

# Tree Risk Assessment

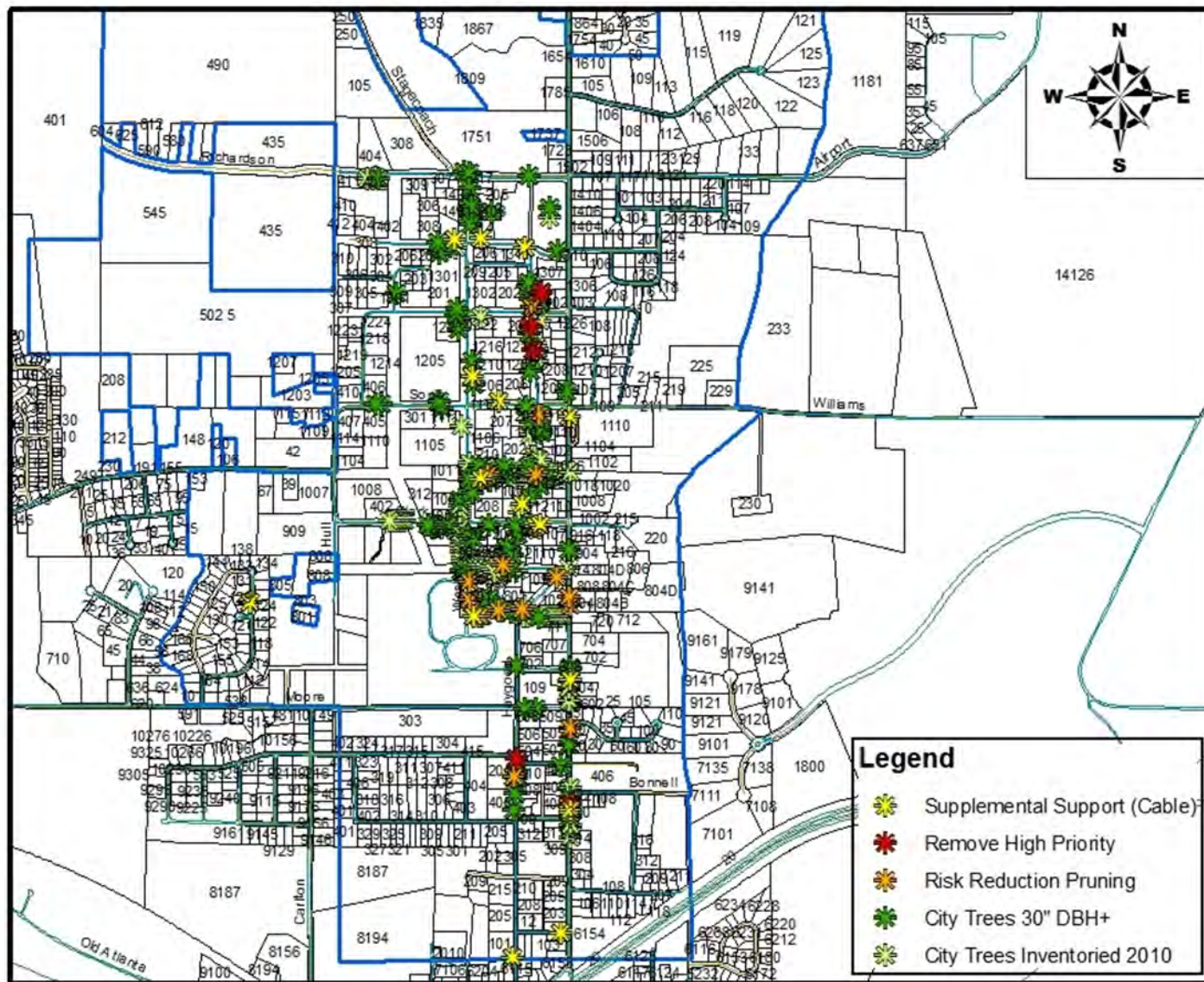
- Tree Risk Management includes...
  - Tree Risk Assessment
  - Tree Risk Mitigation
    - Pruning
    - Supplemental Support
    - Lightning Protection
    - Removal

# Tree Risk Assessment

- Tree risk assessment should be conducted periodically and after each storm event
- May also be combined with a complete public tree inventory

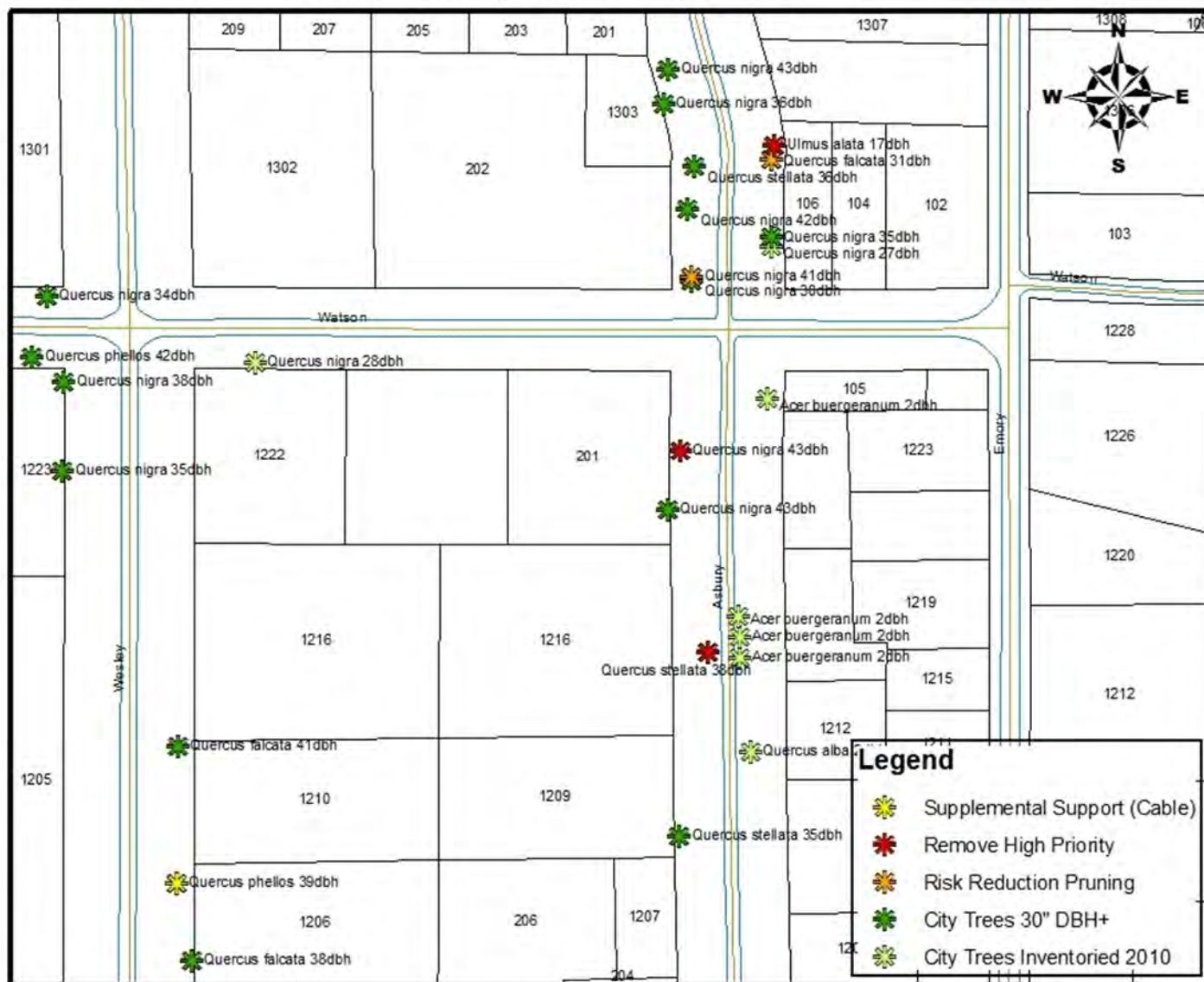
# Large Trees Recommended for Risk Reduction Pruning, Cabling or Removal

## 2010 Reinventory of Trees 30" DBH and Greater



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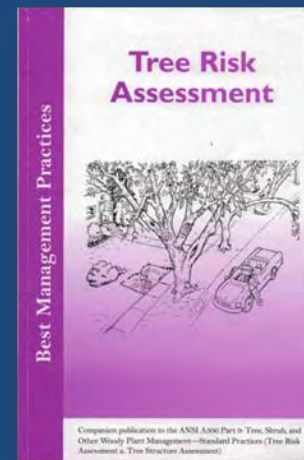
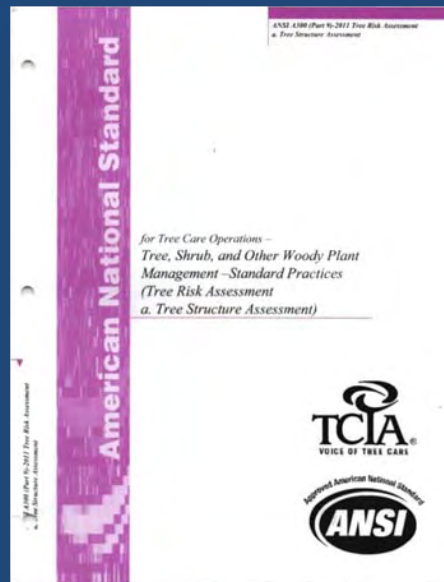
# Tree Risk Assessment

- *A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas* (Nelda P. Matheny and James R. Clark)
  - *Uses ratings for size of part, probability of failure, and target frequency to calculate a hazard rating*

| SECTION | HAZARD RATING |   |    |    |    |    |    |    | TOTAL |
|---------|---------------|---|----|----|----|----|----|----|-------|
|         | 0             | 6 | 7  | 8  | 9  | 10 | 11 | 12 |       |
| CBD     | 45            | 0 | 0  | 1  | 0  | 2  | 0  | 0  | 48    |
| NW      | 131           | 1 | 12 | 12 | 7  | 9  | 3  | 1  | 176   |
| NE      | 12            | 0 | 0  | 1  | 6  | 3  | 2  | 0  | 24    |
| SE      | 9             | 1 | 0  | 5  | 4  | 2  | 1  | 0  | 22    |
| SW      | 24            | 0 | 0  | 4  | 8  | 6  | 1  | 0  | 43    |
| TOTAL   | 221           | 2 | 12 | 23 | 25 | 22 | 7  | 1  | 313   |

# Tree Risk Assessment

- *ANSI A300 Part 9, Standard for Tree Risk Assessment, a. Tree Structure Assessment*
- *Best Management Practices for Tree Risk Assessment*



# ANSI A300 Part 9:

## Tree Risk Assessment

- Purpose is to provide guidelines for the practice of tree risk assessment and standards for writing specifications
- To assess structural integrity and other factors that affect the level of risk to people or property and to provide information for mitigating risk
- Specifications and mitigation should be provided by an arborist competent in tree risk assessment

# Definitions

- **Risk** - combination of the probability of an event and its consequence
- **Risk analysis** – systematic use of information to identify and estimate risk
- **Risk assessment** – overall process of risk analysis and risk evaluation

# Definitions

- **Tree risk** – the likelihood and consequences of failure of tree or tree parts
- **Tree risk assessment** – a systematic process used to identify, analyze and evaluate tree risk
- **Mitigation** – the process of diminishing risk
- **Residual risk** – risk remaining after mitigation

# Risk Assessment Levels

- Level I: Limited Visual Assessment
- Level II: Basic Assessment
- Level III: Advanced Assessment

# Level I: Limited Visual Assessment

- Limited visual assessment of an individual tree or a population of trees near specified targets, such as along roadways or utility rights-of-way, to identify specified conditions or obvious defects
- Walk-by, drive-by, or aerial patrol
- Level I risk assessment can also be done for trees on private property adjacent and within a specified distance of critical roads

# Level I: Limited Visual Assessment

- Obvious defects:
  - Dead trees
  - Large cavity openings
  - Large dead or broken branches
  - Fungal fruiting structures
  - Large cracks
  - Severe leans
  - Lethal pests
  - Symptoms of root decay

# Level I: Limited Visual Assessment

- Identify the location and/or selection criteria of trees to be assessed
- Determine the most efficient route and document the route taken
- Assess the tree(s) of concern from the defined perspective (walk-by, drive-by).

# Level I: Limited Visual Assessment

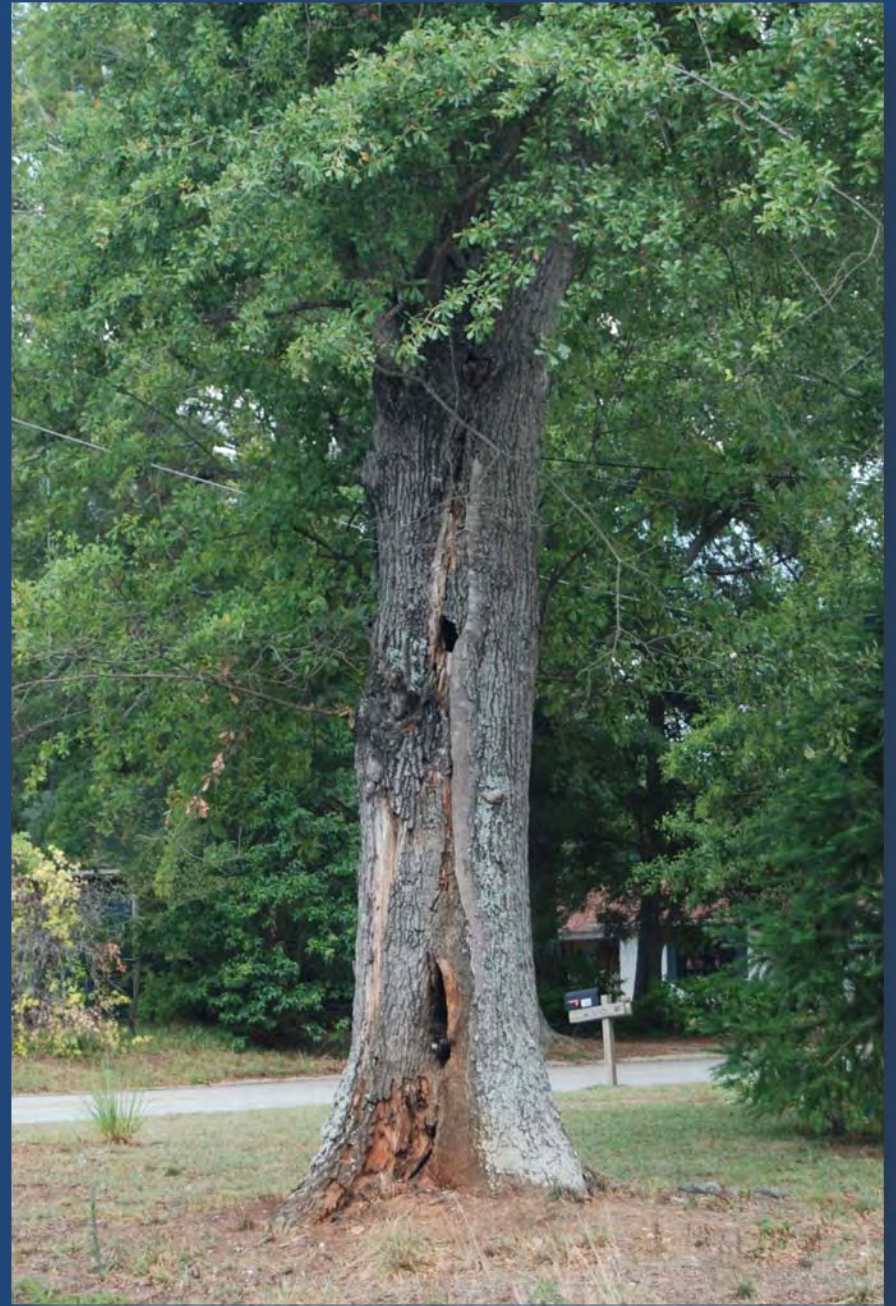
- Record locations of trees that meet the defined criteria (for example, significant defects or other conditions of concern)
- Evaluate the risk ( a risk rating is optional).
- Identify trees needing a higher level of assessment and/or prompt action
- Submit recommendations or report.











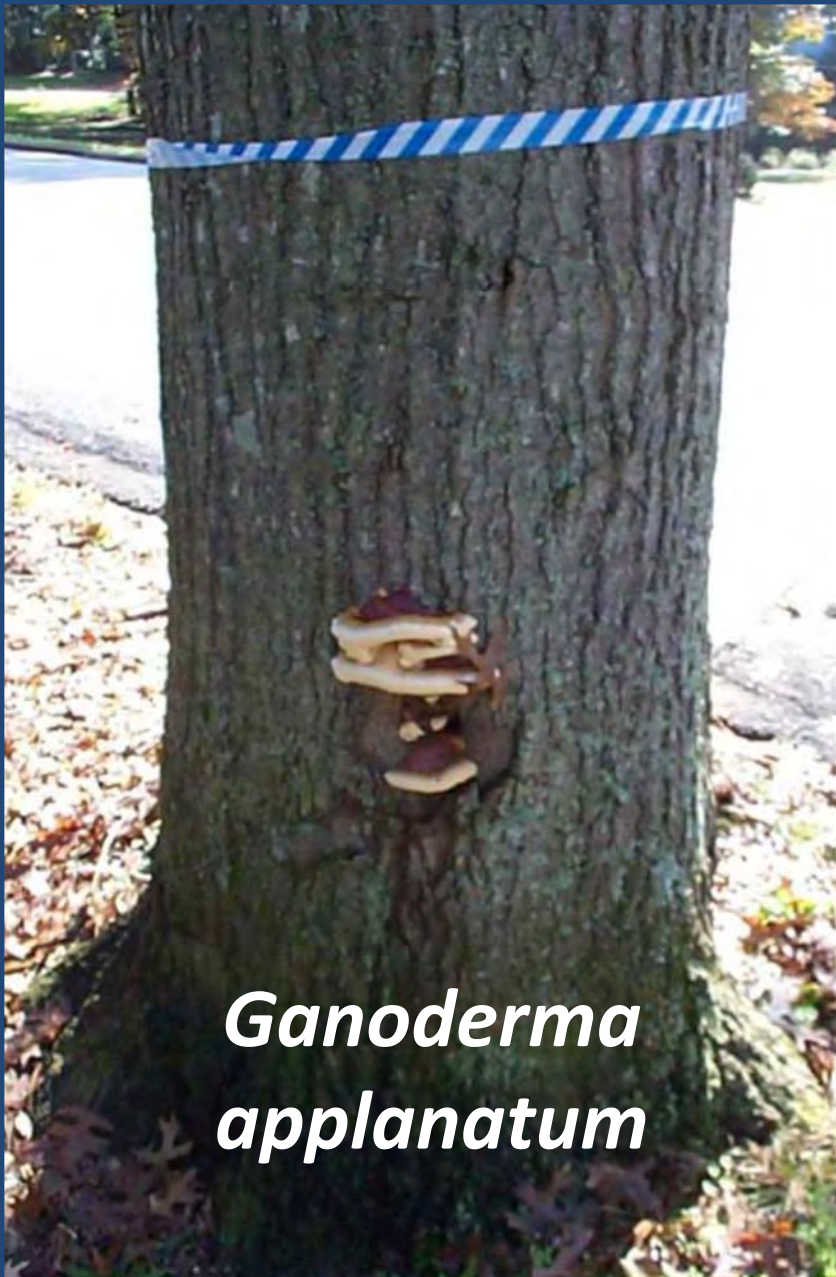








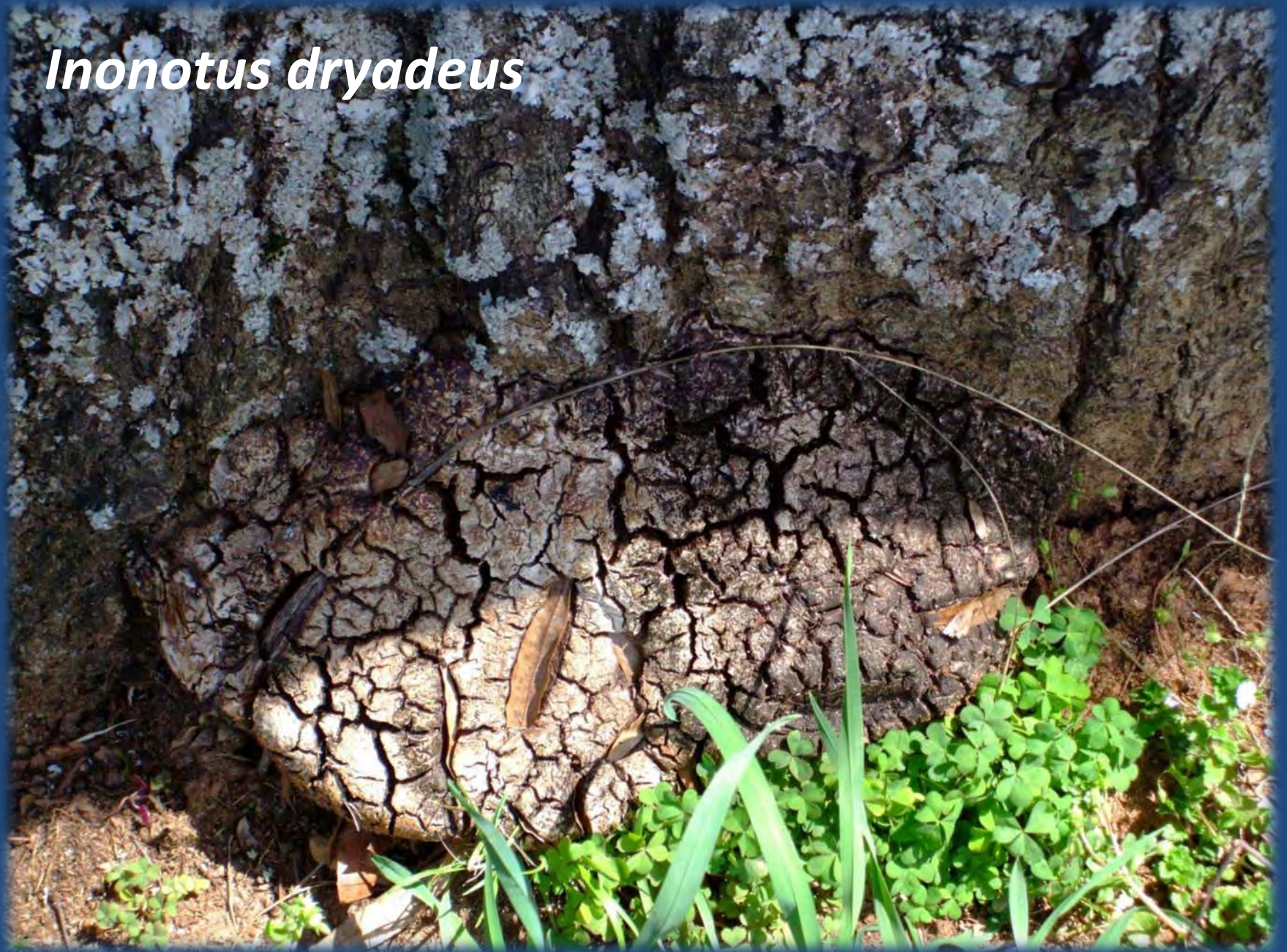
**Hypoxylon Fungus**



# *Inonotus dryadeus*



*Inonotus dryadeus*





# Wetwood/Slime Flux

Foul-smelling and unsightly seepage of sap from the trunk of shade trees

Bacterial disease causing discolored or wet wood; bacteria enters through root or trunk wounds

Gas is produced by fermentation by bacteria which causes sap to ooze or “flux” from the wood

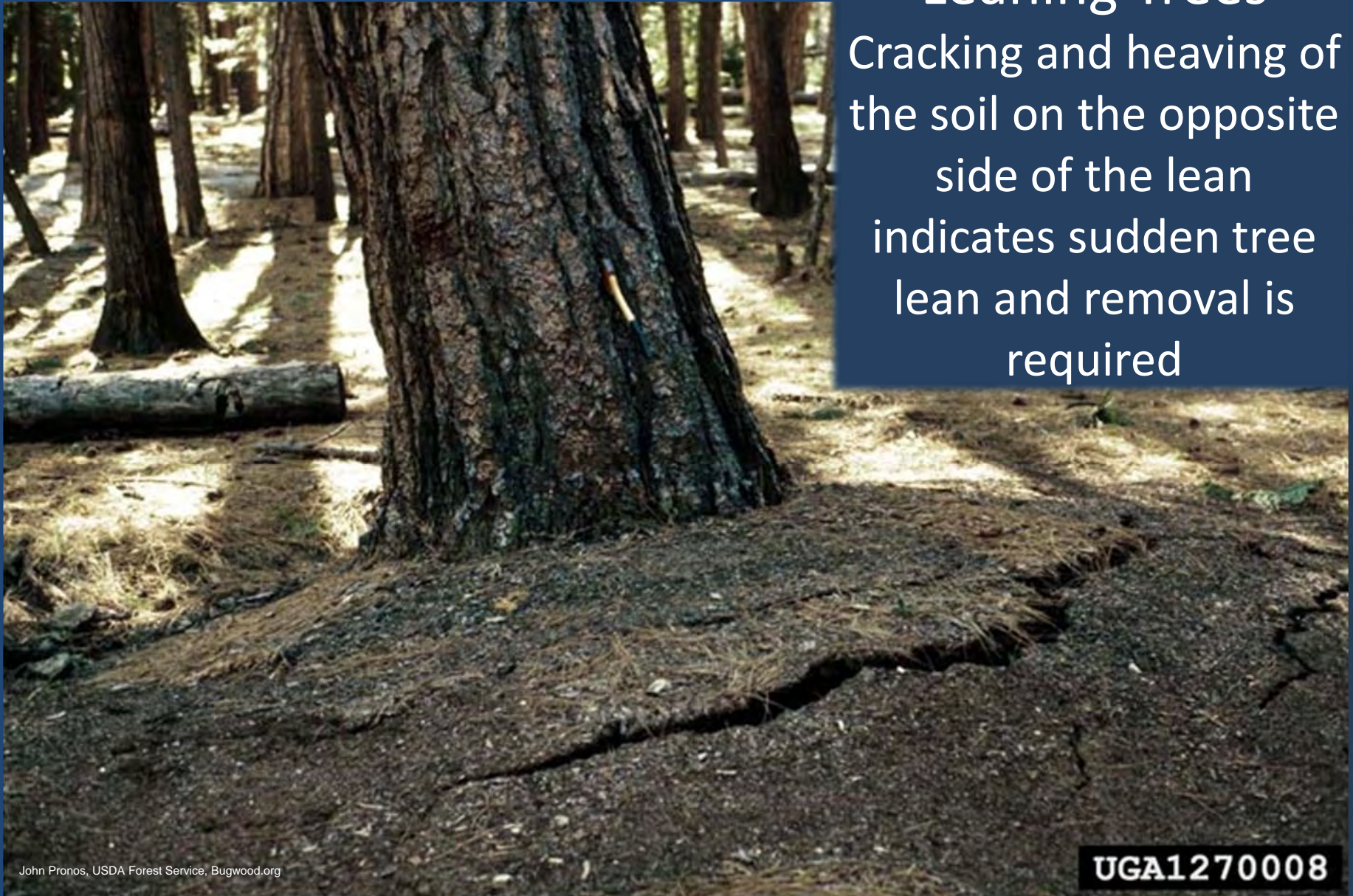
Many different microorganisms grow in the flux producing a foul or alcoholic smell

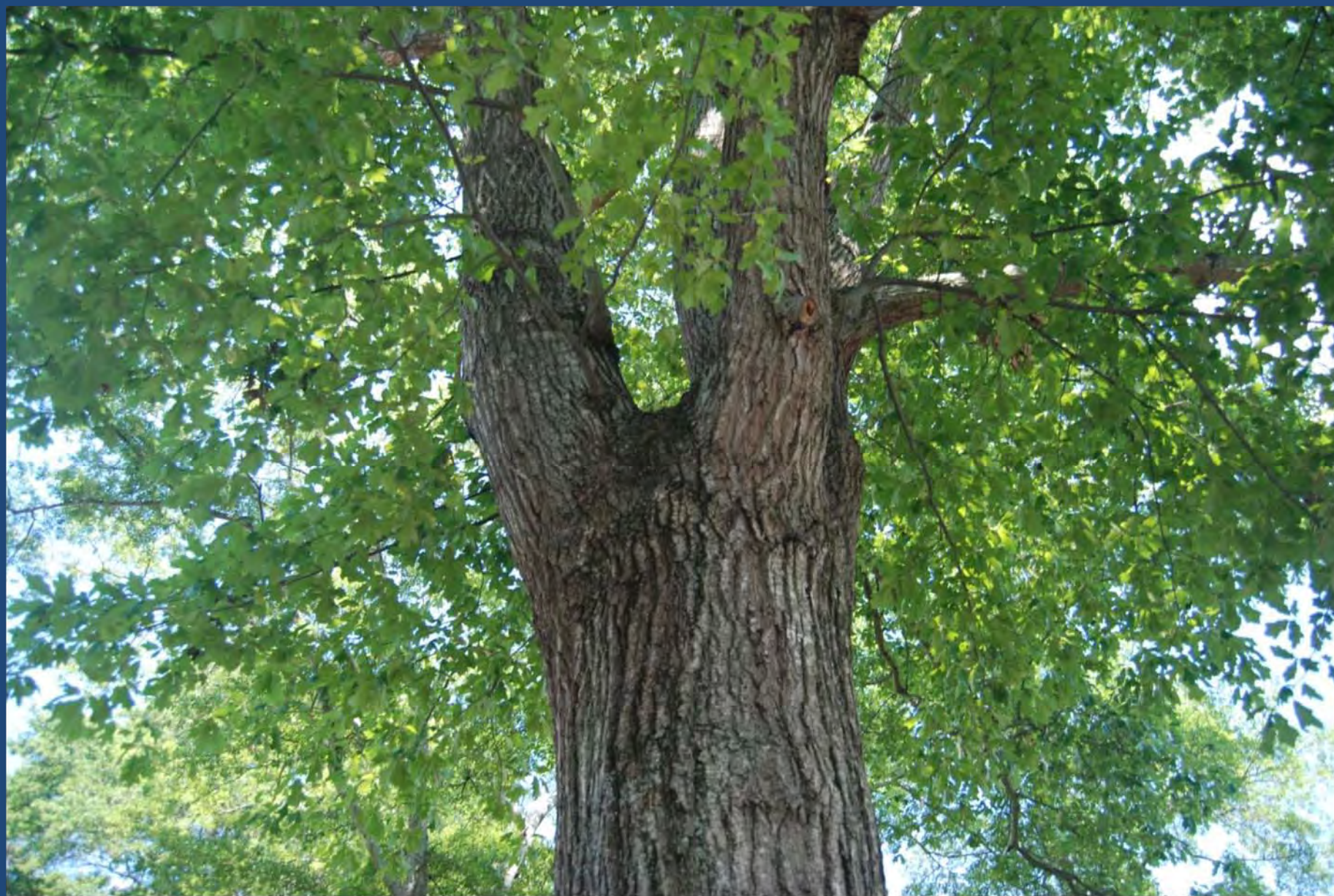
Insects are attracted to the slime flux



# Leaning Trees

Cracking and heaving of the soil on the opposite side of the lean indicates sudden tree lean and removal is required







# Assessing Risk on Private Property

## Smyrna Tree Canopy Survey

| CANOPY CATEGORY | NUMBER OF PARCELS | PERCENT OF TOTAL |
|-----------------|-------------------|------------------|
| 1               | 838               | 30%              |
| 2               | 367               | 13%              |
| 3               | 263               | 9%               |
| 4               | 122               | 4%               |
| 5               | 185               | 7%               |
| 6               | 561               | 20%              |
| 7               | 189               | 7%               |
| 8               | 2                 | 0%               |
| 9               | 103               | 4%               |
| 10              | 28                | 1%               |
| 11              | 15                | 1%               |
| 12              | 33                | 1%               |
| 13              | 17                | 1%               |
| 14              | 35                | 1%               |
| 15              | 45                | 2%               |
| TOTAL           | 2,803             | 100%             |

The most tree canopy overhanging the city street rights-of-way is on parcels categorized as 8 through 13

# Smyrna Tree Canopy Survey

- 2,803 parcels surveyed for tree canopy overhanging the street right-of-way
- There are 198 parcels (7%; 9% in Phase II) that have significant (greater than 50%) tree canopy cover overhanging the right-of-way
- These levels of tree canopy overhang can be mapped on the City's GIS to provide another picture of the distribution of tree canopy cover

# Level II: Basic Assessment

- 360-degree, ground-based visual inspection of the tree crown, trunk, trunk flare, above-ground roots, and site conditions around the tree in relation to targets
- Tools that may be used include:
  - Binoculars
  - Magnifying glass
  - Mallet
  - Probe
  - Trowel or shovel

# Level II: Basic Assessment

- Locate and identify the tree or trees to be assessed.
- Determine the targets and target zone of the tree or branches of concern.
- Review site history, conditions and species failure profile.
- Assess potential load on the tree and its parts.
- Assess general tree health.

# Level II: Basic Assessment

- Inspect the tree visually—using binoculars, mallet, probes or shovels, as desired by the arborist or as specified in the scope of work.
- Record observations of site conditions, defects and outward signs of possible internal defects and response growth.
- If necessary, recommend an advanced assessment.

# Level II: Basic Assessment

- Analyze data to determine the likelihood and consequences of failure in order to evaluate the degree of risk.
- Develop mitigation options and estimate residual risk for each option.
- Develop and submit the report/documentation, including, when appropriate, advice on re-inspection intervals.

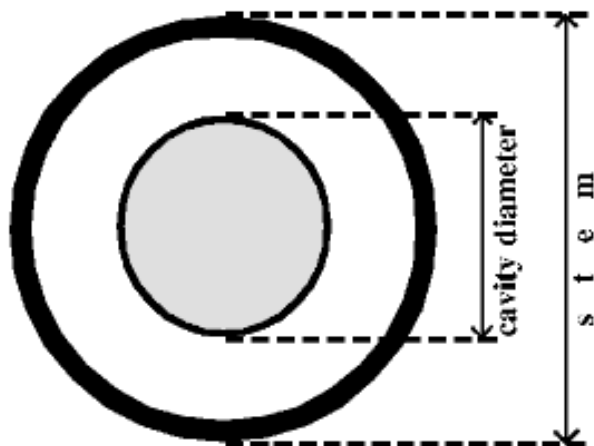
# Decay Columns with Open Cavities

1/3 good wood is required for strength; an open cavity decreases strength (use strength loss table/formula)



**Table 1:** Relative strength of a stem with a cavity compared to a solid stem (centered closed cavity). Figure 1 clarifies terms used in the table.

| percent of stem diameter hollow | relative strength of hollow stem | percent of stem diameter hollow | relative strength of hollow stem |
|---------------------------------|----------------------------------|---------------------------------|----------------------------------|
| 99                              | 4                                | 81                              | 57                               |
| 98                              | 8                                | 80                              | 59                               |
| 97                              | 11                               | 75                              | 68                               |
| 96                              | 15                               | 70                              | 76                               |
| 95                              | 19                               | 65                              | 82                               |
|                                 |                                  |                                 |                                  |
| 94                              | 22                               | 60                              | 97                               |
| 93                              | 25                               | 55                              | 91                               |
| 92                              | 28                               | 50                              | 94--6% weaker than solid stem    |
| 91                              | 31                               | 45                              | 96                               |
| 90                              | 34                               | 40                              | 97                               |
|                                 |                                  |                                 |                                  |
| 89                              | 37                               | 35                              | 98                               |
| 88                              | 40                               | 30                              | 99                               |
| 87                              | 37                               | 35                              | 98                               |
| 86                              | 45                               | 20                              | 99                               |
| 85                              | 48                               | 15                              | 99                               |
|                                 |                                  |                                 |                                  |
| 84                              | 50                               | 10                              | 99                               |
| 83                              | 53                               | 5                               | 99                               |
| 82                              | 55                               | solid                           | 100                              |



**Figure 1:** Calculating relative strength.

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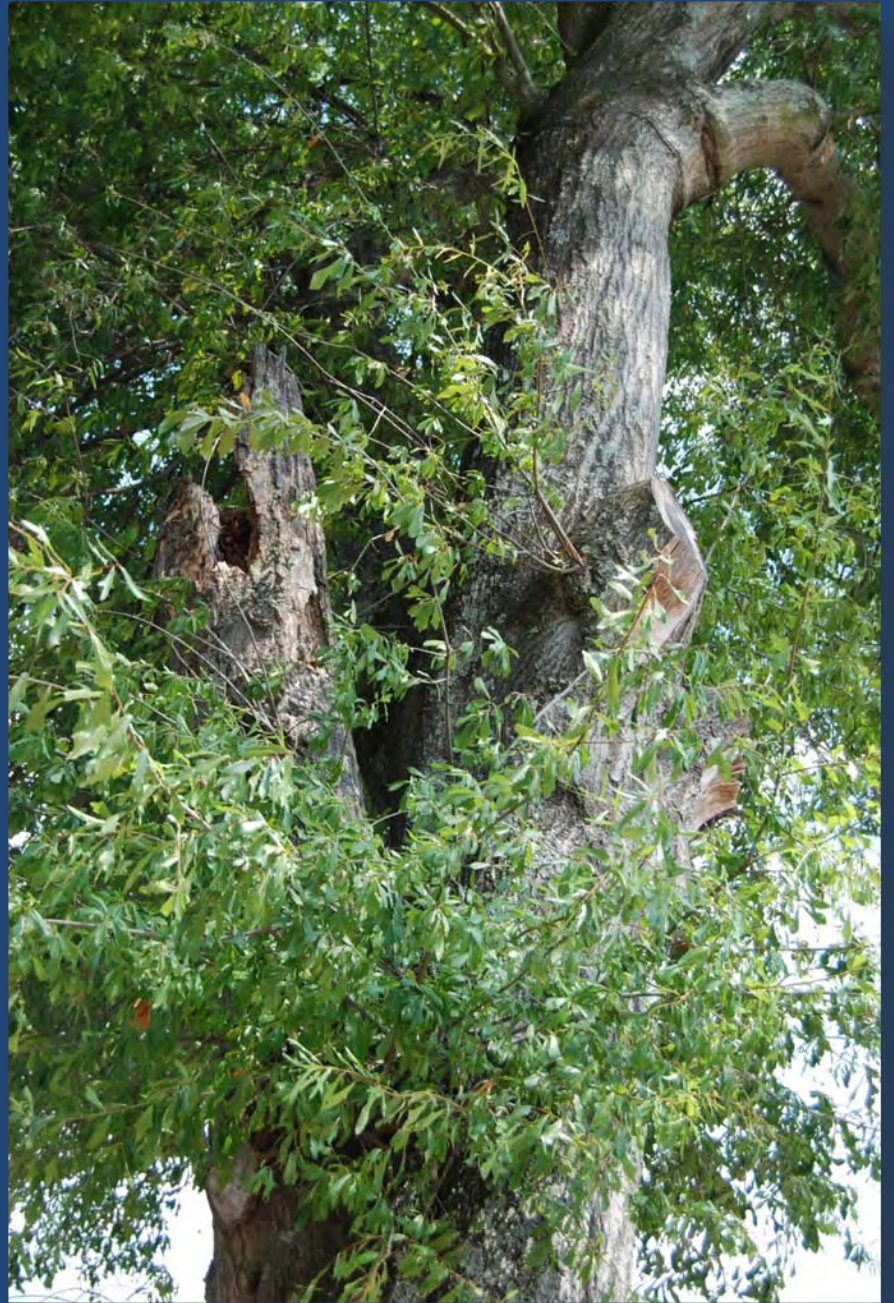












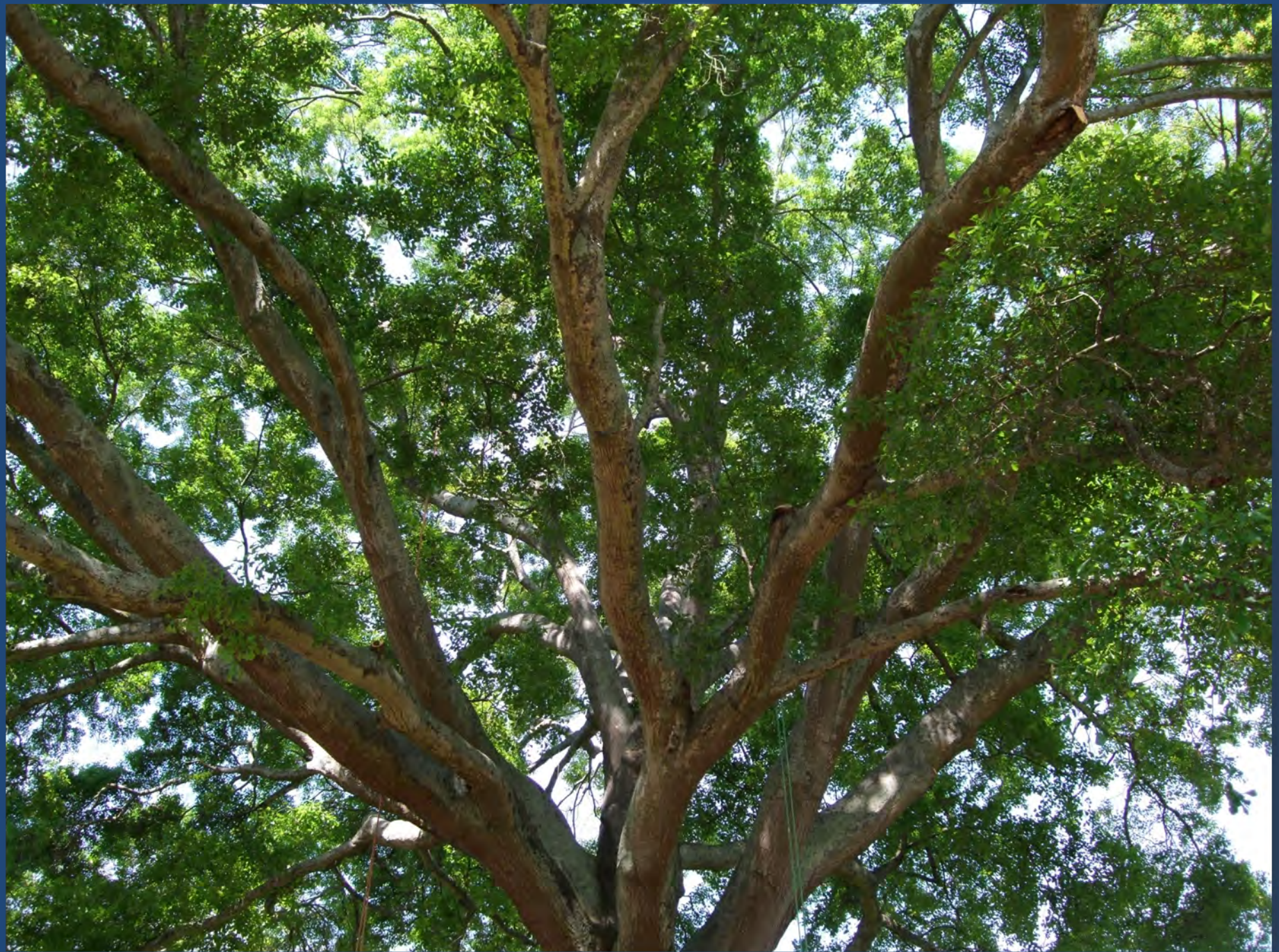




# Level III: Advanced Techniques

- Aerial inspection and evaluation of structural defects in branches
- Detailed target analysis
- Detailed site evaluation
- Decay testing
- Health evaluation
- Root inspection and evaluation
- Storm/wind load analysis
- Measuring and assessment the change in trunk lean
- Load testing



















# Assessing Tree Benefits and Calculating Values

- Can be used to gain support for tree risk assessments
- Can be used to gain support for community forest management programs
- The value of tree benefits does not enter into calculations for FEMA Public Assistance Grants

# Tree Benefits and Values

- i-Tree Eco, Streets
  - Produces information on the ecosystem services and economic values of trees
  - [www.itreetools.org](http://www.itreetools.org)
- National Tree Benefit Calculator
  - [www.treebenefits.org](http://www.treebenefits.org)
- Guide for Plant Appraisal
  - Council of Tree and Landscape Appraisers

## Oxford, Georgia

### Annual Benefits of Public Trees by Species (\$/tree)

8/18/2009

| Species               | Energy | CO <sub>2</sub> | Air Quality | Stormwater | Aesthetic/Other | Total (\$) Standard Error |
|-----------------------|--------|-----------------|-------------|------------|-----------------|---------------------------|
| Flowering dogwood     | 19.72  | 0.83            | 1.24        | 4.14       | 5.78            | 31.71 (N/A)               |
| Water oak             | 169.64 | 6.83            | -13.01      | 89.21      | 81.97           | 334.64 (N/A)              |
| Common crapemyrtle    | 5.93   | 0.12            | 0.35        | 1.04       | 1.74            | 9.19 (N/A)                |
| Willow oak            | 129.34 | 4.71            | -16.88      | 72.91      | 66.71           | 256.80 (N/A)              |
| Loblolly pine         | 106.42 | 3.94            | -15.05      | 53.88      | 59.44           | 208.63 (N/A)              |
| Broadleaf Deciduous I | 46.72  | 1.60            | 1.90        | 14.12      | 28.32           | 92.66 (N/A)               |
| Winged elm            | 72.43  | 3.58            | 3.97        | 26.34      | 40.49           | 146.82 (N/A)              |
| White oak             | 33.32  | 1.55            | 0.21        | 18.71      | 23.86           | 77.64 (N/A)               |
| Pecan                 | 147.47 | 4.43            | 5.15        | 57.47      | 62.09           | 276.60 (N/A)              |
| Eastern red cedar     | 41.34  | 1.34            | 3.23        | 11.06      | 6.75            | 63.71 (N/A)               |
| Southern red oak      | 165.93 | 4.83            | 5.53        | 68.82      | 63.89           | 309.00 (N/A)              |
| Post oak              | 215.38 | 4.96            | 6.50        | 99.61      | 66.23           | 392.68 (N/A)              |
| Scarlet oak           | 66.09  | 2.24            | 2.61        | 21.49      | 39.01           | 131.45 (N/A)              |
| Southern magnolia     | 42.16  | 0.95            | 1.55        | 16.30      | 15.72           | 76.67 (N/A)               |
| Sweetgum              | 80.88  | 2.71            | -10.22      | 35.09      | 61.64           | 170.10 (N/A)              |
| Yoshino flowering che | 27.05  | 0.68            | 1.54        | 5.95       | 12.58           | 47.81 (N/A)               |
| Callery pear          | 14.17  | 0.64            | 0.94        | 3.17       | 7.77            | 26.69 (N/A)               |
| Black cherry          | 45.61  | 1.67            | 1.95        | 12.77      | 32.98           | 94.98 (N/A)               |
| Red maple             | 29.59  | 1.27            | 1.24        | 10.55      | 27.55           | 70.20 (N/A)               |
| Eastern redbud        | 38.71  | 1.44            | 2.38        | 8.77       | 8.81            | 60.11 (N/A)               |
| Other street trees    | 53.45  | 1.87            | 2.16        | 19.66      | 23.57           | 100.71 (N/A)              |

## Oxford, Georgia

### Annual Energy Benefits of Public Trees by Species

8/18/2009

| Species                   | Total Electricity<br>(MWh) | Electricity<br>(\$) | Total Natural<br>Gas (Therms) | Natural<br>Gas (\$) | Total<br>(\$) | Standard<br>Error | % of Total<br>Trees | % of<br>Total \$ | Avg.<br>\$/tree |
|---------------------------|----------------------------|---------------------|-------------------------------|---------------------|---------------|-------------------|---------------------|------------------|-----------------|
| Flowering dogwood         | 6.1                        | 4,731               | 321.7                         | 336                 | 5,067         | (N/A)             | 15.6                | 4.1              | 19.72           |
| Water oak                 | 45.7                       | 35,294              | 1,288.6                       | 1,348               | 36,642        | (N/A)             | 13.1                | 29.4             | 169.64          |
| Common crapemyrtle        | 1.0                        | 750                 | 59.4                          | 62                  | 812           | (N/A)             | 8.3                 | 0.7              | 5.93            |
| Willow oak                | 16.7                       | 12,930              | 499.0                         | 522                 | 13,452        | (N/A)             | 6.3                 | 10.8             | 129.34          |
| Loblolly pine             | 13.6                       | 10,495              | 344.2                         | 360                 | 10,855        | (N/A)             | 6.2                 | 8.7              | 106.42          |
| Broadleaf Deciduous Large | 4.6                        | 3,591               | 184.7                         | 193                 | 3,784         | (N/A)             | 4.9                 | 3.0              | 46.72           |
| Winged elm                | 6.8                        | 5,283               | 211.6                         | 221                 | 5,505         | (N/A)             | 4.6                 | 4.4              | 72.43           |
| White oak                 | 2.6                        | 2,007               | 87.5                          | 91                  | 2,099         | (N/A)             | 3.8                 | 1.7              | 33.32           |
| Pecan                     | 9.3                        | 7,199               | 307.9                         | 322                 | 7,521         | (N/A)             | 3.1                 | 6.0              | 147.47          |
| Eastern red cedar         | 2.2                        | 1,721               | 54.2                          | 57                  | 1,778         | (N/A)             | 2.6                 | 1.4              | 41.34           |
| Southern red oak          | 8.2                        | 6,364               | 261.1                         | 273                 | 6,637         | (N/A)             | 2.4                 | 5.3              | 165.93          |
| Post oak                  | 10.7                       | 8,291               | 310.0                         | 324                 | 8,615         | (N/A)             | 2.4                 | 6.9              | 215.38          |
| Scarlet oak               | 3.2                        | 2,449               | 122.6                         | 128                 | 2,577         | (N/A)             | 2.4                 | 2.1              | 66.09           |
| Southern magnolia         | 1.8                        | 1,418               | 55.0                          | 58                  | 1,475         | (N/A)             | 2.1                 | 1.2              | 42.16           |
| Sweetgum                  | 3.2                        | 2,472               | 110.8                         | 116                 | 2,588         | (N/A)             | 2.0                 | 2.1              | 80.88           |
| Yoshino flowering cherry  | 0.8                        | 634                 | 40.2                          | 42                  | 676           | (N/A)             | 1.5                 | 0.5              | 27.05           |
| Callery pear              | 0.4                        | 319                 | 20.5                          | 21                  | 340           | (N/A)             | 1.5                 | 0.3              | 14.17           |
| Black cherry              | 1.2                        | 905                 | 50.2                          | 53                  | 958           | (N/A)             | 1.3                 | 0.8              | 45.61           |
| Red maple                 | 0.7                        | 560                 | 30.4                          | 32                  | 592           | (N/A)             | 1.2                 | 0.5              | 29.59           |
| Eastern redbud            | 0.9                        | 730                 | 42.1                          | 44                  | 774           | (N/A)             | 1.2                 | 0.6              | 38.71           |
| Other street trees        | 14.4                       | 11,165              | 516.9                         | 541                 | 11,705        | (N/A)             | 13.3                | 9.4              | 53.45           |
| Citywide total            | 154.3                      | 119,308             | 4,918.6                       | 5,145               | 124,453       | (N/A)             | 100.0               | 100.0            | 75.66           |

## Oxford, Georgia

### Annual Stormwater Benefits of Public Trees by Species

8/18/2009

| Species                   | Total rainfall<br>interception (Gal) | Total<br>(\$) | Standard<br>Error | % of Total<br>Trees | % of Total<br>\$ | Avg.<br>\$/tree |
|---------------------------|--------------------------------------|---------------|-------------------|---------------------|------------------|-----------------|
| Flowering dogwood         | 107,530                              | 1,065         | (N/A)             | 15.6                | 1.9              | 4.14            |
| Water oak                 | 1,946,313                            | 19,270        | (N/A)             | 13.1                | 34.6             | 89.21           |
| Common crapemyrtle        | 14,442                               | 143           | (N/A)             | 8.3                 | 0.3              | 1.04            |
| Willow oak                | 765,836                              | 7,582         | (N/A)             | 6.3                 | 13.6             | 72.91           |
| Loblolly pine             | 555,044                              | 5,495         | (N/A)             | 6.2                 | 9.9              | 53.88           |
| Broadleaf Deciduous Large | 115,535                              | 1,144         | (N/A)             | 4.9                 | 2.1              | 14.12           |
| Winged elm                | 202,209                              | 2,002         | (N/A)             | 4.6                 | 3.6              | 26.34           |
| White oak                 | 119,035                              | 1,179         | (N/A)             | 3.8                 | 2.1              | 18.71           |
| Pecan                     | 296,014                              | 2,931         | (N/A)             | 3.1                 | 5.3              | 57.47           |
| Eastern red cedar         | 48,036                               | 476           | (N/A)             | 2.6                 | 0.9              | 11.06           |
| Southern red oak          | 278,026                              | 2,753         | (N/A)             | 2.4                 | 4.9              | 68.82           |
| Post oak                  | 402,427                              | 3,984         | (N/A)             | 2.4                 | 7.2              | 99.61           |
| Scarlet oak               | 84,651                               | 838           | (N/A)             | 2.4                 | 1.5              | 21.49           |
| Southern magnolia         | 57,622                               | 571           | (N/A)             | 2.1                 | 1.0              | 16.30           |
| Sweetgum                  | 113,407                              | 1,123         | (N/A)             | 2.0                 | 2.0              | 35.09           |
| Yoshino flowering cherry  | 15,033                               | 149           | (N/A)             | 1.5                 | 0.3              | 5.95            |
| Callery pear              | 7,694                                | 76            | (N/A)             | 1.5                 | 0.1              | 3.17            |
| Black cherry              | 27,090                               | 268           | (N/A)             | 1.3                 | 0.5              | 12.77           |
| Red maple                 | 21,315                               | 211           | (N/A)             | 1.2                 | 0.4              | 10.55           |
| Eastern redbud            | 17,710                               | 175           | (N/A)             | 1.2                 | 0.3              | 8.77            |
| Other street trees        | 434,879                              | 4,206         | (N/A)             | 13.3                | 7.7              | 19.66           |
| Citywide total            | 5,629,850                            | 55,739        | (N/A)             | 100.0               | 100.0            | 33.88           |

## Oxford, Georgia

### Replacement Value for Public Trees by Species

8/18/2009

| Species                 | DBH Class (in) |           |            |            |            |            |            |            |            | Total        | Standard Error | % of Total |
|-------------------------|----------------|-----------|------------|------------|------------|------------|------------|------------|------------|--------------|----------------|------------|
|                         | 0-3            | 3-6       | 6-12       | 12-18      | 18-24      | 24-30      | 30-36      | 36-42      | >42        |              |                |            |
| Flowering dogwood       | 7,954          | 40,187.78 | 168,082.44 | 96,625.38  | 0.00       | 0.00       | 0.00       | 0.00       | 0.00       | 312,849.88   | (±0)           | 3.87       |
| Water oak               | 1,025          | 3,898.39  | 44,827.80  | 82,214.17  | 293,656.66 | 393,949.72 | 384,851.66 | 620,785.44 | 314,785.69 | 2,139,994.00 | (±0)           | 26.50      |
| Common crapemyrtle      | 8,644          | 22,234.68 | 13,115.71  | 0.00       | 0.00       | 0.00       | 0.00       | 0.00       | 0.00       | 43,994.79    | (±0)           | 0.54       |
| Willow oak              | 128            | 10,667.04 | 51,918.61  | 69,389.20  | 87,553.24  | 147,290.34 | 291,713.00 | 366,269.06 | 311,588.56 | 1,336,517.13 | (±0)           | 16.55      |
| Loblolly pine           | 170            | 1,674.34  | 10,928.32  | 112,583.38 | 258,056.06 | 297,833.59 | 129,308.30 | 30,528.51  | 0.00       | 841,082.19   | (±0)           | 10.41      |
| Broadleaf Deciduous Lar | 2,825          | 7,824.95  | 24,353.86  | 114,288.09 | 33,284.70  | 0.00       | 29,580.06  | 0.00       | 0.00       | 212,156.88   | (±0)           | 2.63       |
| Winged elm              | 510            | 3,001.51  | 23,170.78  | 58,400.32  | 143,581.77 | 19,469.32  | 0.00       | 0.00       | 0.00       | 248,133.33   | (±0)           | 3.07       |
| White oak               | 5,499          | 910.56    | 8,430.91   | 9,093.57   | 0.00       | 9,025.88   | 106,695.48 | 0.00       | 31,583.10  | 171,238.41   | (±0)           | 2.12       |
| Pecan                   | 149            | 592.79    | 7,748.93   | 87,288.88  | 117,434.36 | 177,527.61 | 52,656.86  | 59,440.92  | 0.00       | 502,839.22   | (±0)           | 6.23       |
| Eastern red cedar       | 968            | 2,068.30  | 21,328.91  | 67,327.55  | 20,635.42  | 33,569.22  | 0.00       | 0.00       | 0.00       | 145,897.64   | (±0)           | 1.81       |
| Southern red oak        | 0              | 0.00      | 5,717.75   | 33,963.53  | 95,775.23  | 104,486.38 | 57,783.50  | 107,101.25 | 0.00       | 404,827.63   | (±0)           | 5.01       |
| Post oak                | 0              | 0.00      | 1,319.31   | 10,655.32  | 105,671.48 | 69,935.88  | 137,487.09 | 77,937.49  | 146,108.66 | 549,115.25   | (±0)           | 6.80       |
| Scarlet oak             | 763            | 2,710.22  | 23,516.52  | 11,198.92  | 22,903.86  | 39,891.10  | 0.00       | 0.00       | 0.00       | 100,983.38   | (±0)           | 1.25       |
| Southern magnolia       | 1,115          | 2,509.89  | 22,449.09  | 56,772.98  | 12,300.87  | 40,582.43  | 0.00       | 0.00       | 0.00       | 135,730.27   | (±0)           | 1.68       |

|                    |             |
|--------------------|-------------|
| Water Oak          | \$2,139,994 |
| Willow Oak         | \$1,336,517 |
| Flowering Dogwood  | \$ 312,849  |
| Common crapemyrtle | \$ 43,994   |

# Benefit to Cost Ratio of Street Tree Management

- Calculate your total community forest management costs
- Some of this information should be available in your most recent Tree City USA application
- Input these costs into the i-Tree Streets program

## Oxford, Georgia

### Total Annual Benefits, Net Benefits, and Costs for Public Trees

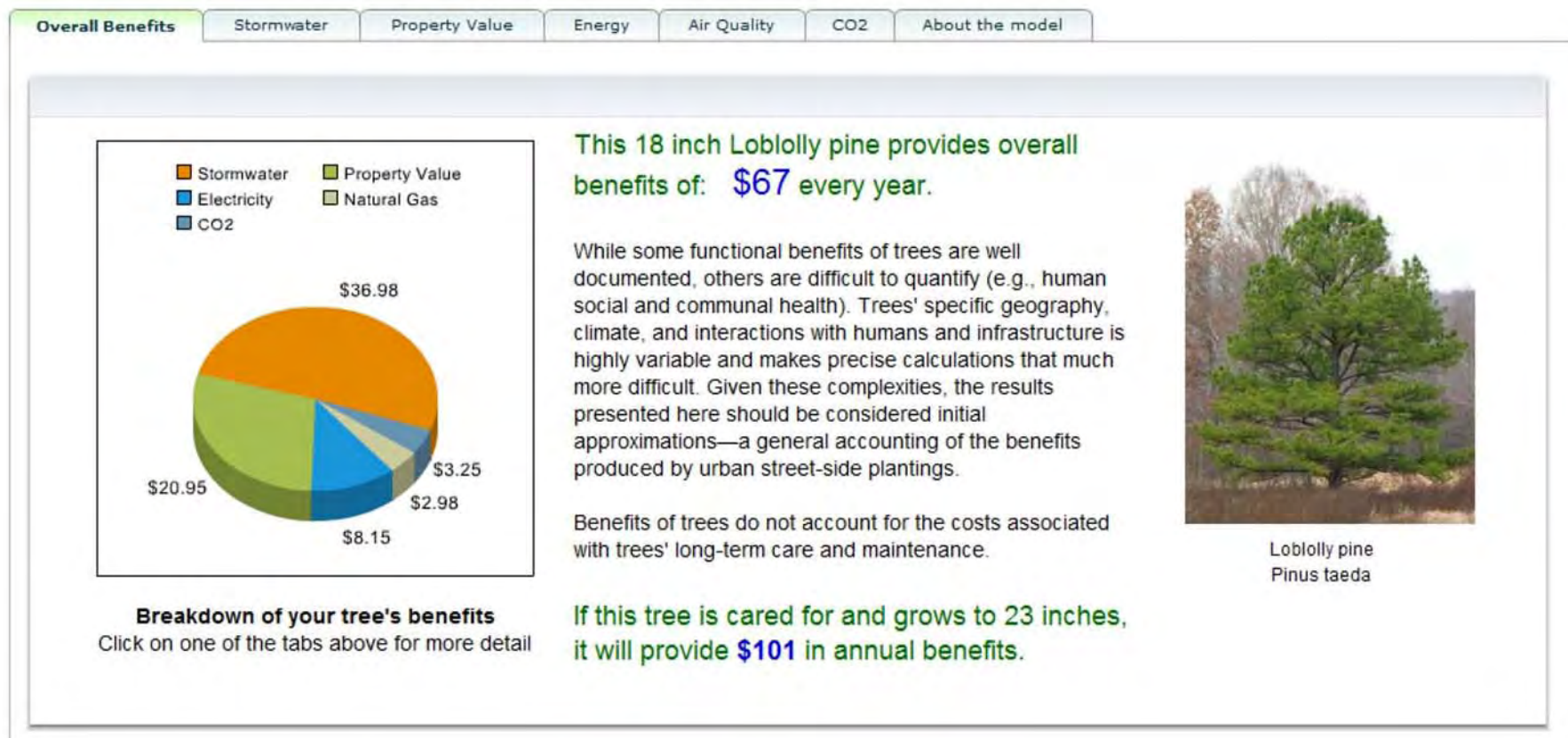
8/18/2009

| Benefits              | Total (\$) Standard Error | \$/tree Standard Error | \$/capita Standard Error |
|-----------------------|---------------------------|------------------------|--------------------------|
| Energy                | 124,453 (N/A)             | 75.66 (N/A)            | 49.82 (N/A)              |
| CO2                   | 4,511 (N/A)               | 2.74 (N/A)             | 1.81 (N/A)               |
| Air Quality           | -3,907 (N/A)              | -2.38 (N/A)            | -1.56 (N/A)              |
| Stormwater            | 55,739 (N/A)              | 33.88 (N/A)            | 22.31 (N/A)              |
| Aesthetic/Other       | 59,093 (N/A)              | 35.92 (N/A)            | 23.66 (N/A)              |
| Total Benefits        | 239,889 (±0)              | 145.83 (±0)            | 96.03 (±0)               |
| Costs                 |                           |                        |                          |
| Planting              | 4,100                     | 2.49                   | 1.64                     |
| Contract Pruning      | 0                         | 0.00                   | 0.00                     |
| Pest Management       | 450                       | 0.27                   | 0.18                     |
| Irrigation            | 0                         | 0.00                   | 0.00                     |
| Removal               | 15,400                    | 9.36                   | 6.16                     |
| Administration        | 4,554                     | 2.77                   | 1.82                     |
| Inspection/Service    | 0                         | 0.00                   | 0.00                     |
| Infrastructure Repair | 0                         | 0.00                   | 0.00                     |
| Litter Clean-up       | 0                         | 0.00                   | 0.00                     |
| Liability/Claims      | 0                         | 0.00                   | 0.00                     |
| Other Costs           | 0                         | 0.00                   | 0.00                     |
| Total Costs           | 24,504                    | 14.90                  | 9.81                     |
| Net Benefits          | 215,385 (±0)              | 130.93 (±0)            | 86.22 (±0)               |
| Benefit-cost ratio    | 9.79 (±0)                 |                        |                          |

I used the tree benefits calculator to define the annual dollar value of the benefits provided by an 18 inch DBH loblolly pine in Oxford, Georgia, on park or vacant land. I would estimate the pine trees on the Boy Scout Lodge site to average around 18 inches. If there are 90 of them, these annual benefits total \$6,030 to the community. This would be higher with increasing DBH, or if considered a residential site. Go to [www.treebenefits.org](http://www.treebenefits.org) to use the interactive tree benefits calculator and see the details of the stormwater, property value, energy, air quality, and CO2 benefits.

## National Tree Benefit Calculator

Beta



# Guide for Plant Appraisal

- Trunk Formula method considers:
  - Trunk diameter
  - Cost of largest transplantable tree available
  - Basic value of largest transplantable tree
  - Species, condition and location factors
- Results in an appraised value
- Cost of cure method calculates the cost to restore site to a reasonable approximation of its original condition





**Table 1. Surface Temperatures in Downtown Fort Valley, Georgia on 8/16/07**

| <b>Surface Type and Location</b>             | <b>Temperature With Trees (Shade)</b> | <b>Temperature Without Trees (Sun)</b> |
|--|---------------------------------------|--|
| O'Reilly's cement parking lot                | No shade available                    | 123                                    |
| CB&T asphalt parking lot                     | n/a                                   | 133                                    |
| CB&T grass                                   | 93 under pecan                        | 105                                    |
| CB&T bare soil                               | 101                                   | 119                                    |
| CB&T cement bench                            | 102                                   | n/a                                    |
| Parking area uptown in shady area            | 98                                    | 113                                    |
| Parking area uptown in sun, cement sidewalk  | n/a                                   | 122-123                                |
| Parking area uptown in sun, asphalt          | n/a                                   | 135-139                                |
| Shady corner on Main Street, cement sidewalk | 92 under live oak                     | n/a                                    |
| Shady corner near fruit vendor, sidewalk     | 93 under oak<br>108 under small holly | 122 in front of store                  |
| Wooden bench                                 | 102                                   | 151                                    |
| Sidewalk                                     | 94-95 with shade trees                | 122                                    |
| Vehicle surface                              | 100                                   | 120                                    |
| <b>AVERAGE of all measurements</b>           | <b>98</b>                             | <b>124</b>                             |

# Storm Mitigation Map

- Purpose is to identify the corridors and facilities where access is critical after a storm
- Used to prioritize the removal of fallen trees and woody debris
- Can be a hardcopy, paper map highlighted with information
- Can be a GIS generated map

# Storm Mitigation Map

- Can be a hardcopy, paper map highlighted with information
- Can be a GIS generated map
- Should include:
  - Critical facilities
  - Transportation network
  - Trees
  - Emergency response sites

# Critical Facilities

- Hospitals and other critical health care facilities
- Fires stations
- Police stations
- Communications networks and facilities
- Electric utilities and other utility networks and facilities
- Water and sanitation systems

# Emergency Response Sites

- Emergency management centers
- Homeland Security offices
- Personnel and equipment staging areas
- Debris staging and storage areas

# Transportation Network

- Include the street network
- Include bridges across major waterways
- Highlight priority streets where access is required to critical and emergency facilities

# Trees

- Include all public trees
- Include large canopy trees located on private property adjacent to critical street rights-of-way and other critical facilities
- Highlight large canopy trees, those 24" and greater in diameter
- Look at large tree canopy density across the city to evaluate where most tree damage is likely to occur

# Trees

- Other tree layers can be highlighted, such as all trees 36 inches and greater, all trees with high risk ratings, all oaks, all trees with cabling recommendations or other categories of interest

MAP 13

Fire Station/DHS

Electric Substation

Elementary School

High School

Middle School

Jefferson Academy

Police Station

City Hall



















# Urban Tree Risk Index

- Developed by the Central Alabama Regional Planning and Development Council and partners
- Tool to help arborists, foresters and emergency management personnel define, rank and map the areas of greatest need for tree risk mitigation
- Results in the development of a map and database that can be used for prioritizing tree risk mitigation