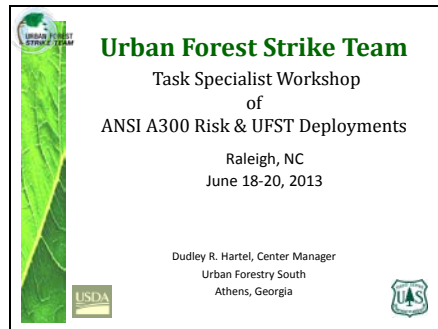


Slide 1



This is the *Tree Risk Assessment Specifications* presentation developed by the UFST Advisory Committee & the USDA Forest Service for the UFST Task Specialist workshop in Raleigh, NC; June 18-20, 2013.

The Urban Forest Strike Team program was developed by the Southern Group of State Foresters and has since been adopted and adapted for use throughout the eastern United States. [Note: The UFST logo is the SGSF's identifying mark for this program.]

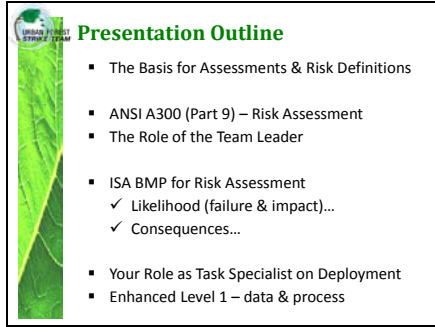
Urban Forestry South is the Southern Region's urban & community forestry Technology Transfer Center which supports U&CF programs through state agencies and municipalities. The Northeast Area State and Private Forestry works with the 20 States in the Northeast and Washington DC (Maine to Minnesota, to Missouri to Maryland) to support and promote urban forestry programs.

Urban Forestry South in Athens, Georgia (Dudley Hartel & Eric Kuehler), the USDA FS Office of the Durham (NH) Field Representative (John Parry), and the Midwest Center for Urban & Community Forestry in St. Paul, MN (Jill Johnson) provide the primary technical support for UFST development, implementation, and deployment.

The UFST Advisory Committee(s) provide(s) the guidance, direction, and oversight of the program on behalf of the Southern Group of State Foresters, Massachusetts Tree Wardens, and other participating federal agencies.

File: 2013 UFST Task Specialist Workshop - ANSI A300 Risk & BMP (18Jun13 v1.2).pptx

Slide 2



Presentation Outline

- The Basis for Assessments & Risk Definitions
- ANSI A300 (Part 9) – Risk Assessment
- The Role of the Team Leader
- ISA BMP for Risk Assessment
 - ✓ Likelihood (failure & impact)...
 - ✓ Consequences...
- Your Role as Task Specialist on Deployment
- Enhanced Level 1 – data & process

The objective of this presentation is to introduce the ANSI A300 Part 9) in general terms) and ISA BMP risk protocol and its relationship to the UFST assessments provided following significant disaster events; and the respective roles (for risk assessments) of Team Leaders and Task Specialists.

I will introduce/review the risk assessment protocol used by UFST that is based on the ANSI A300 Part 9 standard and ISA Tree Risk BMP...

- Basis for risk assessments – (ANSI & ISA BMP)
- Team Leader – Tree Risk discussions with the municipalities
- The ANSI A300 (Part 9) Risk Assessment standard and how it applies to UFST
- UFST specification components
- An overview of the ISA BMP for Risk Assessment
 - ✓ when necessary we can discuss these in terms of Matheny & Clark
- Task Specialists role in risk assessment – field data & observations
- How the risk specification & BMP protocol are executed in the field (UFST deployment)

For this presentation we will use the following three (3) references (i.e. current arboricultural standards):

- ANSI A300 (Part 9)-2011 Tree Risk Assessment;
 - a. Tree Structure Assessment, Tree Care Industry Association, Inc., Londonderry, NH
- Best Management Practices: Tree Risk Assessment (2011), Smiley, E.T., and N. Matheny, S. Lilly, International Society of Arboriculture, Champaign, IL
- Tree Risk Assessment - Manual (2013), Dunster, J. and E.T. Smiley, N. Matheny, and S. Lilly, International Society of Arboriculture, Champaign, IL (i.e. TRAQ)

Slide 3




Basis for Tree Risk Assessments

- **ANSI A300 (Part 9)-2011 Tree Risk Assessment; a. Tree Structure Assessment**, Tree Care Industry Association, Inc., Londonderry, NH
- **Best Management Practices: Tree Risk Assessment (2011)**, Smiley, E.T., and N. Matheny, S. Lilly, International Society of Arboriculture, Champaign, IL
- **Tree Risk Assessment - Manual (2013)**, Dunster, J. and E.T. Smiley, N. Matheny, and S. Lilly, International Society of Arboriculture, Champaign, IL (i.e. TRAQ)

Tree risk assessments (for UFST and urban tree risk management programs in general) should adopt and follow the current arboricultural standards.

- ANSI A300 (Part 9)-2011 Tree Risk Assessment; a. Tree Structure Assessment, Tree Care Industry Association, Inc., Londonderry, NH
- Best Management Practices: Tree Risk Assessment (2011), Smiley, E.T., and N. Matheny, S. Lilly, International Society of Arboriculture, Champaign, IL
- Tree Risk Assessment - Manual (2013), Dunster, J. and E.T. Smiley, N. Matheny, and S. Lilly, International Society of Arboriculture, Champaign, IL (i.e. TRAQ)

Slide 4



Definitions

- Risk... is the combination of the likelihood of an event and the severity of the potential consequences.

In the context of trees, risk is the likelihood of a conflict or tree failure occurring and affecting a target, and (combined with) the severity of the associated consequences – injury, damage, disruption.

Definitions adopted from current arboricultural standards are based on the ISO 31010 (see optional slide at end of presentation).


Risk (from ISA BMP: Tree Risk Assessment)...

- Probabilities (likelihood) involved
- An event
- Consequences (harm) with some level of severity (or concern)

Conflict... e.g. tree obstructs stop sign visibility at intersection, or tree limbs/branches touching power distribution lines.

Target... e.g. human, infrastructure, vehicle.

Slide 5



Definitions (continued)

- Hazard... is a likely source of harm.

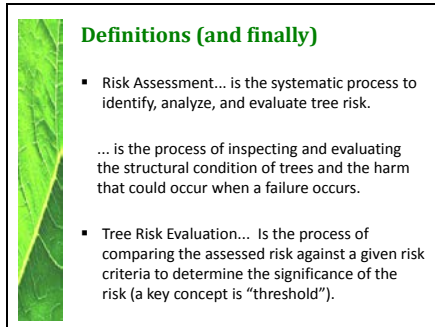
In relation to trees, a hazard is the tree part(s) identified as a likely source of harm; assessed, rated, and determined to exceed the owner's threshold for acceptable risk. i.e. a hazardous tree

Hazard (from ISA BMP: Tree Risk Assessment)...

- What is the likely source (e.g. limb, branch, whole tree) of the assessed harm (i.e. consequence)

The defect is NOT the hazard, until assessed, assigned a risk rating, and determined to exceed the owner's threshold for acceptable risk.

Slide 6



Definitions (and finally)

- Risk Assessment... is the systematic process to identify, analyze, and evaluate tree risk.

... is the process of inspecting and evaluating the structural condition of trees and the harm that could occur when a failure occurs.

- Tree Risk Evaluation... Is the process of comparing the assessed risk against a given risk criteria to determine the significance of the risk (a key concept is “threshold”).

Risk assessment is the step after an urban tree risk management program (framework) establishes a community's context for risk and its management. (see Pokorny 2003)

Assessment and evaluation (from ISA BMP: Tree Risk Assessment)...

- Systematic process
 - Identify
 - Analyze
 - Evaluate
- There are standards (i.e. ANSI A300 Part 9) that should be followed when developing this assessment process

Evaluation (from ISA BMP: Tree Risk Assessment)...

- Comparing the assessed risk to the owner's experience and/or expectations (i.e. risk threshold; how much harm is acceptable to the controlling authority)

Slide 7



**Questions
Comments
& Discussion!**

USDA

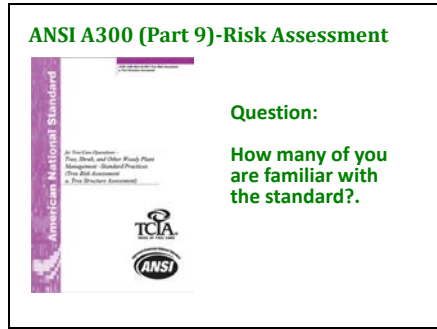


Review:

- ANSI A300 (Part 9) includes the standardization of definitions and terminology
- Risk assessment based on published arboricultural references (ISA)

Any questions or comments after this quick introduction to ANSI ?

Slide 8

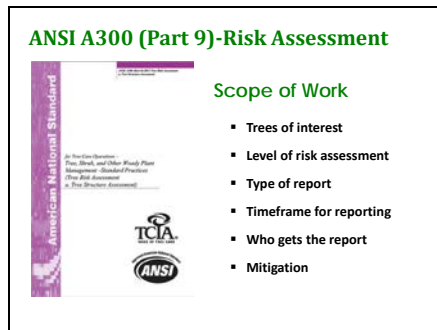


Now we will quickly review the major components of the ANSI A300 Part 9 published in 2011.

How many of you are familiar with this new standard?

- Aware of it?
- Read it?
- Studied it?
- Used it?

Slide 9



Published in 2011 by TCIA (see additional slides at end of presentation for TCIA's role in ANSI A300).

The "standard" reviews the ANSI system and introduces the tree risk standard (Part 9).

It covers safety, other standards that apply, and definitions.

Requirement for written specifications: Section a. 1.2 "for developing written specifications" and Section 90.1 "standards for writing specifications".

The "Tree Structure Assessment Practices" – Section 93 includes the requirements for a statement of work (SOW) in addition to other general information related to objective, qualifications, and target identification. It states that:

"The arborist should perform tree structure assessments on only those trees specifically identified in the scope of work."

Let's look first at the details of the scope of work...

The standard indicates should be included, at a minimum, in the Scope of Work portion of the written risk specification:

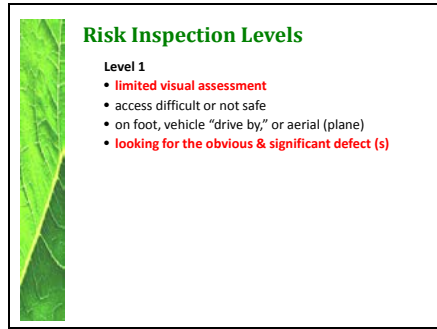
- Trees of interest – can be spatial (i.e. area), species specific, or other definable attribute
 - ✓ UFST: trees damaged by the storm event PLUS spatial boundaries
- Level of risk assessment - detail when Level 1,2, and 3 would be used
 - ✓ UFST: we use an enhanced Level 1 (i.e.

- more than is needed for Level 1, but less than required for Level 2)
- ✓ UFST: Level 2 requires assessment of multiple defects/targets and a more detailed assessment of targets
- ✓ UFST: Team Leader and municipality develop target occupancy zones to define our spatial area of interest
- Type of report – written or verbal
 - ✓ UFST: the Team Leader will produce a written report (from UFST template) for the deployment
 - ✓ UFST: draft reports (at defined interval) may be produced if needed (i.e. if debris contractor is working very close behind UFST crews)
- Timeframe for reporting – this is the timeframe for the deployment and final report
 - ✓ UFST: final report is delivered at demobilization of the last team deployed for the storm event
- Who gets the report – the owner or owner’s representative
 - ✓ UFST: this is determined during the Team Leader’s
- Mitigation – what needs to be done, and when (i.e. action and priority)
 - ✓ UFST: we use standard FEMA debris criteria for removals and pruning; plus mitigation for non-FEMA risk
 - ✓ UFST: prioritization is based on the ISA risk rating (4 levels), and size of part (or other criteria collected and discussed with owner)

Go over these and then explain why they are important for UFSTs.

- Indicates our professional, standardized approach
- Documents the assessment process
- Clearly defines trees and physical area of the work to be done
- Makes it clear how information will be transmitted to the owner (i.e. municipality)
- Think of it as an extension of ICS into the community

Slide 10



Risk Inspection Levels

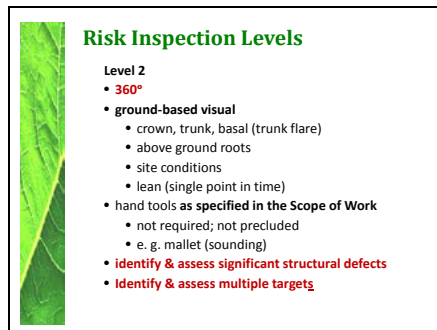
Level 1

- **limited visual assessment**
- access difficult or not safe
- on foot, vehicle "drive by," or aerial (plane)
- **looking for the obvious & significant defect (s)**

The standard defines three distinct levels of assessment that may be used by a qualified arborist.

For UFST, we use Level 1; the significant defect(s) are typically but not necessarily storm related.

Slide 11



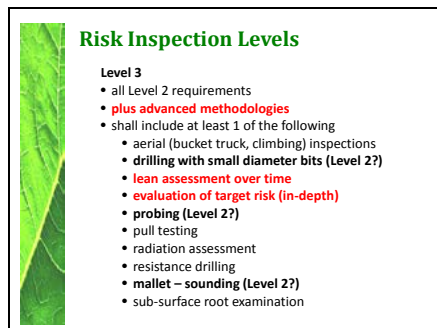
Risk Inspection Levels

Level 2

- **360°**
- **ground-based visual**
 - crown, trunk, basal (trunk flare)
 - above ground roots
 - site conditions
 - lean (single point in time)
- **hand tools as specified in the Scope of Work**
 - not required; not precluded
 - e. g. mallet (sounding)
- **identify & assess significant structural defects**
- **identify & assess multiple targets**

Level 2 (see (ISA TRAQ Manual pg 174-175) indicates multiple defect/target assessment and probably a more in-depth evaluation of targets.

Slide 12



Risk Inspection Levels

Level 3

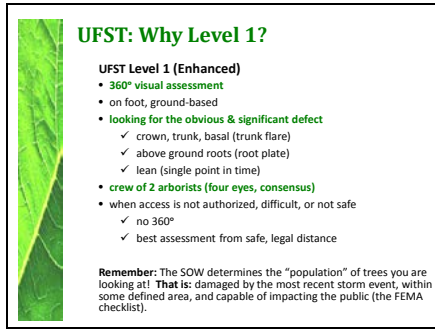
- all Level 2 requirements
- **plus advanced methodologies**
- shall include at least 1 of the following
 - aerial (bucket truck, climbing) inspections
 - **drilling with small diameter bits (Level 2?)**
 - **lean assessment over time**
 - **evaluation of target risk (in-depth)**
 - **probing (Level 2?)**
 - pull testing
 - radiation assessment
 - resistance drilling
 - **mallet – sounding (Level 2?)**
 - sub-surface root examination

Level 3 requires the most advanced techniques (possibly multiple) and should result in assessments with highest confidence (i.e. lower chance of missing significant defects and their associated risk).

Sounding, probing, and drilling (i.e. small diameter bits) may also be common techniques for Level 2 for many arborists. Remember, Level 2 does not preclude use of any of these techniques.

Level 3 requires at least 1 of the “advanced methodologies”.

Slide 13



UFST: Why Level 1?

UFST Level 1 (Enhanced)

- 360° visual assessment
- on foot, ground-based
- looking for the obvious & significant defect
 - ✓ crown, trunk, basal (trunk flare)
 - ✓ above ground roots (root plate)
 - ✓ lean (single point in time)
- crew of 2 arborists (four eyes, consensus)
- when access is not authorized, difficult, or not safe
 - ✓ no 360°
 - ✓ best assessment from safe, legal distance

Remember: The SOW determines the "population" of trees you are looking at! **That is:** damaged by the most recent storm event, within some defined area, and capable of impacting the public (the FEMA checklist).

The UFST "enhanced" Level 1 includes these significant features:

- 360 degree assessment unless restricted (for safety, legal access)
- A ground-based from foot assessment (NOT a drive-by unless #1 applies)
- Quickly locating the obvious storm damage and most significant risk (even if pre-storm)
- Considering all above-ground damage and visual defects
- We assess based on 2 arborists and their discussion

The Scope of Work (SOW) determines which streets we walk down (or parks we are in), and which trees we stop at (recent storm damage; i.e. the Federally/State/Local declared disaster event). State & local events would be UFST in-state deployments; and Federally declared events could be regional UFST deployments.

The Team Leader works with the municipality to develop the UFST specifications from a "template" for each deployment.

Review:

- Includes a quick review of the ANSI A300 Standard
- Illustrates the levels of risk assessment
- Role of UFST Team Leader


Any questions or comments from this quick introduction to the ANSI A300 levels?

Slide 14




**Questions
Comments
& Discussion!**

USDA



Slide 15



Team Leader's Role

- Met with the municipality to determine...
 - ✓ Boundaries for UFST assessments
 - ✓ Tree population of interest (storm damaged trees)
 - ✓ General risk zones (human occupancy)
- ✓ Develops this into a written Tree Risk Specification (a UFST template based on the ANSI Standard)
- ✓ Convey that specification to Task Specialists

Specifically related to the tree risk assessments, the Team Leader has discussed the area of the post-disaster assessments (spatial boundaries), other tree population criteria (i.e. storm damaged to meet FEMA definitions), timeframe, residual risk, and human occupancy zones within the spatial boundary (e.g. parks and park areas, residential areas, others).

In addition the Tree Risk Specification is written and discussed with the municipality (controlling authority). This is the “guide” UFST tree risk assessments for this specific deployment.

The TL then conveys that specification to the Task Specialists upon deployment in their first day.

Slide 16



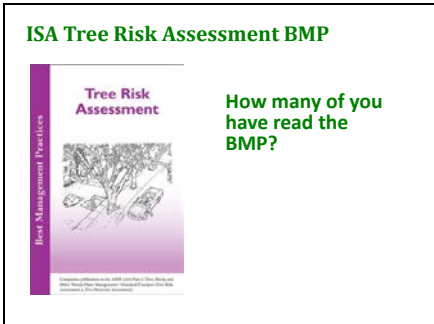
Questions Comments & Discussion!

Review:

- Of the Team Leader's role (related to the risk assessment)

Any questions or comments?

Slide 17



ISA Tree Risk Assessment BMP

How many of you have read the BMP?


Question: How many of you have read the BMP?

How many have used the methods outlined in the BMP in the field for risk assessment?

(raise hands? Or answer question—very little, extensively, somewhere in between?)

Slide 18

ISA Tree Risk Assessment BMP




Terms...

- **Likelihood** vs. probability
 - ✓ Failure
 - ✓ Impact
 - ✓ Consequences

The term likelihood is used instead of probability (to emphasize the subjective nature of the assessment and less implied “mathematical” accuracy & precision [Guy Meilleur, 18Jun13]).

Slide 19

Tree Risk BMP – Rating System



Assess:

- Likelihood of Failure
- Likelihood of Impacting a Target
- Consequences of Failure

From Tree Risk Assessment - Manual (2013) – ISA

This system uses an assessment of three factors:

- The likelihood of failure: tree part(s) or whole tree
- The likelihood of a impacting the target: when it fails how will it impact the target, and
- The consequences of the failure on the specific target (assuming that it will fail and impact; those are both covered above).

Examples:

- You may have a storm-damaged branch that is barely hanging on by a thread, and it’s located directly over a target. This likelihood of failure is **probable** and likelihood of impacting the target is **high**. But the size of the branch is only 1” in diameter and 2 feet long, and the target is a rickety fence. The consequence is **negligible** because of the size of the part AND the value of the target (extreme example but gives you the idea). . The risk rating is **LOW** for this scenario.
- You have a tree with a vertical crack in the trunk and heartwood exposed just below a major junction of scaffold limbs; this tree crown is also located over a location with high levels of human occupancy. This may have likelihood of failure that is **probable** and likelihood of impacting the target (humans) of **high**. The consequence of this scenario is **severe** because of the value of the target AND mass of the tree that is expected to fail. The risk rating is **HIGH** for this scenario.
- You have a tree with a cracked limb (4” at break) that appears to still be securely

attached; this limb is about 30' from a well used trail (to the side 90°) – frequent human occupancy. This may have likelihood of failure that is possible and likelihood of impacting the target (humans) of low. The consequence of this scenario is significant because of the value of the target (human). The risk rating is LOW for this scenario.

Note: underlined words in these scenarios are “keywords” for the ISA BMP and TRAQ.

Slide 20

Tree Risk BMP – Rating System
Likelihood of (Tree Part) Failure

What data will contribute to UFST knowledge of LOF?

- Defect – type & severity
- Site Characteristics - Construction
- Load on the tree part
 - ✓ Exposure
 - ✓ Cultural practices – i.e. bad pruning

From Best Management Practices: Tree Risk Assessment – ISA – T. Smiley, N. Matheny, S. Lilly – 2012
Likelihood of Tree Part Failure

Include major factors that contribute to this assessment
...

Slide 21

Tree Risk BMP – Rating System
Likelihood of Impacting a Target

What data will contribute to UFST knowledge of LIT?

- Target zone – Shape & location
- Occupancy
 - ✓ Type of target e.g. stationary vs. moving
 - ✓ Rate e.g. rare to constant

From Best Management Practices: Tree Risk Assessment – ISA – T. Smiley, N. Matheny, S. Lilly – 2012
Likelihood of Tree Part to Fail

Include major factors that contribute to this assessment
...

Slide 22

Tree Risk BMP – Rating System
Consequences of (Target) Impact

What data will contribute to UFST knowledge of COI?

- Value
 - ✓ Human
 - ✓ Economic
- Extent of injury
 - ✓ Size of part/tree
 - ✓ Distance falling
 - ✓ Fall characteristics

From Best Management Practices: Tree Risk Assessment – ISA – T. Smiley, N. Matheny, S. Lilly – 2012
Consequences of impacting the target

Include major factors that contribute to this assessment
...

Slide 23

Tree Risk BMP – Rating System

Matrix I:

		Likelihood of Impacting Target (Person or Property)			
		Very Low	Low	Medium	High
Likelihood of Failure (Tree Part)	Imminent	Unlikely	Somewhat likely	Likely	Very likely
	Probable	Unlikely	Unlikely	Somewhat likely	Likely
	Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
	Improbable	Unlikely	Unlikely	Unlikely	Unlikely

From Best Management Practices: Tree Risk Assessment – ISA – T. Smiley, N. Matheny, S. Lilly – 2012

This system uses two inter-related matrices to define the “risk rating”.

In the first matrix, failure potential (the rows: improbable to imminent) are intersected with probability of target impact (the columns: very low to high). This matrix rating is then transferred to Matrix II (the “Risk Matrix”).

Slide 24

Tree Risk BMP – Rating System

Matrix II:

		Consequences (to Target)			
		Negligible	Minor	Significant	Severe
Likelihood of Failure & Impact	Very likely	Low	Moderate	High	Extreme
	Likely	Low	Moderate	High	High
	Somewhat Likely	Low	Low	Moderate	Moderate
	Unlikely	Low	Low	Low	Low

From Best Management Practices: Tree Risk Assessment – ISA – T. Smiley, N. Matheny, S. Lilly – 2012

Matrix I values are rows (combination of failure potential & impact onto a target) that are intersected with expected consequences to the target (the columns: negligible to severe).

The intersection represents the “assessed risk rating” (from **Low** to **Extreme**) based on the three components:

- Likelihood of failure (i.e. failure potential)
- Likelihood of impacting (affecting) a target
- Consequences of that impact


and is used to develop mitigation recommendations.

Municipalities can use any of the subcomponents (e.g. Consequences) to prioritize large numbers of assessed trees that have the same risk rating (e.g. Moderate).

Slide 25

Tree Risk BMP – Rating System

Multiple Defects



Decide in the beginning which part you are going to assess...

Which one is the...most likely to fail?

Poses the greatest risk?

Residual Risk – Once mitigation is complete, are there other defects that contribute to risk?

Multiple defects and residual risk.

UFST Task Specialists assess the FEMA defect (or the defect most likely to result in failure within the time frame) and then indicate if any additional defects (storm related or not) may represent some significant risk **FOLLOWING** storm mitigation.

This is residual risk that is identified but NOT assessed with our Level 1 protocol.

Slide 26

Risk Assessment – In the Field

Assessing the FEMA Component

UFST GPS data dictionary collects...

- Genus/Species
- Diameter (DBH)
- Tree component of concern
- FEMA class (descriptive)
- Number of broken limbs
- Risk rating components (3)
- Multiple defects (indication of residual risk)

For disaster response, UFST assesses the FEMA defect (if a non-FEMA tree, then assess most likely to occur or as defined in the specification that the Team Leader has developed with the municipality).

Slide 27

**Questions
Comments
& Discussion!**

USDA

Review:

- The ISA BMP process for assessing risk for UFST

Any questions or comments from this discussion of the UFST Tree Risk Specification “template”?

Slide 28

UFST Risk Resources

Protocols and services provided by Urban Forest Strike Teams follow national disaster policy and current arboricultural standards:

- ANSI A300 (Part 9)-2011 Tree Risk Assessment: a. Tree Structure Assessment, Tree Care Industry Association, Inc., Londonderry, NH [<http://bit.ly/U904ll>]
- Best Management Practices: Tree Risk Assessment (2011), Smiley, E.T., and N. Matheny, S. Lilly, International Society of Arboriculture, Champaign, IL [<http://bit.ly/PMCiml>]
- Tree Risk Assessment - Manual (2013), Dunster, J. and E.T. Smiley, N. Matheny, and S. Lilly, International Society of Arboriculture, Champaign, IL (i.e. TRAC)

UFST standards and references for risk assessment:

- ISA’s new Tree Risk BMP (2011)
- ANSI A300 (Part 9) Tree Risk Assessment (2011)
- Tree Risk Assessment - Manual (2013)
- Currently considering the role that the ISA Tree Risk Qualification program may have within UFST.
- For a more comprehensive guide to urban tree risk management, see Pokorny (2003).

Slide 29

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USDA

This presentation will be archived and available as a PDF at www.UrbanForestrySouth.org.

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