Trees after the Storm

STORM DAMAGE & YOUR TREE

Helping homeowners lessen the effects of storm damage to their trees

Veronica Keithley

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Storm Damage and Your Tree

Helping Homeowners Lessen Storm Damage To Their Trees

WRITTEN BY
Veronica Keithley, RF, CA
Staff Forester • Cross Timbers Forestry
PO Box 440 • Tecumseh, OK 74873 • 405-598-6146
vmkeithley@yahoo.com • www.crosstimbersforestry.com

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The Greater Oklahoma City Tree Bank Foundation
(DBA THE TREE BANK)
16301 N. Rockwell Bld. A • Edmond, OK 73013
Ph. (405) 330-4701 Fax (405) 330-5415
treebankok@msn.com

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During an hour and a half on the evening of May 3, 1999, thousands of homes were destroyed and lives in Oklahoma were irreparably changed by some of the strongest storms ever recorded. A group of tornadoes, including an F5, ripped through central Oklahoma with winds in excess of 200 miles per hour. In less than one-half hour, nearly 4000 trees were lost, leaving a tree replacement cost for homeowners in excess of $1 million.

This guidebook and accompanying website (www.treesafterthestorm.org) were created to provide sound, concise information on addressing storm damage to trees – *to help ourselves and others rebuild.*

Our hope is that you will never need this information, but in case you do – begin the process of damage assessment early and be thorough. And don't forget to REPLANT!

The trees in our yards face many challenges and stresses – and the worst can be storms. Imagine.....

213 mile per hour winds
50,000 degree Fahrenheit lightning strikes
8 feet of standing water
500 pounds of ice

For many yard trees, this is all in a year's work. Trees in your yard may have to withstand tornadoes, floods and ice storms, just to name a few. No wonder our city trees often look abused – they are by the sudden storms that can wreak havoc on them.

1999 STORM DEVASTATION, Oklahoma
Courtesy of The Tree Bank Foundation

This guide was created to help you begin the process of assessing and mitigating tree damage from the following storms:

- Tornadoes
- High Winds
- Hurricanes
- Floods
- Ice Storms
- Lightning

Evaluating the damage to your tree after the storm will include the following steps:

I. What part of the tree was damaged?
   - Branches
   - Trunk
   - Roots
   - Entire Tree

II. How much damage did your tree receive?

III. Will your tree survive and *thrive?*

IV. What do you do now? What type of maintenance does your tree need?

V. Do you hire a professional or do the work yourself?

VI. Who do you contact for help?

1999 STORM DEVASTATION, Oklahoma City, Oklahoma
Courtesy of The Tree Bank Foundation

ROOT FAILURE, Oklahoma
Courtesy of The Tree Bank Foundation

People who live in tornado-prone areas are familiar with the astounding force of these storms. Tornadoes can lift and carry entire buildings for blocks, they can drill blades of grass into telephone poles and they can wreak havoc on trees. The high winds and blowing debris break branches, strip bark off tree trunks and uproot entire trees.

Tornadoes damage trees through:

- **Branches** – broken, twisted, cracked branches
- **Trunk** – broken, twisted, cracked or bent trunks, stripped bark
- **Roots** – root failure, erosion
- **Tree Decline**

DEBRIS PILE FROM TORNADO
- Oklahoma
Courtesy of The Tree Bank Foundation

High winds cause numerous types of damage to trees, potentially damaging the entire tree. The important factors in wind storms are the force and the direction of the wind. If you know the direction of the wind, you can focus your investigation of the tree on the windward and leeward sides of the tree. The windward side is the side the wind blew against; the leeward side is the side 180 degrees opposite of the wind.

High winds damage trees through:

- **Branches** – broken, twisted, cracked branches
- **Trunk** – broken, twisted, cracked or bent trunks, stripped bark
- **Roots** – root failure, erosion

THIS TREE WAS TWISTED AND CRACKED BY HIGH WINDS

Oklahoma

Courtesy of The Tree Bank Foundation

HURRICANES

With winds up to 125 miles per hour, it is no wonder that hurricanes can cause severe damage to trees. Trees are also subjected to blowing debris, torrential rains and flooding. Hurricanes, like tornadoes and floods, often cause hidden structural damage that only becomes visible months or years after the storm.

Hurricanes damage trees through:

- **Branches** – broken, twisted, cracked branches
- **Trunk** – broken, twisted, cracked or bent trunks, stripped bark
- **Roots** – root failure, erosion and suffocation
- **Tree Decline**

HURRICANE WINDS NOT ONLY DESTROY HOMES BUT RIP TREES COMPLETELY OUT OF THE GROUND

For most areas of the United States, floods are rare but devastating events. Trees weather floods with varying degrees of damage; however, few trees will escape floods completely unharmed.

Identifying flood damage and mitigating it pose a challenge to well trained professionals and homeowners alike. When possible, trees that have potentially been damaged by floods should be evaluated by a professional arborist or urban forester.

Floods damage trees through:

- **Roots** – root failure, erosion and suffocation
- **Tree Decline**

TREE ROOTS CAN SUSTAIN HIDDEN DAMAGE FROM STANDING FLOOD WATERS

ICE STORMS

Ice storm damage is often overlooked because it may not be obvious. For instance, twisted or cracked branches or trunks can be hard to see. Many homeowners don't notice until spring when the trees begin to leaf out, or more specifically, don't leaf out. In addition, evaluating ice damaged trees is frequently postponed until "the weather gets better," until it is warmer outside, which increases the possibilities of the damage worsening.

Ice Storms damage trees through:

- **Branches** – broken, twisted, cracked branches
- **Trunk** – broken, cracked or bent trunks
- **Roots** – root failure

CHRISTMAS OF 2000 BROUGHT ICE STORMS SO SEVERE THAT PEOPLE WALKED SWIFTLY PAST TREES AND POWER LINES, TRYING TO AVOID THE DREADED SOUND OF ICE CRACKING. THAT SOUND ALMOST SURELY MEANT MORE TREE AND LINE FAILURE.

Ardmore, Oklahoma

© 2000 Samuel Roberts Noble Foundation

Lightning's powerful flashes are awesome to behold. However, for a tree, these energy streamers pose the risk of damage and death. The core of a lightning bolt can reach 50,000 degrees Fahrenheit, causing an air concussion and boiling sap to blow wood fiber apart. And unfortunately for trees, lightning does consistently strike the same place more than once.

Lightning damages trees through:

- **Branches** – broken or cracked branches
- **Tree Decline**

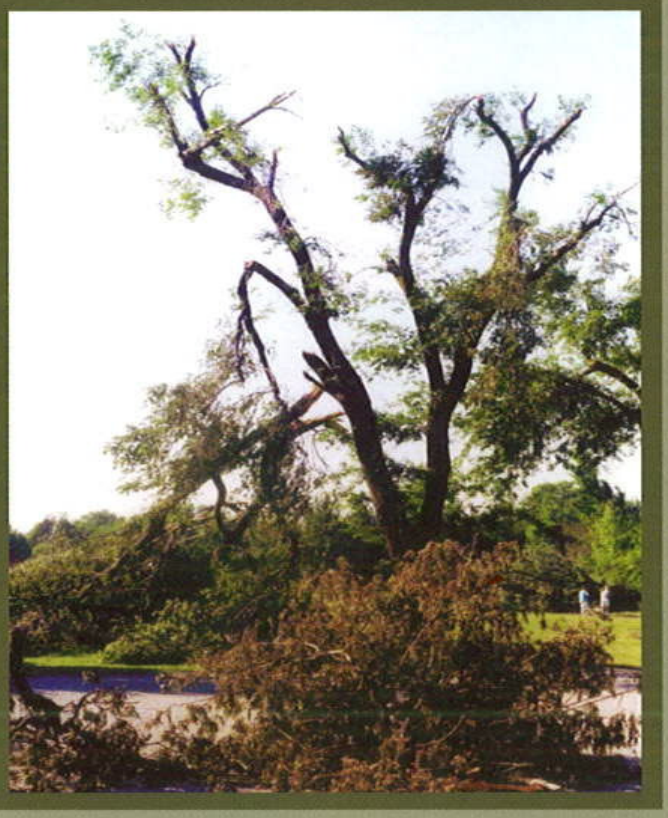
LIGHTNING CAUSED THIS TREE TO BLOW APART. IT HAS THE APPEARANCE OF BRANCHES STANDING ON SHREDDED OR CHIPPED WOOD.

Oklahoma 2000

© Veronica Keithley, Cross Timbers Forestry

BRANCH DAMAGE

Branches are the portion of the tree most likely to be damaged by a storm. Because the branches spread so widely from the trunk, they receive the majority of the force from winds and the weight of ice build-up. These tremendous stresses can cause branches to break, twist or crack. The damage usually occurs at weak locations on a branch or where branches fork from each other or the trunk.



COMMON BRANCH DAMAGE INCLUDES:

Broken branches

Twisted branches

Cracked branches

THE BRANCHES OF THIS TREE FAILED IN ALL DIFFERENT DIRECTIONS FROM CIRCLING, TORNADIC WINDS IN EXCESS OF 200 MILES PER HOUR

Oklahoma City, Oklahoma 1999
Courtesy of The Tree Bank

How damaged branches weaken a tree:

- Number of leaves for photosynthesis is lessened
- Break in bark's protective layer
- Opening for insects and diseases to enter the tree

Twisted and cracked branches can be difficult to see.

- Focus on branches that are large or close to the ground because they will cause the most damage to people and structures if they fall.
- Look at all sides of the branches.
- Check for torn or twisted bark, oddly angled sections of branches or visible wood.

STORMS THAT DAMAGE BRANCHES:

Tornadoes
High Winds
Hurricanes
Ice Storms

SMALL, TWISTED BRANCH FROM THE WEIGHT OF ICE ACCUMULATION

Ardmore, OK Dec., 2000

© Samuel Roberts Noble Foundation

TRUNK DAMAGE

Trunk damage can be very hazardous because it often results in a portion of the trunk breaking and falling over. While a tree may be able to withstand damage to a portion of the branches or roots, the tree only has one trunk and severe damage to it will often necessitate the tree's removal.

COMMON TRUNK DAMAGE:

Wood fiber detachment

Broken trunks

Twisted trunks

Cracked trunks

Bent trunks

Stripped bark

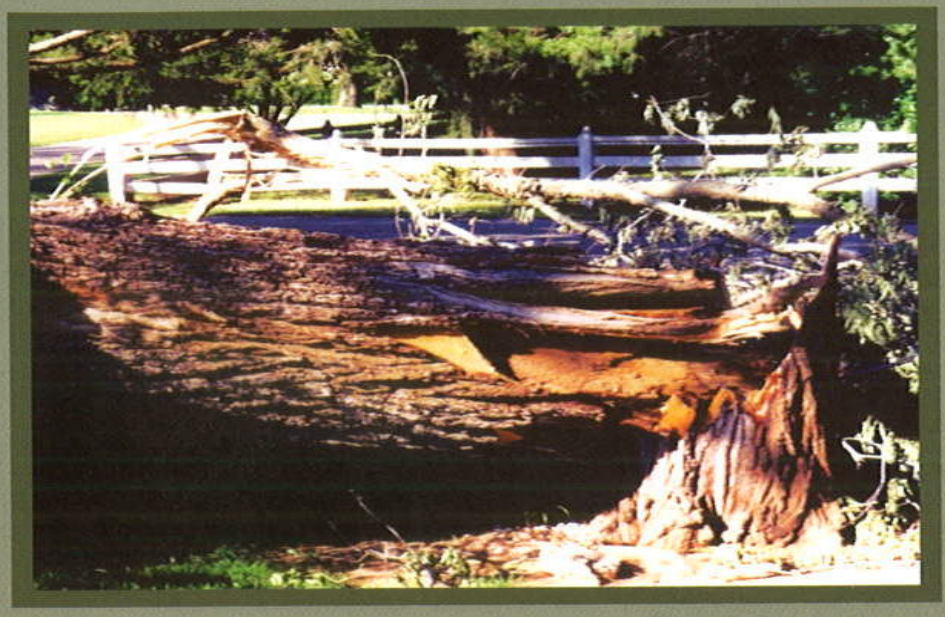
COLOSSAL TRUNK FAILURE CAUSED BY A TORNADO

Oklahoma 1999
Courtesy of The Tree Bank

How a damaged trunk weakens a tree:

- Support to keep the tree standing is weakened
- Reduced ability to move water and food through the tree
- Break in bark's protective layer

Broken trunks are usually caused by high winds, heavy weight on the branches or root damage. Trunks tend to break where trees fork or where there is internal rot or a prior crack. Broken trunks can not be repaired or healed; a tree with a broken trunk should be removed.



BROKEN TRUNK

Oklahoma 1999
Courtesy of The Tree Bank Foundation

Twisted trunks are most common with young or small diameter trees that are flexible enough to twist without snapping the trunk. Trunks of larger, older trees will tend to crack or break when twisted. A young tree may recover from having a twisted trunk, but the tree should be monitored every six months to check for trunk cracks.

Twisted trunks will usually have:

- odd angles
- spiral appearance to the bark
- exposed wood where the bark has twisted

CRACKED TRUNKS

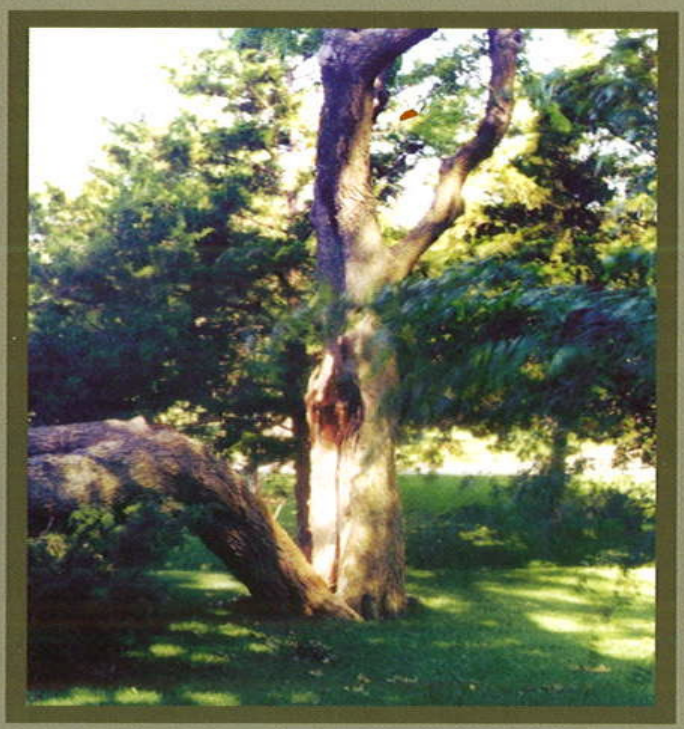
Cracked trunks usually occur where a tree forks or where several branches come from the same location. The key to a cracked trunk is that once it is cracked, it will always be cracked, causing a structural weakness. In general, a tree with a cracked trunk should be removed.

Search for cracked trunks on:

- Trees that fork
- Older trees that have heavy crowns with large branches
- Trees that commonly crack, such as Bradford pear, silver maple, elms, cottonwood, pecan, etc.

Lightning

A special kind of cracking results from lightning. If lightning only shears the edge of the tree, a vertical scar and crack will form on the trunk. Trees will often seal off cracks caused by lightning and remain structurally sound.



TYPICAL CRACKED TRUNK
CAUSED BY WIND, TORNADO,
HURRICANE OR ICE DAMAGE

Oklahoma 1999
Courtesy of The Tree Bank

Bent trunks are common as a result of ice storms and occasionally from wind storms.

How a trunk becomes bent:

1. The branches, trunk and leaves of a young tree are coated with ice or bent under heavy winds.
2. The weight exceeds the trunk's ability to stay upright.
3. The weight is redistributed by the trunk bending over.

PINE BENT FROM THE WEIGHT OF THE ICE ACCUMULATION
Ardmore, Oklahoma 2000
© Samuel Roberts Noble Foundation

Although no damage is good damage, a bent trunk is one of the few preferable types of damage during an ice or wind storm. It indicates that the tree was healthy enough for the trunk to bend and not break. Many trees will stand back up once the weight has been removed. For trees that do not correct the bend themselves, stake the tree so that it is upright and then monitor it.

ROOT DAMAGE

Root damage poses a challenge for homeowners because it is often not obvious at first inspection. Root suffocation can be hidden until many months or years after the damage. To evaluate a tree's root damage effectively, a professional urban forester or arborist should be contacted.

COMMON DAMAGE:

Root failure

Erosion

Suffocation

COMMON ROOT FAILURE FROM WIND STORM

Oklahoma 1999

Courtesy of The Tree Bank Foundation

How damaged roots weaken a tree:

- Limited ability to keep the tree standing, causing the tree to topple
- Reduced ability to move water and food through the tree
- Opening for insects and disease

ROOT FAILURE

Root failure is caused by a substantial force that causes roots to snap and/or come out of the ground. The connection of roots to the soil is the stabilizing mechanism for trees and when enough of this connection is broken, failure results.

Root failure is more likely with:

- Shallow root system
- Previously damaged roots
- Large ice accumulations on large, old trees
- Disconnection of roots from soil due to flooding

For very young trees, re-staking a tree that has had partial root failure may help the tree survive. However, for older mature trees, root failure is often either immediately fatal or results in tree leaning. Trees that lean pose a potential hazard and monitoring them should be a main priority.

COMMON ROOT FAILURE FROM WIND STORM

Oklahoma 1999
Courtesy of The Tree Bank Foundation

Erosion around a tree from water or wind storms (high winds, tornadoes, hurricanes) causes roots to be exposed. Roots must maintain contact with the soil, and any time that connection is broken and the roots are exposed for a substantial period of time, root death will occur. Insects and fungus can take advantage of these exposed roots and accelerate the desiccation process.

ROOT SUFFOCATION

Root suffocation is the death of roots because of their inability to absorb oxygen from the soil.

The process of root suffocation:

- Soil is water saturated for long periods (often there is standing water).
- Root can't absorb oxygen and begin to die
- In many cases, fungus and bacteria enter the dying roots, accelerating the roots' death.
- When enough roots die, root failure is likely, causing the tree to topple.

There is no cure or remediation for root suffocation; once the roots have quit processing oxygen and have died, the tree will eventually die also.

STORMS THAT DAMAGE ROOTS

Tornadoes
High Winds
Hurricanes
Floods
Ice Storms

THE LONGER THESE TREES STAND IN WATER, THE MORE LIKELY THEY ARE TO DEVELOP LONG-TERM ROOT PROBLEMS FROM SUFFOCATION.

Tree decline is a condition in which no single portion of a tree appears heavily damaged, but the tree is not healthy or growing well. The tree has a generally "sickly" appearance that can not be attributed to insect or disease problems either.

PORTIONS OF THE TREE VISIBLY AFFECTED BY DECLINE:

Branches • Leaves • Trunk • Roots

Branch characteristics of decline

- Stunted growth
- Branches dying from the ends without appearing broken, twisted or cracked by a storm

Leaf characteristics

- Defoliation – total or partial loss of leaves
- Odd coloring of leaves, particularly yellowing or browning
- Misshapen leaves

Trunk characteristics

- Abnormal amounts of flaking bark
- Root sprouts coming from the base of the tree
- Trunk rot – large fungus growing near the base of the tree

Root characteristics

- Broken, cut or crushed roots
- Fetid odor from root rot

Tree decline is particularly an issue with subtle damage done to individual portions of the tree that when added together severely limit a trees' health and structural soundness.

Example tornado damaged tree:

- Small portion (10-15%) of its branches broken
- Slight twist in the trunk that self-corrects
- Small portion (10-15%) of the roots fail

Any of these problems alone would be considered minor. Combining them on a single tree means almost 50% of the tree is damaged. The tree will be stressed and stunted, at best.

Complications for the tree:

- Reduced ability to photosynthesize
- Reduced water uptake
- Small, malformed and discolored leaves
- Weaker trunk structure

All of these manifestations combine as hallmarks of tree decline and necessitate careful monitoring of your tree after you notice the symptoms.

Tree decline is a situation that often requires professional assistance from an arborist or urban forester. The subtlety of tree decline can make diagnosing and mitigating the damage difficult without extensive training. A professional's experience will be of benefit to your tree when there is a question of tree decline. See Do-It-Yourself vs. Hiring a Professional and Who Do I Contact.

Below are a list of steps for evaluating the amount of damage to your tree and the steps to follow in mitigating the damage.

Overall appearance

- Does the tree appear damaged?
- Which areas of the tree seem to have sustained the most damage?

Branches
Roots
Trunk
Whole Tree/Tree Decline

Branches

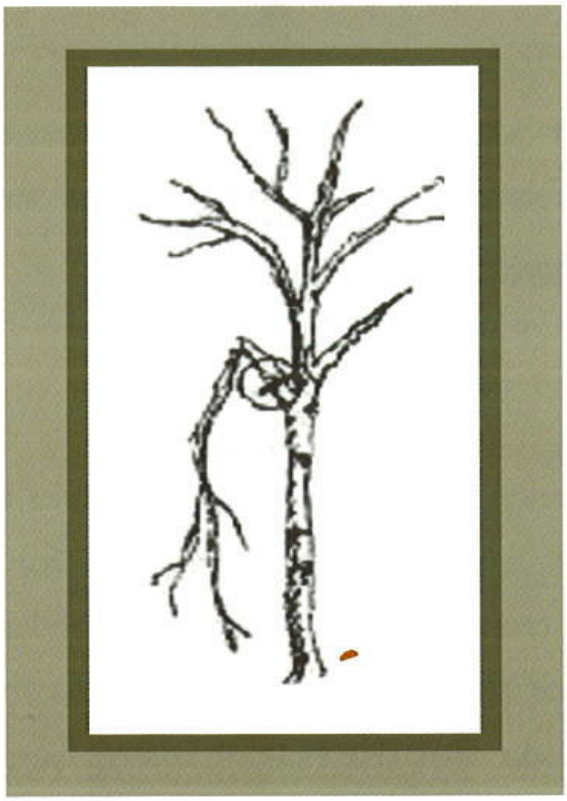
Branches allow trees to make food for themselves by growing the leaves that photosynthesize. Broken, twisted or cracked branches will not allow for healthy leaf development and will limit the tree's ability to thrive. The key to branch damage is this: Having 25-33% of the branches damaged is the equivalent of a person skipping lunch every day for the rest of his or her life!

1. Look for broken, cracked or twisted branches.

- Twisted branches will often have bulged areas at the point of the twist or will have odd angles.
- Cracks often run along the length of the branch. They are often hard to see because they tend to run along the top and sides of the branches, not on the bottom side that's most visible from the ground.

2. What percentage of the crown has broken, twisted or cracked branches?

To figure the percentage of the crown that is damaged, look at each damaged branch and decide where the closest fork is in the undamaged portion. You will have to prune back to this fork. On the picture below, the damaged portion is approximately ¾ the length of the branch, but it will have to be pruned further back, to the location marked on the photo.



THE PERCENTAGE OF DAMAGED BRANCHES SHOULD BE BASED ON THE TOTAL AMOUNT OF BRANCHES THAT WILL HAVE TO BE PRUNED, NOT JUST THE PORTION DAMAGED.

BRANCH DAMAGE AND RECOMMENDED MAINTENANCE

% of Branches Damaged	Recommended Maintenance	Likelihood of Surviving
25% or less	Prune	High
25-50%	Prune and monitor	Moderate
50% or more	Remove and replant	Low

Trees with 50% or more of the branches damaged may survive, but they pose a risk of hazards and misshapen growth. The question is: Will It Survive and Thrive?

3. Are there hanging branches, branches that are caught on other branches?

   Hanging branches pose a substantial risk of falling and should be removed immediately.

Trunk

The trunk is the main support structure for the tree, allowing the tree to stay standing while supporting hundreds of pounds of wood in the crown. Trunk damage is often a more substantial problem than branch or root damage because the tree only has one trunk. Damage to the trunk not only puts the tree at risk of dying but also creates a safety hazard for people and property.

1. **Look for broken, twisted, cracked or bent portions of the trunk.**
   - Twisted trunks can be identified by spiraling bark or the trunk having odd angles.
   - Cracks will usually be vertical and often wood is visible where the bark has split or pulled away. Pay special attention to forks and where large branches meet the trunk.

2. **Look for stripped bark, places where the wind or debris has torn the bark partially or completely off the trunk.**

3. **If the tree could have been hit by lightning, look for visible wood, particularly wood that looks splintered and detached.**

TRUNK DAMAGE AND RECOMMENDED MAINTENANCE

Trunk Damage	Recommended Maintenance	Likelihood of Surviving
Broken	Remove and replant	Very low
Twisted - young tree	Stake and monitor	Moderate
Cracked	Remove and replant	Low to moderate**
Cracked - historic or highly valuable tree	Contact a professional arborist or urban forester	Low to moderate**
Bent - young tree	Stake and monitor	High
Bent - mature tree	Stake and monitor	Moderate
Stripped bark	See #4 on the next page	
Wood fiber detachment	Remove and replant	Very low

** While a tree with a cracked trunk has a low to moderate potential to survive, it will always pose a risk of failure *(see Will It Survive and Thrive)*. This is why removal and replanting is recommended. Before you decide to keep a tree with a cracked trunk, contact a professional arborist or urban forester to determine how much risk the tree poses *(see Who Do I Contact?)*.

4. **Stripped bark**

BARK DAMAGE AND RECOMMENDED MAINTENANCE

% of Stripped Bark	Recommended Maintenance	Likelihood of Surviving
25% or less	Trim the bark	High
25-50%	Trim the bark and monitor	Moderate
50% or more	Remove and replant	Low

Girdling

There is a special case of stripped bark called girdling. A girdled tree has its bark removed all the way around the trunk in a continuous ring and this missing bark makes it impossible for the tree to transport water and food. If the stripped bark is actually girdling the tree, the tree should be removed.

Roots

Roots provide two main functions for trees: anchoring and absorption of nutrients, water and oxygen. Roots are a redundant system with multiple roots serving the same function; therefore, if a section of root is damaged, the tree can still function fairly well. The challenge with root damage is accurately deciding how much damage there is. As with branch damage: Having 25-33% of the roots damaged is the equivalent of a person skipping lunch every day for the rest of his/her life!

1. **Look for broken or crushed roots and exposed root ends.** This damage often results in root failure.

2. **What percentage of the roots are broken or crushed and exposed at the ends?**
   - Estimate based on the percentage of ground surface that appears damaged, knowing that the roots may extend twice as far from the trunk as the branches. For instance, a tree with branches 40 feet wide may have roots that run 80 feet from the trunk of the tree.
   - Take the percentage of damaged roots and double it. This will account for damage you can't see and for damage deep inside the ground.

ROOT DAMAGE AND RECOMMENDED MAINTENANCE

% of Roots Damage (after double the visual estimate)	Recommended Maintenance	Likelihood of Surviving
25% or less	Prune exposed roots, if possible, and monitor	Moderate to high
25-50%	Remove and replant	Moderate to low
50% or more	Remove and replant	Very low

3. **Look for trees that lean following the storm.**
   This is usually an indication of root damage.

4. **How much does the tree lean?**
   - Did the tree lean before the storm?
   - Has the lean increased substantially?

LEANING TREES AND RECOMMENDED MAINTENANCE

Amount of Lean	Recommended Maintenance	Likelihood of Surviving
15 degrees or less - young tree	Stake and monitor	Moderate to high
15 degrees or less - mature tree	Monitor	Moderate
15-30 degrees	Contact a professional urban forester or arborist	Low to moderate
30 degrees or more	Remove and replant	Very low

5. **Look for erosion, for exposed roots that otherwise look healthy.**
   These areas should be mulched, and the tree monitored.

6. **Root suffocation is very difficult to see. The main hallmarks are:**
   - A fetid, rotten smell coming from the ground as the roots rot
   - General tree decline

Whole Tree/Tree Decline

Whole tree damage or tree decline is a condition in which various portions of the tree are affected, and the tree appears weak. Decline is a general condition that can not be attributed to a single location of identifiable external damage, insects or diseases. Once trees begin to decline, they may survive for many years but their growth is stunted, their leaves are misshapen or off-color and they are often unattractive.

1. **Branch characteristics of decline**
   - Stunted growth
   - Branches dying from the ends without appearing to be damaged by a storm

2. **Leaf characteristics**
   - Defoliation – total or partial loss of leaves
   - Odd coloring of leaves, particularly yellowing or browning
   - Misshapen leaves

3. **Trunk characteristics**
   - Abnormal amounts of flaking bark
   - Root sprouts coming from the base of the tree
   - Trunk rot – large fungus growing near the base of the tree

4. **Root characteristics**
   - Broken, cut or crushed roots
   - Fetid odor from root rot

Trees can not recover from decline. A tree that is in decline can continue to survive for many years but will always have limited or abnormal growth and appearance. In general, trees in decline should be removed and replaced.

Don't delay your tree evaluation!!

1. **The tree's condition may worsen without prompt care.**
   Bent or twisted branches may break because they were not pruned quickly. Small trees that were partially uprooted may not reattach their roots to the soil because they were not restaked. Any number of complications can occur from delayed maintenance, and the most effective means of early treatment is to know the damage is there.

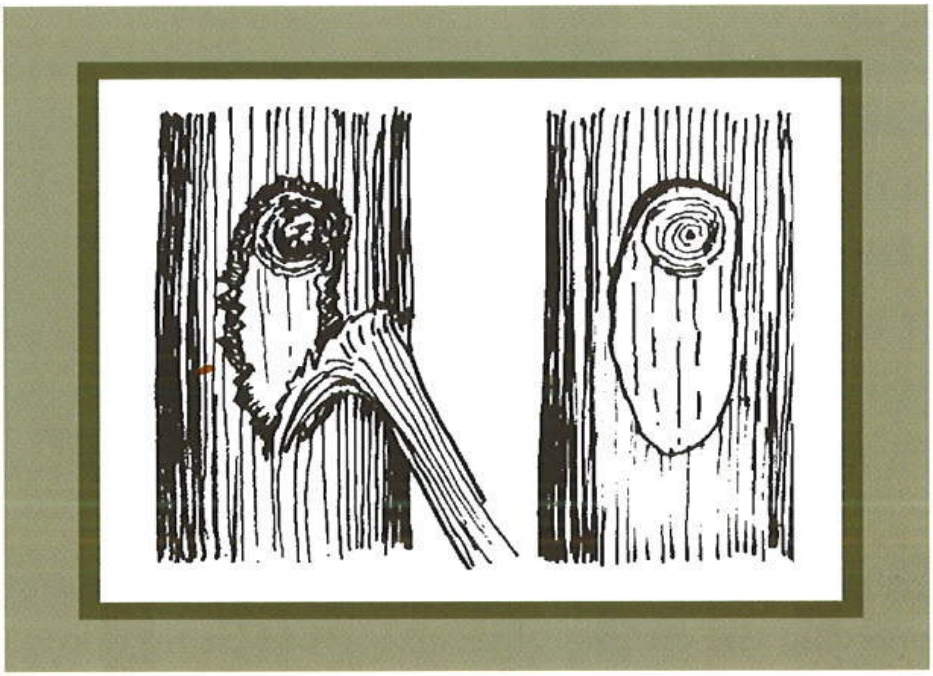
2. **If delayed, there is an increased chance of receiving poor service from a tree care company.**
   Every community has a wealth of qualified professional tree care companies that will work with homeowners to address a damaged tree. However, storms tend to bring out untrained tree care workers, those that appear the day after the storm and are gone about the time homeowners' money runs out. If you have already evaluated your tree and know what damage it has received, you will know if you need to hire someone and you can effectively discuss care options with the provider.

By properly evaluating your tree, not only will you begin the process quickly of correcting the damage, but also avoid being taken advantage of because you'll already know what your tree needs.

Bark Trimming
Monitoring
Mulching
Pruning – branches
Pruning – roots
Replanting
Staking
Tree Removal

Bark Trimming

- Trim bark when it has been partially stripped or torn but is not girdling the tree.
- Removing the loose bark will:
  - allow the tree to grow new bark over the exposed wood
  - limit moisture build-up and fungus under the tear



Before trimming After trimming

1. Use a sharp knife or chisel to make a clean cut at the edges of the tear.
2. Do NOT paint the exposed wood with anything, including paint or tar.

Monitoring

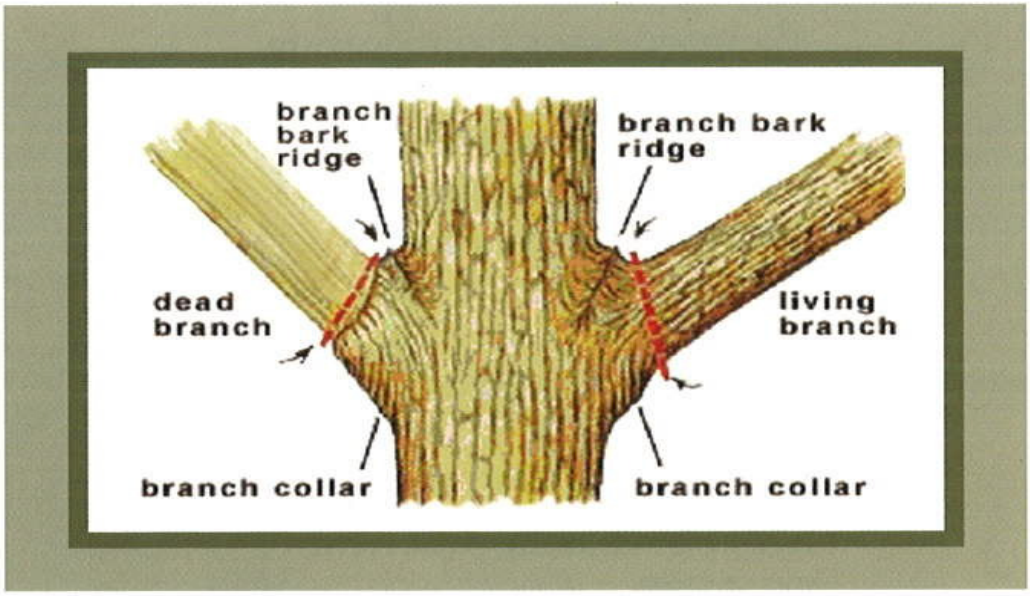
- Use to keep track of how your tree is recovering from the storm.
- Trees that should be monitored every 3 months:
  - Damaged trees on which work has not begun
  - 25-50% branch damage
  - Twisted or bent trunks
  - 25-50% of the bark stripped off the trunk
  - 25% or less root damage
  - 15 degrees or less of lean
  - Exposed roots from erosion
  - In decline
- Monitor every 6 months
  - if you do not see damage
  - after work is completed
- Things to watch for:
  - Trunk rot
  - Root rot
  - Increased lean
  - Misshapen or off-color leaves
  - Insect or disease problems
  - Decline

Mulching

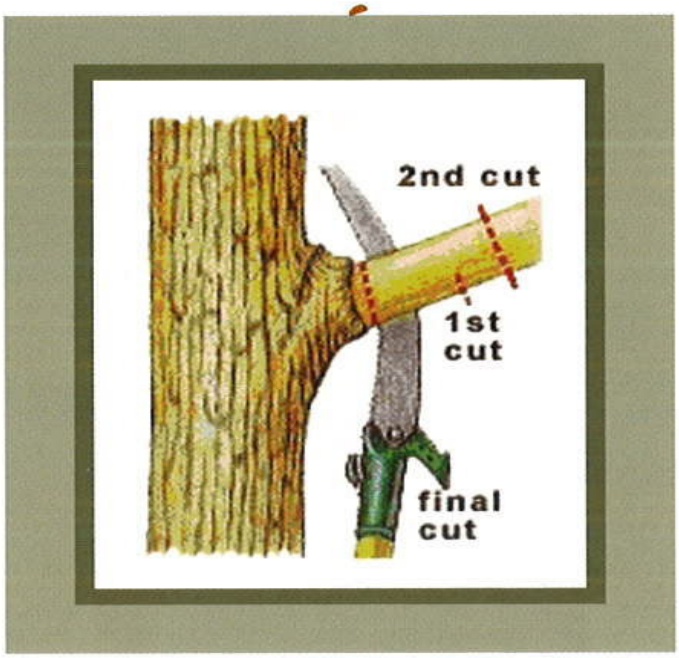
- Recommended for all trees but of particular importance for eroded areas
- Mulching is intended to:
- Protect the roots from exposure and drying
- Keep water close to the roots for easy absorption – makes your watering more effective
- Use wood chips or shavings
- 4-6 inches deep over entire root area
- Do NOT mound mulch against the trunk – leave 2-4 inches of exposed ground next to the trunk

Pruning – branches

- Remove broken, twisted or cracked branches
- Do not remove more that 25% of the crown in a single year
- Prune during the dormant season (the winter).
- Make clean cuts with sharp tools
- Do not cut into the branch collar (see illustration below)
- Use the 3-cut system for large branches (see illustration below)

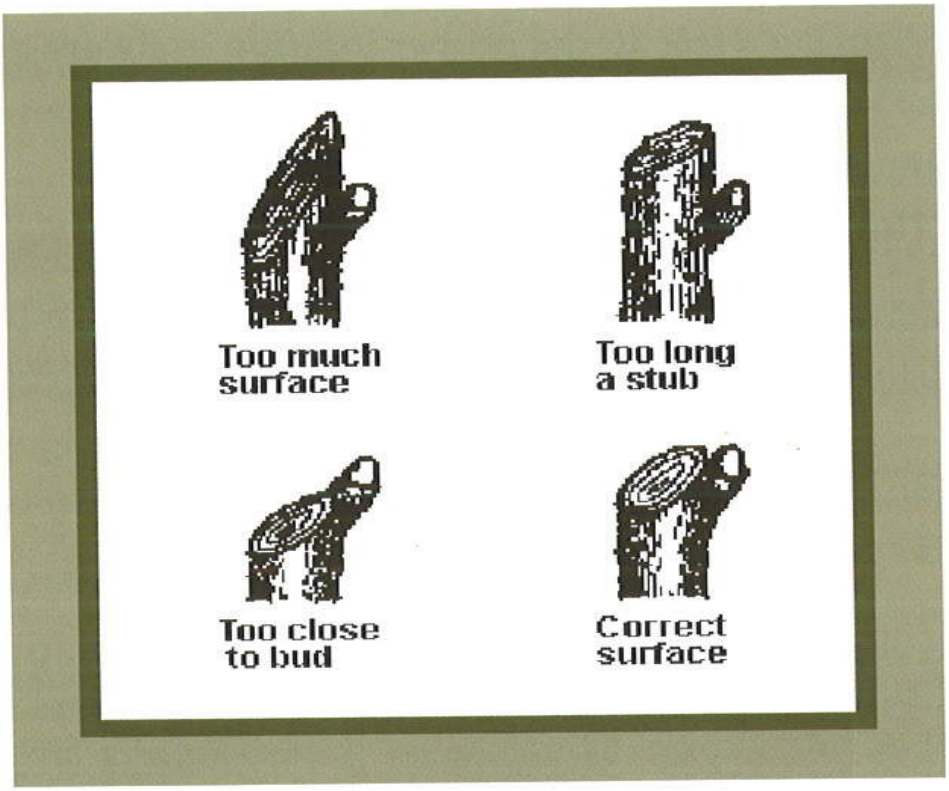


Proper pruning technique



Example of 3-cut system

Proper pruning adjacent to a bud



For more information on pruning, visit the Trees are Good website, in cooperation with the International Society of Arboriculture. www.treesaregood.com

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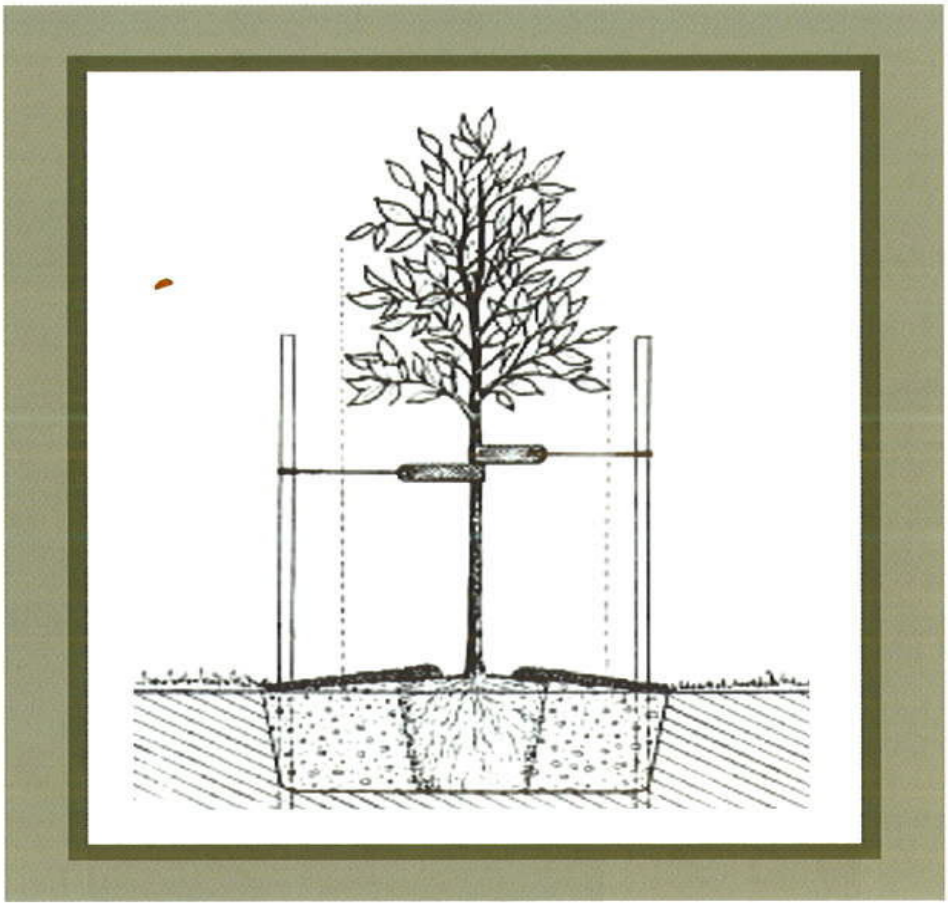
Pruning – roots

- Recommended for trees with a few small, exposed roots that have been severed or torn
- Root pruning is intended to:
  - Create a clean end for the damaged root
  - Encourage new root growth from the cut
- Use a sharp tool
- Prune jagged ends of exposed roots when it is possible to prune all the way through the root – do not prune a partial break or prune through only a portion of the root.

Replanting

- Planting a tree in the proper location is always a good idea, so replanting appropriately after a tree has been damaged by a storm is a great idea!
- The following steps will help your replanting be a success:
  1. Select a good site – check for overhead and under ground utilities; adjacent buildings, sidewalks and plants; and sufficient space for the tree to grow.
  2. Purchase a healthy, structurally sound tree.
  3. Plant it properly.
  4. Provide proper maintenance.
  5. Enjoy!
- The following drawing shows the basics of proper planting.



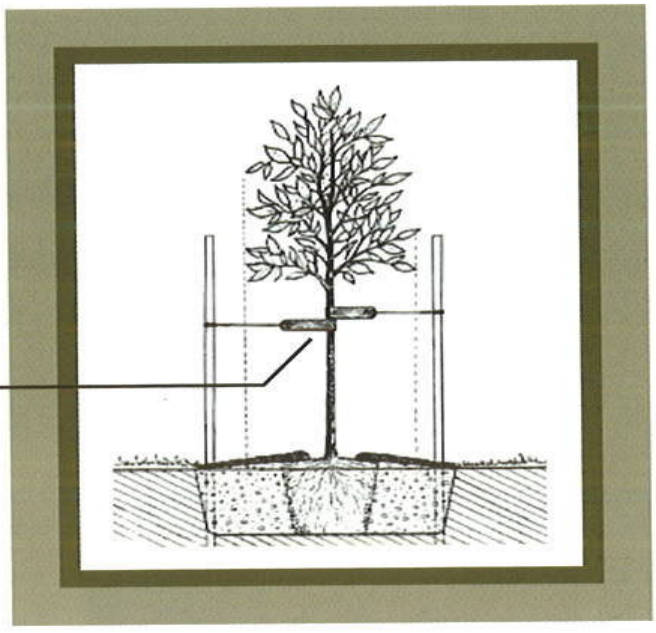
Replanting, cont.

1. Dig the hole 2-3 times the diameter of the root ball.
2. Place the top of the root ball at or above ground level.
3. Use nylon strapping or webbing for staking *(see staking below)*.
4. Mulch over the hole, but leave a bare area immediately next to the trunk.

- The International Society of Arboriculture has a series of publications available on the web in the category of "Before Tree Buying and Planting" at www.treesaregood.com. These publications provide information on selecting trees and planting them properly.

Staking

- Recommended for small trees that have exposed roots from partial root failure or erosion
- Stabilizes a tree and encourages root growth
- Use 3-5 foot tall posts and nylon strapping or webbing whenever possible – avoid the "hose and wire" method of staking.



Staking, cont.

- Place the stakes on either side of the tree, 90 degrees from the prevailing wind. For example, if your predominant winds are north and south, place the stakes on the east and west of the tree.
- Remove staking after 1 year.

Tree Removal

- Recommended for trees that can not be remediated or that pose a hazard.
- The size of the tree to be removed will determine whether you can remove it yourself or whether you should hire a professional. (See Do-It-Yourself vs. Hire a Professional)
- Before you begin removing a tree yourself, identify all powerlines that you may contact. If there are any electrical lines that you may touch with a portion of the tree, consider hiring a professional that works around electric lines regularly.

The Next Steps

After identifying the damage and appropriate maintenance for your storm damaged tree, you may be interested in contacting professionals that can further identify the damage and/or help with the remediation:

Do-It-Yourself vs. Hire a Professional

Who Do I Contact?

Will My Tree Survive and Thrive?

"Can my tree's problems be dealt with so that the tree will continue to grow and be healthy?"

Thrive:

ALIVE, GROWING, HEALTHY AND STRUCTURALLY SOUND.

Alive – Most trees will still be alive even after violent storms like tornadoes and hurricanes.

Growing – Does the tree have enough branches and roots to photosynthesize and to absorb water?

- If 25% or less of either the branches or the roots are damaged, the tree should continue to grow.
- If all of the damaged branches or roots are on a single side, the tree will continue to grow but could be misshapen.

Healthy – Is your tree healthy?

- Does the tree have enough bark to ward off most insects and diseases?
- Are there enough roots to absorb water, nutrients and oxygen?

Structurally sound – Are the trunk and roots strong enough to hold up the tree?

- Are the branches firmly attached and well distributed around the trunk?
- Are the roots firmly attached to the soil?

If the answer is no to any of the above questions, you may want to consider having the tree removed and another planted in its place. No matter what reason you have for removing the tree, your time and money are better spent on a tree that will thrive than on one that won't.

Do-It-Yourself vs. Hiring a Professional

Reasons to do the work yourself

- The amount of work is minor and easily accomplished with typical home equipment.
- It is cheaper than hiring someone.
- You are familiar with your tree and its importance in your landscaping.
- You're a professional tree care worker.

Reasons to hire a professional

- Years of experience and training.
- In-depth evaluation for hidden damage.
- Risk and liability are placed on the professional.
- Work can be done promptly.
- Opportunity for long-term tree care from a professional who is familiar with your trees.

Minimum qualifications for professional tree care worker

- Bonded and insured
- List of references - Be specific!
  - Homeowners in your area
  - Completed in the last 2-3 years
  - Pertain to your specific storm and needs
- Detailed work plan and cost estimate in writing
- Expected dates of work
- List of recent training programs and memberships in associations such as International Society of Arboriculture (ISA), the National Arborist Association (NAA), American Society of Consulting Arborists (ASCA), the state arborist association or the Society of American Foresters (SAF).

Arborist vs. Urban Forester vs. Tree Care Worker

- Arborists are trained tree care professionals who specialize in individual tree care with a background in tree maintenance (pruning, removal, etc) and insect and disease diagnosis.
  They are often members of the International Society of Arboriculture (ISA) and the National Arborist Association (NAA).

- Certified Arborists are very highly trained arborists who have demonstrated their proficiency through testing and continuing education. They are certified through ISA. Contact ISA at www.isa-arbor.org or (217) 355-9411.

- Urban Foresters are foresters who are specially trained in managing urban tree communities with a background in tree hazard evaluation, tree maintenance and insect and disease diagnosis. Urban foresters are well qualified to assess the damage to your tree and offer recommendations, but they rarely perform the tree care themselves.
  They are often members of ISA, the state arborist association and the Society of American Foresters.

- Tree Care Workers usually have experience in various types of tree care, such as pruning, removal and staking. Often they do not have the amount of training that arborists or urban foresters have, and their references should be checked carefully.

Whether you choose to hire someone or do the work yourself, there are certain risks involved. It may not be possible to mitigate all the damage to your tree, and your tree may have hidden damage that makes your care efforts less effective. These are NOT reasons to postpone or cancel tree maintenance. Remember that trees are living things that may not respond even to the best care available but will respond to the quality of care they're provided.

Trees and the Law

Laws concerning trees and their maintenance vary by state; however, trees on your property are usually your responsibility. This means that you could be liable for a tree on your property that poses a hazard to your property, others property, pedestrians or vehicles. And as with all legal situations, ignorance is not a defense. In this light, tree maintenance becomes more important for homeowners, and care should be taken particularly after a storm.

If you have questions concerning the law and trees on your property, your best source of information is an attorney. There are attorneys who specialize in tree and vegetation issues, and often their experience will be to your benefit as their client.

Questions to ask your attorney:

1. What are my responsibilities if my tree is damaged by a storm?
2. What are my responsibilities for maintenance?
3. What time period do I have to address maintenance?
4. Who is responsible for trees in the easement, the right-of-way or under utility lines?
5. What specific county or municipal ordinances relate to my tree in addition to state statutes?

These are some suggested questions to start a conversation with your attorney. However, this list should not be considered comprehensive. For all legal concerns, contact a qualified attorney in your area.

Who Do I Contact?

- City Urban Forester or Arborist
- State Forestry Agency or Commission
- State Department of Natural Resources
- State Urban Forestry Commission, Board or Council
- ISA (www.isa-arbor.org)
- Certified Arborist
- City or state licensing board for arborists and/or urban foresters
- State arborist association
- National Arborist Association (Tree Care Industry Association) (www.natlarb.com)
- National Arbor Day Foundation (www.arborday.org)
- U.S. Forest Service (www.fs.fed.us)

Currently, most homeowners' insurance policies do not provide compensation for storm damage to trees nor does FEMA consider tree values when assisting storm damaged areas. For more information on insurance and tree-related policy contact your state's insurance commission. For more information on FEMA policy related to trees contact them at www.fema.gov.

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