# STATE VEGETATION MANAGEMENT TASK FORCE

# FINAL REPORT

## ISSUED TO THE CONNECTICUT DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION

**AUGUST 28, 2012**

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## Acknowledgments

While the impacts from both storms are still fresh, the Task Force applauds the leadership and commitment of Governor Dannel P. Malloy and Commissioner Daniel C. Esty of the Department of Energy & Environmental Protection (CT DEEP) in forming both the Two Storm Panel and the State Vegetation Management Task Force.  Their timely action will ensure that we learn from these storms and take actions that will minimize risks from future storms and preserve the benefits that trees provide to our urban, suburban, and rural communities.

We also owe a great debt of gratitude to the Co-Chairs of the Two Storm Panel – Joe McGee, V.P., Business Council of Fairfield County and Major General James Skiff, U.S. Air Force (retired) – and the many panelists and experts who took the time and energy to analyze the many issues raised by these two storms, and publish them in the *Two Storm Panel Report* with 82 excellent recommendations.  [The Recommendations on Tree Trimming from the *Two Storm Panel Report* are excerpted as *Appendix 4*.]

I want to personally thank the members of the Task Force for their dedication, consistently high attendance, and for sharing their expertise with all of us.  I want to specially recognize the following Task Force members who were willing to put an extra shoulder to the wheel by leading Working Groups:  Mary Hogue (Public Education), Karl Reichle (Regulations, Legislation & Funding); and Jeffrey Ward, PhD (Technical Standards).  We also need to thank Task Force member Kimberly Barbieri for her outstanding work on designing brochures and developing other above-and-beyond graphics for this report.

Bill Logue deserves high praise as our consulting facilitator for this effort, and the CT DEEP team of Deputy Commissioner Susan Whalen, State Forester Chris Martin, and Urban Forestry Coordinator  Chris Donnelly have been highly knowledgeable and dedicated to supporting the Task Force throughout this process.

In addition, there were several individuals who provided significant content for the report despite not officially being on the Task Force.  Tom Degnan of Burns & McDonnell was the lead author on the chapter entitled "Roadside and Utility Line Forest Management for a more Storm Resistant Future;" Professor Glenn Dreyer of Connecticut College was the co-author with Jeffrey Ward of the Right Tree, Right Place standards.  The Right Tree, Right Place list was assembled with contributions from several papers and professionals: Alexopoulos et al. (2007), Gerhold et al. (1993), the Connecticut Nursery and Landscape Association, Audubon Connecticut, the Connecticut Notable Trees Project, and the Urban Resources Initiative.

The Task Force benefitted from thoughtful presentations on legal issues by Melinda Decker, GIS/Inventory issues by Mike Gantick and Mark Goetz, and Risk Assessment 101 from Tim Brady. Others who attended meetings of the Task Force and provided helpful input included Joseph Aresco and Rich Skarzynski of AT&T, Mikey Hirschoff of the New Haven Garden Club, and Pam Klomberg of the Westport Tree Board.

> Sincerely,
> Eric Hammerling, Executive Director, Connecticut Forest & Park Association
> Chair, State Vegetation Management Task Force

# I. The State Vegetation Management Task Force

***Mission:*** CT DEEP established and appointed the members of the State Vegetation Management Task Force (hereafter Task Force) based upon recommendation #23 from the *Two Storm Panel Report* with the following mission:

> "To develop standards for road side tree care in Connecticut, vegetation management practices and schedules for utility rights of way, right tree/right place standards, standards for tree wardens, municipal tree inventories and pruning schedules."

***Members:*** There are 20 members of the SVMTF representing electrical and telecommunications utilities as well as state, municipal, and private tree managers, non-profit environmental representatives and other experts. Short bios for each of the Task Force members are found in *Appendix 1*.

***Process:*** The first meeting of the Task Force was held on April 24, 2012 at Town Hall in Rocky Hill, CT. Since then, the 20 members of this Task Force have met every two weeks and worked diligently in between meetings to reach the goal of issuing a final Task Force report by August 28th.

The Task Force has been led through a consensus-based process by professional facilitator, William (Bill) Logue. The ground rules and roles that Task Force members agreed to are included in *Appendix 2*.

To facilitate public input and ensure transparency of the work and deliberations of the Task Force, CT DEEP also developed a web page to post meeting summaries, ground rules, and other information. http://www.ct.gov/dep/cwp/view.asp?a=2697&q=503040

***Working Groups:*** To effectively accomplish its work the Task Force established three primary working groups: 1) Public Education; 2) Regulations, Legislation, & Funding; and 3) Technical Standards. [The questions and topics of focus for each of the Working Groups are described in *Appendix 3*.]

**EXECUTIVE SUMMARY OF TASK FORCE RECOMMENDATIONS**

Members of the State Vegetation Management Task Force share a strong belief that if municipalities and the state increase their investment in roadside forest[1] management over time, Connecticut could reduce economic losses, enhance public safety, and have healthier trees along its roadsides.

There is a clear need for investment – both of human and financial resources – at the municipal level and at the state level for improved management of the roadside forest.  The storms of 2011 were estimated to cause more than $3 billion in economic losses in Connecticut alone, and CL&P estimates that 9 out of 10 power outages in its service territory were caused by trees and branches falling on power lines.  Some of these future losses and disruptions will be avoided if the Task Force's recommendations are implemented.

There are some necessary additional investments that have been proposed and are currently being implemented by electric utilities (CL&P and UI) to manage roadside forests where electric infrastructure exists.  Together, the electric utilities (CL&P and UI) expect their vegetation management budgets to increase to the $50-60 million/year level over the next 2 years (please note: these increased budgets focus on tree pruning and removals but generally <u>do</u> <u>not</u> include funding for tree replanting).  **With these proposed utility increases, investment by utilities would be an estimated 6 times greater than tree maintenance expenditures by the state's Department of Transportation and all municipalities <u>combined</u>**.  This budget imbalance combined with chronic underfunding for forest management at the state and municipal levels has led to the current situation where utilities serve as *de facto* tree managers for most towns. There are many examples of the utilities assisting the towns and tree wardens, but the utility goals of keeping the lights on does not always sync neatly with the goal of building a healthy, more storm resistant roadside forest for the future.

The Task Force understands that there is no "one size fits all" solution to achieve a better maintained, healthier roadside forest.  This makes sense given the large differences between urban, suburban, and rural areas, various tree species, and diverse aesthetic visions from town to town.  The Task Force also acknowledges that the many benefits provided by trees are maximized when those trees are healthy and well-maintained.

The Task Force has chosen to highlight several recommendations in this Executive Summary, but we encourage you to read the entire report for the full set of recommendations and the context for each:

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[1] Roadside Forest is defined as follows: "The roadside forest consists of all trees and shrubs growing alongside roads, streets and highways on all land ownership types (municipal, state, and private) and across all population gradients from urban to rural. The roadside forest extends from the road to a distance that is equal to the potential mature height of any roadside tree that could impact the road or utilities."

Recommendations for Municipalities

- Municipalities are required by law to appoint a tree warden, but there is no requirement that the tree warden have the knowledge and qualifications that the position requires. The Task Force recommends that all tree wardens need to be certified as to their qualifications for the position within 1 year of being appointed.
- Municipalities should develop 5-year roadside forest management plans (based upon a model ordinance) that include tree pruning and removal guidelines for trees along public roads; and standards for tree planting that include the avoidance of overhead and underground power and communications lines, road signals and/or the obstruction of other state, municipal or private infrastructure.
- All trees planted within the public right-of-way and on municipal property should be reviewed and approved by the town tree warden.

Statewide Recommendations

- Informational resources including frequently asked questions about the roadside forest need to be centralized in a logical place for private landowners, municipalities, businesses, and others.
- The Right Tree, Right Place guidelines must be used for planting trees and shrubs in roadside forest areas where trees have either failed or have to be removed.  It is important to note that large trees have an important place in the current and future roadside forest.
- Roadside Forests must be managed to become more storm resistant over time (decades) through a combination of tree pruning, removals and Right Tree, Right Place planting.
- Standards are essential to ensure tree removals are done based upon science-based professional training, shared methods of hazard assessment, and planning for tree replacement.
- Property owners need to be made more aware of the stewardship required to properly maintain trees to maximize benefits and reduce potential community hazards.

Funding Recommendations

- Because of the importance of this issue both to public health and to the state's economy, there needs to be state or federal funding dedicated to incentivize municipal investments in this area.  We recommend the state should provide "one-time funding" at the level of $100,000/town for 2 years (perhaps through Municipal Road Aid) to assist tree maintenance and establishment of 5-year municipal tree management plans.
- As proposed in the Two Storm Panel Report, 1.5 % of all funds approved for utility vegetation management by PURA should fund the removal of hazard trees in the roadside forest that are on private property for 5 years.

- Municipalities are encouraged to use a rule-of-thumb formula, similar to the one we propose, for building their annual budgets for roadside forest management based upon forested road miles.
- As utility vegetation management budgets are increased, the amount of vegetation management funding (~20-25%) that currently goes to "non-vegetation management costs" such as traffic control must be reduced.
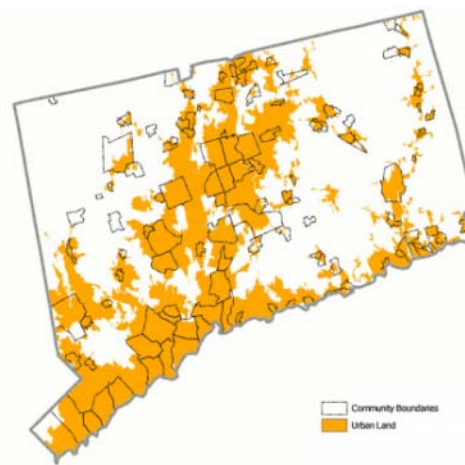
## II.    Introduction & Key Definitions

One year after the "two storms" of 2011, Connecticut citizens and businesses are still recovering from Tropical Storm Irene and the October Nor'easter which caused widespread tree failures, power outages, structural damage, and economic disruptions well beyond the "norm" for Connecticut.  Conservative estimates have placed the cost of damage done by the October Nor'easter alone at close to $3 billion. Much of the blame for power outages has been attributed to trees without regard for the many benefits that trees provide or an understanding of the need to better manage our roadside forest to reduce the expense of future storms.

As we begin, it is important to understand how the Task Force defines the "Roadside Forest" in this report:

**Roadside forest:** The roadside forest consists of all trees and shrubs growing alongside roads, streets and highways on all land ownership types (municipal, state, and private) and across all population gradients from urban to rural. The roadside forest extends from the road to a distance that is equal to the potential mature height of any roadside tree that could impact the road or utilities.
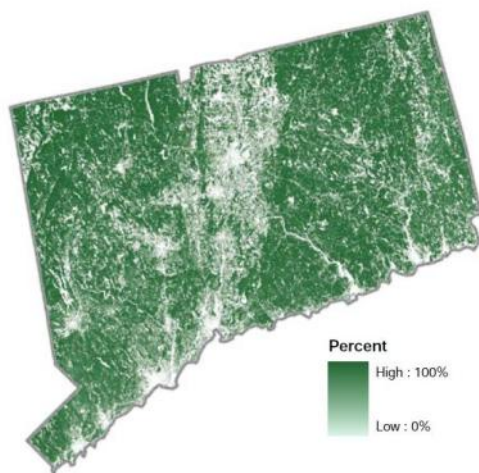
Forest Cover in Connecticut, USDA Forest Service (2012)          Forest Cover in CT Urban Areas, USDA Forest Service (2012)

Connecticut has the distinction of being the 5th most forested state in the nation (72.6%), and leads the nation in the forest cover found in our urban areas (67.4%).  Connecticut also leads the nation in the measure known as Wildland Urban Interface, which means we have the highest percentage of forested land that has homes and trees in close proximity.  Of course, this situation has evolved over the course of many decades and, in fact, the forest cover of Connecticut has changed dramatically over time.

**Changes in the Connecticut Forest**
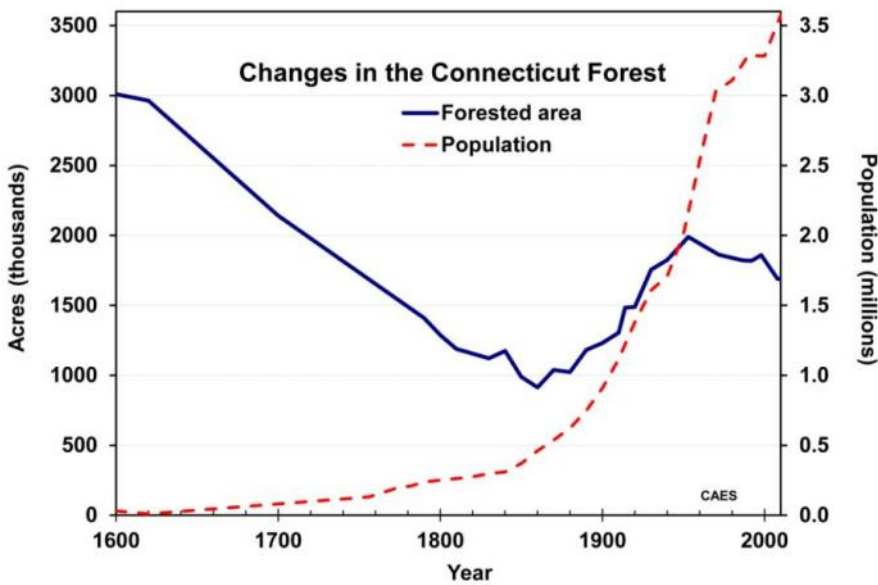
Although the overall forest cover of Connecticut is much higher than it was 100 years ago, the state's forest cover has generally declined and become more fragmented over the past two decades. The roadside forest, however, has increased as communities have sprawled and the roadside forest has matured.

It is helpful to think about how many trees are estimated to be part of the roadside forest. According to testimony that was presented to the Two Storm Panel by Task Force member Dr. Jeffrey Ward, there are an estimated 2.1 million trees lining almost 21,000 miles of roads in Connecticut (based upon an average of 100 trees/mile found beside 3,731 miles of state highways and 17,232 miles of town roads). Around 1.2 million of these trees are estimated to be larger than 1 foot in diameter, and almost half (~48%) of all of the trees are maples.

<u>Key Definitions</u>

Before presenting the Task Force's findings and recommendations, there are a few other key definitions that are important to consider within the context of this report:

**Easement:** the right to use the real property of another for a specific purpose. The easement is itself a real property interest, but legal title to the underlying land is retained by the original owner for all other purposes. Typical easements are for access to another property (e.g., a right-of-way for "access and egress"), for utility or sewer lines both under and above ground, use of spring water, and other uses.

**Hazard or Risk Tree:** a tree that has a <u>defect</u> that could cause it to break apart or fall over and if it did, harm or damage a valuable <u>target</u>.

**Right-of-Way:** the legal right, typically established by an easement, to transit a specific route on property belonging to another. In this report, this term is used two ways to describe: 1) a

right-of-way along a public road, and 2) a right-of-way utility corridor that may go along roads as well as on properties with no public road.

**Tree Maintenance:** refers to the activities involved with maintaining the health of trees through their life cycles, i.e., tree pruning, tree removal, and tree planting.

Taking action to improve the health and safety of our roadside forests simply cannot be put off any longer.  We have a window of time NOW while the memory of the 2011 storms lingers, and at a time when many diverse interests are motivated and working together to prepare for future storms.

## III.     Task Force Findings and Assumptions

In arriving at its recommendations, the Task Force made a number of assumptions along with the requisite underlying conditions for implementation. The Task Force also attempted to rely on pre-existing work, definitions, standards and practices both to avoid creating confusion and to build and improve on existing beneficial practices.  The following represents the findings and assumptions of Task Force members who embody a breadth of experience in roadside tree maintenance and care with the perspectives of diverse groups: the state, municipalities, private landowners, electrical and telecommunications utilities, environmental organizations, private arborists, and forestry research experts:

- There were three overarching findings:  1) the roadside forest is aging; 2) the roadside forest is populated with trees that are likely to become "hazard trees" over time; and 3) any policies developed to reduce risks of failing trees in the roadside forest will impact a large area, be expensive, and take time to implement in a way that tree maintenance, professional tree care standards, and community values and aesthetics are appropriately balanced.

- Trees provide enormous societal, environmental, and economic benefits that would be more fully realized if there were dedicated investments in better roadside forest management by municipalities, the state, utilities, businesses, and other landowners.

- The longer Connecticut delays investment in better roadside forest management, the more expensive the damage will be from future storms.

- Historically, financial resources have been allocated toward utilities, police, fire, hospital, paramedic/EMT, and other "emergency services."  However, it is important to note that these emergency services cannot be effectively utilized without clear, safe roads.  If estimates by CL&P are correct that suggest 90% of power failures during the storms were due to power line interactions with trees, then better management of the roadside forest should save both time and lives by enabling emergency efforts to be dispatched more quickly after a storm event.

- Utilities have been generally vilified in the wake of the major storms of 2011, but it is also important to recognize that there are several examples of utilities sharing resources with municipalities, tree wardens, and individual landowners to address management issues of mutual interest in the roadside forest.

- There is no "cookie cutter solution" for managing the roadside forest.  Each storm is unique as is each species of tree as well as each landowner or municipality.

Management plans must be both comprehensive and flexible to accommodate many differences across the state.

- Better management of our roadside forest will have other benefits such as putting more experts in the field to enable early detection and response before invasive pests such as the Emerald Ash Borer (which impacts ash trees) and the Asian Long-horned Beetle (which impacts many species of hardwood trees that are common along the roadside such as maple, elm, sycamore, birch, and poplar) create even larger hazards along the roadsides of Connecticut.

Although we believe the risks from future storms can be reduced by implementing science-based standards for improved tree care, it should also be noted that this will not immunize trees against failure or prevent property damage in the event of a tornado or a Category I, II, or III hurricane.  The recommendations made by the Task Force should make a difference 99% of the time during "normal" New England weather conditions, and, just as importantly, will help the state, towns, and individuals determine the desired future conditions of the roadside forest. They will also help set in place some of the practices and systems that will allow for more timely and coordinated restoration of transportation, power, and communication services when more extreme events do occur.

## The Benefits of Trees

Too often, walking along a street or driving down a road, we barely notice the healthy trees we pass. We may briefly appreciate a spot of cool shade, an eye pleasing color, or a graceful leaf blowing in the breeze, but rarely do we think about the broader benefits of trees. When an unhealthy tree falls or a storm blows a branch down we do think about the immediate inconvenience or cost, but again, we don't think about the decades worth of benefits that this tree has already provided.

Such benefits of public and privately managed trees are well documented by the Urban and Community Forestry Division of the USDA Forest Service.  The three primary sources used for this report are the "Northeast Community Tree Guide: Benefits, Costs, and Strategic Planning"; "Planning the Urban Forest: Ecology, Economy, and Community Development"; and a USDA Forest Service brochure entitled "Trees Pay Us Back"[2].

Several well-documented benefits from healthy trees follow:

*Healthy Trees, Lower Energy Bills:*  Trees planted strategically for shade or windbreaks can result in significant energy savings.  Shade trees can save up to 56% on annual air-conditioning costs, and evergreens that block winter winds can save up to 30% on heating.  The benefits of trees occur over multiple seasons.  For example, a deciduous tree can provide cool shade during the summer and admit light for warmth in the winter.  Reduced heating and cooling costs are matched by fewer emissions being created from power generation.

*Healthy Trees, More Valuable Homes and Commercial Space:*  On average, each large front yard tree adds 1% to the house sales price, and large specimen trees can add 10-15% to a property's value.  Apartments and offices in wooded areas rent more quickly, have higher occupancy rates, and retain tenants longer.  Also, businesses leasing office space in wooded developments find their workers are more productive and absenteeism is reduced.

*Healthy Trees, Healthy Economy:*  Tree care is directly tied to jobs performed by arborists, landscapers, and other "green" professionals, as well as sales for nurseries and other businesses.  At the same time, trees give, economically, more than they take.  The Forest Service reports that the considerable economic benefits generated by trees are an average of three times greater than tree care costs.

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[2] Each of these publications are available by means of download from the USDA Forest Service website.  The first is available as a General Technical Report (GTR 201) at www.fs.fed.us/psw/publications.  The other two publications may be found by visiting na.fs.fed.us/urban/index.shtm.

*Healthy Trees, Better Business:*  In tree-lined commercial districts, shoppers report more frequent shopping, longer shopping trips, willingness to pay more for parking, and willingness to spend 12% more for goods.

*Healthy Trees, Fewer Floods and Less Erosion:*  Trees reduce flooding, stormwater runoff, and erosion problems.  Trees increase soil permeability (the ability of the soil to hold water), help recharge drinking water aquifers, and tree roots serve as anchors that reduce erosion and sediment flowing into our streams and Long Island Sound.  100 mature trees will catch about 139,000 gallons of rainwater per year.   Looking at this another way, without trees, towns might need to increase stormwater drainage channels and/or waste treatment capacities to handle increased water runoff.

*Healthy Trees, Healthy Air:*  Trees provide great benefits to human health by improving air quality.  Trees trap and hold pollutants like dust, ash, pollen and smoke that damage human lungs.  One hundred trees will remove 430 pounds of these pollutants each year.  Also, on average, an acre of trees will produce enough oxygen for 18 people every day, and will absorb 2.6 tons of carbon each year (enough $CO_2$ to offset driving a car for 26,000 miles).

*Healthy Trees, Healthy People:*  Trees directly influence human health by providing us with clean air, clean water, reduced exposure to damaging sunlight and a generally more hospitable environment.  They also improve people's outlook, uplifting us as we move through our busy days simply by their presence.  Studies have shown the many positive effects of trees on people's mental and physical well-being.

*Healthy Trees, Less Noise:*  Thick strips of vegetation can reduce noises, such as road noise, by 6 to 15 decibels.  Plants absorb more high-frequency noise than low frequency, which is advantageous since higher frequencies are most distressing to people with noise sensitivities.

*Healthy Trees, Healthy Streets:*  Trees casting shade on streets can help extend the life of asphalt by protecting pavement from weathering in direct sun.  Tree lined streets also have a traffic calming effect, helping to reduce traffic speed.

*Healthy Trees, Safer Communities:*  Tree-filled neighborhoods have been documented to have lower levels of domestic violence as well as being safer and more sociable.  This is not surprising because, in general, trees create feelings of relaxation and well-being, provide privacy and a sense of solitude and security while also encouraging people to engage with their neighbors, and (when well managed) contribute to a sense of community pride.

*Healthy Trees, Healthy Wildlife:*  Trees and associated vegetation are fundamental to local ecosystems that provide habitat and food for birds and animals. Trees can also offer suitable "mini-climates" for biodiversity that could otherwise be absent from urban areas.

Many of these benefits of healthy trees are viewed as "free" benefits to society because they lack a formal market like more traditional "goods and services." Unfortunately, we tend to take trees for granted and can forget that healthy trees and forest ecosystems are literally life-support systems that help sustain our well-being. Forests, even the subset that we refer to as roadside forests, provide a rich suite of goods and services that are vital to human health and livelihood. Trees cannot be neglected on Connecticut's "balance sheet" any longer.

This healthy, tall elm tree in West Hartford (below) provides benefits worth approximately $150 every year. These benefits[3] include:

- $12.31 in reduced heating costs, due to the tree being a wind break
- $31.10 in reduced cooling costs, from the shade cast
- $59.12 in reduced storm water processing costs
- $41.70 in air pollutants removed
- $5.93 in removed carbon dioxide

Of this $150 total, the first $42.41 is money saved directly by the homeowner, $59.12 is money saved by the town, and $47.63 are general environmental benefits translating into reduced medical expenses within the citizenry at large.



Clearly, with a tree such as this elm, there are expenses associated with its maintenance, and so the benefits must be balanced against the cost. However, the authors of the Northeast Community Tree Guide[4], published by the US Forest Service, estimate the annual net benefits of an average large tree in the northeastern US is between $85 and $113 per year.

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[3] Benefits are derived though the i-Tree Design application within the i-Tree Tools software package. These tools may be downloaded without charge from www.iTreeTools.org.

[4] *Northeast Community Tree Guide: Benefits, Costs and Strategic Planting*, by E. Gregory McPherson, James R. Simpson, Paula J. Peper, Shelley L. Gardner, Kelaine E. Vargas, and Qingfu Xiao. US Department of Agriculture, Forest Service, Pacific Southwest Experiment Station, August 2007

## The Importance of Large Trees

There is a concern that large trees, simply because of their sheer size and mass, present a significantly greater danger to people and to infrastructure, and so should not be allowed to grow alongside streets and roads. It is true that the larger and heavier a tree is, the greater capability it has to cause injury or damage should it fail. It is also true that, given the large potential for destructive violence in any extreme weather event, no tree is fully protected from failure in a storm. No tree is ever absolutely safe. No matter how old a tree is, how significant it is as a specimen, or how healthy it appears to be, all trees will eventually decline.

At the same time, the discussion regarding the use of large trees along roadsides should not turn solely on considerations of the potential for damage from large trees when they eventually fail or must be removed before failing. Other important aspects of the discussion ought to be the relative health and stability of the tree, how well it has been maintained and will be maintained in the future, and the contributions that a tree makes to the well-being of those who live in the vicinity of that tree, who travel the nearby streets, and who have benefitted from what that tree has provided over the decades of its life.

Trees provide many ecosystem benefits including cleaner air, cleaner water, the sequestration of atmospheric carbon, and enhanced nutrient cycling, that promote biodiversity and a more stable environment. What is not always noted is that these ecosystem services are almost always directly related to the volume of a tree's crown and the area of leaf surface within that crown. The more leaf surface area, the more photosynthesis that can occur, the more water that the tree will transpire from its leaves, the more carbon it will pull from the atmosphere, and the more surface area for certain atmospheric pollutants to settle out upon.

As a measure of tree size, diameter of the trunk as measured at 4-1/2 feet off of the ground (diameter at breast height, or dbh) is one-dimensional. The volume of the crown of the tree is three-dimensional. When looking at tree sizes and the ecosystem services they provide, increases in ecosystem services will be roughly geometric in proportion to increasing trunk diameter. This is because the volume increase of the crown is three-dimensional as compared to diameter increase of the trunk. This comparison of increasing crown volume to increasing trunk diameter is approximate because, of course, the change in crown volume is not always directly proportional to the change in the tree's trunk diameter.

The basic point is made, however, that large, healthy trees contribute much more in ecosystem services than do even an equivalent number of smaller trees whose trunk diameters add up to be the same as that of a single large tree.

A better way to illustrate this might be to look at Hartford's tree population, as sampled during a survey completed in 2007[5].  In this study, the researchers found that 20% of Hartford's trees are 12 inches in diameter (dbh) or greater, 5% of Hartford's trees are 24 inches in diameter or greater and 2% of Hartford's trees are 36 inches in diameter or greater.  Their study also showed that 75% of the leaf area of Hartford's trees are in trees 12 inches in diameter or greater, 40% of the leaf area of Hartford's trees are in trees 24 inches in diameter or greater and 14% of the leaf area of Hartford's trees are in trees 36 inches in diameter or greater.  In other words, the largest 5% of the trees in Hartford contribute 40% of the ecosystem service benefits, while the largest 2% contribute 14% of the total benefits.  This last figure relates to about 11,000 trees citywide, among a total tree population of about 568,000.

**Comparison of Percentage of Trees by Size (dbh) and**
**Contributed Ecosystem Service Benefits, Hartford Study - 2007**
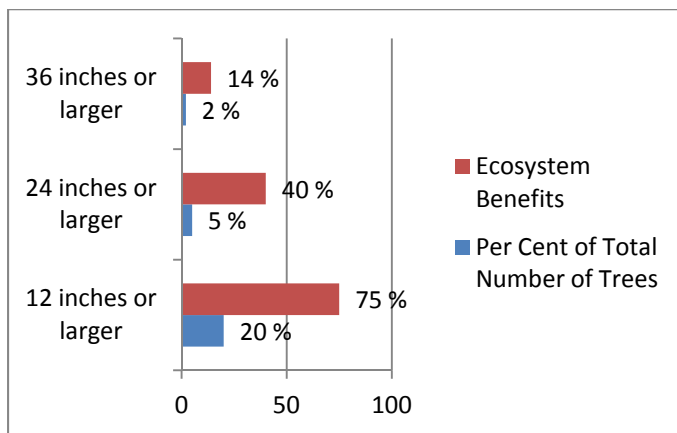


In cities, the relationship between tree size and tree benefits becomes especially important due to the relatively fewer trees there are in cities and the greater need for the ecosystem service benefits that they provide.  Additionally, large trees in cities provide shade for walkers and buildings alike, reduce the amount of ozone found in congested streets, and can greatly enhance the quality of life in urban neighborhoods.

These larger trees do come with greater responsibilities and expenses.  Indeed, larger trees, should they fail, can cause proportionally much greater damage than smaller trees. Therefore, it is our responsibility to plant and grow trees in places where there is adequate space, both above- and below-ground, to support their size, and with a careful view toward what sort of damage they would cause should they fail.  Roadside and urban trees need to be well-maintained, with dead limbs regularly removed and with regular monitoring of their overall health and structural stability.  Certain species, known for their proclivity to unpredictable failure or messy habits should be avoided.  Owners of large trees, or tree wardens when the tree is under the responsibility of the municipality, should be especially vigilant regarding large trees, and should be quick to take action when circumstances warrant.  Any tree that appears

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[5] See "Hartford's Urban Forest - the Challenge" to be found on the Urban Forestry page of DEEP's Forestry web site- www.ct.gov/deep/forestry.

to be in a condition where it is likely to fail in the near term should be immediately removed or the problem should be remediated.



Sugar Maple in Bridgeport  (center)

## The Costs of Municipal Trees

The benefits of trees have been well-established.  Also well-proven is that, under most circumstances, the benefits of trees outweigh their costs.  Trees are a net positive to the community in terms of benefit/cost ratio, often by a wide margin.

However, sometimes overlooked in this discussion is the way the costs of municipal trees are borne by the city or town in which they are located.  Even in circumstances in which trees save the municipality money, such as when trees reduce stormwater treatment costs, the manager of an individual town or city department often sees trees only as line-items on his or her budget, and as so, expenses in the budget.  As a result, and as the benefits accrue to others, it can sometimes be difficult to convince a manager or financial control officer that trees are indeed a net positive.

The USDA Forest Service has produced figures on average tree costs for both public and private trees.  For the Northeast, the annual costs for public trees, presented in the Northeast Community Tree Guide,[6] are as follows:

| Costs per year | small tree | medium tree | large tree | pine tree |
|---|---|---|---|---|
| planting costs | $10.00 | $10.00 | $10.00 | $10.00 |
| pruning | $3.26 | $7.69 | $11.60 | $6.40 |
| removal and disposal | $1.28 | $1.62 | $2.06 | $1.47 |
| pest and disease | $0.09 | $0.13 | $0.17 | $0.11 |
| infrastructure repair | $1.13 | $1.55 | $2.06 | $1.37 |
| clean-up | $0.26 | $0.35 | $0.46 | $0.31 |
| admin and inspect | $3.96 | $5.42 | $7.21 | $3.10 |
| **Total** | **$19.98** | **$26.76** | **$33.56** | **$22.76** |

These numbers are based on the expected cost of a tree for the first 40 years after planting.  In other words, during the first 40 years $400 will be spent on planting the tree, $130.40 on pruning a small tree, $464 on pruning a large tree, and so on.  One disadvantage of this approach is that it only considers the costs associated with relatively young trees, and not those associated with very large, very old specimens, which would present significantly greater pruning and removal costs on an annual basis.  Also, the approach used assumes that 34% of the trees planted will die during this first 40 year period.  This presents an additional

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[6] *Northeast Community Tree Guide: Benefits, Costs and Strategic Planting*, by E. Gregory McPherson, James R. Simpson, Paula J. Peper, Shelley L. Gardner, Kelaine E. Vargas, and Qingfu Xiao.  US Department of Agriculture, Forest Service, Pacific Southwest Experiment Station, August 2007

underestimation of the removal and disposal costs for the municipal tree population as a whole.

Regardless, these numbers provide a useful framework for considering trees costs.  They may not represent the true, typical costs of tree planting in a particular community, for example, if that community is hampered by having numerous undersized and heavily compacted tree pits in the downtown area.  Alternatively, it is difficult to plan for emergency work, where cleanup and infrastructure repair costs can rise rapidly.  Even in a relatively minor event, calling out a crew would likely mean paying at least 3 people time-and-a-half for a minimum 4 hour shift.

It is not our recommendation that these numbers be used directly to determine a tree budget.  Given the limitations mentioned earlier, using these numbers as the basis for 'per tree' costs that can be extrapolated to the tree population of a community as a whole would likely not adequately represent the annual tree budget needs for that community.  Also, these numbers likely underestimate equipment and personnel costs, such as the highly important investments that should be made in employee education and training.  These numbers, however, are a start, and they serve to reinforce the notion that, for municipalities, the bottom line is the bottom line.  For most managers, the costs for trees need to be accounted for as expenditures, regardless of what additional benefits might accrue to the community at large or show up as cost savings in other areas of the municipal budget.

## General Recommendations

The Task Force suggests the following recommendations:

- *Need Resources for Best Information on Roadside Forest Management:* A recognized "go to" resource for all landowners with questions about tree management within the roadside forest is sorely needed.  CT DEEP, UConn Extension, and the Connecticut Agricultural Experiment Station serve as resources for landowners and businesses with tree questions; however, all three have been under-resourced for many years. Connecticut Agricultural Experiment Station (CAES) is a critical resource for conducting, collecting, and disseminating relevant tree-related research.  The roles of these three state entities need to be better defined, strengthened and coordinated in way that provides landowners and others the information they need regarding the roadside forest.

- *Need Increased Municipal Involvement in Roadside Forest Management:* Municipalities are responsible for the "care and control" of the vast majority of trees alongside Connecticut's roads, yet most municipalities are unable to commit to managing street trees to the extent needed: 1) tree wardens need to be certified through a process that demonstrates that they have qualifications necessary for the position, and 2) funding needs to be made available so that municipalities are able to provide the required level of management for their roadside forests.

- *Transition from Reactive to Proactive Roadside Forest Management:* The state needs to step-up tree removals, as we transition from a reactive to proactive approach to roadside forest management. The public needs to be educated as to why there is a need for these tree removals at the same time every effort is made to keep this process of tree removal at a level that is appropriate to the problem, is intelligent in approach, and is effective over the long term.

- *More Proactive Emergency Management:*  More proactive communication between FEMA, CT Department of Emergency Management and Homeland Security (DEMHS), CT Department of Transportation, and tree experts will help ensure that tree care standards are not sacrificed for post-storm expediency, and that future storm risks are minimized appropriately.

- *Understand that Right Tree Right Place Includes Both Small and Large Trees:* 'Right Tree, Right Place' is an important concept, as it captures the need for trees to be planted in places where they are appropriate (i.e., size, form, growth requirements and other features). This means small trees in the vicinity of utility wires, but it also means large trees where the site is appropriate, for all of the personal, social, and environmental advantages associated with both small and large trees.

## Public Education Recommendations

The Public Education Working Group will extend beyond the official efforts of this Task Force by assisting statewide organizations such as CT DEEP, UConn Extension, CT Urban Forest Council, CT Tree Protective Association, Connecticut Forest & Park Association, Tree Wardens Association of CT, Audubon Connecticut, and many local organizations to "get the word out" to the various audiences involved with maintaining the current roadside forest and planting the roadside forest of the future.  We would also like to reach out beyond tree, garden and government groups and work with industry to support public-private partnerships.

Private property rights are an important and valued part of lives as citizens in Connecticut and with these rights comes responsibility.  This task force believes there is a need to make the general public aware of their role and responsibility in maintaining their property and all the resources available to them.  This is why we have made the recommendation that a single resource for landowners for managing their personal property is essential as well as increased funding for municipalities to play catch-up on their roadside forest management, which has been severely neglected for many decades.

In Appendix 5, we include two draft brochures, still works in progress, which could advance a broader appreciation of the roadside forest and shared stewardship for all landowners.

## Regulations, Legislation, & Funding Recommendations

During the early meetings of the Task Force, the General Assembly was debating several energy proposals that included recommendations on vegetation management.  The most significant legislation that relates to this Task Force is Public Act 12-148 (formerly S.B. 23), which was signed into law on June 15, 2012 by Governor Malloy.  This new law requires the Connecticut Public Utilities Regulatory Authority (PURA) to open a docket (#12-06-09) that will consider, among other things, "the standards appropriate for road-side tree care in the state, vegetation management practices in utility rights-of-way, right tree-right place standards, and any other tree maintenance standard recommended by the State Vegetation Management Task Force established by the Department of Energy and Environmental Protection."  The deadline for PURA to produce a report based upon the information submitted to its docket by this Task Force and others is November 1, 2012.

The recommendations of the Task Force follow:

### Legislation

- Define "Roadside Forest" and "Roadside Forest Area" in Statutes.
- *Tree Warden Certification:*  require all municipal tree wardens to be certified based upon standards developed by CT DEEP (analagous to certification requirements for

arborists or foresters). CT DEEP should be given 6 months to set standards, and municipalities should be given 1 year from the setting of standards to ensure that their tree wardens are certified.

- *Model Tree Care Ordinance:* CT DEEP shall work with the Tree Wardens Association of CT, CUFC, CFPA, CTPA, and the electrical utilities to develop a model tree care ordinance which shall include:
  - o A 5-year plan for the maintenance of trees within the jurisdiction of the tree warden.
  - o Tree pruning and removal guidelines for trees along public roads.
  - o Standards for tree planting that include the avoidance of overhead and underground power and communications lines, road signals and/or the obstruction of other state, municipal or private infrastructure. All trees planted within the public way and on municipal property shall be approved by the tree warden.
- *Tree Warden New Construction Planning:* ensure municipal tree wardens are consulted in the local Planning/Zoning/Wetlands review processes to help ensure implementation of "right tree/right place" and other tree best management practices.
- Give explicit authority (without additional liability) to certified tree wardens to identify "hazard trees" on private property adjacent to roadsides (a tree that has a <u>defect</u> that could cause it to break apart or fall over and if it did, harm or damage a valuable <u>target</u>) and bring those hazard trees to the attention of the landowner.
- Require landowners (state, municipal, private) with active and constructive knowledge of a "hazard tree" to take action to remediate problems within a reasonable amount of time. Homeowner insurance, the utility-supported "private property hazardous tree program" (see below), or other sources may provide funding if landowner is unable to pay for remediation.

## Regulations

- Ensure all municipalities have dedicated sites for collecting biomass after a storm event. This is especially important for "big wood" rather than the material created through routine tree maintenance.

- Encourage Road Masters and Scholars program -- a series of workshops offered by the UConn Technology Transfer Center to provide Connecticut's municipal highway personnel with the fundamentals of modern road maintenance management procedures and techniques -- to continue to include roadside forest management issues for the benefit of public work employees and others not necessarily involved in tree maintenance. Similarly, cross-train tree wardens on Road Scholars program considerations.

**Funding**

- *New Revenue for Municipal Tree Management:* There are broad benefits from trees and universal public safety issues at stake in the roadside forest. The Task Force recommends that the General Assembly actively considers statewide proposals to raise revenue to assist municipalities with the costs of municipal tree maintenance (pruning, removal, and planting) with the understanding that making these investments should avoid larger costs from future storms. Examples include a small tax on tree-related products such as wood chips, mulch, and trees (perhaps with an exemption for "locally grown" products). Revenues generated would be directed to a dedicated fund for municipal tree maintenance. Another suggestion was a tax similar to the recent hotel tax in Connecticut which provides funding for regional performance incentive grants. There are also examples from other states like Missouri which has a 0.1% portion of the sales tax that is dedicated to management of the state's natural resources.

- Towns should be made aware that funding from Municipal Road Aid can be used for tree maintenance work. At present, the authority for using Municipal Road Aid funding for tree maintenance work exists, but it is rarely used for this purpose.

- As proposed in the Two Storm Panel Report, 1.5 % of all funds approved for utility vegetation management by PURA should be used to fund the private property Hazardous Tree program for 5 years.

- The State should provide "one-time funding" at the level of $100,000/town for 2 years (perhaps through Municipal Road Aid) for the purpose of tree maintenance and establishment of 5-year municipal tree management plans.

- Ensure that vegetation management funding for utilities is used for vegetation management. For example, an estimated 20-25% of all vegetation management funding by NU and UI goes to "traffic control" and other expenses at work sites rather than to tree care. Traffic control expenses (which represent over 50% of these non-vegetation management costs) should be reviewed to ensure vegetation management funding goes toward its intended purpose. One option is to require municipalities to provide the traffic control or ensure the traffic control services are provided at straight time rather than overtime rates for either flag crews and/or police.

- Seek Federal Funding for Roadside Tree Maintenance through Department of Agriculture, Department of Interior, FEMA, Department of Homeland Security, or other federal partners.

## Building a Municipal Tree Management Budget

The Regulations, Legislation and Funding Working Group has had several conversations about the inadequacy of municipal budgets for roadside forest maintenance and has proposed a simple "rule of thumb" formula that municipalities can use to build their roadside tree maintenance (pruning, removal, and planting) budgets:

**MR** = Miles of road maintained by the town.

**MC** = Estimated average tree maintenance cost/mile ($5,000/mile)

**DF** = Density Factor (higher density population will have higher costs). DF = 1.25 for Urban (population/mile greater than 200), DF = 1 if Suburban (population/mile between 100 – 200), and DF = 0.75 if Rural (population/mile less than 100). This factor can be modified based upon several on-the-ground factors (higher than average number of trees/mile, revenue sharing with utilities in "backbone" areas, etc.).

The formula to use is **MR x MC X DF = Recommended Roadside Tree Maintenance Budget** for any municipality. For the town of Norwalk, the following numbers would be applied:

MR = 244        MC = $5,000    DF = 1.25

**244 x $5,000 x 1.25 = $1,525,000/year <u>or</u> $381,250/year if the municipality chose to use a 4-year cycle for pruning, removals & plantings** (the total would actually be less when non-town managed roads are subtracted out, and a rate lower than $5,000/mile may be negotiated by the town). As a comparison, the actual tree budget for Norwalk in 2004 was $110,000.

**N.B. This formula is not intended to cover the budget for other forested areas such as parks, town forests, etc.**

The following graphics (based upon a study by DEEP Forestry in 2004) show how municipal budgets for tree maintenance vary greatly between small towns and large cities. Based upon an average budget of $3 per capita, the total expenditure on trees by all municipalities in the state is approximately $10,500,000.

Connecticut
Tree Budget Per Capita

Budget Per Capita

- No Data
- $0.00 - $0.99
- $1.00 - $1.99
- $2.00 - $2.99
- $3.00 - $3.99
- $4.00 - $9.99
- > $10.00
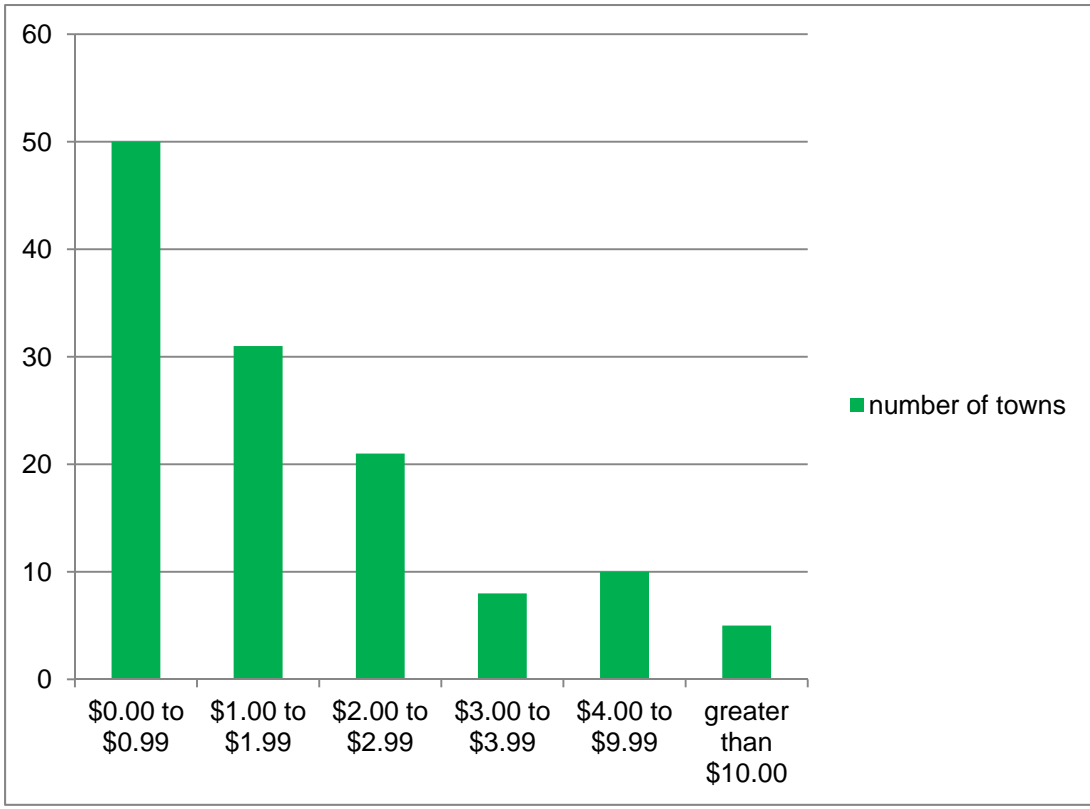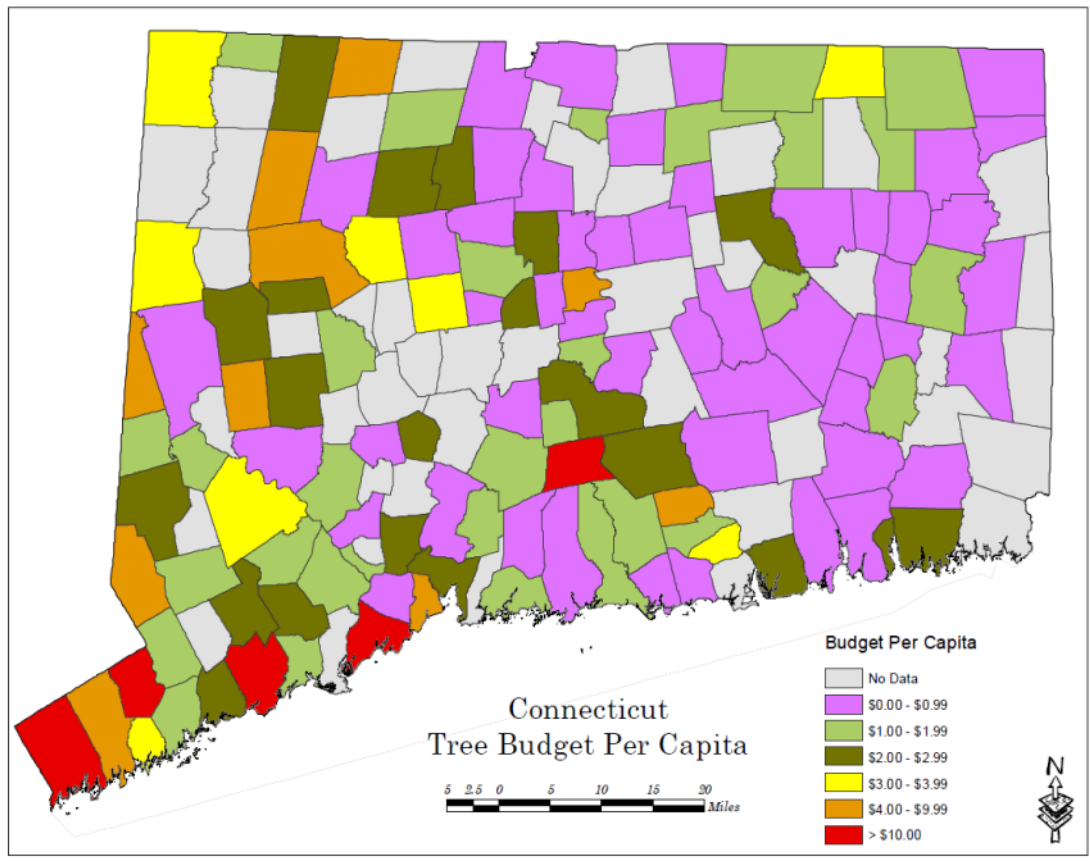
## Technical Standards Recommendations

The Technical Standards Working Group was called to action for two primary reasons: 1) provide guidance for landowners on what trees to plant within the roadside forest of the future; and 2) highlight tree care standards designed to enhance public safety while preserving the ecological and societal benefits that trees provide. Before delving into other recommendations, it is important to envision how we want to manage the roadside forest, and what we would like the future roadside forest to look like.

## The Future Roadside Forest

The damage to utility infrastructure caused by roadside trees during the severe storms of 2011 highlighted the benign neglect of our roadside forest and the need to envision what the future roadside forest should be in Connecticut. By the future we mean a long-term time frame – one that represents the span of a tree's lifetime – sixty to eighty years. This future state is one that we will work toward over the coming decades to reach the goal of roadsides that are beautiful, functional, safe and wildlife-friendly.

We are beginning to recognize that just as we design and manage our roads - we also need to design and manage our roadside forest. Arboricultural research has increased our understanding of structural problems of individual trees and assessing their risk. We now recognize that the roadside forest is an integral part of our infrastructure and there is a need to allocate sufficient resources to balance the roadside forest's ecological values with societal needs of minimally interrupted power, communication, and vehicular access.

While Connecticut's residents are asking for a roadside forest compatible with our built infrastructure (e.g., roads, utility poles and wires), the roadside forest must still perform its core environmental and scenic functions. These basic roadside functions were laid out early in The Connecticut Arboretum in Bulletin #11 published in 1959:

1. Adequate visibility for motorists, which necessitates removal of certain woody growth along the roadsides, especially at intersections and the insides of curves.
2. Adequate space for pedestrians and areas where motorists can safely pull off of the travelled pavement.
3. The eradication of plants specifically known to be undesirable in regard to human health and maintenance procedures. Today we would also include invasive, non-native plants in this group.
4. A roadside attractive to motorists, whether on vacation or commuting to and from work.
5. The accomplishment of the foregoing objectives at a minimum cost, figured on a long-range basis.

The Task Force is adding three more needs to this list:

6. A storm-resistant roadside forest managed to minimize the likelihood of infrastructure failures and other forms of storm damage to the greatest extent possible.
7. The roadside forest must also continue to play its role of providing ecosystem services such as reducing storm water runoff into adjacent riparian zones.
8. A good statewide biomass management plan to guide both roadside wood removal work and creative wood product use.

## Who Must Be Involved?

The successful future of the roadside forest will require a wide spectrum of participants (state and municipal government, utilities, private owners, businesses) along with a cultural shift toward understanding the complexities of roadside forests. Although there will be variations from community to community, the following are some preconditions for the successful management of our future roadside forests:

- State agencies, municipalities, homeowners, utility companies, and environmental groups must work together to design and maintain a roadside forest with diverse species that is appropriate for the Connecticut's wide mosaic of urban to rural landscapes, while supporting a range of scenic and ecological values, and infrastructure protection.

- Roadside forest management must be designed to be as economical and sustainable as possible by encouraging site-appropriate vegetation.

- Roadside forest maintenance must be done within the context of "Right Tree, Right Place" and include pruning and invasive control along with planting. Long-term, a multi-pronged program will result in a roadside forest that is healthier, more resistant to storm damage (i.e., less likely to impact utility infrastructure), and retains the scenic appeal of our Connecticut roads.

- Roadside forest management must be partnered with education and outreach for Connecticut residents to enhance the understanding of roadside forest values so that trees on private property adjacent to roads will also be managed to protect our shared infrastructure.

- Roadside forest management provides jobs that are necessary and vital, and that should be filled by skilled professionals.

<u>What Should Our Roadside Forest Look Like?</u>

The future roadside forest must include diverse vegetation types and heights that range from stately trees to managed herbaceous plants and low shrubs. These roadsides will be designed and maintained to achieve as many of the aforementioned local, regional, and state objectives as possible.

If we are to manage the roadside forest to both meet our aesthetic goals and reduce future storm impacts, it is important to have some ideas of what it could look like [see Figures 1 and 2 on the following pages].  The following are two graphic depictions of the rural roadside forest where there is a gradual conversion to a "storm resistant" forest of large trees that are wider rather than tall, interspersed with small statured native trees and shrubs.  These figures are meant to be examples rather than prescriptive.  Visions like this one should be developed at the community-level and will vary widely based upon local preferences, history, specific site characteristics, and community goals.

*Figure 1. One vision for the suburban/rural roadside forest*



**TODAY**

Clear Zone
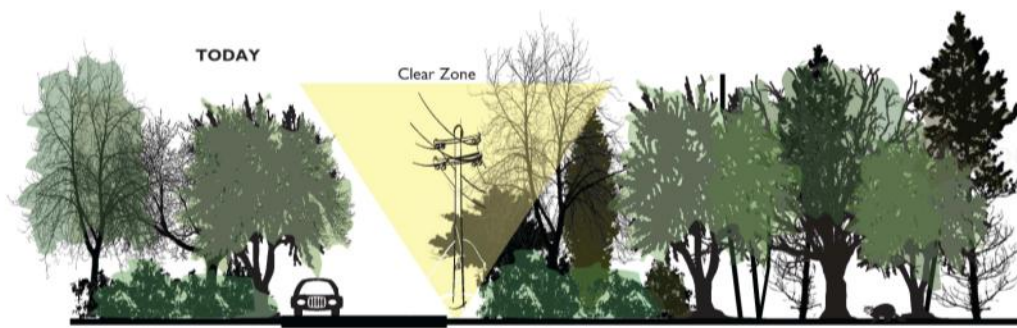
A typical road surrounded by forested land—the branches overarch the roadway and interfere with existing utility lines. Trees are crowded and growing together with narrow silhouettes and small root balls—creating unstable trees along the road opening.

**5 YEARS**
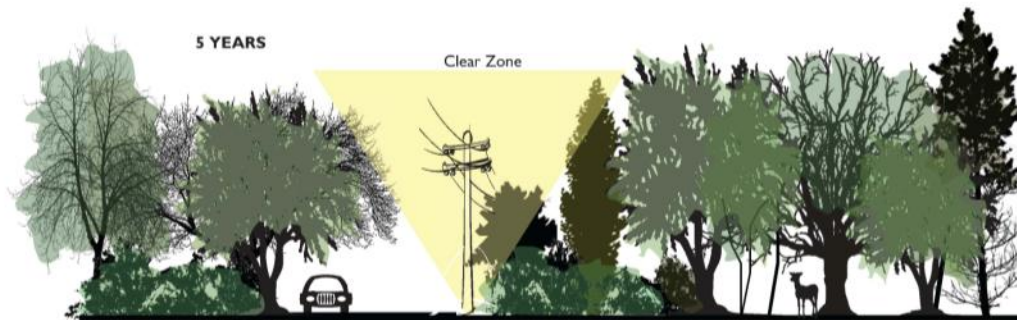
Clear Zone

That same road with selective clearing around utility lines and overhanging trees. Understory trees and shrubs are permitted to flourish. Trees that have expanded into the Clear Zone are either trimmed or removed/replanted.

**10-20 YEARS**
Developed 'amphitheater effect"

Clear Zone
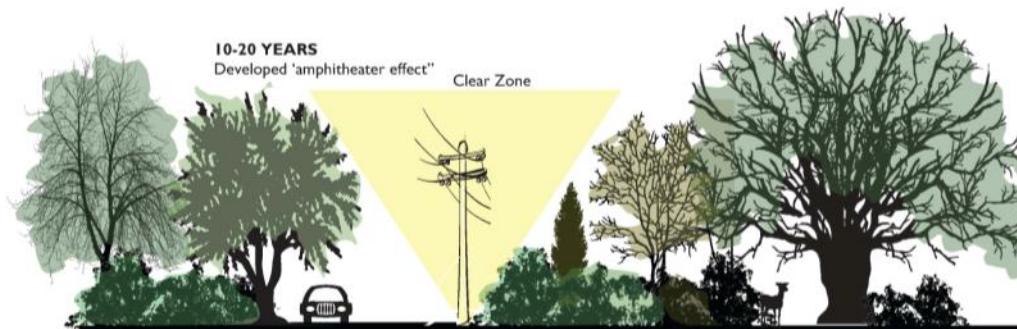
Further selective clearing over time allows large well rooted and larger canopy trees to develop. A hierarchy of shrubs, understory trees and shade trees are permitted to grow surrounding the roadway maintaining an aesthetic and attractive area surrounding the road without posing any threat to property, or services.

**THE PROGRESSIVE DEVELOPMENT OF THE FUTURE ROADSIDE FOREST OVER TIME**
An illustration of a thin slice of a sample suburban/rural road

*Figure 2. One vision for the future suburban/rural roadside forest*
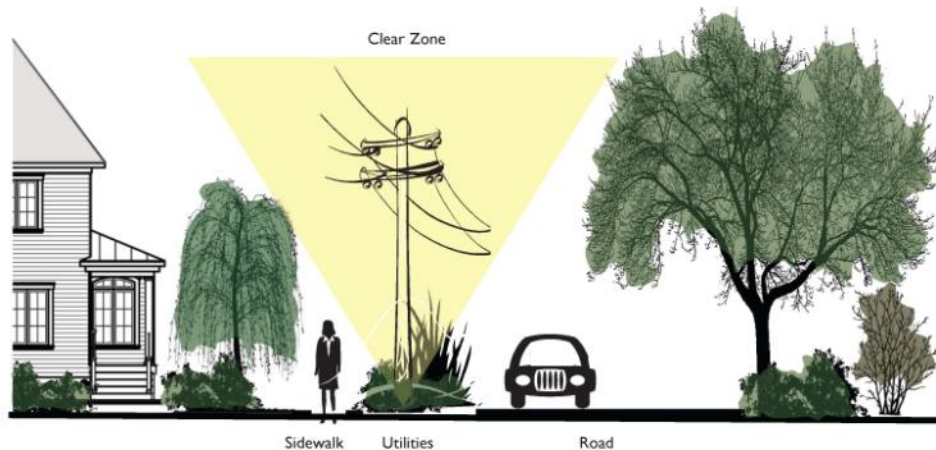


Clear Zone

Sidewalk    Utilities    Road

A hierarchy of shrubs, understory trees and shade trees are permitted to grow surrounding the roadway maintaining an aesthetic and attractive area surrounding the road without posing any threat to property, or services. The heights of the various plant material create an 'amphitheater effect' surrounding the road and support a human-scale landscape.

**THE FUTURE RESIDENTIAL ROADSIDE FOREST**

An illustration of a thin slice of a residential road

As Connecticut moves beyond the "Two Storms," we have two visions of the future – one where it's simply "business as usual," and one where we proactively manage our roadside forests. We carry a shared risk with shared responsibility to make our roadside forests a valued, shared resource. The Task Force has made "Right Tree, Right Place" recommendations for appropriate plantings for our future roadside forests (especially in close proximity to utility infrastructure). It will be up to the many parties involved to invest in and maintain an aesthetic and safe future roadside forest for the citizens of Connecticut.

As citizens, we do have a choice. We can continue to manage our roadside forests with the current minimal standards and we can expect that expenses (including damage and resultant loss of power, communications, and road access) will be concentrated after extreme storm events. Or, we can chose to actively manage the roadside forests by spreading maintenance expenses over multiple years and by making that choice, we can expect to minimize damage and loss of emergency services during future storm events.

## Role of Property Owners in Responsible Tree Stewardship

Responsible planting and maintenance of trees are critical to the well-being of our state and communities. Private property owners play an important role in both activities, since their land and trees abut most of the public right of way in Connecticut.

It is important to acknowledge that trees are a major feature not only of the urban and rural landscapes, but also of the individual landscapes that surround our houses, apartments, condominiums and businesses.

At the same time that trees represent beauty and health, they can also present a danger to life and property if not cared for properly. Although the property owner may not have a legal obligation to be a responsible tree steward, we encourage property owners to help ensure that their tree (or trees) is cared for such that its roots will not lift up the sidewalk, nor its branches or entire trunk fall on pedestrians, cars, utility wires or the roadway itself.

Caring for trees starts with planting the right tree in the right place. A list of suggested trees and shrubs for planting near or under utility wires is provided in the Right Tree, Right Place section of this Report. Planting a tree that won't grow into wires and then require pruning will save money and resources. A tree planted in the right place can grow into its natural form and will become an amenity both for the property and the community.

Depending upon the site and community goals, larger trees can be planted as set-backs farther from the right of way. In all cases, it is important for the property owner to be aware that trees are not maintenance-free. Proper early pruning will pay huge benefits in the longer life of the tree, as well as avoiding later, more expensive pruning which often is harmful to the tree's vitality and long-term structural stability.

Trees with roots below or branches above the right of way may become the responsibility of the local tree warden who is charged with the care and control of "town trees" within the urban forest. This care and control does not negate the responsibility of the property owner to ensure the safety of his or her trees.

The Task Force recommends that property owners visually inspect all their trees on at least an annual basis, especially those that could present a danger to pedestrians, traffic or the right of way. When property owners have questions about a tree's health or growth habits, a licensed arborist should be called in for a consultation. By Connecticut statute, any work done for hire to improve the condition of a tree, including pruning, must be performed by a licensed arborist. A list of Connecticut licensed arborists is available at www.kellysolutions.com/ct.

Older and larger trees can have hazards that are not obvious to the untrained eye, so it is part of the property owner's responsibility to have such trees inspected regularly. Pruning of dangerous branches or cabling of leaders can prolong the life of the tree, helping to keep the benefits of a healthy tree in the roadside forest.

Property owners are encouraged to maintain their existing trees and to plant new ones within the guidelines of this report for the overall health and beauty of their landscapes and of our state.

## Roadside Trees on Private Property: Legal Considerations

The Task Force did consider the role of property owners with regards to trees on private property alongside roads, and the responsibility of those private property owners with respect to those trees.  Unfortunately, as a full consideration of this issue entails detailed interpretation of State Statutes [see Appendix 6] and of case law, the Task Force was not able to come up with a clear answer with respect to what the role of these private property owners should be.  There is agreement that the issues involved need further consideration and, possibly, additional action.

The Task Force discovered the following:

- State Statute, through CGS 23-59, appears to put the responsibility for the maintenance of many of the trees located along roads that would normally be considered as belonging to the private property owner on the municipal tree warden.  Normally, ownership of a tree is determined by where the base of the tree lies.  However, the Statute states that "care and control" of roadside trees belongs to the tree warden when that tree extends "in whole or in part" into the public right of way.

- Additional interpretation of State Statute further suggests that, not only does the tree warden have care and control of these trees, but that the property owner should not maintain or remove these trees, as their action might be determined to be interfering with the tree warden's care and control.

- The Task Force heard references to existing Connecticut case law that support an interpretation of Statute that, at a minimum, places all responsibility for any damage caused by roadside trees on the tree warden and the municipality, even when that tree is owned by a private property owner, if parts of that tree extend into the public right of way.  It should be noted that tree roots can extend a considerable distance beyond the edge of a tree's crown.

- The Task Force saw this as a disincentive for private property to care for or remove roadside trees, due both to the understanding that, under this interpretation, the private property owner may not have the authority to care for these trees, despite their ownership of these trees, and also due to the understanding that, should the tree fail and cause damage, the private owner of the tree would not bear any financial responsibility for those damages.

- The Task Force found this interpretation discouraging.  It finds that this places an additional burden on municipalities and on the tree wardens, who are already overburdened and under-resourced with respect to the care, control and maintenance of those trees that are clearly municipally owned.

- At the same time, the Task Forces recognized that placing the full burden of responsibility for maintenance of roadside trees owned by private property owners is

also very likely to be an ineffective solution, for a variety of reasons. It gave thorough consideration to the many reasons why it is good for the tree warden to have the right and responsibility to inspect trees outside of municipal ownership, when the tree warden does have care and control of these trees. It is also good for the tree warden to have the authority to make determinations as to what should be done so as to mitigate the risk to the public when such risks are discovered from those trees.

- The Task Force, however, was unable to decide upon a mechanism by which this should occur. Difficulties included giving the tree warden clear authority to enter onto private property and inspect private trees, and determining a reasonable means for follow-up activity that would lead to mitigation of the concern. In this discussion, the Task Force also encountered questions regarding funding limitations, the rights of private property owners, and potential liability concerns with respect to the tree warden and the municipality should the municipality be unable to effect action when it is determined that action is needed.

- The Task Force did find that there may be circumstances where there are trees on private property that do not extend into the public right of way and hence are not under the care and control of the tree warden, but that would nonetheless have the potential to fail and impact the public safety. These trees should be maintained as a part of responsible stewardship by the owners of those trees. Examples might include tall conifers set back sufficiently from the road such that no limbs extend over the right of way, but which are tall enough that, should they fail, they could contact the traveled portion of the road or nearby utility infrastructure.

- In general, the Task Force reached agreement that it would favor a system that would:
  - Encourage private property owner responsibility for privately owned trees.
  - Encourage public oversight, through the tree wardens, over trees on private property that pose risks to the public, the public right-of-way and utility infrastructure.
  - Foster public-private collaboration in a way that encourages proactive tree management, such that risks to the public would be mitigated before they became severe and that the municipality would also have the clear authority to intervene once risks are determined to have become severe.

- Examples by which such public-private collaboration could occur might include:
  - Educational campaigns emphasizing the responsibilities of tree owners for their trees, along with clearly outlined parameters by which the owners of roadside trees could act without interfering with the tree warden's "care and control" when it applies to these trees.

- Funding sources, such as that proposed by the Two Storm Panel (Recommendation #22) that could allow for financial assistance to both municipalities and private property owners in circumstances such as these.

## Right Tree, Right Place Standards

Tree-lined streets provide not only the aesthetic 'sense of place' that is Connecticut, but provide many benefits along roadways including reducing traffic speeds, prolonging pavement life, and improving stream quality by reducing storm water runoff. In the absence of forward looking planning and maintenance, however, these benefits are not without the potential cost of losing power and communication along with road obstruction during severe weather. Part of the solution for reducing damage caused by trees during severe weather events is to favor trees with short mature heights adjacent to roads and overhead utilities.

Trees grow. For example, very common Connecticut trees like eastern white pine and oaks can transform from small seedlings to heights overtopping utility lines within several decades, and can continue to grow to one hundred feet or more. To reduce disruption of electrical and telecommunication services during severe weather, trees adjacent to utility poles and wires should have mature heights shorter than the wires, or be set back a sufficient distance from the wires that broken branches or wind-thrown trees are unlikely contact them. This strategy will also increase access by public safety officials (police, fire) during and after storms by reducing road debris.

Over the next several decades, many of the larger trees in our maturing roadside forests will decline and will to need to be replaced. This will provide an opportunity to replace tall trees that can damage critical infrastructure (utilities and roads) with shorter species that can maintain the forested aesthetic, e.g., replacing roadside Norway maples with paperbark maples or saucer magnolias. Because trees can survive for a century or more, many of the trees we plant today will be around for decades if not well into the 22nd century.

The concept of "Right Tree, Right Place" is that tree selection should be matched to the particular conditions at a given site. This includes planting or favoring existing species that have short mature heights adjacent to utility infrastructure and roads, while allowing progressively taller species at increasing distances from roads and wires. The utility companies have developed a zone approach for vegetation near
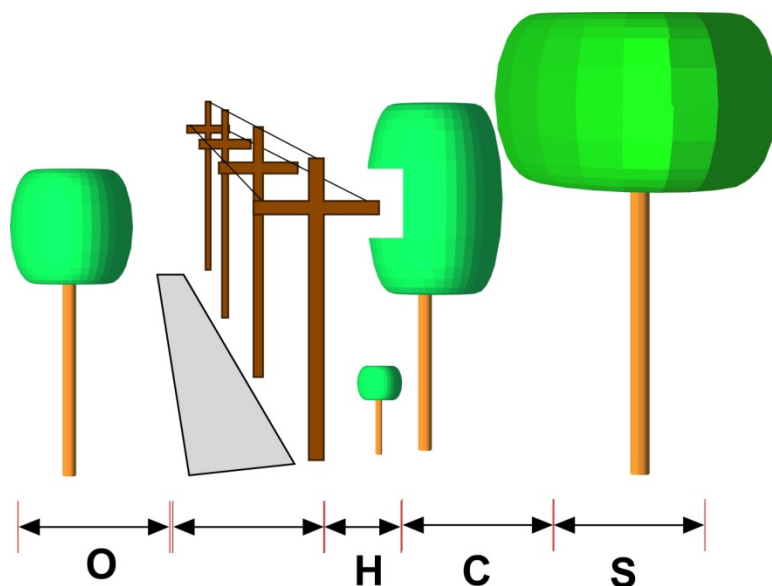


Figure 3. Critical planting zones for Right Tree, Right Place. O-Opposite zone, H-Height reduction zone, C-Clearance zone, S-Strike zone.

their wires and poles:(Fig. 3): Opposite zone – street trees on the opposite side of the road from utility wires, Height reduction zone – trees growing directly under utility wires, Side clearance zone – trees growing adjacent to utility wires whose crowns can expand horizontally into wires, and Strike zone – trees beyond the side clearance zone that may be tall enough to impact wires if they fell.

We include two lists of woody plants: shrubs that are an appropriate size for the height reduction zone (H) and small trees that are appropriate for the opposite (O) and side clearance zones (C). The lists were developed from a variety of sources including Dreyer (1991), Alexopoulos et al. (2007), and Gerhold et al. (1993) with input from the Connecticut Nursery and Landscape Association, Audubon Connecticut, and the Connecticut Notable Trees Project.



Trees with tall mature heights, such as these pin oaks, are inappropriate for planting under utility wires.

It is hoped that this list will assist local planning officials and private residents to select species that are appropriate for a given site. It is recommended that private property owners consult with their local tree warden or others knowledgeable on growth patterns and site requirements when planting new trees to ensure the tree is tree for the location.

The optimal maximum height for vegetation in each zone will vary depending on the width of the road (for the Opposite zone) and the actual height of the wires. As a general guideline, it is safest for a tree to be at least as far from the wires as it can get in height. So a 30 foot maximum height tree should be located at least 30 feet from a point directly below the wires. However, shrubs and small trees, especially evergreens, would be inappropriate in locations where they would block site lines for people backing out of driveways or parking lots.

No list can be fully comprehensive since mature heights will vary by local environmental conditions (soil fertility, moisture, and volume; amount of light, etc.), individual tree genetics, and care. There are a wide variety of native and non-invasive introduced shrubs that can be appropriate under utility wires. We have listed only a few with an emphasis on native species.

We do not list specific cultivated varieties (called cultivars) because plant breeders are continually introducing new types with novel flowers, growth characteristics, and increased disease resistance. There are cultivars of some species not included in this list that have short mature stature that could be used in locations near wires. In addition, many species have upright varieties, called columnar or fastigate, that have narrow growth forms and rarely get as

tall as is standard for the species. Please consult with local nursery and horticulture professionals to discuss cultivar characteristics and availability. In addition, this list should be updated regularly to keep current with new research, changing climate, and new potential non-native pests and disease.

Once again, this is a list of some, not all, of the trees and shrubs with low to medium mature heights that could be used when it is deemed appropriate to plant near roads with above ground utility equipment.  It is not a comprehensive list of every possible plant for every conceivable situation.  It does not only include native plants because there are a limited number of regionally native species that are appropriate for roadsides and available in nurseries, and because not all non-native species are considered to be invasive. We are not advocating the wholesale removal of existing trees and replanting with only species on this list. Where low growing trees and shrubs are currently present, they should be favored in management operations.  In more natural forested roadside situations we recommend preserving or planting native species.  We did not include tall trees because the purpose of the list is to draw attention to smaller size plants that are less likely to interfere with aboveground utilities.

**References**

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# Trees with Short Mature Heights

## Connecticut State Vegetation Management Task Force

**Glenn Dreyer[1] (Connecticut College)**
**Jeffrey Ward[2] (The Connecticut Agricultural Experiment Station)**

| Common name | Scientific name[3] | Origin[4] | Height (ft)[5] | | Not for Urban Sites | Notes |
| --- | --- | --- | --- | --- | --- | --- |
| | | | Typical | CT max | | |
| Trident Maple | *Acer buergerianum* | NE Asia | 20-25 | 57 | | |
| Hedge maple | *Acer campestre* | Europe | 30+ | 60 | | Tolerates urban conditions well. No fall color. |
| Paperbark maple | *Acer griseum* | China | 30 | 40 | | Beautiful shiny copper-colored bark |
| Japanese maple | *Acer palmatum* | NE Asia | 15-30 | 48 | | Is spreading from planted locations; Invasive in nearby states |
| Tatarian maple | *Acer tataricum* | Europe | 20-25 | | | Is spreading from planted locations; Invasive in nearby states |
| Horsechestnut hybrids | *Aesculus hybrids* | Hybrid | 30-35 | 45-55 | ? | |
| Common serviceberry | *Amelanchier arborea* | Native | <30 | 55 | | White flowers in late April; edible fruit in July |
| Allegheny serviceberry | *Amelanchier laevis* | Native | <30 | 50 | | White flowers in late April; tasty fruit in July |
| European hornbeam | *Carpinus betulus* | Europe | 30-40 | 72 | | |
| American hornbeam | *Carpinus caroliniana* | Native | 30+ | 37 | | Smooth, gray bark |
| Eastern redbud | *Cercis canadensis* | Native | 25 | 45 | ? | Purple-pink spring flowers and heart-shaped leaves |
| Chinese Fringetree | *Chionanthus retusus* | NE Asia | 15-25 | 17 | ? | Weak wood, bushy habit |
| Flowering dogwood | *Cornus florida* | Native | 30 | 47 | ? | Showy white flowers in mid-May; (may be listed as *Benthamidia florida*) |
| Dogwood hybrids | *Cornus hybrids* | | | | | Dogwood hybrids |

| Common name | Scientific name[3] | Origin[4] | Height (ft)[5] | | Not for | Notes |
| | | | Typical | CT max | Urban Sites | |
|---|---|---|---|---|---|---|
| Kousa dogwood | *Cornus kousa* | NE Asia | 30 | 36 | | Showy white flowers in late May; (may be listed as *Benthamidia japonica*) |
| Cornelian cherry dogwood | *Cornus mas* | NE Asia | 15-25 | 28 | | |
| Smokebush | *Cotinus coggygria* | Europe | 15 | 20 | ? | |
| American smoketree | *Cotinus obovatus* | Native | 30 | 51 | ? | |
| Hawthorn hybrids | *Crataegus* sp. | Native | 25 | | | All have some level of susceptibility to rust and a few have some resistance to leaf spot, some have thorns |
| Redvein Enkianthus | *Enkianthus campanulatus* | Japan | 15 | | ? | Bushy habit |
| Seven-son flower | *Heptacodium miconioides* | China | 12 | 25 | | Fragrant, late summer flowers |
| American holly | *Ilex opaca* | Native | 30+ | 47 | X | |
| Long stalk holly | *Ilex pedunculosa* | | 15-20 | 26 | X | |
| Eastern redcedar | *Juniperus virginiana* | Native | 30+ | 64 | X | Evergreen |
| Amur maackia | *Maackia amurensis* | NE Asia | 30 | 41 | | Clusters of yellow flowers in July |
| Star magnolia | *Magnolia stellata* | Japan | 20 | 40 | | Upright shrub with large white flowers |
| Sweetbay magnolia | *Magnolia virginiana* | Native | 25 | 28 | | Creamy flowers have a sweet fragrance |
| Saucer magnolia | *Magnolia x soulangiana* | China | 30 | 44 | | Large white or pink flowers early spring |
| Crabapples | *Malus* sp. | Mixed | 25 | 55 | | Showy flowers in spring and persistent fruit |
| Hophornbeam | *Ostrya virginiana* | Native | 30+ | 67 | | Rough bark |
| Sourwood | *Oxydendrum arboreum* | Native | 25 | 87 | ? | Showy white flowers in July |
| Persian parrotia | *Parrotia persica* | SW Asia | 20-40 | 28 | | Interesting mottled bark |

| Common name | Scientific name[3] | Origin[4] | Height (ft)[5,6] | | Not for Urban Site | Notes |
|---|---|---|---|---|---|---|
| | | | Typical | CT max | | |
| American red plum | *Prunus americana* | Native | 20 | | ? | |
| Cherry plum | *Prunus cerasifera* | NE Asia | 25 | 29 | | White flowers in spring; purple leaved forms popular |
| Cherry hybrids | *Prunus hybrids* | | | | | |
| Sargent cherry | *Prunus sargentii* | Japan | 35-40 | 42 | | |
| Japanese flowering cherry | *Prunus serrulata* | NE Asia | 25 | 33 | | Pink early spring flowers; 'Kwanzan' a popular type |
| Higan cherry | *Prunus subhirtella* | Japan | 30+ | 67 | | Pink spring flowers; weeping forms available |
| Bosc (common) pear | *Pyrus communis* | Europe | 30 | 59 | ? | White spring flowers; fruit could be a problem |
| Pussy willow | *Salix discolor* | Native | 30 | | ? | Appreciated for its small, fuzzy early flowers |
| Japanese stewartia | *Stewartia peuedocamellia* | Japan | 30 | 39 | | Large showy June flowers and colorful mottled bark |
| Japanese snowbell | *Styrax japonicus* | Japan | 25 | 28 | | White bell shaped flowers in June |
| Japanese tree lilac | *Syringa reticulata* | Japan | 25 | 51 | | Creamy flower clusters in June, very adaptable |
| English yew | *Taxus baccata* | Europe | 30+ | 47 | X | Evergreen |
| Arborvitae | *Thuja occidentalis* | Native | 30 | 70 | X | Good evergreen screen: susceptible to deer damage |

[3]Common and scientific names from USDA Plants database (http://plants.usda.gov)  [4]Native refers to eastern North America

[5]Typical height from personal observation and Dirr (1998) Manual of woody landscape plants, 5th edition
[6]Maximum Connecticut height from database of Connecticut Notable Tree Project

# Selected shrubs suitable for planting near utilities

## Connecticut State Vegetation Management Task Force

**Glenn Dreyer[1] (Connecticut College)**
**Jeffrey Ward[2] (The Connecticut Agricultural Experiment Station)**

| Common name | Scientific name[3] | Origin[4] | Height (ft)[5] | Root suckers[5] | Notes |
|---|---|---|---|---|---|
| Canadian serviceberry | *Amelanchier canadensis* | Native | 15 | n | White flowers in late April; edible fruit in July |
| Red chokeberry | *Aronia arbutifolia* | Native | 6 | Yes | Good flowers and fall color (may be listed as *Photinia pyrifolia*) , |
| Black chokeberry | *Aronia melanocarpa* | Native | 6 | Yes | Conspicuous white flowers, formerly (may be listed as *Photinia melanocarpa*) |
| Carolina allspice | *Calycanthus floridus* | Native | 8 | n | Fragrant flowers |
| Chinese fringetree | *Chionanthus retusus* | NE Asia | 15 | n | |
| White fringetree | *Chionanthus virginicus* | Native | 20 | n | Large clusters of white flowers in June |
| Japanese clethra | *Clethra barbinervis* | Japan | 15 | n | White flowers in summer, attractive bark |
| Alternate-leaved dogwood | *Cornus alternifolia* | Native | 20 | n | Large shrub with small clusters of creamy white flowers |
| Redosier dogwood | *Cornus sericea* | Native | 10 | Yes | Bright red stems maintained by cutting older stems |
| American hazelnut | *Corylus americana* | Native | 12 | n | Edible nuts are commercially cultivated |
| Redvein enkianthus | Enkianthus campanulatus | Japan | 15 | | Great fall color follows midsummer flowers that attract bees |
| Chinese witchhazel | *Hamamelis mollis* | China | 15 | n | Flowers in early spring |
| Witchhazel | *Hamamelis virginiana* | Native | 15 | n | Small yellow flowers in October |

| Common name | Scientific name[3] | Origin[4] | Height (ft)[5] | Root suckers[5] | Notes |
|---|---|---|---|---|---|
| Rose-of-Sharon | *Hibiscus syriacus* | SW Asia | 12 | n | Summer flowers in various colors |
| Panicled hydrangea | *Hydrangea paniculata* | Asia | 10 | n | Needs constant pruning |
| Winterberry | *Ilex verticillata* | Native | 10 | n | Shrub with abundant red berries |
| Beach plum | *Prunus maritima* | Native | 12 | n | White flowers in spring; edible fruit |
| Winged sumac | *Rhus copallinum* | Native | 15 | Yes | Suckering shrub with brilliant red fall foliage |
| Smooth sumac | *Rhus glabra* | Native | 15 | Yes | Suckering shrub with brilliant red fall foliage |
| Arrowwood | *Viburnum dentatum* | Native | 6 | n | Small white flowers clusters in spring |
| Nannyberry | *Viburnum lentago* | Native | 15 | n | Creamy white flower clusters in June |
| Withe-rod | *Viburnum nudum* var. *cassinoides* | Native | 12 | n | Flower clusters in June, multi-colored fruit in fall |
| Blackhaw viburnum | *Viburnum prunifolium* | Native | 12 | n | Creamy white flower clusters in June |
| Cranberry viburnum | *Viburnum trilobum* | Native | 6 | n | Edible red fruit persists into winter |

[3]Common and scientific names from USDA Plants database (http://plants.usda.gov)    [4]Native refers to eastern North America

[5]Typical height and root suckering from personal observation and Dirr (1998) Manual of woody landscape plants, 5th edition

## Tree Pruning Standards

The Task Force endorses the following tree care industry standards for ensuring proper pruning:

- ANSI Z133.1
- OSHA 29 CFR 1910.269
- ANSI A300 Part 1: Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices, Pruning
- Best Management Practices, Utility Pruning of Trees

The Task Force also recommends that the recently released standards/best management practices from ISA (International Society for Arboriculture) be utilized.

**Utility Line Clearance Standards (proposed jointly by CL&P and UI)**

The following standards shall be considered the minimum requirements for each electric distribution company's vegetation management plan. Line clearance shall be performed to protect the company's primary electric lines and equipment during normal and severe weather.

<u>Vegetation Management Plan</u>

By November 15 of each year, the company shall file an annual Vegetation Management plan that includes but shall not be limited to the following:

1. Work scope and budget details
    a. Roadside miles scheduled, backbone and lateral
    b. Right-of-Way miles, brush control and side pruning
    c. Risk tree removal
    d. Vine control
    e. Traffic control
    f. Customer request tree work
    g. Mid-Cycle
    h. Emergency restoration, minor storm
    i. Other

2. Tree and brush work specification

3. Line clearance organization

4. Property owner notification and consent procedures

5. The planned maintenance within each town within the company's service territory

<u>Clearance Requirements</u>

1. Routine maintenance tree and brush work (tree pruning) shall be performed on a 4-year cycle.
    a. All roadside and off-road primary voltage lines shall be cleared at least once every 4 years.
2. The utility clearance zone shall be the area 8 feet to the side of all primary conductors from the ground to the sky.
    a. Enhanced Clearance shall be performed to achieve the following clearances on all circuit backbone and lateral conductors selected for enhanced tree work:

i. Remove all tall growing tree species below within the clearance zone
ii. Remove all overhanging limbs within the clearance zone
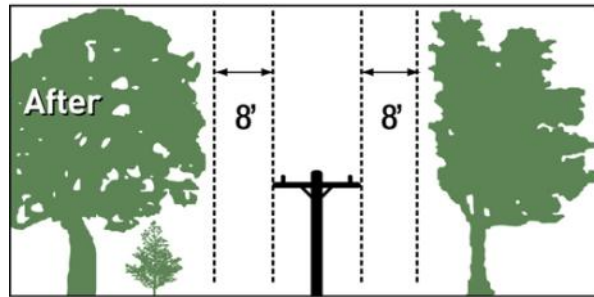


b. Scheduled Maintenance Clearance shall be performed to achieve the following clearance around all primary voltage conductors not selected for enhanced tree work:
i. 10 feet below within the clearance zone
ii. 15 feet overhead within the clearance zone
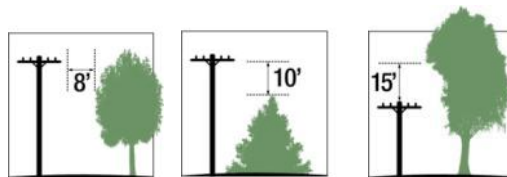


3. Remove hazard trees within the clearance zone
4. Each tree shall be evaluated at the time that it is pruned. The tree crew shall consider tree species, condition, growth rate and location when performing line clearance.
5. Clearance shall be performed in accordance with the following tree care industry standards:
   a. ANSI Z133.1
   b. OSHA 29 CFR 1910.269
   c. ANSI A300 Part 1: Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices, Pruning
   d. Best Management Practices, Utility Pruning of Trees

## Utility Line Clearance Standards – Communications (proposed by AT&T)

AT&T has operational agreements with both major power companies to share costs for trees removed as the result of either a major storm or for a mutually agreed hazard tree.  The trimming guidelines provided below are utilized by technicians or contractors when trimming branches for the business as usual scenario.

AT&T's practices address utility line clearance in the communications gain on the utility pole which is approximately 16 feet above ground level.  The communications gain is below the power gain which is located at the top of the pole and is where power facilities are placed.  Communications providers do not face the same challenges as power companies in regards to tree trimming due to the nature of our facilities as well as our attachment location on the utility pole.

Under a business as usual scenario, AT&T will trim branches as necessary when trees interfere with our ability to place or replace facilities.  When specific hazard trees are identified which pose a significant risk to our communication facilities, AT&T utilizes certified tree contactors to remove the hazard tree.

Tree Trimming Guidelines

This section outlines the principles that should guide telecommunication employees and tree removal contractors engaged in "Line Clearance" type work. All work shall be performed in a safe and professional manner consistent with good service, while still maintaining the health and appearance of the trees and shrubs alongside and under telecommunication lines.

As a result of the environmental awareness in our country, people are concerned for the welfare of our trees, particularly those trees that grow along the roadside. Therefore, the utmost care and proper pruning practices must be used in line clearance operations.

The goal of **construction trimming**, either road-side or right-of-way, is to provide a clear path for the construction of a new pole line or cable. The "clear path" will include removal of all undesirable woody plants under the pole line, and pruning trees not removed to keep them from interfering with telecommunication facilities for a 3- to 5-year period.

Local policy will decide how much trimming will be performed by telecommunication employees, but they can do telecommunication trimming as assigned. Trimming by telecommunication employees should be confined to those areas that can be done from the ground with pruning tools, from a ladder, or an aerial lift vehicle. Many phases of tree trimming and pruning require experience and sophisticated tools unavailable to telecommunication employees; therefore, such activities as joint trimming (trimming both electric and

telecommunication lines), dismantling large trees, and rope climbing, shall be performed by outside contractors.

Employees and tree removal contract personnel must consider the appearance and welfare of all trees during trimming operations; not only from the standpoint of maintaining the natural beauty of these trees, but also from the standpoint of successfully maintaining the aerial plant and promoting good public relations.

## Tree Removal Standards

The current Connecticut roadside forest has many large trees, many neglected trees, and many trees that pose a serious risk to people and property.  A stepped-up effort towards removal of trees that are a significant risk because of structural defects or being in poor health with numerous dead limbs, for example, is essential for the safety and well-being of the people of the state.  For this to be acceptable to the public, there must be a generally agreed-upon understanding of the benefits and values of trees as well as their inherent risks.  The standards for determining when a tree should be removed must be guided by the insights and knowledge of qualified professionals, including certified tree wardens and licensed arborists, and implemented by municipalities, private property owners, the State of Connecticut and the public utilities in a manner that also includes a commitment to the stewardship of our roadside forest.

The approach we advocate towards encouraging this increased level of tree removal has two components.  First, it is important that field crews and field decision makers be given clear, concise and specific guidance as to the causes and conditions that would lead to a decision to remove a tree.  Second, it is important that an educational network regarding trees and tree removals be fostered, so that, as a group, we learn, get better, and adapt as our knowledge improves.

In the middle of this balance between guidance and learning is a commitment to tree removal training for municipal, private arborist, utility tree crews, and others.

The Basic Elements of a Tree Removal Training Program

Training programs with regards to tree removals should start, first and foremost, with safety. Tree work in any manner is inherently dangerous.  Safety is essential.

Experts in tree care should be called on to provide clear guidance on the types of situations and circumstances in which a tree ought to be removed.  These can range from trees that are determined to be structurally compromised to trees that are unsafe due to their location with regards to the road.

Training should also focus on the basic physiology and structure of trees, how tree conditions can negatively impact the structural condition of a tree, and how trees respond to stress and adverse conditions such as recent construction.  The seven categories of tree defects as outlined by the USDA Forest Service should be a key component of this training:

1. Decayed Wood
2. Cracks
3. Root Problems

4. Weak Branch Unions
5. Cankers
6. Poor Tree Architecture
7. Dead Trees, Tops or Branches

Training should emphasize proper techniques and alternative methods of tree removal. All companies involved in tree removals, including, especially, municipal and utility crews, should be encouraged to take this training. The general outline for this training should be developed by the tree care professional groups as a whole, and supported by efforts at the state level.

<u>Standardized Approach to Tree Removals</u>

***Training:***

One of the non-profit organizations in Connecticut (e.g. CUFC, CTPA, or TWAC) takes the lead in authorizing the development of a standardized training program for tree removals, with the emphasis on tree removals within the roadside forest. This training program would include:

- safety
- an overview of form and function within the healthy tree
- the seven structural defect categories from the US Forest Service (*Urban Tree Risk Management*, 2003)
- tree growth response, including to structural defects
- the role of environment
- tree assessment, including both tools and methods
- the importance of identifying targets
- an overview of various methods of tree removal along with directions as to where to go to get additional training
- guidance on how to best reuse or otherwise capture the value of the wood produced by removals

As part of this training program, a decision key will be developed to help guide tree removal decisions. This tree removal key may be based on one of the existing hazard tree rating sheets.

The "Tree Risk Management" program developed by Bartlett Tree Experts and used by CT DOT for training may be used as a guide for how to set up this program. A grant may be sought to allow this training program to be created. Once created, it will be shared and presented widely throughout the state.

***Municipal Planning:***

It must be recognized that a proportionally high number of trees need to be removed along our state roads and highways, due to the age, size, condition and deferred maintenance of these trees.

To help tackle this backlog, each municipality will be encouraged to develop a plan for the prioritized removal of trees from the roadside forest.  Priorities for tree removal will be based upon:

- the condition of the tree
- the importance of a road section, especially during emergencies (e.g., main roads leading to a hospital)
- areas where the risk to targets should a tree fail are greatest (e.g., busy intersections)

Each town will take these three parameters into consideration as they assess trees for removal, and remove those with the highest priority rating first.

Tree wardens will recognize that the authority of the tree warden includes all trees that extend into or overhang the public right of way, and so will assess those trees whose base is outside of the right-of-way in a manner similar to town-owned trees, and with the same authority to call for their removal.

As a first step in developing the plan, each municipality should at a minimum conduct a windshield survey to identify and record those trees that present the greatest risk, according to the three categories mentioned above.

The State DEEP is encouraged to assist the towns in developing their plans for tree removal by developing a model tree removal plan.  The State might also develop a system by which tree removals and tree inventory data are compiled in a comprehensive database that is based on standardized input from communities around the state.

## Roadside Management in a Forested Landscape

Although a high proportion of our state's roads have trees alongside them, approximately 36% of Connecticut's roads – 7,600 of all 21,000 miles[7] -- cross landscapes that would be considered forested landscapes in the traditional, rural sense. Although the expanse of roads and utility corridors in such forested areas is enormous; proactive management has been minimal. Historically, maintenance of roadside trees in these forested areas has been largely limited to pruning by utilities to specified distances from lines, and occasional hazard tree removal. Few, if any, resources have been invested on management of the surrounding forest.

Challenge of managing forested roads

Trees that affect utility infrastructure and public transportation fall into two ownership categories, public (local and state roadside buffers) and private (rural and residential land). To properly manage roadside trees in forested landscape, it is important to look closely at what is being managing before determining how it should be managed.

Public roads are maintained by state and municipal officials who balance the need for public safety and aesthetics with limited budgets. Most municipalities focus their attention on the hazardous trees that they receive complaints about, while some progressive municipalities have an active pruning program. Very few municipalities have a management program that evaluates all trees in their right-of-ways (ROW). While most state or municipal officials recognize the benefits of a more comprehensive approach, they struggle to find adequate funding for implementation of a program beyond removal of identified hazard trees.

Private land outside of the municipal or State's ROW is a much more challenging area to manage due to the number of landowners and the variety of attitudes that they have about the relative importance of safety, utility service, aesthetics, and the environment. Management recommendations need to consider landowner attitudes towards tree removal and maintenance when developing an education and outreach program that works within the private property ownership constraints of Connecticut.

Current forested road management

Landowners often complain about utility line pruning, arguing that it is not attractive and leaves trees deformed. There is some concern as to whether the heavy pruning required to achieve Enhanced Tree Trimming (ETT) standards could create potential future hazards. Municipal tree wardens and the general public need to be assured that any adopted practice will (1) leave

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[7] Per Mark Goetz-derived using deciduous, coniferous, and forested wetland classifications from the 2006 Landcover Data from CLEAR (30 meter resolution data) and buffered by 150 ft. road centerline

trees in a healthy condition without compromising their long-term structural integrity and (2) meet community-appropriate aesthetic goals.

Creating a "storm resistant" forest

The ultimate challenge is to maintain the aesthetic appeal of forested Connecticut byways while reducing the potential of tree-caused damage to infrastructure during severe storms. Because most of Connecticut's forests do not have a diverse age structure (e.g., most large oaks originated in the early 1900's), creating a storm resistant roadside forest will provide an opportunity to increase biodiversity by increasing the diversity of age classes, species, and stand structures. These roadside biodiversity corridors will support a myriad of mammal, bird, and invertebrate species that depend on small tree and shrub species that are often lacking in unmanaged forests.
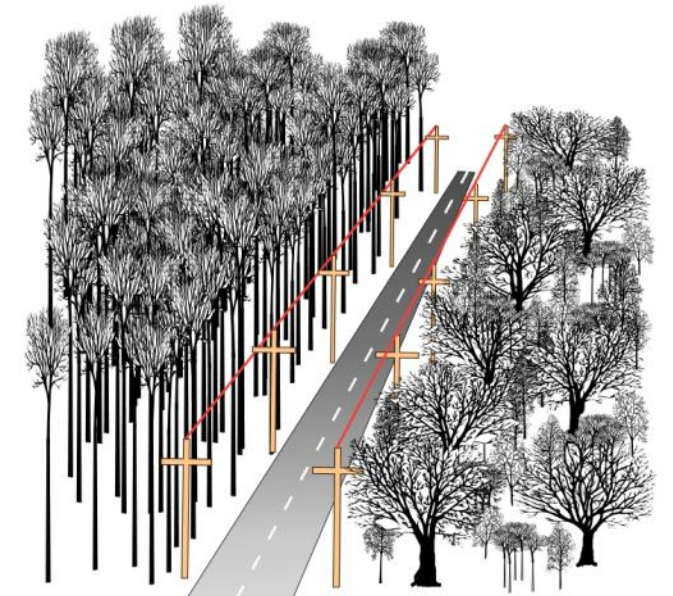


Unmanaged roadside forest with tall trees susceptible to storm damage and with few small trees and shrubs.

"Storm-resistant" forest with trees that have thick trunks and are wide rather than tall; interspersed shrubs and small trees.

Note: utilities are shown on both sides of the street for illustrative purposes

A management program which combines arboriculture (individual tree care) and silviculture (forest management), along with an enhanced outreach programs may be an effective way to manage roadside trees in forested areas. Though arboricultural pruning practices should immediately decrease the probability of utility interruption due to branch failure, their effectiveness is limited to several years and will have minimal effect during severe tropical storms. Complementary silvicultural work (forestry) in the adjacent forest is a long-term process that will require several years to fully implement, but will have benefits that last for decades.

A proactive approach would be to create a roadside forest that is resistant to severe storms. Open-grown trees, such as those in open fields, develop crowns that are wide rather than tall, have stouter stems and branches, and develop well-anchored, widespread root systems. All of the characteristics of open-grown trees make them more resistant to wind damage, especially to becoming wind thrown.

Recommendations

- Incorporate a Management Zone (MZ) or area of up to 100 feet in both directions from utility lines that includes a Wire Zone (within 25 feet of wires) and a Side Zone (extending out an additional 75 feet). (Fig. 4).
Mature upper canopy trees in Connecticut are often 80 feet tall with some white pine, tulip poplar, and red oak reaching 100 feet or taller. Therefore, the management zone should be 80-100 feet wide to include all mature trees that could potentially damage utility infrastructure during a severe storm. Because mature forests in the Northeast typically have 60-100 upper canopy trees per acre, there are 600 to 1200 trees per mile on each side of a road (curb mile) constituting a forest that could potentially affect utilities or block roads. (A strip 1 mile long and 100 feet deep is about 12 acres in area - one 80 feet wide is slightly less than 10 acres).

- MANAGEMENT ZONE – Combine traditional pruning practices (ANSI A300 Standards), best management practices from the International Society of Arboriculture, and an enhanced hazard tree identification process with a long-term, selective tree removal program. A more in-depth review of trees that looks at above and below ground health symptoms and structural risks should be done. This includes reviewing trees that otherwise may be "aggressively" pruned, to determine if excessive live wood (more than 25%) will be removed or the tree will have insufficient leaf area after pruning (typically equivalent to 40% of total tree height). Aggressive pruning following a rigid line clearance standard may leave a tree with long-term structural and health risks that is also unaesthetic.
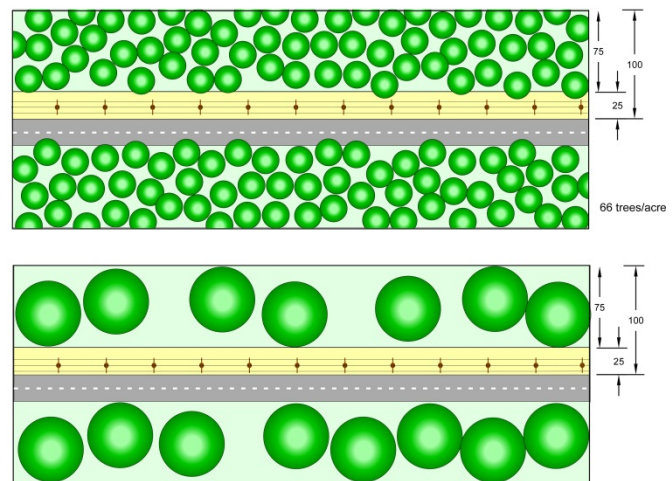


Figure 4. Bird's eye view of a typical forest in Connecticut (top) with 700-1200 trees per mile on each side of a road compared with a storm resistant forest (bottom) would have fewer trees with crowns that are wide rather than tall. Small trees and shrubs are not shown in either forest, but would occupy gaps between trees.
   Tree crowns are shown as green circles, utility poles as crossed brown circles connected by brown wires. Figure 1. Critical planting zones for Right Tree, Right Place. O-Opposite side zone, H-Height

  - WIRE ZONE – Smaller growing trees, shrubs and grasses should be encouraged emphasizing the "Right Tree, Right Place" approach.

- In rural areas, protection of native species such as dogwood or hophornbeam and shrubs such as mountain laurel, witch-hazel or spicebush should be encouraged. Integrated Vegetation Management (IVM) techniques can be used for this purpose. This is a more "passive" approach to Right Tree/Right Place that should not require planting. It will be important to consider site-lines when developing a denser understory adjacent to roads.

- In residential areas a more "active" Right Tree, Right Place approach (active planting) may be necessary to encourage ornamental trees and shrubs that work with utility lines. A strong landowner outreach program will be essential in residential areas where aesthetics may need to be considered more than in rural areas. Replanting with appropriate plants would incentivize landowners and work to further develop good working relationships. This would also allow the utility or municipalities to remain involved in the replanting process, ensuring that the appropriate species are selected. An enhanced outreach program should be developed to provide landowners with a better understanding about the program and landscaping advice when planting around roads and utility lines.

- SIDE ZONE – Creation of a storm resistant forest within the side zone should begin in young stands by releasing 30 to 40 trees per acre (300 to 480 per curb mile) from competition using well-developed crop tree management prescriptions. Every 10-20 years, all trees directly competing with selected trees should be removed. As trees mature and the crowns of the crop trees close in, the goal should be to reduce the number of crop trees from 30-40 to 15-20 large trees (150 to 240 per curb mile) with wide-spreading crowns. These trees should be well spaced and managed to develop stout trunks and healthy crowns similar to what might be found in an open "park", but unlike a park, would surrounded by a diversity of small trees, shrubs, and wildflowers .

- SIDE ZONE – Creating a storm resistant forest is more challenging in mature roadside forests. Removing all but 15 to 20 trees per acre in one step would increase the susceptibility of the remaining trees to wind damage for several years until they develop increased stem taper and better anchored roots. A more pragmatic approach would be to begin with a heavy thinning that emphasized removing trees with obvious structural defects (e.g., cavities, weak forks), potential structural defects (e.g., frost cracks, fungal structures, lean, offset crowns), small crowns, perennial diseases (e.g., Neonectria), or dieback in the upper crown. The thinning would allow residual trees to become more wind firm by increasing stem taper

(more wood at bottom of tree) and developing stronger root systems.

    The next step would be to conduct another thinning 10 to 15 years later, after the trees have become more wind-firm. It may be possible to proceed immediately to the goal of 15 to 20 large trees per acre if there are sufficient candidate trees with balanced crowns and well-anchored root systems. Otherwise, multiple thinnings are recommended with a goal of achieving a forest with 15 to 20 large trees per acre.

    The thinning process will also encourage growth of native shrubs and small trees that will contribute to the 'natural' look by creating a multi-level canopy reminiscent of an old-growth forest.

    Invasive vines and shrubs may be a problem in some areas following thinning. Depending on the level of infestation by invasive species, mechanical or chemical control may be required.

The results of this management will be a Wire Zone dominated by shorter Right Tree, Right Place trees and shrubs, and a Side Zone with widely-spaced large trees in the overstory, younger trees of multiple age and size classes growing in the mid-story, and native shrubs in the understory. In the Wire Zone, long-term pruning costs will be reduced by the removal of many Side Zone trees that would otherwise have encroached into the Wire Zone. This more active, holistic management approach focused on developing "Storm Resistant" forests along utility line corridors will reduce damage when the next severe storm does strike. This approach requires a more expansive vision of the roadside forest and utility line corridor that not only looks at reducing immediate risks, but also at long-term individual tree care and whole forest care.  For maximum effectiveness, this management regime should be combined with education and outreach to landowners in order to achieve a well-informed public along with a safer, more reliable utility and transportation system.

## Controlling Vine Infestations

Vines in trees can cause increased risk of a tree's failing and disrupting utilities during wind, ice, and wet snow storms. Vines increase the 'sail' area of a tree during high winds and the surface area for accumulation of damaging heavy wet snow or ice. The most common species that have been observed to increase the risk of a tree failing during a storm are oriental bittersweet (*Celastrus orbiculatus*) and grape (*Vitis* spp.). Occasionally, other species such as wisteria (*Wisteria* spp.) or kudzu (*Pueraria montana*) can infest a tree sufficiently to increase the risk of tree or large limb failure. Not all vines are necessarily detrimental. Poison ivy (*Toxicodendron radicans*) and Virginia creeper (*Parthenocissus quinquefolia*) are usually found growing on the main trunk of a tree and not over or along branches. These two species rarely need to be controlled to reduce the risk of tree failure.

**Trees with a dense infestation of oriental bittersweet are more likely to fail during severe storms.**

Ideally, vines are controlled before they form a dense infestation mat in the tree's canopy. After they are killed, it may take several years for the vines to decompose and eliminate the risk of tree failure during severe weather. However, any control of infesting vines will reduce the risk of tree failure by killing the leaves that increase the sail (wind) and accumulation (wet snow, ice) areas.

The simplest method of vine control is to cut the stems as close to the ground as possible. This will cause death of all aboveground tissues. However, the surviving root systems of all species will quickly send up new vines that again infest the trees. To provide longer protection, it is suggested that the cut stems of problematic species be treated with an herbicide to kill the root systems. Treating the cut stems, and not spraying the foliage, dramatically reduces the amount of herbicide that is needed and reduces the impact to any vegetation that is near the treated vines. It is important to follow all label directions when applying herbicide.

Herbicide control is not a panacea because new plants will develop from seeds buried in the soil or deposited by birds or deer. Therefore, it will be necessary to periodically treat an area to control any new vines. Because the new vines are much smaller, it should be relatively easier to implement a maintenance program than for the initial control effort.

## Inventory/GIS Recommendations

Chapter six of the Two Storm Panel Report recommended municipalities, utilities, and state agencies share Geographical Information Systems (GIS) mapping with an emphasis on GIS data relating to streets and utility infrastructure.   Recommendation #20 in Chapter three of the Two Storm Panel Report stated "Conduct a state-wide tree risk assessment and prioritization schedule particularly targeting hazardous trees."  There was a great deal of discussion in the Task Force meetings regarding the inventorying and assessing the quantity and quality of the trees along the roadside forest of Connecticut.  The information gathered in an inventory or assessment will have great value to the utility companies, municipalities and the State of Connecticut by providing an understanding of the number and condition of trees within the public Right-of-Way.  In order to relate the inventory to other features in and near the right-of-way such as transformers and property owners, these assessments should be conducted within a GIS environment.

For the utility companies, the inventory or assessment could be assimilated with outage data to determine which areas should be prioritized for trimming and other maintenance.   In the long term, if the inventory or assessment is continued over time, this information could be used to validate which types of trimming practices and trimming cycles are most appropriate for a given area.

For the municipalities, the inventory or assessment provides a means to understand the anticipated costs of properly maintaining its roadside forest and correcting liabilities that could be harmful to its inhabitants.  In several towns, like Milford, Norwalk and East Lyme, proactive citizens have conducted inventories with the goal of improving the condition of street trees. These efforts not only provided benefits described earlier but have provided a means to recover costs when disaster strikes.  The same inventory used to improve tree conditions can be used to quickly provide FEMA with the conditions of trees damaged during a storm event.

For the state, the benefits of an assessment or inventory of trees within the state ROW are the similar as for municipalities with the additional condition that most state ROW's are critical for keeping the state up and running after a storm event.  These roads must be able to be cleared quickly after a major storm occurs.

One of the benefits of implementing GIS is the ability to share geographic information in an intuitive manner.  Chapter four of the Two Storm Panel Report covered many of the problems in communication and sharing of information between utilities and municipalities.  Much of the confusion revolved around outage maps and where power was getting restored.  This not only was a nuisance, but was potentially deadly.  Utility companies should share outage information

in real-time to the state and municipalities so that field personnel know where downed wires are no longer live and present eminent danger.

The major recommendations follow three themes:  Coordination, data and systems.  Coordination is critical because of the shared nature of the vegetation management within public rights-of-ways.  As for data, Town of South Windsor Public Works Director's mantra is "You cannot manage what you cannot measure."  In order to manage trees, we need actionable information to assess the problems and devise plans to properly manage those resources.  Hand in hand with data are systems to help further refine the information collected the trees and disseminate that data and information to the appropriate entities that share managerial responsibilities over the care of our roadside forests.
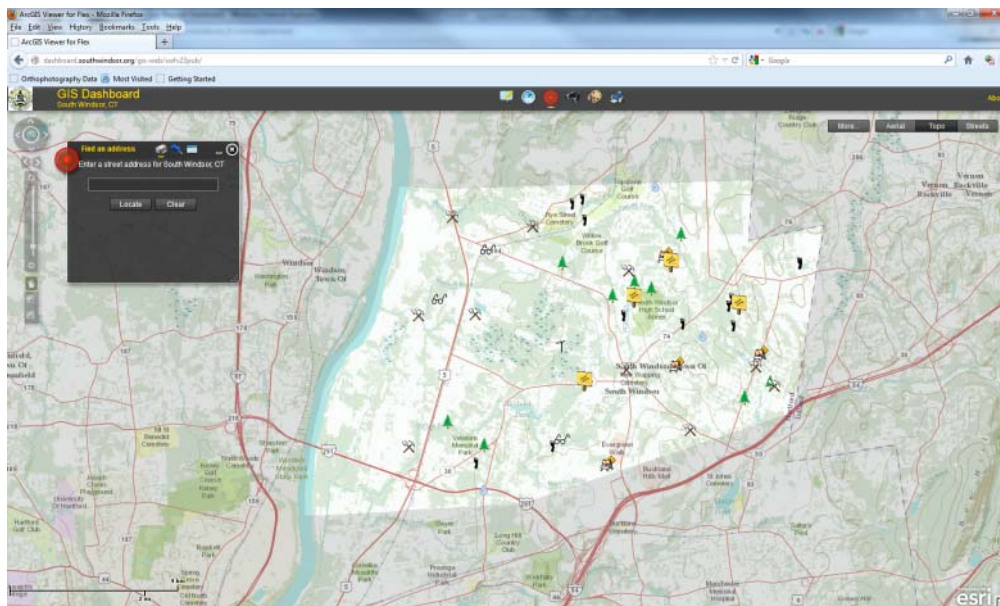
Recommendations:

1. GIS Coordination.  Like recommended in the Two Storm Panel Report, the Connecticut GIS Council (www.ct.gov/gis) should expand representation to include a broader GIS user base beyond State, Regional or Municipal Representation.  This should include quasi-public agencies and private entities.
    a. The Council should revise the Connecticut Enterprise GIS Strategic and Business plans from 2007 to accommodate Utilities and the Public Sector in those plans.
    b. More emphasis should be placed in finalizing and updating Data Subcommittee Standards and Guidelines if necessary to accommodate additional participants on Geospatial Council.
    c. The Council should plan for the development of interoperable systems for sharing information between the utilities, state agencies, regional planning agencies and municipalities.
    d. The State should fund the four core framework datasets described in both the Strategic and Business plans with particular emphasis on the Statewide Orthophoto (aerial photography) and Parcel programs.
    e. Fill empty GIS positions within state agencies when vacated, especially DEEP.
    f. Establish GIS Coordination Unit within the Office of Policy and Management to implement policies established by the Connecticut GIS Council.
2. Aerial Photography.  Continue and establish new funding mechanism to procure statewide high resolution aerial photography at minimum every four years at the specifications detailed in the digital orthoimagery data guidelines published on the CT GIS Council base map imagery subcommittee website: http://www.ct.gov/gis/cwp/view.asp?a=3034&q=410762.

a. Additional funding to insure the USDA NRCS National Aerial Imagery Program flights covering the State of Connecticut will include a Color Infrared band in addition to the natural color (RGB) bands.

b. Additional funding for UConn CLEAR program to classify land cover using the USDA NRCS National Aerial Imagery Program flight data for canopy coverage and other environmental conditions such as impervious surfaces.

c. Additional funding to expand DEEP Coastal Color Infrared aerial photography program to include complete coverage for coastal communities.

d. Additional funding for UConn CLEAR and or MAGIC to georeference and mosaic the various collections of historic aerial photography collections including the highest resolution 193 and 1965 aerial photos housed at the State Library.

3. Parcel Data. Continue and establish new funding mechanisms to develop a statewide parcel dataset. This also includes easements and other encumbrances on private property including electric utility easements and rights-of-way. Continue funding regional parcel development programs through OPM's Regional Performance Incentive Grant with emphasis on programs that accurately build parcel data through subdivisions and other surveyed sources. Parcel data should be developed with the specifications detailed in the Cadastral Data Standards and Guidelines on the CT GIS Council cadastral data subcommittee website: http://www.ct.gov/gis/cwp/view.asp?a=3034&q=410780.

    a. Encourage the Department of Transportation to translate existing paper and CAD Right-of-Way mapping to GIS format compatible with GIS parcel data.

    b. Encourage municipalities to properly research town right-of-ways and make that information readily available for incorporation into GIS parcel datasets.

4. GIS Systems. Expand the use of existing state web-based GIS systems already in place. The Connecticut Geographic Emergency Management System (GEMS) was set up and utilized during the Statewide Emergency Preparedness Drill starting on July 29th. This tool is made available on an as-needed basis.
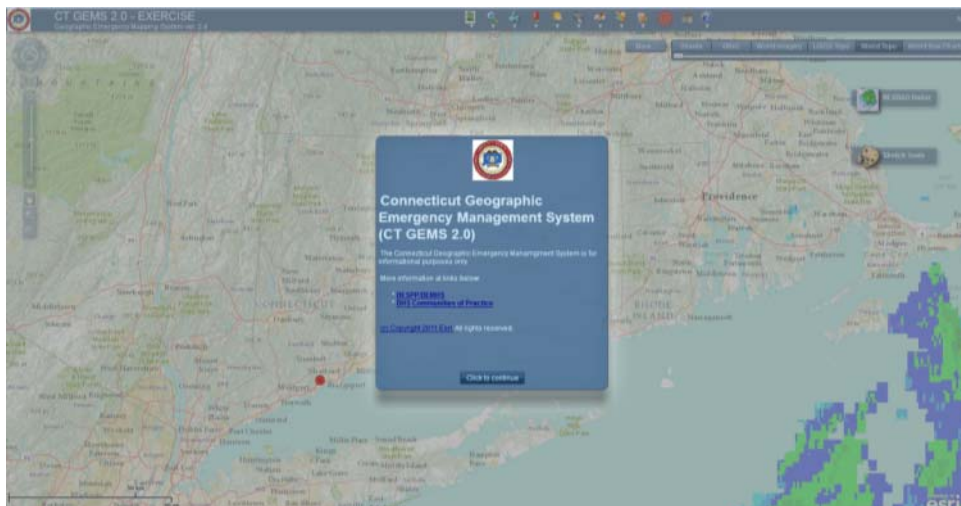
5. Through actions of the Geospatial Council, enable tools similar to GEMS to allow for roadside forest inventories and assessments be uniformly created, updated and maintained.   This should be secure and have the ability for the tree managing participants (utilities, municipalities and the state) to create, update and maintain tree information.  For many small municipalities, this would be the only resource available to conduct such activities.   This system needs to be made available through standard web browsers as well as common mobile devices such as smart phones and tablets.

6. In addition to a system to maintain tree condition data, there should be a system for citizens and rate payers to provide feedback to the tree care provided by the tree stewards similar to the Town of South Windsor's Community Citizen Service Request Dashboard http://www.southwindsor.org/Pages/swindsorct_it/csrd/csrdashboard.  This system allows the citizens of South Windsor to submit requests for services, see current or pending Town projects, and highlight town events.  This system currently provides this functionality from any computer connected to the internet but soon this functionality will be made available on certain mobile devices.

## Recommendations considered but not made

- There was considerable discussion by the Regulations, Legislation and Funding Working Group about the need to accelerate the time after a storm whereby a "make safe" call could be made by the utilities so that municipalities could clear roads of debris for essential purposes such as ensuring a safe path for emergency vehicles. It was determined that utilizing private contractors for "make safe" calls may not be possible, and that Northeast Utilities, in particular, was working toward an internal remedy to this problem.

- The Task Force has received several comments from the public about "undergrounding" electrical utility wires as one way to better secure the electrical utility infrastructure without the need to remove trees. There are many valid arguments on all sides of this issue, but the Task Force did not see it as of central relevance to our focus on vegetation management to reduce the risks of future storms – a scope that stretches beyond a strict focus on utility infrastructure. We do agree that it is an important issue that should be properly explored by another group of experts focusing on hardening Connecticut's infrastructure for greater power reliability in the future.

- The Task Force was unable to propose Utility Right-of-Way management within the time constraints allotted to the group. One of the fundamental research papers that the Task Force has reviewed is the seminal work by Professors William A. Niering and Richard H. Goodwin at Connecticut College in 1974 entitled "Creation of Relatively Stable Shrublands with Herbicides: Arresting "Succession" on Rights-of-Way and Pastureland." More work must be done on this important topic.

## IV. Conclusion

One of our Task Force Members recently asked the question: "How much will the next storm cost us?" Of course, that question is unanswerable, but we do know that Connecticut's roadside forest has generally been under-managed and under-resourced for decades and we are paying the price today for that benign neglect by suffering extensive and expensive damage caused by falling trees and branches during storms.

We have enjoyed benefits from our roadside forests for many years, but we have been unwilling to make the necessary maintenance and replanting investments that are essential if we are to enjoy continued benefits from a healthy roadside forest. Our current benign neglect of the roadside forest would be like buying a new care and ignoring routine maintenance (e.g., changing the oil) or not replacing broken parts like worn out brakes pads. This has to change if we wish to look forward to a more storm-resistant roadside forest, but we must begin taking positive action now:

- Private tree owners must take an active role in understanding their obligations for stewardship of their trees. Along with recognizing the benefits that trees provide, they should also recognize that poor stewardship reduces potential tree benefits and impacts the health and well-being of their community;
- Municipalities must invest in the tree wardens, to increase their overall knowledge and capabilities in managing a critical public resource. Municipalities must make plans to manage their roadside forests better by taking inventory of what they have, conducting risk assessments, and determining the local balance required to both enhance safety and respect the aesthetics of their community's character;
- The State must show leadership and provide expertise, incentives, and funding to help ensure that when trees fail or are removed, they are replaced by the Right Tree in the Right Place;
- The Utilities must look for opportunities to partner with landowners to maintain and establish a future healthy roadside forest;
- In particular, funding and resources must be directed to the municipalities, which have enormous responsibilities regarding the public's trees but often very little capacity to meet those responsibilities. Without additional funding and resources for municipalities, the state can only make the most minimal efforts to improve the management and planting practices alongside of its roads and highways.

The time to act is NOW, though we understand the dedicated work of managing the roadside forest will take place over several decades. However, if we wish to achieve a healthy roadside

forest for Connecticut with shared benefits for our communities, then we must be willing to assume the shared responsibilities necessary to care for it.

To usher the implementation of these recommendations forward, we have taken the liberty of sketching out an initial "To Do List" on the following page showing some of the proposed actions and the organizations who we anticipate will be leading and/or supporting various efforts.

| Shared Initial To Do List/Actions | CT DEEP | ConnDOT | Munici-palities | Utilities | CAES | UConn | Tree Wardens Assn | NGO's[8] |
|---|---|---|---|---|---|---|---|---|
| Tree warden certification standards | P | | | | S | | P | |
| Tree removal standards | P | S | S | S | S | S | S | S |
| Tree maintenance schedule standards | S | P | P | P | S | | P | |
| Model roadside forest management plan | P | P | S | S | S | S | S | S |
| Implement roadside forest mgt plan | S | P | P | P | | | P | |
| Development of municipal budget request | | | P | | | | P | S |
| Advocate for funding of roadside forest management in legislature | P | | P | P | S | | P | P |
| Advocate for legislation related to Task Force recommendations | P | P | P | S | S | | S | P |
| Pursue funding for roadside forest management from other sources | S | | S | S | S | | S | P |
| Initiatives regarding Right tree, Right place | P | S | S | S | P | S | S | S |
| Host website for education and outreach | P | | | | P | S | | S |
| Education and outreach - tree care | P | | S | S | P | S | S | P |
| Print & Disseminate Public Education Brochures | P | | S | S | P | S | S | S |
| Request FEMA post-storm standards recognize tree care standards | P | P | S | S | | | S | S |
| Coordinated management to include trees, utilities, roads, property and people | S | S | P | P | | | S | |
| Roadside tree research | S | | | | P | P | | |
| Roadside forest research | S | | | | P | P | | |
| Coordination of Inventory & GIS Mapping of roadside forest | P | S | S | S | S | S | | |
| **P = Primary** Takes the initiative in the particular area, develops alternatives, analyzes situation. | **S = Support** Consulted by or plays a support role to the Primary party. | | | | | | | |

[8] NGO's include the Connecticut Urban Forest Council, the Connecticut Forest & Park Association, AudubonCT and many others.

# APPENDIX 1: TASK FORCE MEMBER BIOS

**Kim Barbieri** is the Land Use Enforcement Officer for the City of Torrington. With a background in landscape architecture, Kim serves as the staff for the Conservation, Wetlands, and Planning & Zoning Commissions, and in this capacity she has become very familiar with regulations and ordinances that affect new development and its relationship with the built environment, existing infrastructure, and the roadside forest.  Kim is on the Executive Board for the CT Association of Zoning Enforcement Officials, is a board member for the Center Cemetery Association, and is a volunteer with the Little Guild of St. Francis.

**Tim Bockus** is the Director of Public Works for the Town of East Hartford.  The Department of Public Works is responsible for seven separate divisions consisting of Engineering, Fleet Services, Waste Services, Highway Services, Facilities, Park Maintenance, and Administration. The Department provides for the maintenance of over 140 miles of Town roads, 4 miles of levee flood protection system, 22 public buildings, and over 650 acres of public park space. Tim is the Town's Tree Warden and as Director, serves as a member on East Hartford's Beautification Commission, Insurance Committee, and Executive Safety Committee.  He holds a Bachelors degree in Mechanical Engineering and a Masters degree in Public Policy from Trinity College.

**Theresa (Teri) Brown** is Regulatory Director for AT&T in Connecticut. She has extensive experience in working with the Public Utilities Regulatory Authority (PURA) on issues involving utility infrastructure in the public right of way.  In addition, she has been involved with PURA and other state agency storm response and preparedness activities.

**Ken Bullard** is the Line Clearance Arborist at The United Illuminating Company (UI).  Ken is a Certified Arborist for the International Society of Arboriculture and has been a Licensed Arborist in the State of Connecticut since 1993.  Since 1994, he has overseen the vegetation management of Transmission, Distribution, and Substation systems at UI.

**Chris Donnelly** is the Urban Forestry Coordinator within the Division of Forestry of the Connecticut Department of Energy and Environmental Protection. Chris has a CT Arborist License, is certified as a Forester by the State of Connecticut, and is also an ISA-certified Arborist.  As State Urban Forestry Coordinator, Chris is responsible for outreach to all 169 cities and towns, administers a small grant program that encourages local urban forestry projects, and provides advice and assistance on urban forestry for a wide range of audiences.  He is active with the CT Urban Forest Council and with the CT Tree Protective Association, and is a member of the International Society of Arboriculture and the Society of American Foresters.

**Mark Goetz**, is a Senior Information Management Specialist with Burns & McDonnell.  He has worked for the Cities of Milford and Hartford as well as the Regional Planning Agencies (Northeastern Connecticut Council of Governments and the Greater Bridgeport Regional Council) in a variety of Geographic Information System leadership positions.  Mark has also been the Co-Chair of the Brooklyn Conservation Commission and participant in various State of Connecticut GIS initiatives.  During his work with Milford and Hartford, Mark assisted on several Vegetation Management projects including Milford's Volunteer Tree Inventory Project and Hartford's Urban Forest Effects (UFORE) Project.

**David Goodson** is the Manager of Vegetation Management at Northeast Utilities and is responsible for the distribution line clearance programs at the Connecticut Light & Power Company, the Western Massachusetts Electric Company and Public Service of New Hampshire. Dave has been active in tree care industry organizations throughout his career.  He is a Past President of the Connecticut Tree Protective Association and the New England Chapter of the International Society of Arboriculture.  As a member of the International Society of Arboriculture's Board of Directors he was Chair of the Finance Committee.  Dave was one of the founding members of the Connecticut Urban Forest Council and speaker at its Meskwaka Project.  He is an honorary Connecticut Tree Warden and presently represents the Utility Arborist Association on the American National Standards Institute Z133.1 Tree Care Industry Safety Committee.

**James G. Govoni** is president of the Tree Wardens Association of CT and is past Board Director of the Hartford Cooperative Education Council. Jim has been employed since 1981 by the town of Windsor and is currently their Municipal Forester and Tree Warden.  Jim is a member of the CT Tree Protective Association and has participated in the Meskwaka tree programs and Coverts Project.

**Eric Hammerling** is Executive Director of the Connecticut Forest & Park Association (CFPA) and is serving as Chair of the State Vegetation Management Task Force. Since its inception in 1895, CFPA has supported the science-based, sustainable management of Connecticut's forests. Eric is the lead advocate for CFPA at the state legislature where he works primarily on forestry, recreation, education, and trail-related issues. Eric is a Board Member of both Connwood Foresters, Inc. and the Friends of CT State Parks, and also serves on the Steering Committees for the Connecticut Land Conservation Council, Connecticut State Parks Centennial Committee, and the Working Lands Alliance.

**Jane Harris** is a CT licensed arborist and chair of the Middletown Urban Forestry Commission. She is also president of the Rockfall Foundation, an environmental and educational foundation serving Middlesex County. Jane is a member of the board of the CT Chapter of the American Chestnut Foundation and is the manager of an experimental chestnut orchard. Jane is active in

the Middletown Garden Club, the Garden Club of America, and the CT Tree Protective Association, as well as serving on the board of the Middletown Old Burying Ground Association, where she helps to maintain the historic landscapes.

**Mary Hogue** is a member of the Fairfield Forestry Commitee and Fairfield League of Women Voters. Mary worked with a consortium of tree conservation and League of Women Voter's groups in Fairfield County to put on a forum focused on "Power Struggle: Balancing the Needs of People, Power and Trees" held in February at the Darien Town Hall.  Mary is a certified Project Management Professional as well as a graduate of the UConn Master Gardener and Meskwaka tree programs and has been involved for many years with the Connecticut Audubon Society, Mill River Wetland Committee, Fairfield PTAs and many other civic organizations.

**John Jasinski** has been at the Public Utilities Regulatory Authority (PURA) since 1998 as an electrical engineer in the Electric Unit (including a year and a half period at ConnDOT in the Bureau of Policy and Planning).  Previous to PURA, John worked for 21 years as an electrical engineer and analyst in several departments at The United Illuminating Company in New Haven, and worked for 4 years as an electrical engineer and researcher at Connecticut electrical manufacturing companies.

**Leslie Kane** is Director of the Audubon Center Bent of the River, a unit of Audubon CT and the National Audubon Society. Audubon's mission is to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the Earth's biological diversity. In her position at the Bent of the River, Leslie oversees the education, public policy, and conservation programs at the 700-acre nature center and sanctuary and works regionally to implement Audubon's Mission.  Leslie currently serves as a Deputy Tree Warden for the Town of Southbury and on the Board of Directors of the Southbury Land Trust. She is also a representative for the Town of Southbury on the Central Naugatuck Valley Council of Governments.

**Kevin J. Kelly** is the Director of Operations for the Town of Colchester Public Works Department. Since 1999, he has worked in the management, and has overseen the maintenance of the Town's roadway infrastructure. Kevin is a certified Tree Warden and has served in this position for the town, managing the roadside forest. In addition, he is a member of the Executive Board of Directors for the Connecticut Tree Wardens Association and is the current Vice-President. Kevin is a subcommittee chair, and member of the DEMHS Region 4, Regional Emergency Support Function (RESF) #3, whose purpose is to develop and implement a system of resources and response capability for handling regional emergencies.

**William DeVane Logue** has been a mediator, facilitator, consensus builder, trainer and consultant since 1986. He regularly facilitates public policy consensus building work on

environmental, transportation and human service issues in Massachusetts, New York and Connecticut. Bill has designed and led conflict resolution training programs for numerous organizations in the public and private sector. Past chair of the Connecticut Bar Association Alternative Dispute Resolution Section and Co-Chair of the Standing Committee on Dispute Resolution in the Courts, Bill is also a past President of the New England Chapter of the Association for Conflict Resolution. Bill teaches negotiation and mediation representation at Quinnipiac Law School. He is a Senior Affiliate Practitioner of the Massachusetts Office of Public Collaboration. Bill is a graduate of Brown University and the UConn School of Law.

**JoAnn Messina** is the Executive Director of the Greenwich Tree Conservancy (GTC) a non-profit organization created in 2007 to preserve and enhance the tree and forest resources of Greenwich to benefit the community. The GTC locates sites for new tree plantings, educates on the value and benefits of community trees and the importance of stewardship, advocates for policies and funding to integrate tree protection into community planning and fosters public private partnerships. JoAnn is a graduate of the Meskwaka tree program and has held several leadership positions in Greenwich including the President of the League of Women Voters. Earlier this year, she co-chaired a regional committee of league and tree organization leaders to present "Power Struggle: Balancing the Needs of People, Power and Trees."

**John Mitchell** is the Manager of System Maintenance at The United Illuminating Company (UI) and is serving as a member of the State Vegetation Management Task Force.  System Maintenance is an integral part of UI's Electric System Organization which incorporates maintenance management, vegetation management, and structural/civil engineering for the Transmission and Distribution System.  Vegetation management programs employed at UI incorporate tree pruning best practices and special programs to maintain system reliability, public and worker safety, and power quality for the T&D System.

**John Parry** is an Urban Forestry Specialist with the USDA Forest Service in Durham, New Hampshire, providing assistance to state forestry agencies, municipalities and other organizations in New England and New York. The Forest Service provides expert advice, financial assistance, and technology transfer to help agencies and organizations protect and manage trees and forests. John has worked for over 32 years in urban forestry and forest management in the Northeast and Midwest States, and received a B.S. in Forestry from Michigan Technological University and an M.S. in Resource Management and Policy from State University of New York.  Recent work with The Forest Service has focused on tree inventories, tree risk assessment and storm response and recovery.

**Karl Reichle** is the Superintendent of Operations for South Windsor and has been employed by the town since 1974.  Karl has served as the Tree Warden for South Windsor since 1985 and is the Past President of the Tree Wardens Association of Connecticut.  Karl has studied

Arboriculture at Quinnipiac College, completed the CT Technology Transfer Center's Road Master Program, and has 40 years of horticultural/agricultural experience.

**R. Bruce Villwock** is the Transportation Landscape Designer III for the CT Department of Transportation, where has been employed for 16 years. Bruce is a licensed arborist, certified tree warden, certified as a supervisory pesticide applicator, and has a Associates Degree in Forestry from Paul Smith's College. Bruce is a Board Member of the Tree Wardens Association of Connecticut, and serves on the state's Scenic Roads Advisory Committee.

**Jeffrey S. Ward**, Ph.D., is Chief Scientist-Department of Forestry and Horticulture at The Connecticut Agricultural Experiment Station. Author of ninety papers, his forest dynamics research has included studies of long-term tree mortality and growth. He has been secretary, CT Tree Protection Examination Board since 1998, on the Executive Committee of the CT Urban Forest Council, and is an advisor to Audubon CT and the CT Endangered Species Committee. He is a past president of the CT Tree Protective Association and Forest Science Coordinator for the New England Society of American Foresters.

## APPENDIX 2: TASK FORCE GROUND RULES AND ROLES

*Approved at April 24, 2012 State Vegetation Management Task Force Meeting*

In processes where groups of people come together to discuss difficult issues it is easiest to hold productive dialogue and deliberation when the group adopts a set of behavioral and decision making norms at the outset of the discussion. The goal is to create mutually shared expectations and a common understanding and vocabulary for interactions and decisions.

**Purpose & Mission of the Task Force**

The purpose of the Task Force is to ensure necessary perspectives are represented by members who can commit the time and work effectively together, each bringing to the table the necessary knowledge and resources to inform discussion. The goal is to develop consensus recommendations to DEEP within the stated mission. It is anticipated that Task Force will meet approximately 9-10 times in order to complete its recommendations by August 31, 2012.

The Mission of the Task Force is to develop standards for road side tree care in Connecticut, vegetation management practices and schedules for utility rights of way, right tree/right place standards, standards for tree wardens, municipal tree inventories and pruning schedules.

**Ground Rules Governing Behavior of Participants**

1.  One person speaks at a time, no interruptions.
    a. Use name tent cards to cue, try to defer to an existing discussion thread.
2.  Avoid dominating the discussion so as to provide everyone with an opportunity to contribute.
3.  Express your own views and do not speak for others at the table.
4.  No personal attacks. Challenge ideas but not people. Listen as an ally, focus on the merits of what is being said and seek to understand. Ask clarifying questions.
5.  Make every effort to stay on track and on task to move deliberations forward.
6.  Avoid surprises by sharing information and concerns.
7.  Take into account information and advice from stakeholders and technical advisors and make recommendations based on the best available information.
8.  Seek to identify options or recommendations that represent common ground, without glossing over or minimizing legitimate disagreements. Should a member have a serious disagreement, they will work with the chair or facilitator to develop methods for productively bringing forward and addressing or resolving the disagreement with the Task Force as a whole. Each participant agrees to take into account the interests of the participants, other stakeholders, general public and the governmental organizations.
9.  Meetings of the Task Force will be open to the public. Work Group meetings, if necessary, may be held as needed.
10. Each person will speak to the public or others only about their own views. No member will speak on behalf of other participants or the group as a whole.

11.  Members of the public and other observers may attend meetings and must abide by these ground rules. At the discretion of the chair and the facilitator, and as time is available, the public may be recognized to make observations.

12.  Communicating with the Media: No member of the Task Force will speak for the group to the media without the consensus of the Task Force. During the process, the Chair may respond to inquiries from the media and may speak to the process and its goals but not as to the status of the deliberations. If the Task Force believes that anything from a meeting should be communicated to the media they will do so either by press release or through the selection of a spokesperson on the particular issue.

**Ground Rules for Group Decision Making**

1.  Each person agrees to fully and consistently participate in the process unless that person withdraws. If a person is thinking of withdrawing, they agree to explain their reasons for doing so and provide others with an opportunity to accommodate their concerns.

2.  Consensus is reached when the participants agree they can live with and ultimately support the package of recommendations being proposed. Some participants may not agree with every feature of the package as proposed, but the disagreement is not sufficient enough to warrant opposition to the package as a whole.

3.  The facilitators will use the following scale to poll the group on whether consensus has been reached. Participants will express their level of comfort and commitment by indicating:

> 1. Wholeheartedly agree
> 2. Good idea
> 3. Supportive
> 4. Reservations – would like talk
> 5. Serious concerns – must talk
> 6. Cannot be part of the decision

If all participants fall between 1 and 3, consensus on the item is assumed. When someone falls between 4 and 6, that person must state their concerns clearly and offer a constructive alternative. The group will attempt to meet the interests of those parties, without diminishing their own interests.

4.  If at the conclusion of the process, some members of the Task Force do not agree with the consensus package of recommendations of the larger group, the Task Force will articulate in its recommendation those differences in order to assist the agency in making an informed decision.

**Roles of Participants**

**A. Task Force Members**
The role of the Task Force Members is advisory. The Task Force is being asked to advise DEEP on issues identified in the mission.
To do this, Task Force Members are expected to:
• Attend regular meetings of the group;

• Openly communicate Task Force progress with people or groups with whom they are affiliated;

• Present their concerns and issues, and those of people and groups with whom they are affiliated, at Task Force meetings; and

• Work collegially with other Task Force Members, mutually abide by and enforce these ground rules and strive towards consensus agreements.

Meeting Attendance and Removal: The success of the Task Force will depend largely on the consistent attendance and collegial behavior by the Task Force Members. Task Force Members are expected to make a concerted effort to attend all meetings of the Task Force. Members who fail to regularly attend scheduled meetings may be removed from the Task Force by a two-thirds vote of Members present at a scheduled meeting. A Task Force member whose conduct is detrimental to the Task Force or who refuses to render reasonable assistance in carrying out its mission may be considered for removal. Any such member proposed to be removed shall be entitled to at least five days notice in writing of the meeting at which such removal is to be voted upon and shall be entitled to appear before and be heard at such meeting. The member may be removed from the Task Force by a two-thirds vote of Members present.

**B. Connecticut Department of Energy and Environmental Protection**
As the sponsor and convener, DEEP determines the goals and objectives of this process and how the outcomes will be used. The agency is also responsible for securing the endorsement of leadership and engaging participants; planning and organizing the process with the facilitator as appropriate, and allocating sufficient resources to see the process through to conclusion. DEEP will be represented on the
Task Force in an *ex officio* capacity and will provide technical and other information to the Task Force to assist in its deliberations. DEEP is responsible for final decisions regarding the implementation of any recommendations or coordination with other agencies or organizations concerning implementation of any recommendations.

Representatives of DEEP are committed to working with, and supporting, the Task Force and carefully considering the recommendations of the Task. Senior staff will participate in discussions of the Task Force, openly discussing their knowledge of the issues, legal/regulatory/technical requirements, institutional constraints and budgetary information. To the extent feasible, DEEP will provide technical support to the Task Force with respect to a variety of issues such as state and federal regulatory and legislative requirements, limitations and opportunities in the implementation and financial implications of proposed recommendations.

**C. Facilitator**
The facilitator will manage the meetings and assist the Chair and Task Force. He will work with all of the Members and DEEP to ensure that the process runs smoothly. The role of the facilitator usually includes:
- Developing draft agendas,

- Focusing meeting discussions,
- Working to resolve any impasses that may arise, and
- Preparing meeting summaries and a draft of consensus work products.

# APPENDIX 3: TASK FORCE WORKING GROUPS

***Public Education:*** What are the key messages that the public needs to hear about the roadside forest that will help support good policy and appropriate actions?

- What does the public need to know about trees to better understand the necessities of roadside forest management?
- What does the public need to know about the roles and responsibilities of private property owners, municipalities, utilities, and the state (DoT, DEEP Forestry, DEEP PURA, Ag Experiment Station, UConn) to understand the context for road side forest management, tree planting, etc.?
- Can we develop a product such as an informational brochure and/or Public Service Announcement on "Who is Responsible for your Community's Trees?" or "What Landowners need to know about Trees and Power?"

***Regulation, Legislation, and Funding:*** What regulatory context and resources are required to move beyond current obstacles and effectively manage existing and future roadside forests in Connecticut?

- Is a different regulatory structure needed?
- What local ordinances or statewide legislative proposals should be helpful?
- What funding/personnel are required, or how do you make a proposal for additional resources?

***Technical/Standards:*** What standards for pruning, integrated vegetation management, and risk assessment(s) are necessary to guide the management decisions made for existing and future roadside forests?

- What standards currently exist or are being used in Connecticut?
- What standards (from elsewhere) might be useful in Connecticut?
- How might these standards vary based upon location, road type, different risk assumptions about storm intensities/power outages, etc.?
- How will Right Tree/Right Place guidelines be best utilized?

# APPENDIX 4: TWO STORM PANEL REPORT FINDINGS ON TREE TRIMMING

In January, 2012, the eagerly-awaited *Two Storm Panel Report* was issued as "a robust review and evaluation of Connecticut's approach to the prevention, planning, and mitigation of impacts associated with emergencies and natural disasters that can reasonably be anticipated to impact our State (p.1, *Two Storm Panel Report*)." The findings and recommendations on tree trimming follow:

**Two Storm Panel Report Findings**
· Trees have great value, both aesthetic and economic, and Connecticut residents not only take great pride in their beauty, but benefit significantly from them.
Testimony presented by the Urban Forestry unit of DEEP showed the heating and cooling costs of a home were lowered with the presence of appropriate trees.
· Trees knocked down 90% of the utility wires that fell in Tropical Storm Irene.
· Data presented to the Two Storm Panel indicated that Connecticut has one of the most dense tree canopies in the United States (# 1 in the U.S. for our Wildland/Urban Interface tree density). Connecticut's tree profile, also, revealed trees with larger circumferences than average. UIL Holdings estimated that over 300,000 trees are planted in the utility pole rights of way (ROW) in its 17 town territory.
· Tree trimming and removal budgets consist of four sources:

| Source of Tree Trimming Budget | Amount of Budget (2011) |
|---|---|
| Municipal (Used primarily for maintaining health of town trees, not for utility rights-of-way) | Approximately $10 million a year |
| Connecticut Dept. of Transportation (Used primarily for roadway clearance and safety) | $550,000 per year |
| Telecommunications companies | Failed to provide a tree trimming budget to Two Storm Panel |
| CL&P (For 143 towns) | $24,625,000 |
| UI (For 17 towns) | $3,418,883 |

· In its proposal to harden or strengthen its pole and wire infrastructure that CL&P submitted to the Two Storm Panel, the company recommended that they be approved to spend $366 million over the next ten years, essentially a 50% increase over what CL&P spent in the previous ten years, on tree trimming and vegetation management.

· There does not exist in Connecticut specific industry standards for tree trimming aside from the safety standards in ANSI Z 133.1 and OSHA 1910.269 and the operation standards in the ANSI A 300 series to direct the actions of tree wardens or of those performing utility pruning.
· There are also no criteria by which a person may be appointed a tree warden.

**Two Storm Panel Report Recommendations:**
**20)** Conduct a state-wide tree risk assessment and prioritization schedule particularly targeting hazardous trees.

**21)** Establish a state-wide Hazardous Tree Removal Fund that will provide matching grants to homeowners for the removal of trees on private property that endanger utility wires.

**22)** 1.5 % of all funds approved for utility vegetation management by PURA should be used to fund the private property Hazardous Tree program for 5 years.

**23)** Establish a State Vegetation Management Task Force (SVMTF) that will develop standards for road side tree care in Connecticut, vegetation management practices and schedules for utility rights of way, right tree/right place standards, licensing standards for tree wardens, municipal tree inventories and pruning schedules. This Task Force should consist of State, municipal, utility and nonprofit environmental organizations. The Commissioner of the DEEP or his/her designee should be its Chairperson.

**24)** DEEP should convene appropriate State agencies, municipalities and utilities for the purpose of creating a 5 year collaborative effort for an enhanced tree maintenance program and the development of an educational effort regarding the use of appropriate and diverse tree species in both public and private spaces.

**25)** At least four entities—electric utilities, municipalities, telecom utilities, and the State of Connecticut—engage in tree trimming/removal activities that may protect the necessary infrastructure. On a semiannual basis, these activities should be coordinated amongst them to maximize the effectiveness of each entity and goals/targets should be established. This activity would be monitored through the SVMTF.

**26)** Increase DOT Tree Maintenance budget by $1 million a year for three years for road/ tree safety program.

**27)** Legislation should be adopted providing for the removal of "hazard trees" from private property by utilities or municipalities, which should include reasonable protections for property owners.

# APPENDIX 5:  DRAFT BROCHURES FOR PUBLIC EDUCATION

Following are two educational pieces (still works in progress) designed to be utilized with diverse audiences:

1) A quick summary of the many benefits associated with managed trees;

2) A draft brochure developed for an audience of private landowners – homeowners and businesses.

**If you have thoughts about the following brochures that you would like to share with the members of the State Vegetation Management Task Force, please contact Task Force Chair, Eric Hammerling via ehammerling@ctwoodlands.org.**

## The Benefits of Managed Trees:

For every dollar you spend on tree maintenance you get $3 dollars of benefits
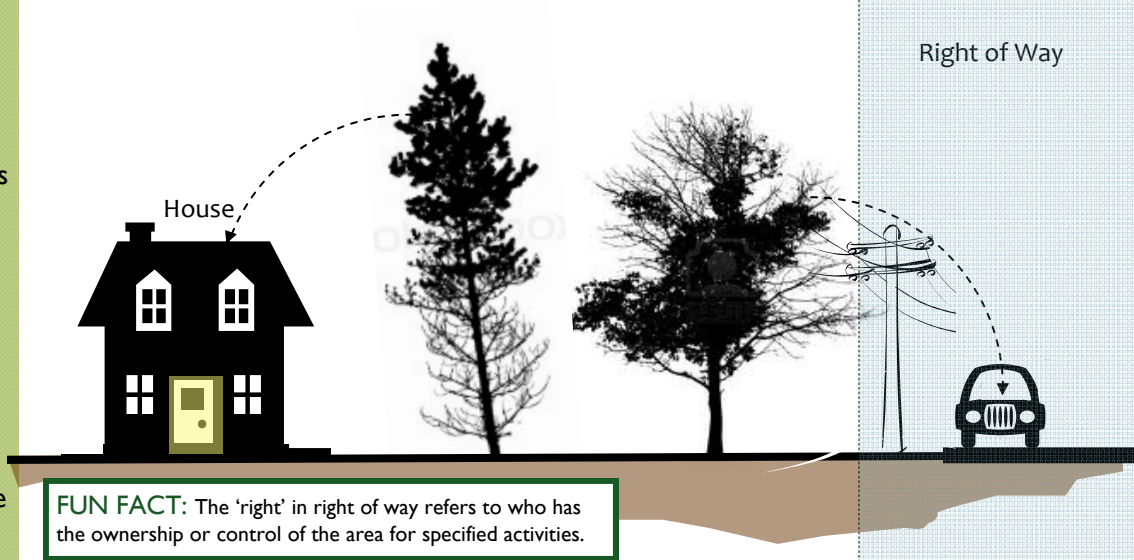
- Tree-lined commercial districts are more successful because shoppers are willing to travel more ,over longer distances, pay more for parking, stay longer to shop, and spend 12% more for goods

- 100 mature trees catch 139,000 gallons of rain water per year.  Trees have a direct positive effect on storm water drainage preventing dangerous flooding and erosion and reducing the need to expand expensive wastewater treatment facilities

- 100 mature trees remove 430 pounds of pollutants out of the air each year.   An acre of trees produces enough oxygen for 18 people and absorbs 2.6 tons of carbon to offset driving 26,000 miles.  Clean air is one of the reasons why it is so important to replant trees when they have to be removed

- Properly sited trees can save up to 56% on air conditioning costs and up to 30% on heating costs.  This means fewer emissions from power generation and happier residents with lower energy bills.

- Shade trees can extend the life of asphalt by protecting the pavement from the weathering effects of direct sunlight.

- Trees provide a more hospitable environment and have a positive effect on people's mental and physical well-being

- Trees offer food and habitat for wildlife such as songbirds and beneficial insects

- Trees absorb the high-frequency noises that people find most upsetting.  They can reduce noise  up to 15 decibels if planted in a large mass with other vegetation

- Each large front yard tree adds 1% to house sales prices.  Large specimen trees add up 15% to property values

- Apartments and offices in wooded areas rent more quickly, have higher occupancy rates, and retain tenants longer

- Workers at businesses in wooded developments are more productive with less absenteeism

- Tree-filled neighborhoods have  fewer incidents of domestic violence

- Trees create feelings of relaxation and well being, provide privacy, promote a sense of solitude and security, and contribute to a sense of community pride

- Trees encourage safer driving through traffic calming, which leads people to drive slower and more carefully on tree-lined streets.

You have a great place with some trees in the yard . . . what now?

Take a good look—Do the trees have any dead branches, holes, signs of diseases or are they leaning badly? These may be signs that the tree needs some attention—or even removal.
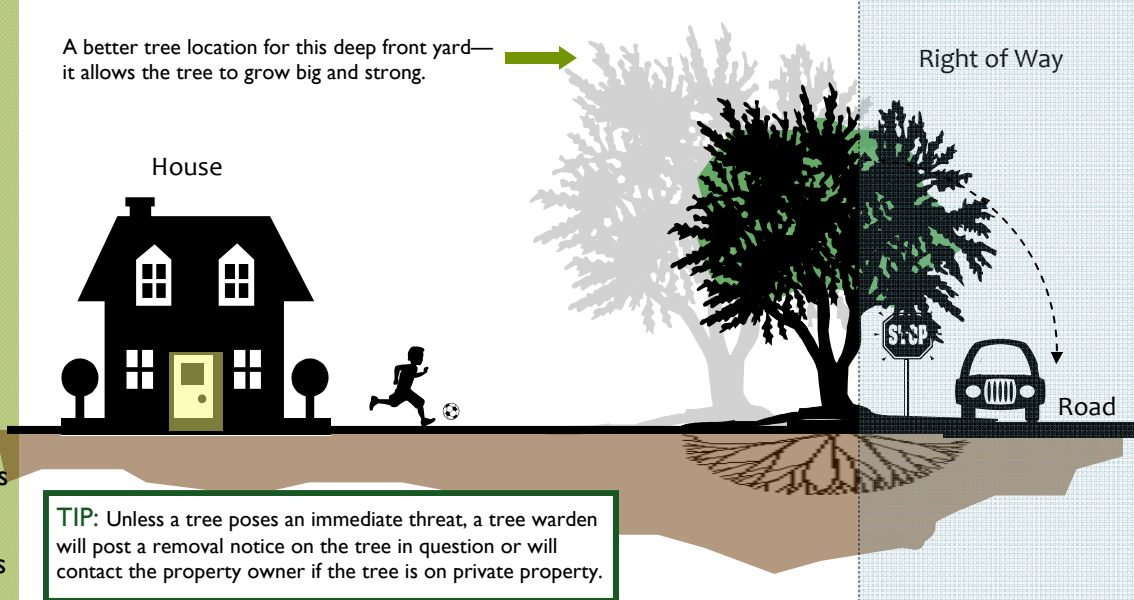
Do you have trees close to the road or near power lines? These trees require special care.

House

Right of Way

**FUN FACT:** The 'right' in right of way refers to who has the ownership or control of the area for specified activities.

# Residential

Did you know that if your tree or parts of your tree (branches, roots etc.) extends from your property into a public road's right of way it falls under the jurisdiction of the town's tree warden?
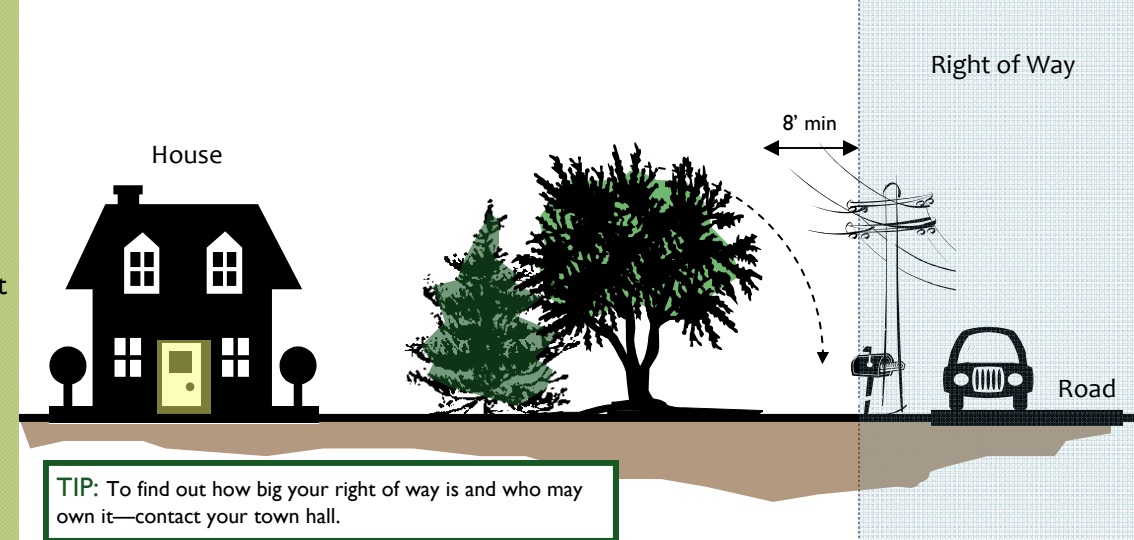
Every town has a tree warden who is generally a professional with the responsibility to manage and care for the trees along our roadways and on municipal lands to ensure our roads are kept open and safe.

A better tree location for this deep front yard—it allows the tree to grow big and strong.

House

Right of Way

Road

**TIP:** Unless a tree poses an immediate threat, a tree warden will post a removal notice on the tree in question or will contact the property owner if the tree is on private property.
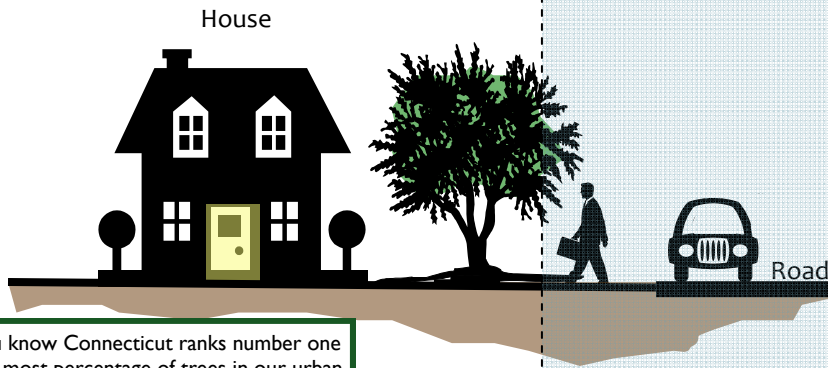
What is a <u>right of way</u> anyhow? For most streets, the pavement sits within a larger area called the right of way, which is typically owned by the town or the state. The right of way can include trees, utility poles, street signage and mailboxes, and although it can look like an extension of your front yard, it may be owned or controlled by someone else.

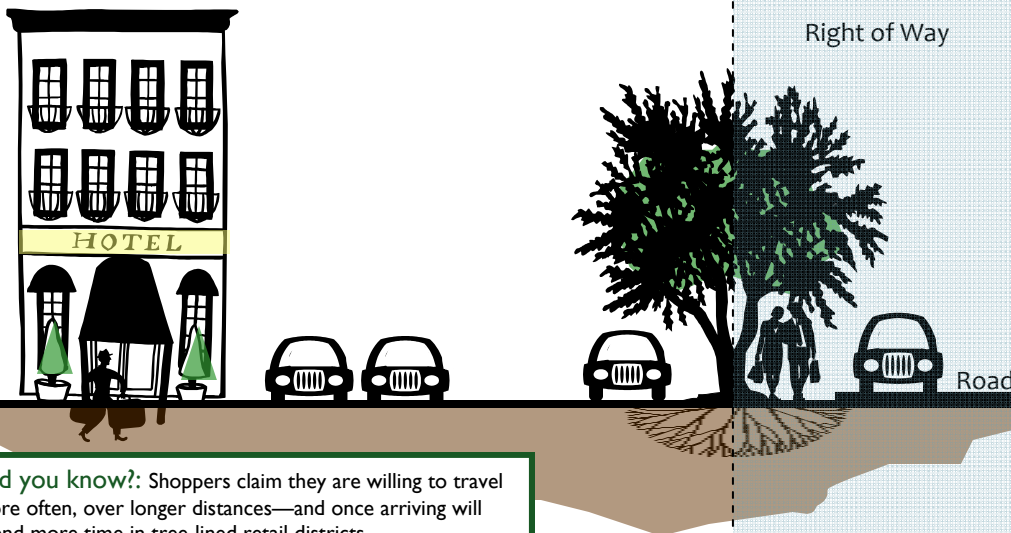Be aware of the public right of way when planting new trees.

House

Right of Way

8' min

Road

**TIP:** To find out how big your right of way is and who may own it—contact your town hall.

## House

If your property is smaller, you may wish to consider using a smaller tree. A smaller tree would keep in scale with your home as well as limit possible conflicts with the right of way.

To find recommendations for the best tree to use check out *"Right Tree—Right Place"* - see the "Links" section for a web-site location.
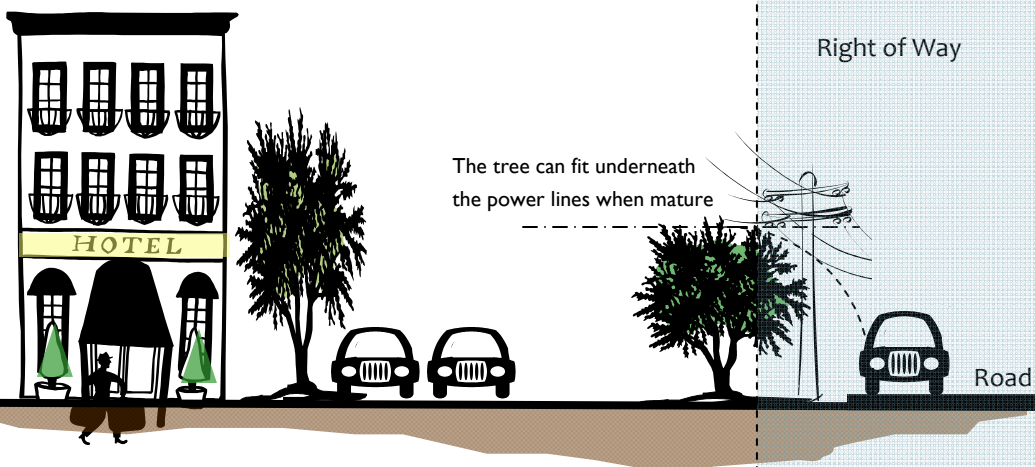
Right of Way

Road

FUN FACT: Did you know Connecticut ranks number one in the nation for the most percentage of trees in our urban areas?

# Business settings

For businesses, many of the same rules apply: limit your liabilities by choosing the right plant for the right place; avoid conflicts with utilities and road-ways, and provide your custom-ers and employees with clean air, shade and surround them with beauty!

Plant the right tree in the right place for yourself and see energy savings, an increase in customers and increase your property value up to 10%.

Right of Way

HOTEL

Road

Did you know?: Shoppers claim they are willing to travel more often, over longer distances—and once arriving will spend more time in tree-lined retail districts.

**Trees are good for business!**
Trees can stimulate economic development by attracting new businesses and tourism, and making retail areas more attrac-tive to shoppers.

Consider using multiple smaller trees instead of one large tree to create more human scale spaces and to provide a softer more welcoming look to your business.

Right of Way

HOTEL

The tree can fit underneath the power lines when mature

Road

FUN FACT: Did you know most utility companies do not own the trees near their lines?

# MAINTENANCE: PROTECTING YOUR INVESTMENT

When you have trees on - or near your property, the best way to make sure the trees remain an asset to you is to take care of them. This includes annual visual inspections, basic pruning, and knowing when to call in a professional arborist. They are trained in best management practices to maintain the health of your trees.

## BEST MANAGEMENT PRACTICES

No matter who you call, avoid "tipping" or "topping" a tree. *Tipping* a tree involves cutting off the tips of the branches to 'shape' the tree and *Topping* a tree includes cutting off the main leader of a tree. If *topping* a tree is necessary to maintain it at an appropriate size for the property—it wasn't the right tree for the right place and you may be better served removing the tree and replacing it with one suitable for the site.

Keep an eye on your trees as they grow look for splits, insect damage, rot, holes, dead limbs or other things that may damage or weaken your trees. If you find any issues, contact a licensed arborist for a consultation. They may be able to help you correct the problem early so you can enjoy a healthy stable tree for along time.

### Why you shouldn't top a tree

Topping is the term used when the main branches of a tree are trimmed to a stub. The practice is widely considered to be harmful to a tree.

When a branch is cut to a stub, it causes weak but fast-growing sprouts to form in large numbers that make the tree bushier and require more pruning.

**Topped tree**

**Properly pruned**

Topping destroys a trees natural shape, weakens it and makes it more susceptible to disease and decay.

Properly pruned trees maintain their natural shape.

*Source: Dana Karcher, certified arborist with The Davey Resource Group, a division of The Davey Tree Expert Company*

THE CALIFORNIAN

## COMMON TREE ISSUES THAT REQUIRE ATTENTION:

1. Weak branch connections & splits 2. Cankers 3. Dead limbs 4. Rot and 5. Leaning with soil rising on the opposite side

## BROCCOLI VS ASPARAGUS

Trees are healthier when they have room to grow and can develop strong crowns (leaves) and thick trunks. A well formed tree can remind you of broccoli, whereas a tree grown in crowded or forested conditions are taller, thinner and more prone to toppling. The taller, thinner trees can remind you of asparagus.

Use this idea to help assess your trees to determine if they need thinning, reducing the number of trees in an area, to produce larger crowns and stronger trees.

# Tree Ownership—Resources
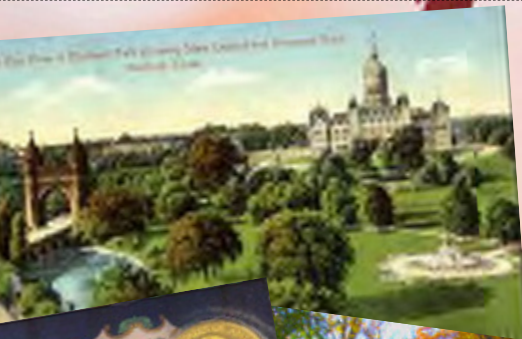
## CONNECTICUT

Images of our home state bring to mind scenic sea ports with tree-lined shores and grand buildings; covered bridges over wild water nestled amongst the brightly colored forested hills; the cool and shady town square and fruitful farms embraced by trees.  The Charter Oak, a majestic and stately tree from our past, is a symbol for the state featured on the Connecticut State quarter.

### TREES ARE CONNECTICUT!

We rarely think of trees, despite having a greater percentage of trees in our urban areas than any other state in the nation. Trees line our streets, shade our homes and they help fill our downtowns with life.  To be in Connecticut—to have property here—makes us all stewards of this great resource that so powerfully defines us and contributes to our identity.

## HELPFUL LINKS

Below are links to websites to provide you with detailed information about tree care; choosing the right tree to plant; and who to call if a tree is posing a potential problem.

- **Premises Liability & Your Trees:**
  http://www.vineandbranch.net/Premise_liability_4-9-07.pdf
- **Right Tree—Right Place :** http://www.cturbanforestcouncil.org/treeselection.html
- **UCONN Extension Service—Homeowners Guide**: http://www.ladybug.uconn.edu/
- **A Homeowner's Guide to tree maintenance:**
  http://www.fs.fed.us/ne/newtown_square/publications/brochures/pdfs/for_homeowners/guide_homeowners.pdf
- **Tree care guide to pruning.**  Discusses why topping trees is a bad idea, how to choose the right tree; discusses the value of your landscaping and tips on hiring an arborist:  http://www.treesaregood.com/home.aspx
- **UCONN Plant Data Base**—a great resource for learning more about plants that grow and thrive in CT:
  http://www.hort.uconn.edu/plants/

**APPENDIX 6: STATE STATUTES RELEVANT TO WORK OF TASK FORCE**

**Connecticut Tree Laws**

Relevant to the Work of the State Vegetation Management Task Force

As selected by Chris Donnelly, CT DEEP Urban Forestry Coordinator, and presented June 5, 2012

(*originally presented as powerpoint slides with underlining for emphasis*)

***Slide 1:***

Opening Comments:

Distinction needs to be made among:

- Federal Laws
- State Laws (Statutes)
- State Regulations
- Local Laws (Ordinances)

***Slide 2:***

Titles

Title 1: Provisions of General Application

Title 7: Municipalities

Title 13a: Highways and Bridges

Title 16: Public Service Company

Title 23: Parks, Forests and Public Shade Trees

Title 52: Civil Actions

***Slide 3:***

List of Statutes included

Sec. 1-1. Words and phrases. Construction of statutes

Sec. 7-148. Scope of municipal powers

Sec. 13a-140. Removal of trees along state highways. Penalties established by municipalities

Sec. 16-32g. Electric wire maintenance plans. Regulations.

Sec. 16-234. Rights of adjoining proprietors.

Sec. 23-58. Tree wardens; appointment; compensation; supervision.

Sec. 23-59. Powers and duties of wardens.

Sec. 23-60. Appropriations. Public trees; removal.

Sec. 23-65. Posting or distributing advertisements. Removing, pruning, injuring or defacing certain trees or shrubs. Restoration. Damages. Regulations. Permit for cutting or removal

Sec. 52-560. Damages for cutting trees, timber or shrubbery. Exclusion

Sec. 52-560a. Damages for encroachment on state, municipal or nonprofit land conservation organization open space land. Attorney General enforcement. Civil action.


*Slide 4:*

**Sec. 1-1. Words and phrases. Construction of statutes.** (a) In the construction of the statutes, words and phrases shall be construed according to the commonly approved usage of the language; and technical words and phrases, and such as have acquired a peculiar and appropriate meaning in the law, shall be construed and understood accordingly.

(q) Except as otherwise specifically defined, the words "agriculture" and "farming" shall include cultivation of the soil, dairying, forestry, raising or harvesting any agricultural or horticultural commodity, including … salvaging timber or cleared land of brush or other debris left by a storm, as an incident to such farming operations; the production or harvesting of maple syrup or maple sugar, or any agricultural commodity, including lumber, as an incident to ordinary farming operations or the harvesting of mushrooms … .  Nothing herein shall restrict the power of a local zoning authority under chapter 124.


*Slide 5:*

**Sec. 13a-140. Removal of trees along state highways. Penalties established by municipalities.**
(a) The commissioner may cut, remove or prune any tree, shrub or other vegetation situated wholly or partially within the limits of any state highway so far as is reasonably necessary for

safe and convenient travel thereon. No person, firm or corporation, and no officer, agent or employee of any municipal or other corporation, shall cut, remove or prune any tree, shrub or vegetation situated partially or wholly within the limits of any such highway without first obtaining from said commissioner a written permit therefor, provided however, that <u>nothing contained in this subsection shall limit the rights of public service companies, as defined in section 16-1, to cut and trim trees and branches and otherwise protect their lines, wires, conduits, cables and other equipment from encroaching vegetation.</u> <u>No such permit shall be issued by the commissioner unless the chief elected official of the municipality in which any tree with a diameter greater than eighteen inches is situated is notified in writing.</u> The notice shall include the location and a description of such tree to be cut or removed. <u>No such permit for the removal of any such tree, shrub or vegetation shall be refused if such removal is necessary for that use of such adjoining land which is of the highest pecuniary value.</u> If such permit is refused on any state highway right-of-way, where the state does not own the right-of-way in fee, the owner of such tree, shrub or vegetation may, within thirty days thereafter, request said commissioner in writing to purchase or condemn an easement for the purpose of maintaining such tree, shrub or vegetation and, if said commissioner does not purchase the same, he shall condemn it, in the manner provided for the condemnation of land for the construction, alteration, extension or widening of state highways. Any payment so made shall be from funds appropriated to the Department of Transportation.  Said commissioner may plant, set out and care for trees, shrubs or vegetation within the limits of such highways and, by agreement with the owner of land adjoining such highways, upon such adjoining land. Upon request in writing within thirty days of planting of trees, shrubs or vegetation to delimit boundaries of a highway by an adjoining owner not agreeing thereto, said commissioner shall purchase or condemn an easement for the purpose of maintaining such tree, shrub or vegetation in the manner provided in this subsection. When the removal of such tree, shrub or vegetation is necessary for that use of such adjoining land which is of the highest pecuniary value, said commissioner shall remove the same upon payment to him of all sums paid for said planting and for any such easement with interest at the rate of six per cent per annum. Any person, firm or corporation cutting, removing, damaging or pruning any tree, shrub or vegetation in violation of the provisions of this subsection, whether it was planted by the commissioner or not, without a permit from said commissioner, shall be fined not more than one thousand dollars for each such violation and shall be liable civilly for any damage in an action brought by said commissioner.

(b) Notwithstanding the provisions of section 51-164p, any municipality, by ordinance, may establish a civil penalty of not more than one thousand dollars, for cutting, removing, damaging or pruning any tree, shrub or vegetation in violation of the provisions of subsection (a) of this section, on any scenic road, designated pursuant to section 13b-31c, located in said

municipality. Any such ordinance shall provide for notice and an opportunity for a hearing prior to the imposition of any such civil penalty. Any person who is assessed a civil penalty pursuant to this subsection may appeal therefrom to the Superior Court.

*Slide 6:*

**Sec. 16-32g. Electric wire maintenance plans. Regulations.** Not later than January 1, 2008, and annually thereafter, <u>each electric or electric distribution company shall submit to the Department of Public Utility Control</u> a plan for the maintenance of poles, wires, conduits or other fixtures, along public highways or streets for the transmission or distribution of electric current, owned, operated, managed or controlled by such company, in such format as the department shall prescribe. Such plan shall include a summary of appropriate staffing levels necessary for the maintenance of said fixtures and <u>a program for the trimming of tree branches and limbs located in close proximity to overhead electric wires where such branches and limbs may cause damage to such electric wires</u>. The department shall review each plan and may issue such orders as may be necessary to ensure compliance with this section. The department may require each electric or electric distribution company to submit an updated plan at such time and containing such information as the department may prescribe. The department shall adopt regulations, in accordance with the provisions of chapter 54, to carry out the provisions of this section.

*Slide 7:*

**Sec. 16-234. Rights of adjoining proprietors.** No telegraph, telephone or electric light company or association, nor any company or association engaged in distributing electricity by wires or similar conductors or in using an electric wire or conductor for any purpose, shall exercise any powers which may have been conferred upon it to change the location of, or to erect or place, wires, conductors, fixtures, structures or apparatus of any kind over, on or under any highway or public ground, without the consent of the adjoining proprietors, or, if such company or association is unable to obtain such consent, without the approval of the Department of Public Utility Control, which shall be given only after a hearing upon notice to such proprietors; or to <u>cut or trim any tree on or overhanging any highway or public ground, without the consent of the owner thereof, or, if such company or association is unable to obtain such consent, without the approval of the tree warden or the consent of the department</u>, which consent shall be given only after a hearing upon notice to such owner; but the department may, if it finds that public convenience and necessity require, authorize the changing of the location of, or the erection or placing of, such wires, conductors, fixtures, structures or apparatus over, on or under such

highway or public ground; and <u>the tree warden in any town or the department may, if he or it finds that public convenience and necessity require, authorize the cutting and trimming and the keeping trimmed of any brush or tree in such town on or overhanging such highway or public ground</u>, which action shall be taken only after notice and hearing as aforesaid, which hearing shall be held within a reasonable time after the application therefor.

*Slide 8:*

**Sec. 23-58. Tree wardens; appointment; compensation; supervision.** <u>The selectmen of each town</u>, except those having cities with coextensive boundaries within their limits, which cities have an officer with similar duties to those of a tree warden who in fact assumes control of all the territory embraced within their limits, and the warden or burgesses of each borough <u>shall, within thirty days of their election, appoint a town or borough tree warden</u>, as the case may be. Such tree wardens shall be appointed for the term of one year and until their successors are appointed and have qualified. <u>Any tree warden may appoint such number of deputy tree wardens as he deems expedient</u> and he may, at any time, remove them from office. A town or borough tree warden and his deputies shall receive for their services such reasonable compensation, from the town or borough, as the town or borough may determine or, in default of such determination, as the selectmen or borough warden prescribes.

*Slide 9:*

**Sec. 23-59. Powers and duties of wardens.** The town or borough tree warden shall have the care and control of all trees and shrubs in whole or in part within the limits of any public road or grounds and within the limits of his town or borough, except those along state highways under the control of the Commissioner of Transportation and except those in public parks or grounds which are under the jurisdiction of park commissioners, and of these the tree warden shall take the care and control if so requested in writing by the park commissioners. Such care and control shall extend to such limbs, roots or parts of trees and shrubs as extend or overhang the limits of any such public road or grounds. The tree warden shall expend all funds appropriated for the setting out, care and maintenance of such trees and shrubs. The tree warden shall enforce all provisions of law for the preservation of such trees and shrubs and of roadside beauty. The tree warden shall remove or cause to be removed all illegally erected signs or advertisements, placed upon poles, trees or other objects within any public road or place under the tree warden's jurisdiction. The tree warden may prescribe such regulations for the care and preservation of such trees and shrubs as the tree warden deems expedient and may provide therein for a reasonable fine for the violation of such regulations; and such regulations, when

approved by the selectmen or borough warden and posted on a public signpost in the town or borough, if any, or at some other exterior place near the office of the town or borough clerk, shall have the force and effect of town or borough ordinances.  Whenever, in the opinion of the tree warden, the public safety demands the removal or pruning of any tree or shrub under the tree warden's control, the tree warden may cause such tree or shrub to be removed or pruned at the expense of the town or borough and the selectmen or borough warden shall order paid to the person performing such work such reasonable compensation therefor as may be determined and approved in writing by the tree warden. Unless the condition of such tree or shrub constitutes an immediate public hazard, the tree warden shall, at least ten days before such removal or pruning, post thereon a suitable notice stating the tree warden's intention to remove or prune such tree or shrub. If any person, firm or corporation objects to such removal or pruning, such person, firm or corporation may appeal to the tree warden in writing, who shall hold a public hearing at some suitable time and place after giving reasonable notice of such hearing to all persons known to be interested therein and posting a notice thereof on such tree or shrub. Within three days after such hearing, the tree warden shall render a decision granting or denying the application, and the party aggrieved by such decision may, within ten days, appeal therefrom to the superior court for the judicial district within which such town or borough is located. The tree warden may, with the approval of the selectmen or borough warden, remove any trees or other plants within the limits of public highways or grounds under the tree warden's jurisdiction that are particularly obnoxious as hosts of insect or fungus pests.

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**Sec. 23-60. Appropriations. Public trees; removal.** Each town, city or borough may appropriate annually a suitable sum to be expended by the town tree warden, borough tree warden, city forester or other similar officer, in the planting, trimming, spraying, care and preservation of shrubs or ornamental or shade trees within the limits of any public highway or grounds under his control and, at the discretion of the tree warden or other similar officer and with the written consent of the owner thereof, upon land adjoining such highway or grounds, if not more than ten feet therefrom, for the purpose of shading or ornamenting such highway or grounds. All shrubs and trees planted under the provisions of this section shall be deemed public shrubs and trees and shall be under the care and control of the tree warden, city forester or other similar officer and may be removed only upon a written permit from him.

***Slide 11:***

**Sec. 23-65. Posting or distributing advertisements. Removing, pruning, injuring or defacing certain trees or shrubs. Restoration. Damages. Regulations. Permit for cutting or removal.** (a) Any person, firm or corporation which affixes to a telegraph, telephone, electric light or power pole, or to a tree, shrub, rock or other natural object in any public way or grounds, a playbill, picture, notice, advertisement or other similar thing, or cuts, paints or marks such tree, shrub, rock or other natural object, except for the purpose of protecting it or the public and under a written permit from the town tree warden, the borough tree warden, city forester or Commissioner of Transportation, as the case may be, or, <u>without the consent of the tree warden or of the officer with similar duties, uses climbing spurs for the purpose of climbing any ornamental or shade tree within the limits of any public highway or grounds</u>, shall be fined not more than fifty dollars for each offense.

 (b) <u>Any person, firm or corporation</u>, other than a tree warden or deputy tree warden, <u>who removes, prunes, injures or defaces any shrub or ornamental or shade tree, within the limits of a public way or grounds, without the legal right or written permission of the town tree warden</u>, the borough tree warden, the city forester, the Commissioner of Transportation, the Department of Public Utility Control or other authority having jurisdiction, may be ordered by the court in any action brought by the property owner or the authority having jurisdiction affected thereby to restore the land to its condition as it existed prior to such violation or shall award the landowner the costs of such restoration, including reasonable management costs necessary to achieve such restoration, reasonable attorney's fees and costs and such injunctive or equitable relief as the court deems appropriate. In addition, <u>the court may award damages of up to five times the cost of restoration or statutory damages of up to five thousand dollars. In determining the amount of the award, the court shall consider the willfulness of the violation, the extent of damage done to natural resources, if any, the appraised value of the shrub or ornamental or shade tree, any economic gain realized by the violator and any other relevant factors.</u> The appraised value shall be determined by the town tree warden, the borough tree warden, the city forester, the Commissioner of Transportation, the Department of Public Utility Control or other authority having jurisdiction and shall be determined in accordance with regulations adopted by the Commissioner of Environmental Protection. The commissioner shall adopt regulations, in accordance with the provisions of chapter 54, to develop guidelines for such plant appraisal. The regulations may incorporate by reference the latest revision of The Guide for Plant Appraisal, as published by the International Society of Arboriculture, Urbana, Illinois. Until such time as regulations are adopted, appraisals may be made in accordance with said Guide for Plant Appraisal

(c) Any person, firm or corporation which deposits or throws any advertisement within the limits of any public way or grounds, or upon private premises or property, unless the same is left at the door of the residence or place of business of the occupant of such premises or property, or deposits or throws any refuse paper, camp or picnic refuse, junk or other material within the limits of any public way or grounds, except at a place designated for that purpose by the authority having supervision and control of such public way or grounds, or upon private premises or property without permission of the owner thereof, or affixes to or maintains upon any tree, rock or other natural object within the limits of a public way or grounds any paper or advertisement other than notices posted in accordance with the provisions of the statutes, or affixes to or maintains, upon the property of another without his consent, any word, letter, character or device intended to advertise the sale of any article, shall be fined not more than fifty dollars or imprisoned not more than six months or both for each offense.

(d) The removal, pruning or wilful injury of any shrub or ornamental or shade tree, or the use of climbing spurs upon any ornamental or shade tree without the consent of the tree warden or of the officer with similar duties or the affixing of any playbill, picture, notice, advertisement or other similar thing concerning the business or affairs of any person, firm or corporation, to a pole, shrub, tree, rock or other natural object, within the limits of any public way or grounds in violation of the provisions of this section by an agent or employee of such person, firm or corporation, shall be deemed to be the act of such person, firm or corporation, and such person, or any member of such firm or any officer of such corporation, as the case may be, shall be subject to the penalty herein provided, unless such act is shown to have been done without his knowledge or consent.

(e) The affixing of each individual playbill, picture, notice, advertisement or other similar thing to a pole, shrub, tree, rock or other natural object, or the wilful removing, pruning, injuring or defacing of each shrub or tree, or the throwing of each individual advertisement or lot of refuse paper or other material within the limits of any public way or grounds or on private premises, shall constitute a separate violation of the provisions of this section. Nothing in this section shall affect the authority of a tree warden, either by himself or by a person receiving a written permit from him, to remove, prune or otherwise deal with a shrub or tree under his jurisdiction.

(f) Any person, firm or corporation, other than a tree warden or his deputy, who desires the cutting or removal, in whole or in part, of any tree or shrub or part thereof within the limits of any public road or grounds, may apply in writing to the town tree warden, the borough tree warden or the Commissioner of Transportation or other authority having jurisdiction thereof for a permit so to do. Upon receipt of such permit, but not before, he may proceed with such cutting or removal. Before granting or denying such permit, such authority may hold a public hearing as provided in section 23-59, and when the applicant is a public utility corporation, the

party aggrieved by such decision may, within ten days, appeal therefrom to the Department of Public Utility Control, which shall have the power to review, confirm, change or set aside the decision appealed from and its decision shall be final. This shall be in addition to the powers granted to it under section 16-234, provided, if an application for such permit has been made to either a tree warden or the Commissioner of Transportation or other authority and denied by him, an application for a permit for the same relief shall not be made to any other such authority. Upon any approval of such a permit by the Commissioner of Transportation, he shall notify the tree warden for the town in which the tree is located. Upon any approval of such a permit by the Commissioner of Transportation, the permittee shall notify the tree warden for the town in which the tree is located prior to cutting any such tree.

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**Sec. 52-560. Damages for cutting trees, timber or shrubbery. Exclusion.** Any person who cuts, destroys or carries away any trees, timber or shrubbery, standing or lying on the land of another or on public land, except on land subject to the provisions of section 52-560a, without license of the owner, and any person who aids therein, shall pay to the party injured five times the reasonable value of any tree intended for sale or use as a Christmas tree and three times the reasonable value of any other tree, timber or shrubbery; but, when the court is satisfied that the defendant was guilty through mistake and believed that the tree, timber or shrubbery was growing on his land, or on the land of the person for whom he cut the tree, timber or shrubbery, it shall render judgment for no more than its reasonable value.

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**Sec. 52-560a. Damages for encroachment on state, municipal or nonprofit land conservation organization open space land. Attorney General enforcement. Civil action.** (a) As used in this section, "open space land" includes, but is not limited to, any park, forest, wildlife management area, refuge, preserve, sanctuary, green or wildlife area owned by the state, a political subdivision of the state or a nonprofit land conservation organization and "encroach" means to conduct an activity that causes damage or alteration to the land or vegetation or other features thereon, including, but not limited to, erecting buildings or other structures, constructing roads, driveways or trails, destroying or moving stone walls, cutting trees or other vegetation, removing boundary markers, installing lawns or utilities, or using, storing, or depositing vehicles, materials or debris.

(b) No person may encroach or cause another person to encroach on open space land or on any

land for which the state, a political subdivision of the state or a nonprofit land conservation organization holds a conservation easement interest, without the permission of the owner of such open space land or holder of such conservation easement or without other legal authorization.

(c) Any owner of open space land or holder of a conservation easement subject to the provisions of subsection (b) of this section or the Attorney General may bring an action in the superior court for the judicial district where the land is located against any person who violates the provisions of said subsection with respect to such owner's land or land subject to such conservation easement. The court shall order any person who violates the provisions of subsection (b) of this section to restore the land to its condition as it existed prior to such violation or shall award the landowner the costs of such restoration, including reasonable management costs necessary to achieve such restoration. In addition, the court may award reasonable attorney's fees and costs and such injunctive or equitable relief as the court deems appropriate.

(d) In addition to any damages and relief ordered pursuant to subsection (c) of this section, the court may award damages of up to five times the cost of restoration or statutory damages of up to five thousand dollars. In determining the amount of the award, the court shall consider the willfulness of the violation, the extent of damage done to natural resources, if any, the appraised value of any trees or shrubs cut, damaged, or carried away as determined in accordance with the latest revision of The Guide for Plant Appraisal, as published by the International Society of Arboriculture, Urbana, Illinois, or a succeeding publisher, any economic gain realized by the violator and any other relevant factors.