

# Chicagoland Region i-Tree Eco Assessment

An analysis of the structure and function of the region's urban forest



Gary Watson





## Partners:



### The Morton Arboretum

- Data collection, funding, report preparation



### US Forest Service

- Data analysis, funding, report preparation



# The Need

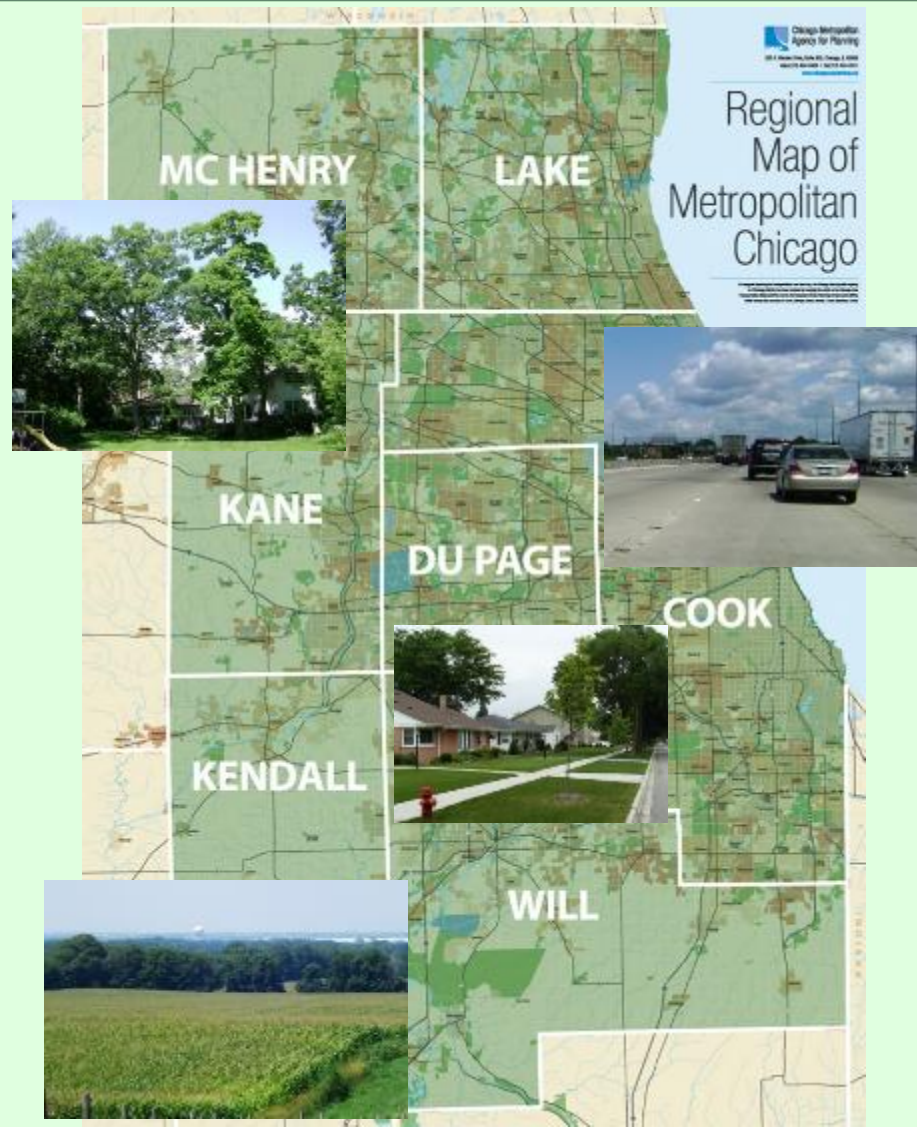
A first step in developing a comprehensive and integrated **regional strategy** for urban forest resource management.

A regional assessment is critical given:

- the **importance of trees** and forests to the environment, human health, and quality of life,
- the **diverse and dynamic character** of the region's forest,
- **increasing threats** from insects, disease, opportunistic species, climate change, and land development, and
- the **need to convey forest information** and emerging threats and opportunities to a wide range of important stakeholders who affect and are affected by the regional forest.

# The Chicago Region

- 10,383 km<sup>2</sup>
- Population
  - 9,000,000
- Population density
  - 126-4,819/km<sup>2</sup>
- Land Use
  - Residential 30%
  - Commercial 14%
  - Open space 23%
  - Agricultural 33%

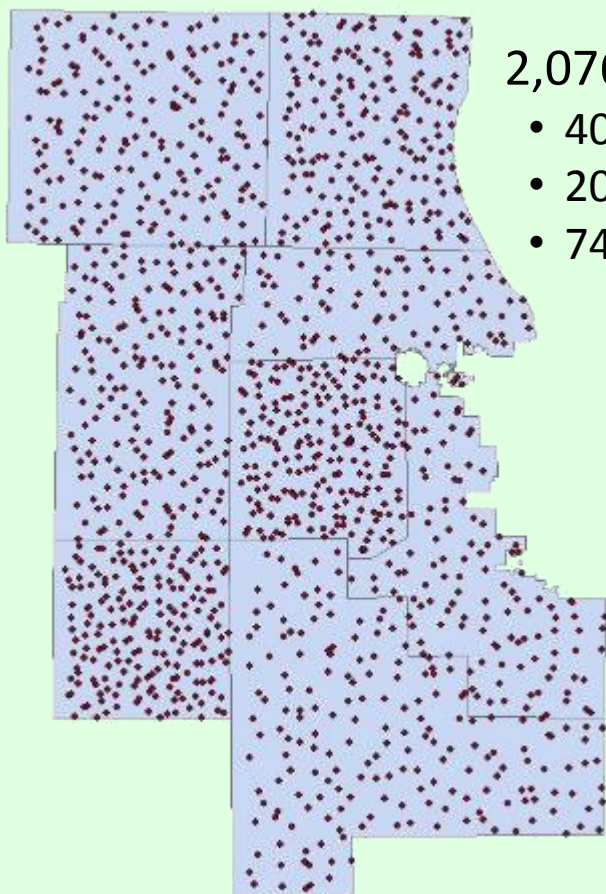




# Why i-Tree Eco?

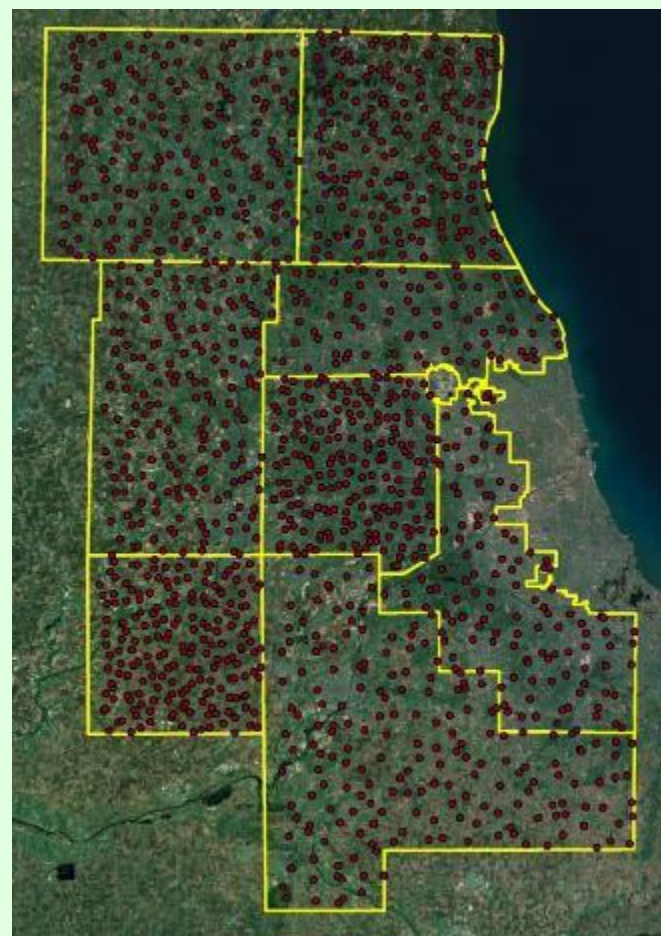
- **Forest *structure* is a measure of physical attributes**
  - Number, size and density of trees
  - Leaf are and canopy cover
  - Species diversity
  - Tree health
- **Forest *functions* include environmental and ecosystem services**
  - Air pollution removal
  - Carbon storage and sequestration
  - Energy consumption
- **Forest *values* are an estimate of the economic worth**
  - Forest structure (compensatory, carbon storage)
  - Forest function (carbon sequestration, pollution removal, reduced energy)

# How i-Tree Works



2,076 sample plots

- 405 m<sup>2</sup>
- 200 per county
- 745 in Chicago

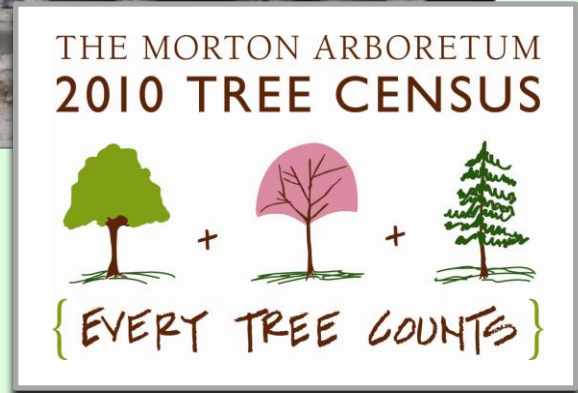




# Random Design



# Field Crew







# Field Survey Data Collected for the i-Tree Eco Assessment of the Chicago Region

## Plot information

- Land use
- Percent tree canopy cover
- Percent shrub cover
- Percent plantable
- Percent ground cover types

## Tree parameters

- Species
- Stem diameter ( $\geq 2.5$  cm dbh)
- Total height
- Height to crown base
- Crown width
- Percent foliage missing
- Percent dieback
- Crown light exposure
- Distance and direction to buildings



# Estimated Tree Functions and Values

- Pollution removal: 18,080 tons/year (\$137 million/year)
- Carbon storage: 16.9 million tons (\$349 million)
- Carbon sequestration: 677,000 tons/year (\$14.0 million/year)
- Building energy reduction: \$44.0 million/year
- Reduced carbon emission: \$1.3 million/year
- Compensatory value: \$51.2 billion
- Volatile organic compound emissions: 10,864 metric tons/year

## Chicago Region Trees Counteract Annual Auto Emissions:

- Particulate matter (PM<sub>10</sub>) from 14,789,000 autos
- Sulfur dioxide (SO<sub>2</sub>) from 1,406,600 autos
- Carbon (C) from 406,600 autos
- Nitrogen dioxide (NO<sub>2</sub>) from 213,500 autos
- Carbon monoxide (CO) from 1,110 autos





# The Forest

157,142,000 trees

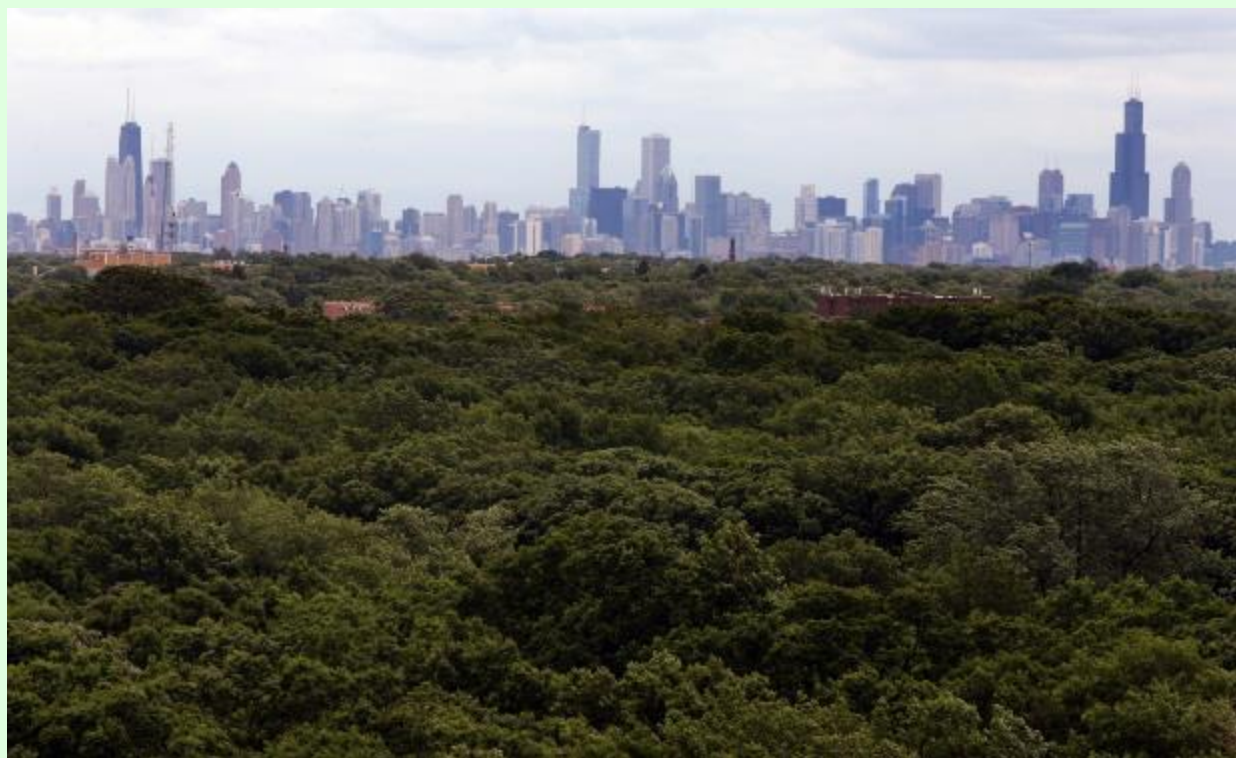
148 trees/ha

13.5 cm mean dbh

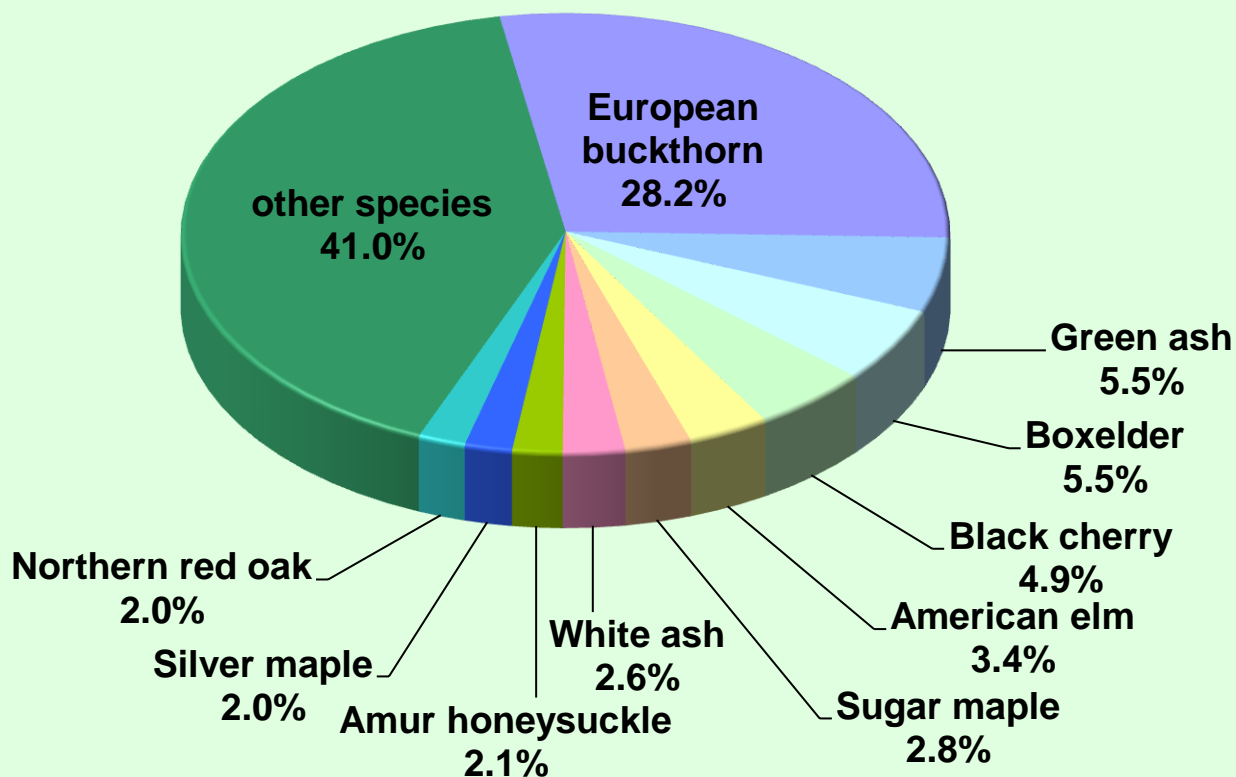
15.5 % tree canopy cover

161 species

47% native

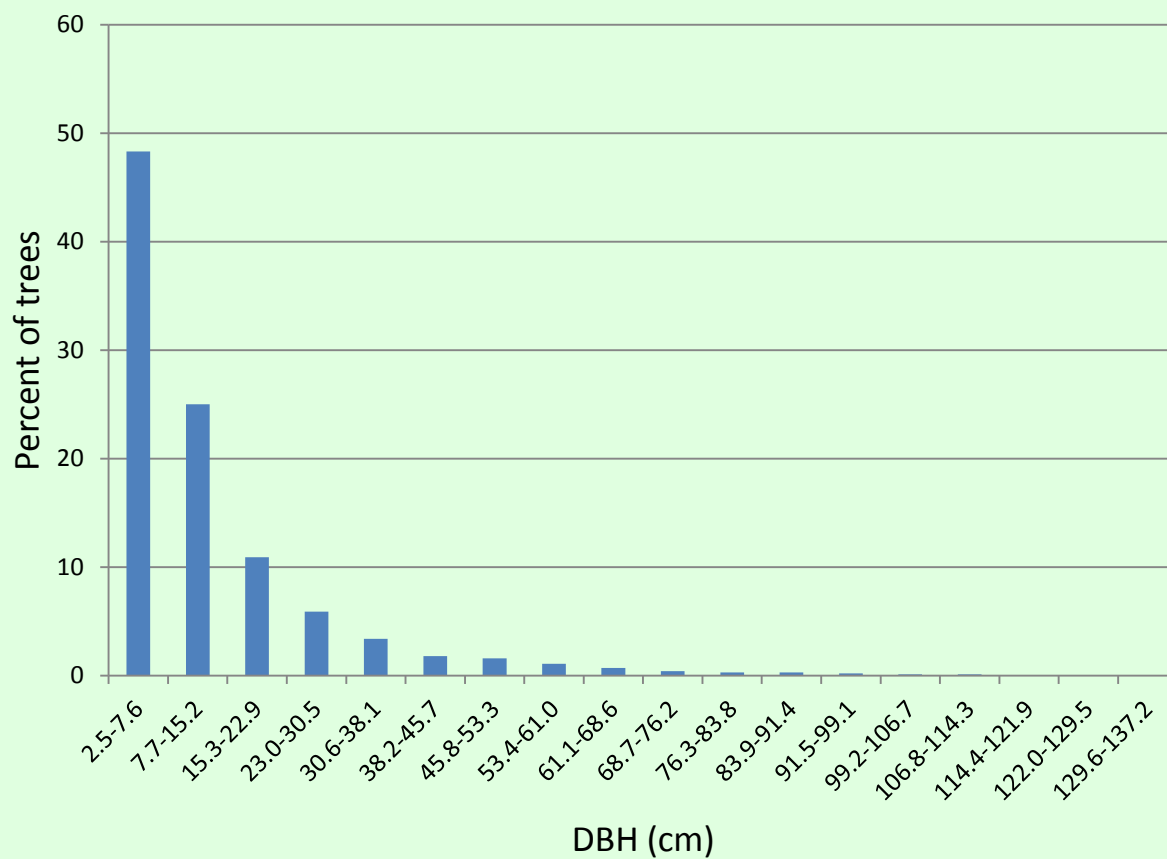


# Tree Species Distribution – Chicago Region

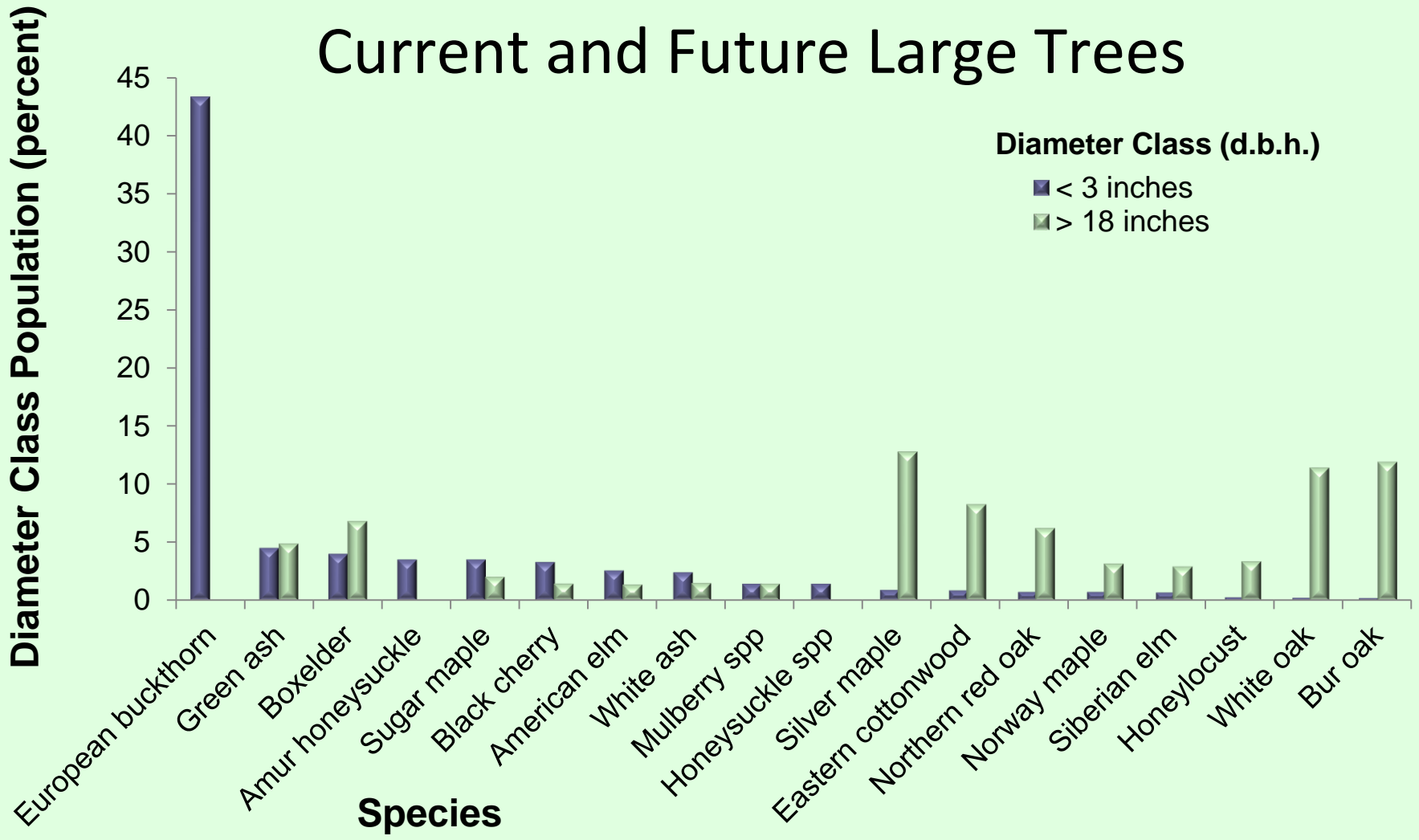




# 73% are Less than 10 cm dbh



# Current and Future Large Trees





18% of trees in City of Chicago residential land use are  $> 45$  cm dbh

Oldest average age of neighborhoods in the region





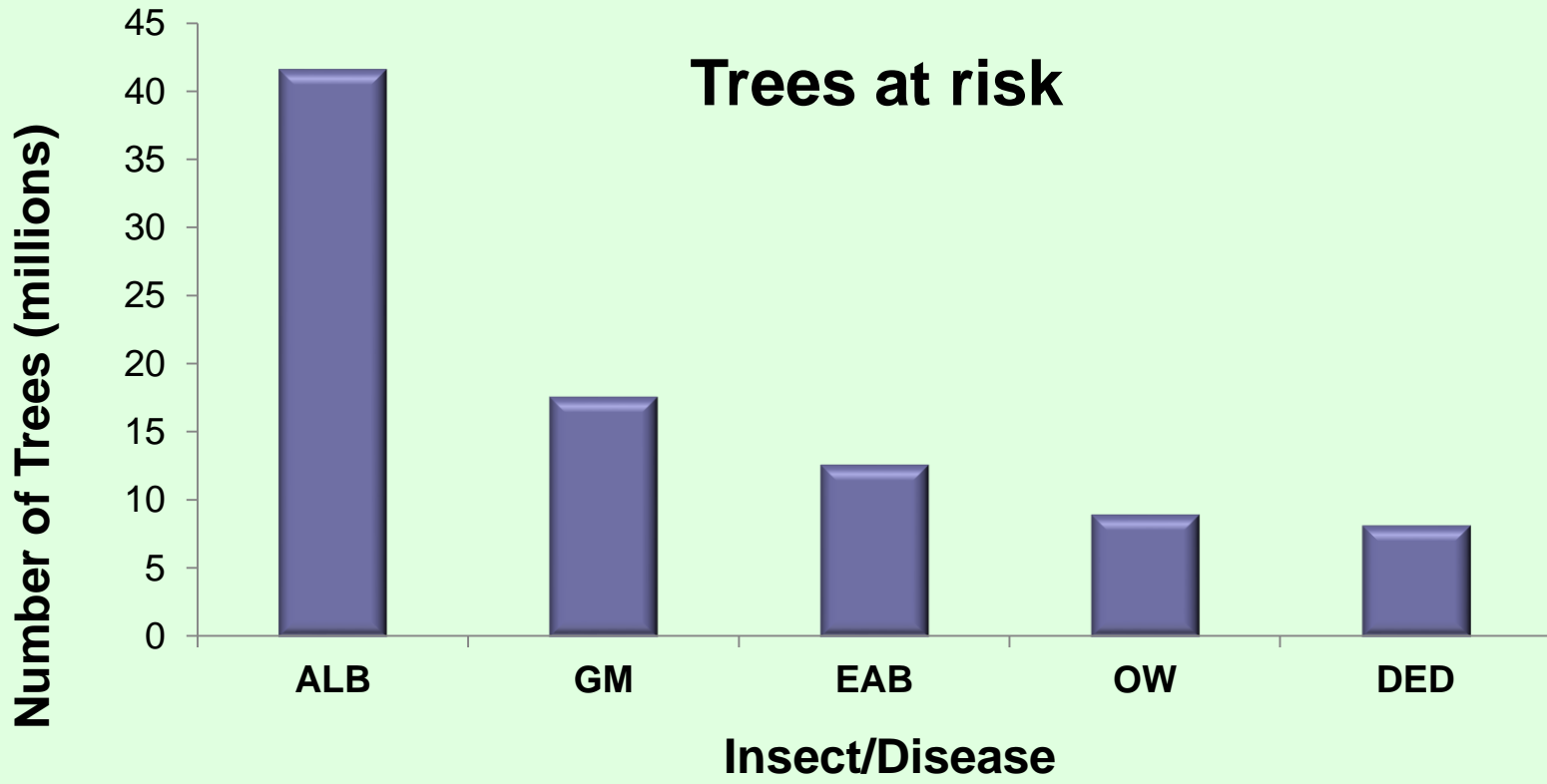
## Forces for Change

- Introduced pests
- Invasive plants
- Human influence





# Introduced Insects and Diseases



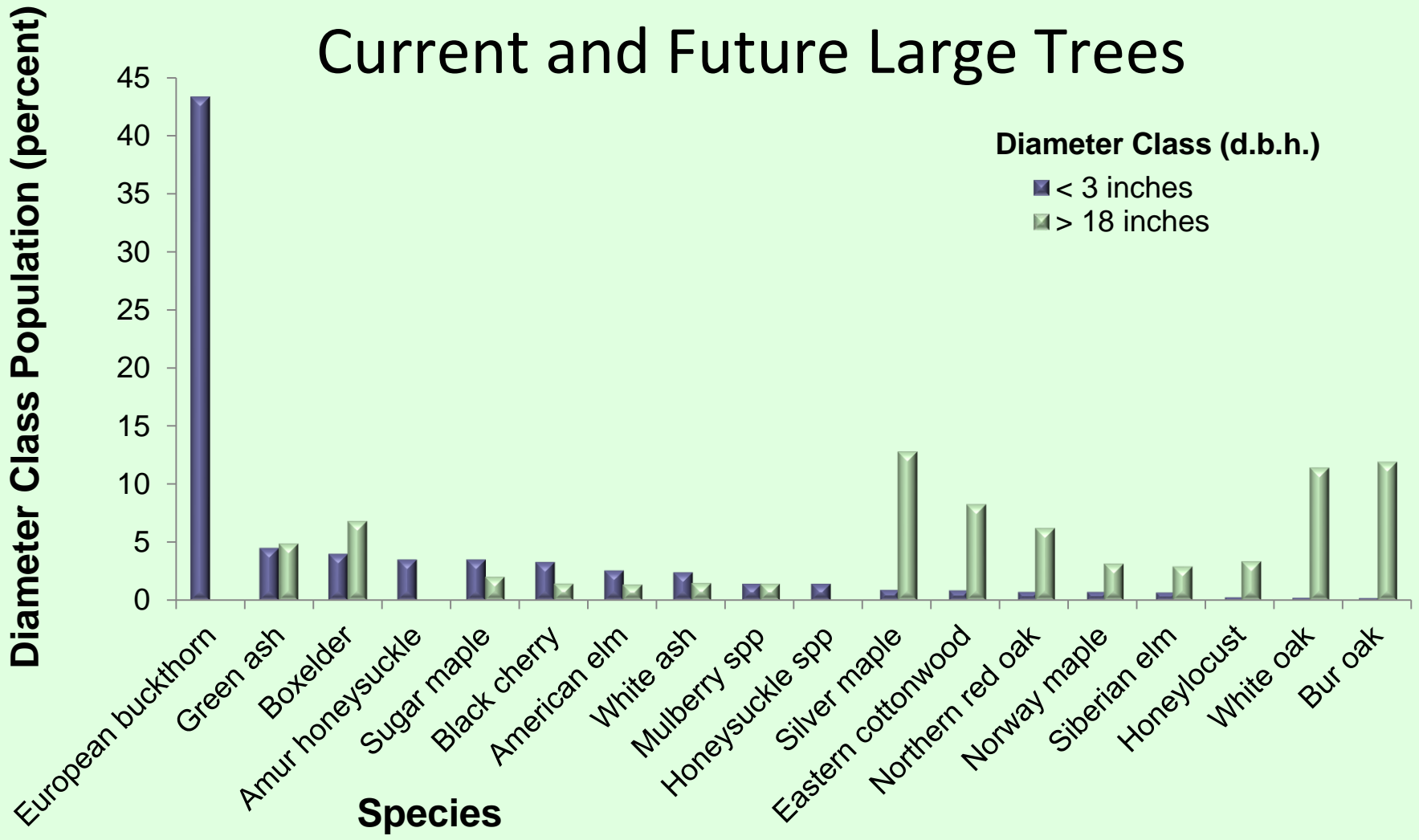
■ Trees at risk



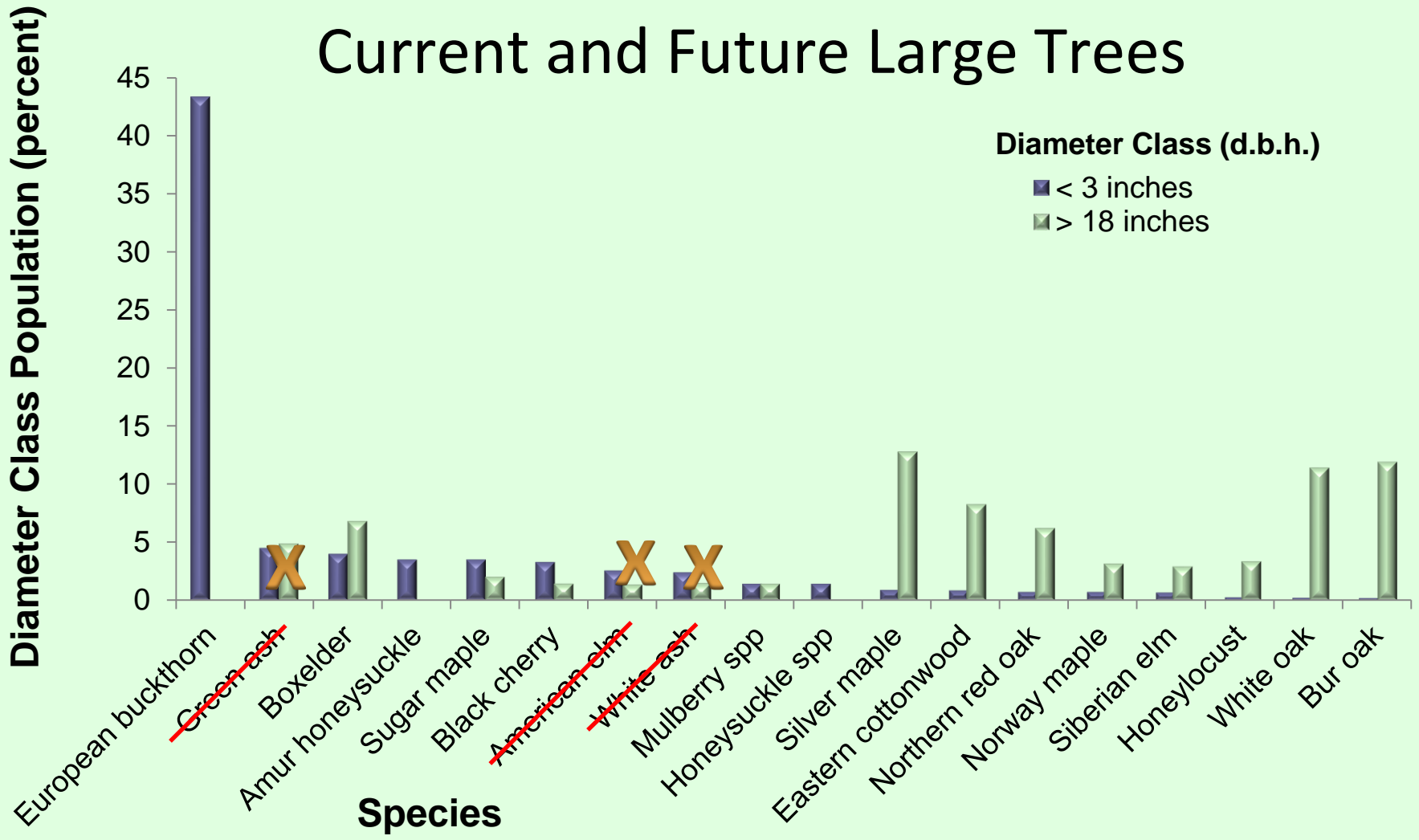
# Ash in the Chicago Region Urban

- Region – 8.1%
- Residential – 9%
  - **Street trees – 21%**
- Open Space – 8.7%
- Agriculture – 1.1%
- Commercial-Transportation-Institution – 4.7%

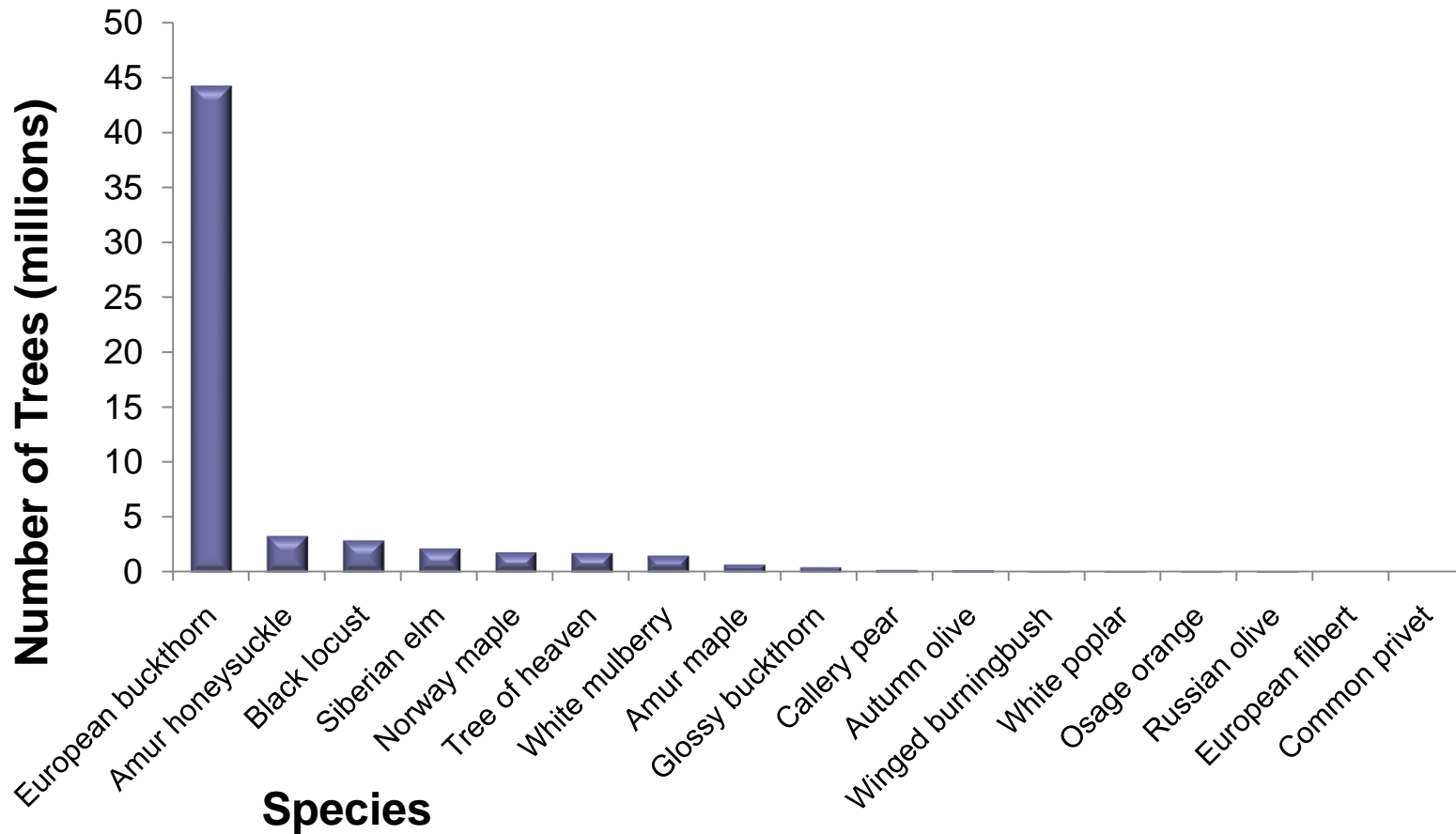
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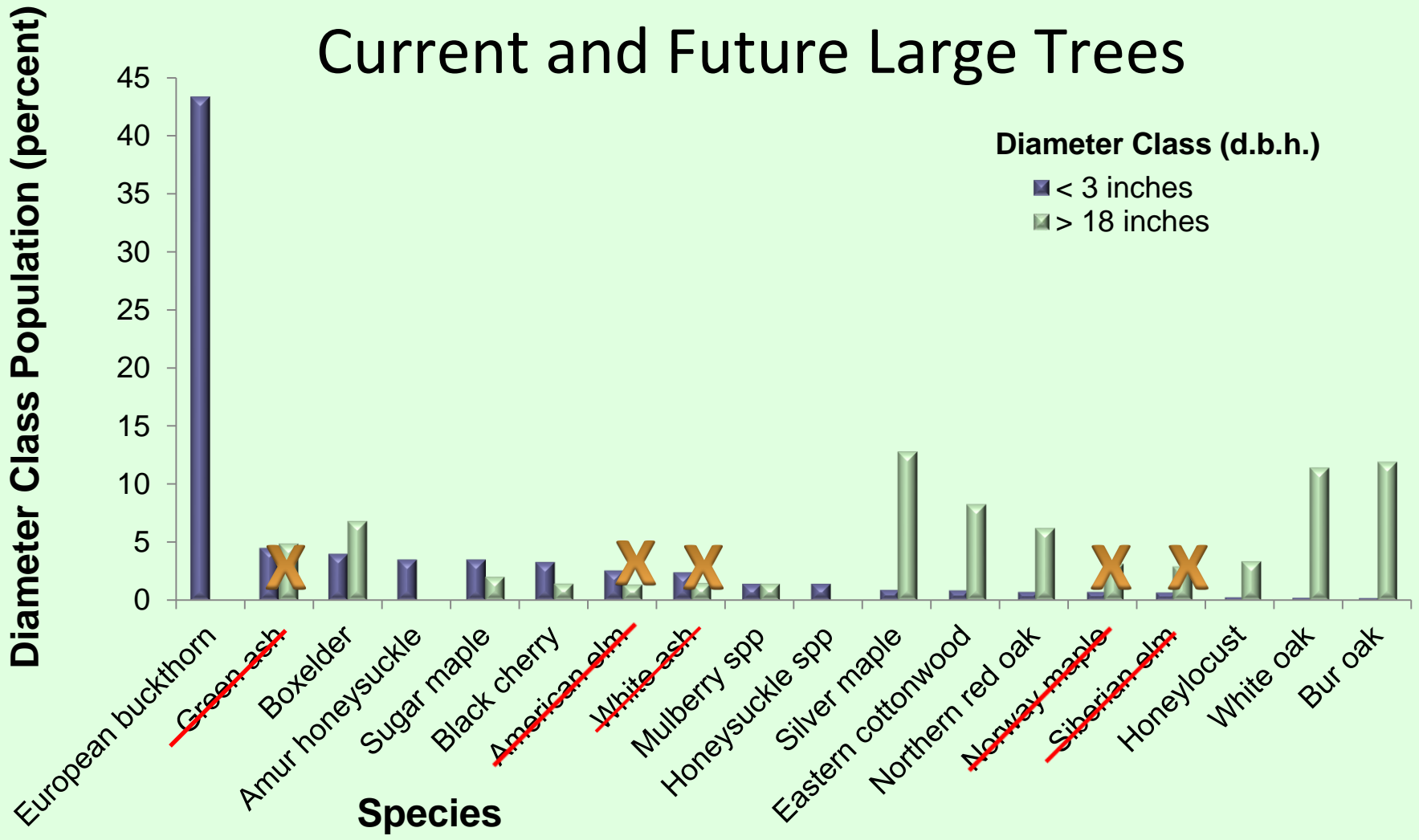
# Current and Future Large Trees



# Number of trees on Illinois Invasive List



# Current and Future Large Trees





# Loss of Oaks



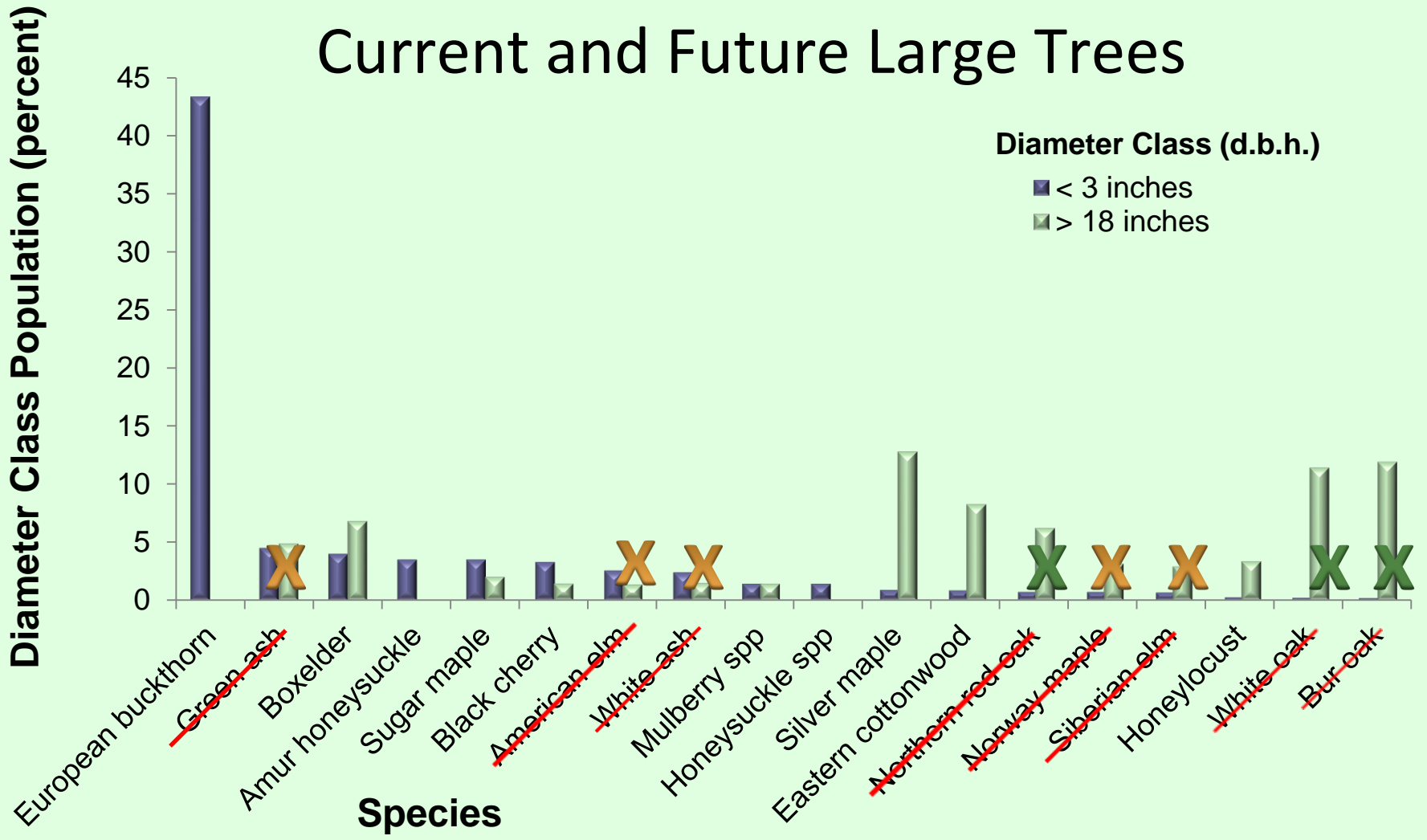




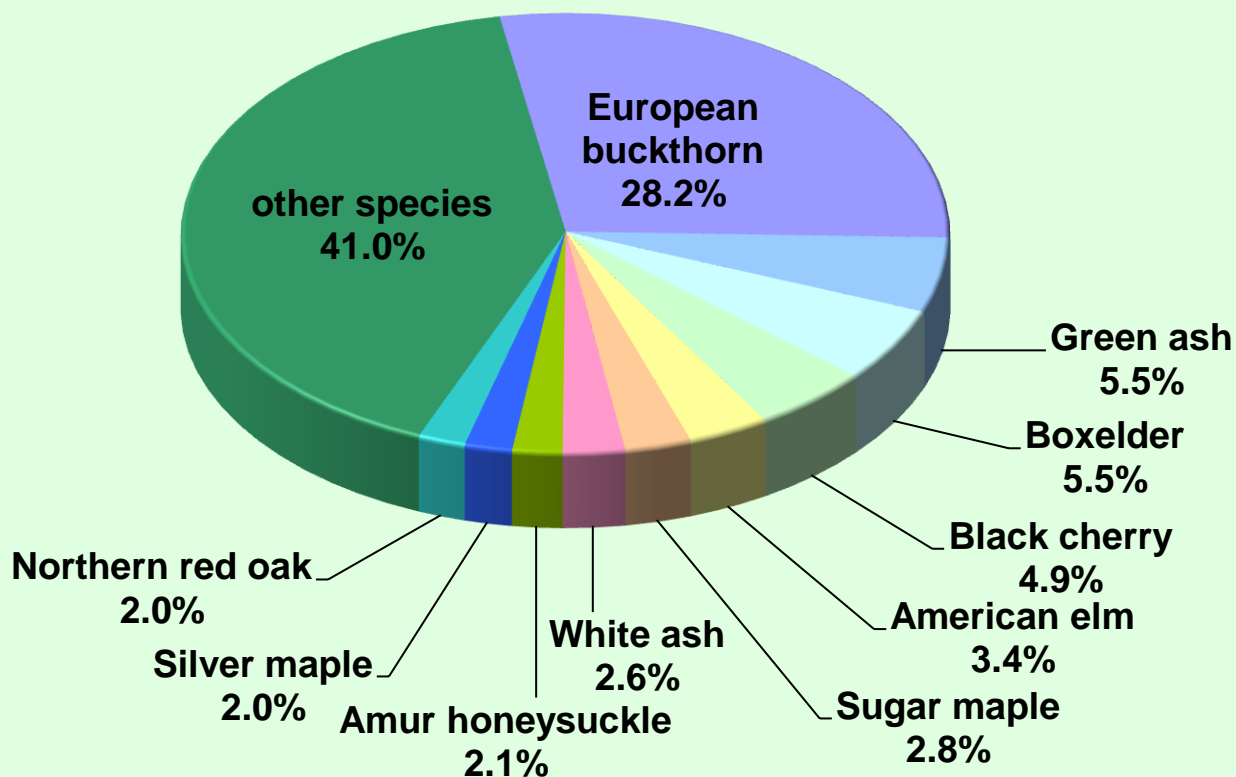
The  
Morton  
Arboretum



# Current and Future Large Trees

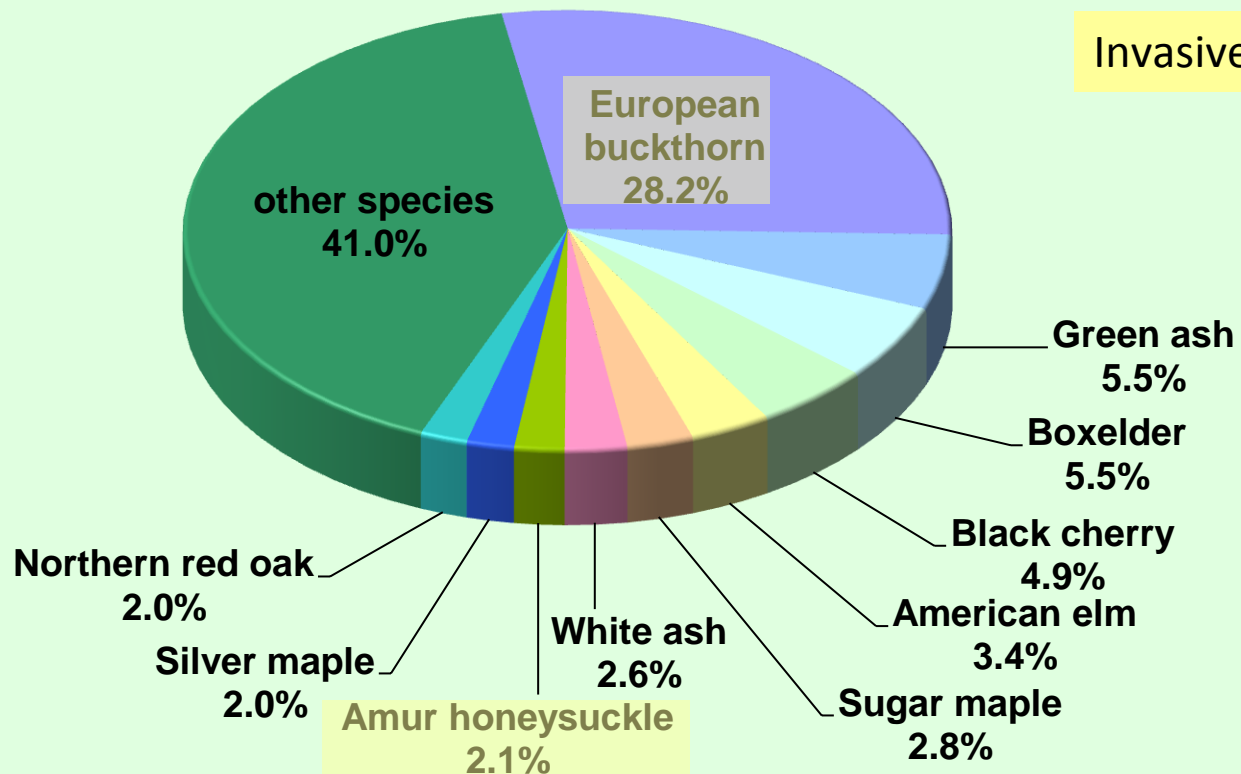


# Tree Species Distribution – Chicago Region

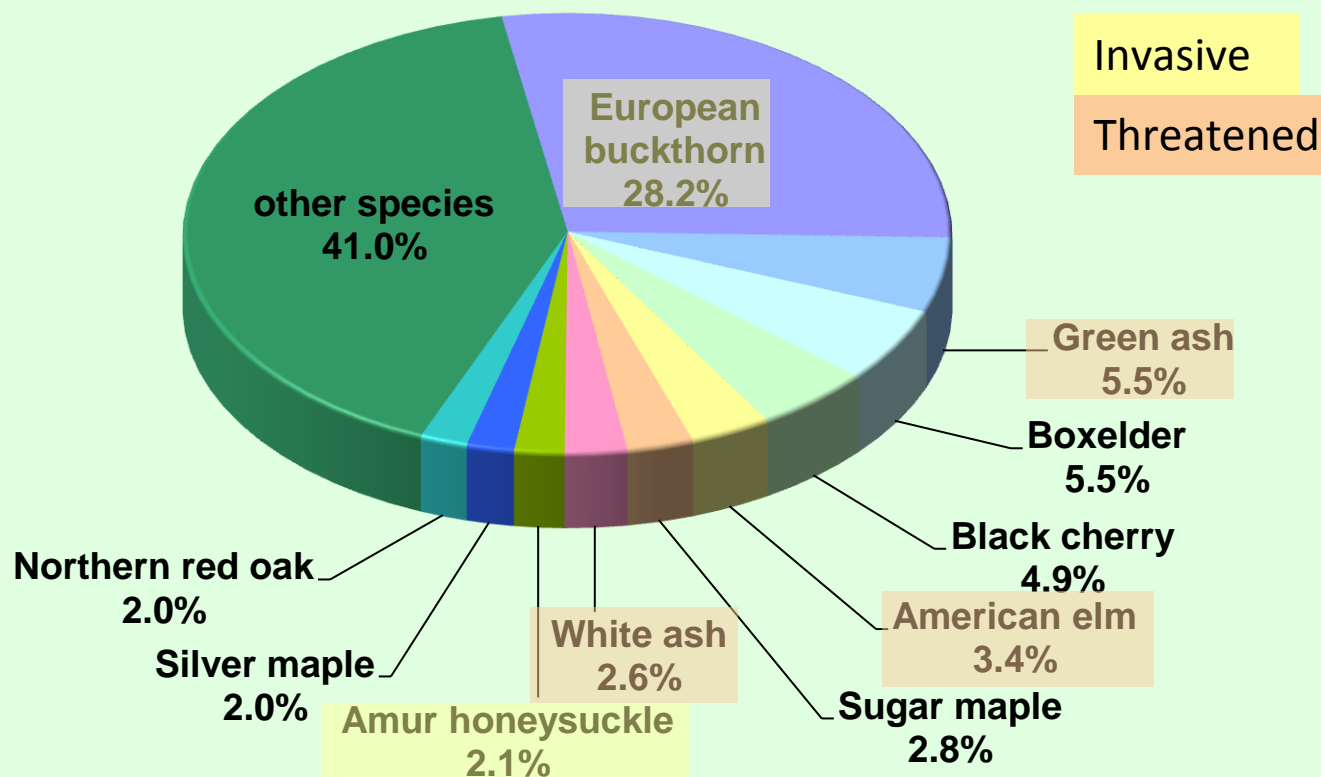




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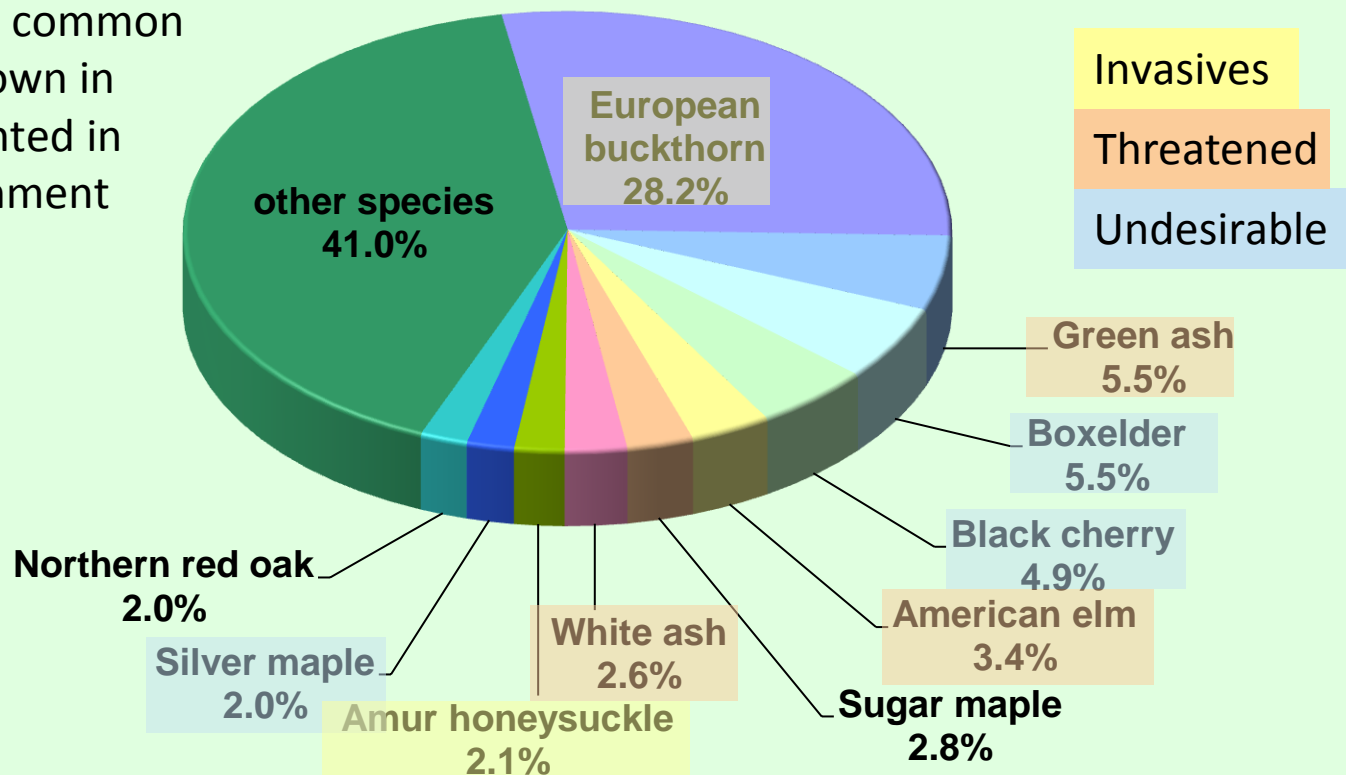
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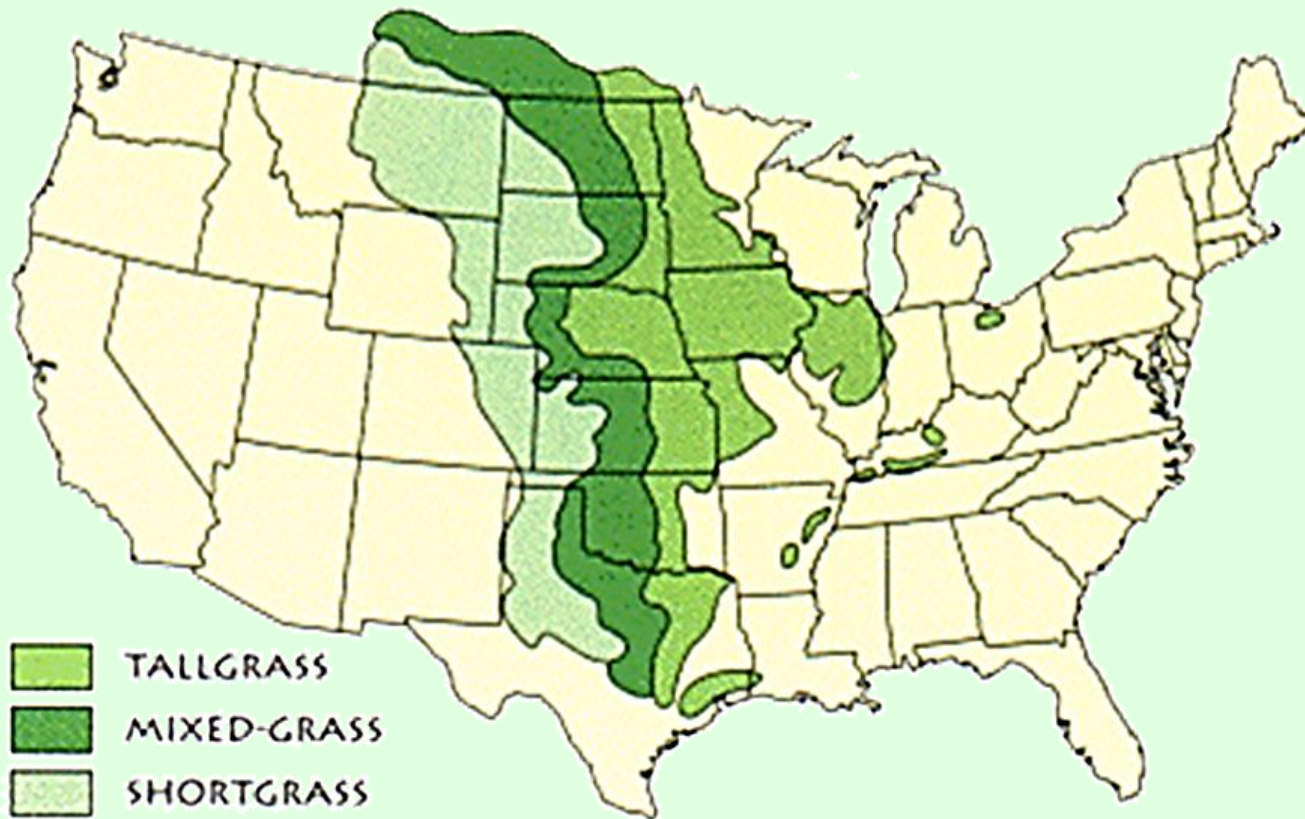


# Tree Species Distribution – Chicago Region

59% of the most common trees are not grown in nurseries or planted in the built environment



# Regional Ecology Challenges Trees





## The i-Tree Eco Assessment will:

- Greater awareness of the breadth, diversity and scope of the urban forest
- Inform approaches for regional urban forest management
- Serve as the basis for a comprehensive regional strategy
- Provide a benchmark for evaluating future trends
- Improve the vigor of the urban forest
- Foster collaboration amongst stakeholders





[http://www.itreetools.org/resources/reports/Chicago\\_Region\\_rb\\_nrs84.pdf](http://www.itreetools.org/resources/reports/Chicago_Region_rb_nrs84.pdf)

or, Google “i-Tree Chicago Region”

