

Concerns regarding the tree-related DIs and DoDs in the EF scale



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The current tree-related DIs.

27. TREES: HARDWOOD

Typical Construction

- Hardwood: Oak, Maple, Birch, Ash

DOD*	Damage description	EXP	LB	UB
1	Small limbs broken (up to 1" diameter)	60	48	72
2	Large branches broken (1"-3" diameter)	74	61	88
3	Trees uprooted	94	76	118
4	Trunks snapped	107	93	134
5	Trees debarked with only stubs of largest branches remaining	143	123	167

28. TREES (SOFTWOOD)

Typical Construction

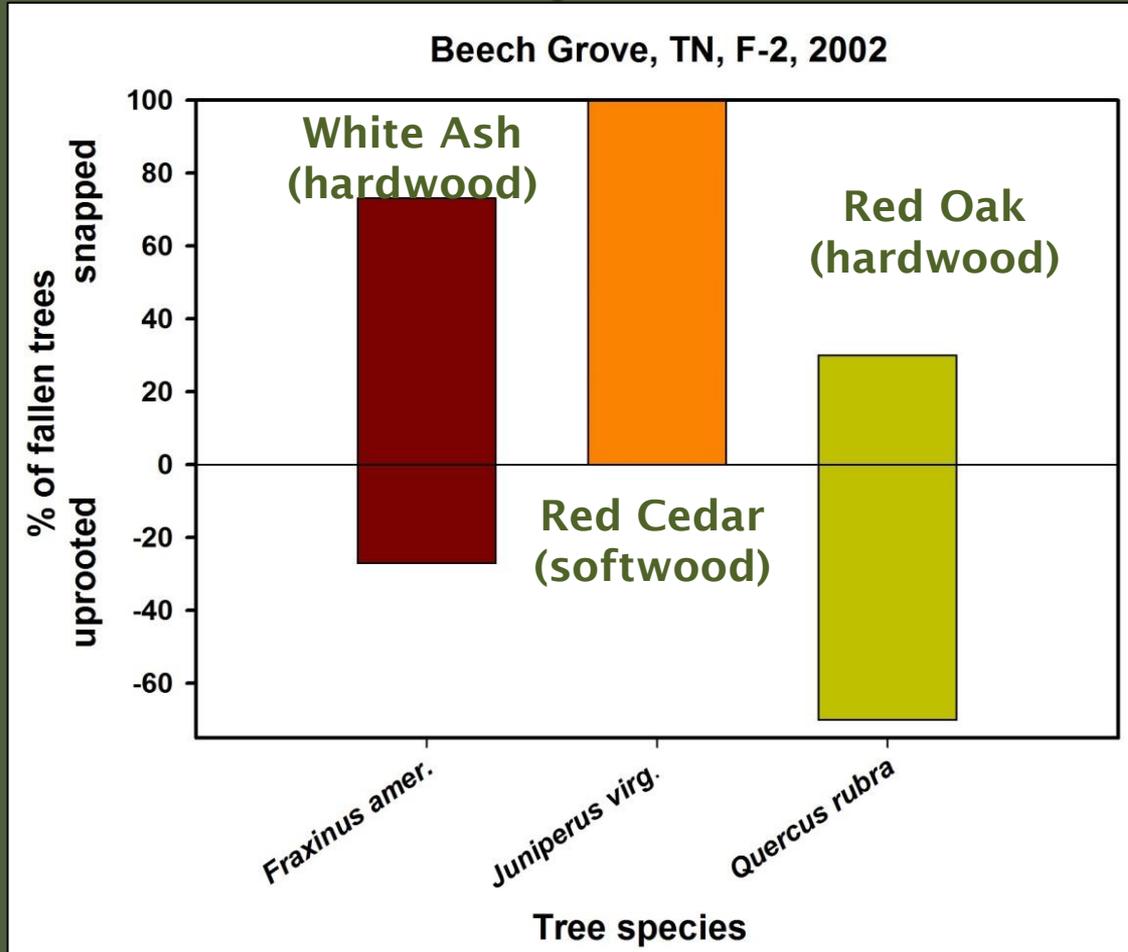
- Softwood: Pine, Spruce, Fir, Hemlock, Cedar, Redwood, Cypress

DOD	Damage description	EXP	LB	UB
1	Small limbs broken (up to 1" diameter)	60	48	72
2	Large branches broken (1" – 3" diameter)	75	62	88
3	Trees uprooted	87	73	113
4	Trunks snapped	104	88	128
5	Trees debarked with only stubs of largest branches remaining	131	112	153

Why are these important:

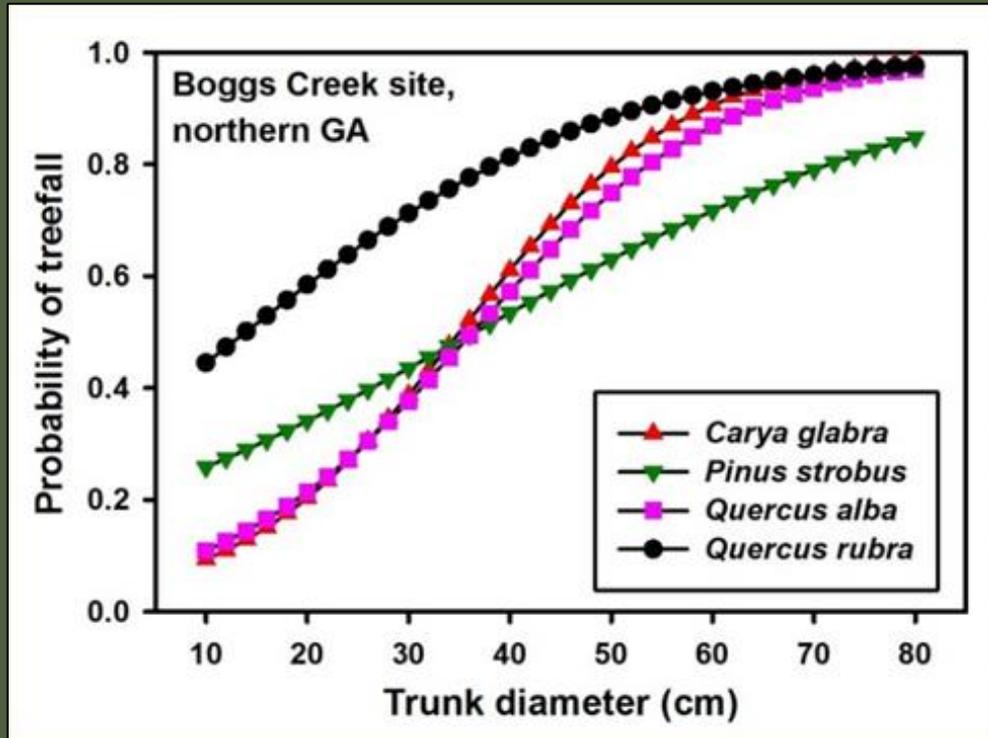
Most EF-scale estimates are based on damage to structures, but large fractions of many tornado tracks hit primarily trees.

- Problems: 1) Need to consider tree species
2) Snapping & uprooting don't indicate different speeds



These trees were spatially intermixed and should have experienced roughly similar winds.

Problem: Need to consider tree size



- ▣ Note differences between species
- ▣ Note trends as a function of tree size
- ▣ For larger size classes, white pine (*Pinus strobus*, a softwood) is less vulnerable than hardwoods

House/tree ratings don't match



Before

After



Rated EF1
Home damaged May 2013
Moore, OK
S. Olde Bridge Rd.

Source: Google

House/tree ratings don't match

Table 2. Damage classification for trees visible in preceding images. Damage categories are not mutually exclusive (e.g., a tree could be both stubbed and debarked). The “branches broken” classification includes damage to both small and large branches.

Tree	Intact, Standing	Defoliated	Branches Broken	Uprooted	Snapped	Stubbed	Debarked
1						X	
2						X	
3						X	
4						X	
5		X	X				
6					X		
7					X		
8	X						
9			X				
10				X			
11						X	

Damage varies from EF0 to EF3 using current EF-scale DoDs

Summary of concerns

- ▣ **No consideration of tree species or size**
- ▣ **Observations do not justify assignment of different DoDs to snapping and uprooting**
- ▣ **Softwood/hardwood distinction probably not justified**
- ▣ **'Stubbing' and debarking probably not indicative of EF3 winds.**
- ▣ **Tree damage often inconsistent with adjacent house**