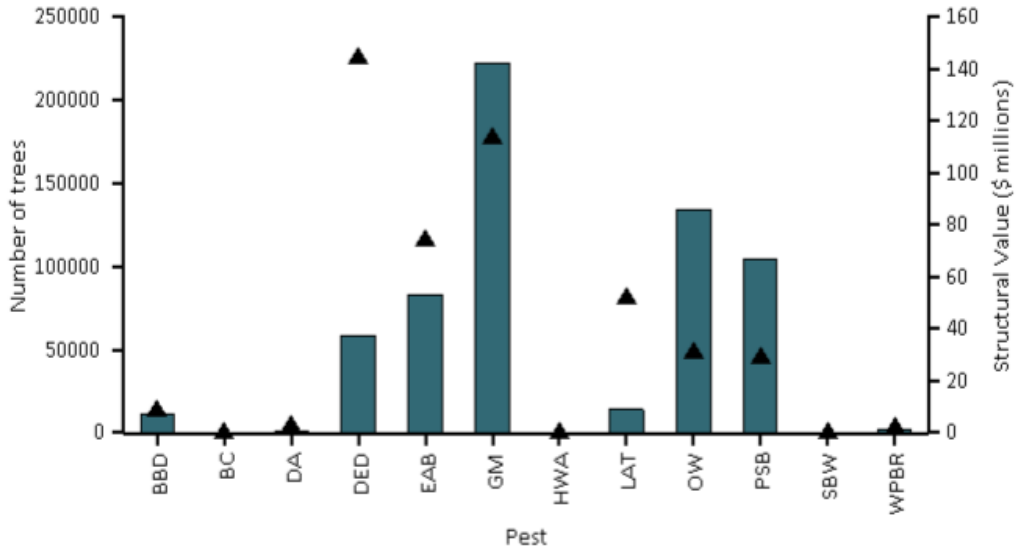


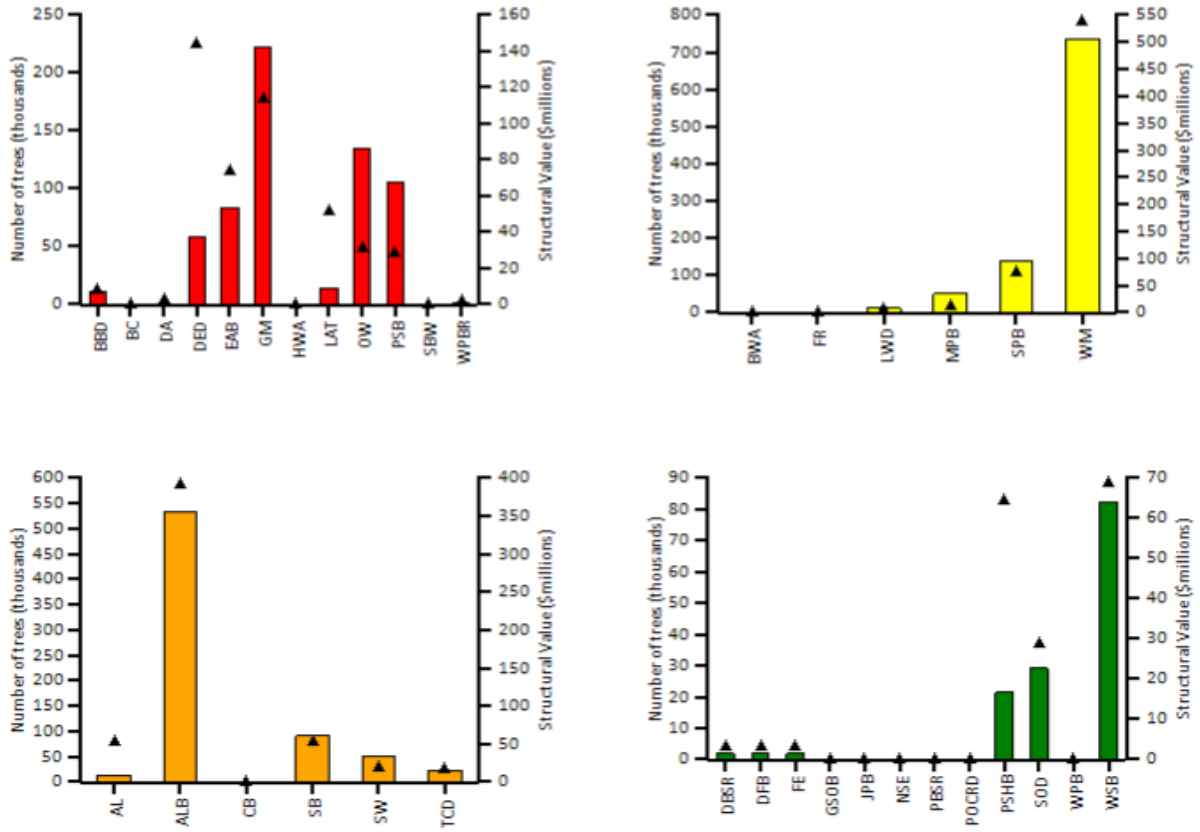
Figure 12. Number of trees at risk (points) and associated compensatory value (bars) for most threatening pests located in the county, Grand Rapids

Potential pest impacts and associated structural value

Based on pest host data

i-Tree Eco - Pest susceptibility

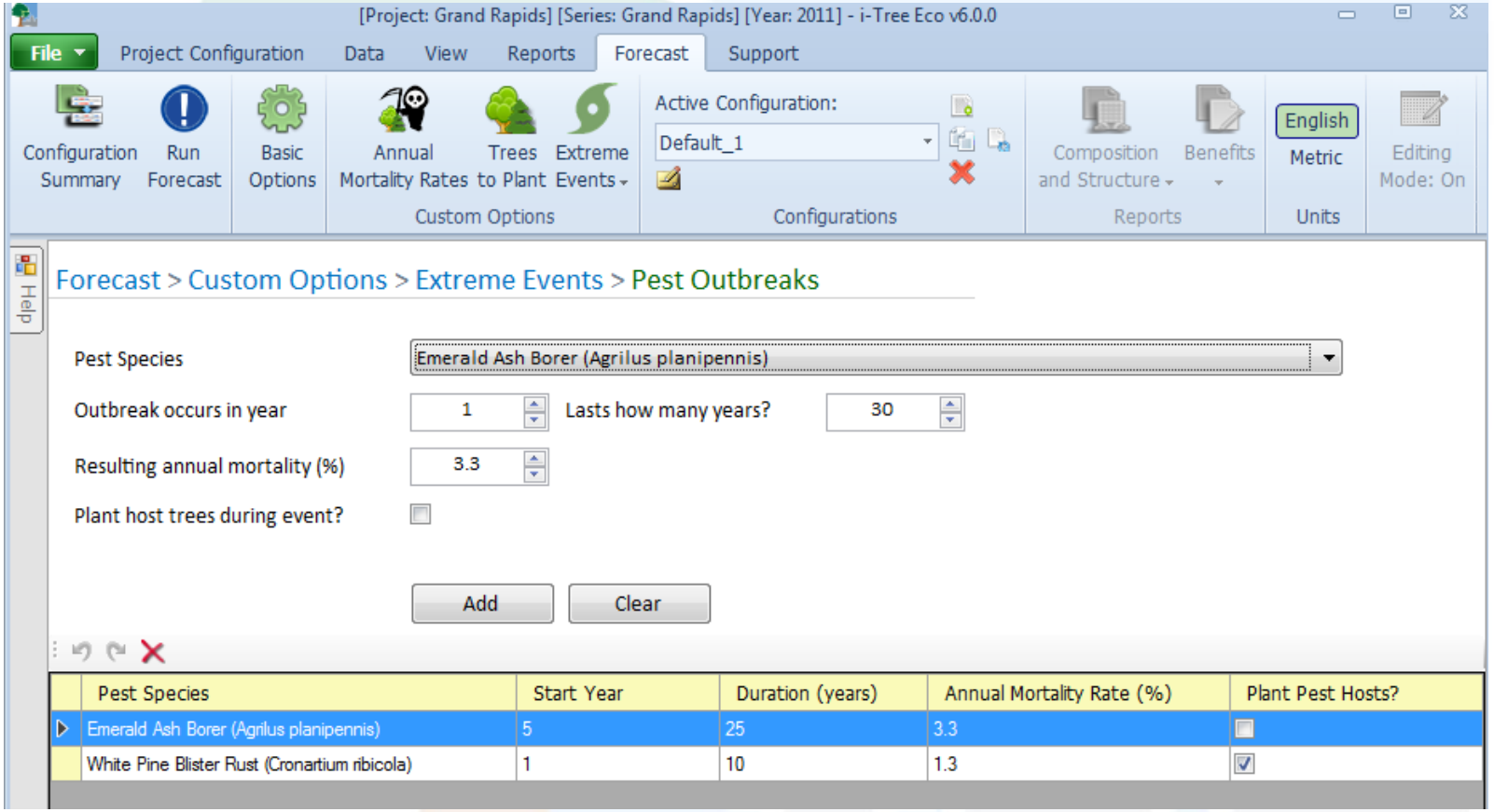
In the following graph, the pests are color coded according to the county's proximity to the pest occurrence in the United States. Red indicates that the pest is within the county; orange indicates that the pest is within 250 miles of the county; yellow indicates that the pest is within 750 miles of the county; and green indicates that the pest is outside of these ranges.



Note: points --- Number of trees, bars --- Structural value

Potential pest risk based on pest range data

i-Tree Forecast - Pest activity scenario

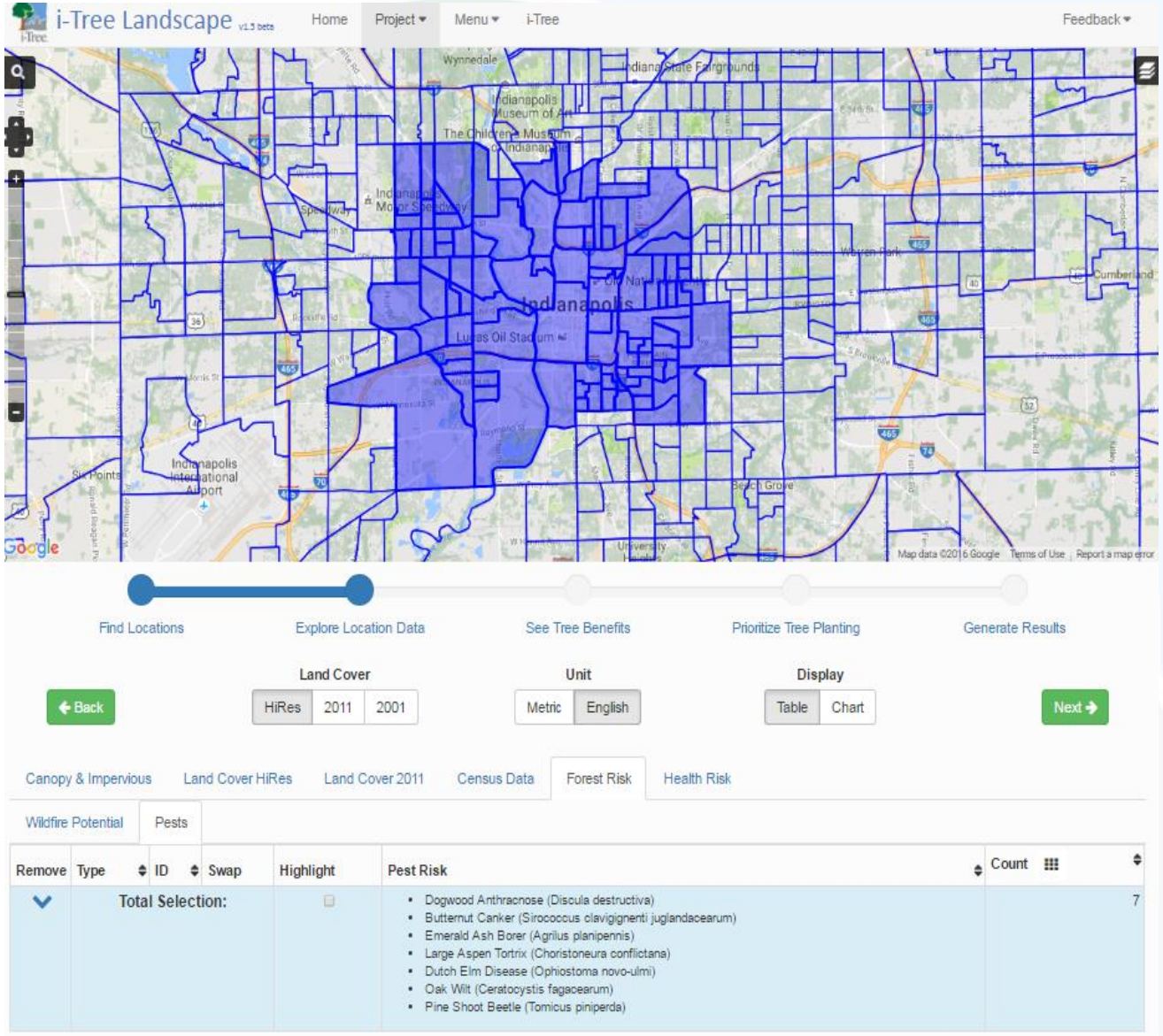


Simulate a pest infestation, to predict the impact on your urban forest

i-Tree Landscape - Pest activity maps

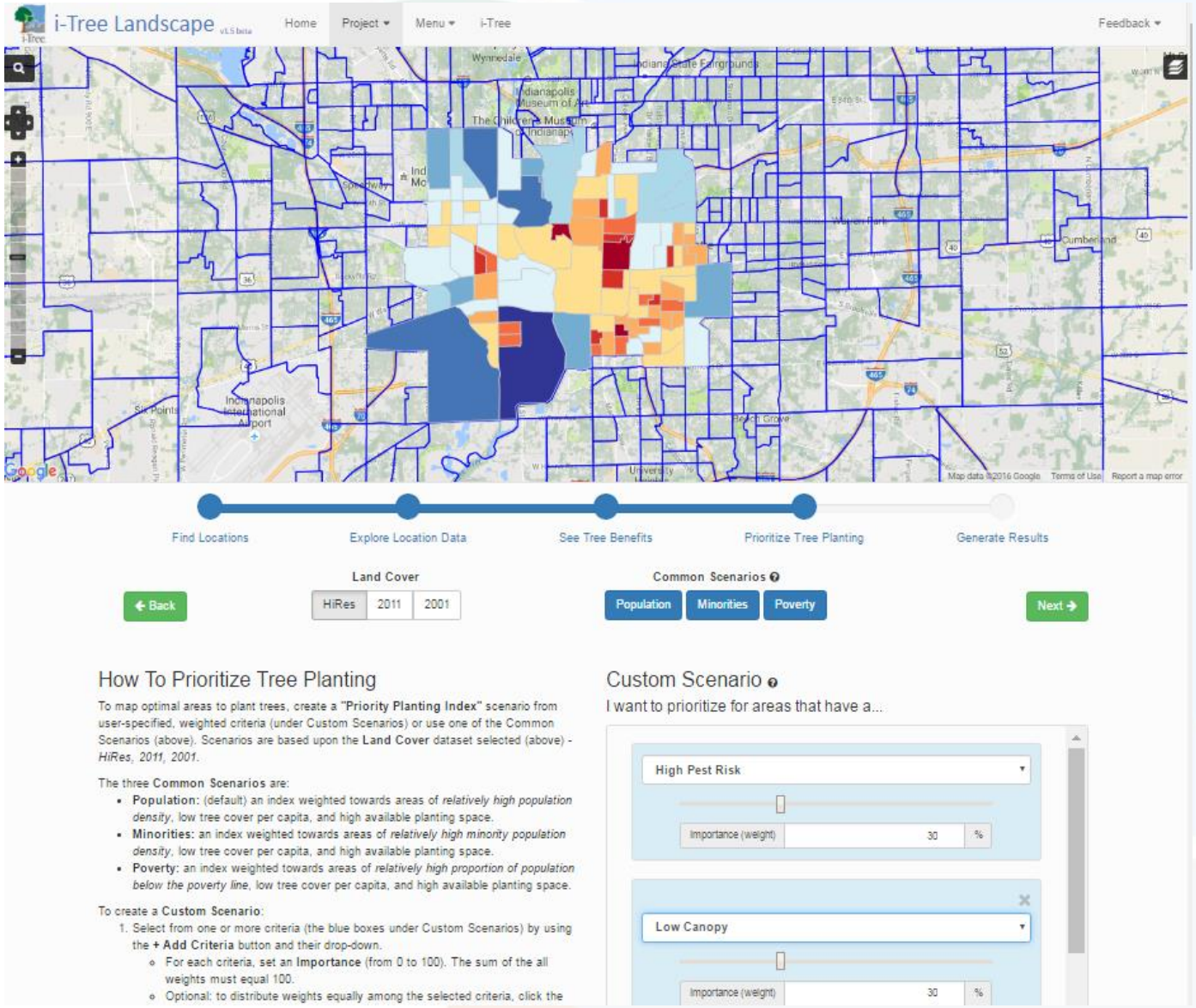
- Pest range maps showing presence or absence of 48 pests in your area of interest.
  - Derived from Forest Health Technology Enterprise Team (FHTET) data
  - National county based pest range maps
  - *http://www.fs.fed.us/foresthealth/technology/*

i-Tree Landscape - Pest activity



List pests active in your area of interest

i-Tree Landscape - Pest activity



Prioritize tree planting in areas with the greatest pest activity

i-Tree Species – Pest risk

S = Sensitive I = Intermediate S/I = Indeterminate

Species				Sensitivity			Pest Risk
Scientific Name	Common Name	Hardiness Zone	Invasive	Ozone (O3)	Nitrogen Dioxide (NO2)	Sulfur Dioxide (SO2)	Possible Pests
SEQUOIA SEMPERVIRENS	COAST REDWOOD	7-10					
LIRIODENDRON TULIPIFERA	TULIP TREE	5-9		S			
ULMUS AMERICANA	AMERICAN ELM	3-9			I/S		Asian Longhorned Beetle, Dutch Elm Disease, Winter Moth
ULMUS GLABRA	WYCH ELM	4-7					Asian Longhorned Beetle, Dutch Elm Disease
MAGNOLIA GRANDIFLORA	SOUTHERN MAGNOLIA	7-10					
TILIA AMERICANA	AMERICAN BASSWOOD	4-9		I	I		Gypsy Moth, Winter Moth
TSUGA HETEROPHYLLA	WESTERN HEMLOCK	6-7			I		Southern Pine Beetle, Western Spruce Budworm
TSUGA MERTENSIANA	MOUNTAIN HEMLOCK	5-7					Fir Engraver, Southern Pine Beetle, Western Spruce Budworm
TSUGA CANADENSIS	EASTERN HEMLOCK	4-7		I			Hemlock Woolly Adelgid, Southern Pine Beetle
BETULA ALLEGHANIENSIS	YELLOW BIRCH	3-7		I	S		Asian Longhorned Beetle, Large Aspen Tortrix, Winter Moth
PLATANUS RACEMOSA	CALIFORNIA SYCAMORE	7-9					Polyphagous Shot Hole Borer
MAGNOLIA ACUMINATA	CUCUMBER TREE	4-8					
LIRIODENDRON CHINENSE**	CHINESE TULIP TREE	5-9					
QUERCUS SUBER	CORK OAK	7-11					Gypsy Moth, Oak Wilt
TSUGA X JEFFREYI**	JEFFREY HEMLOCK	5-7					Southern Pine Beetle

List pests that are a risk to each species that serve the selected functions

Based on pest host data