

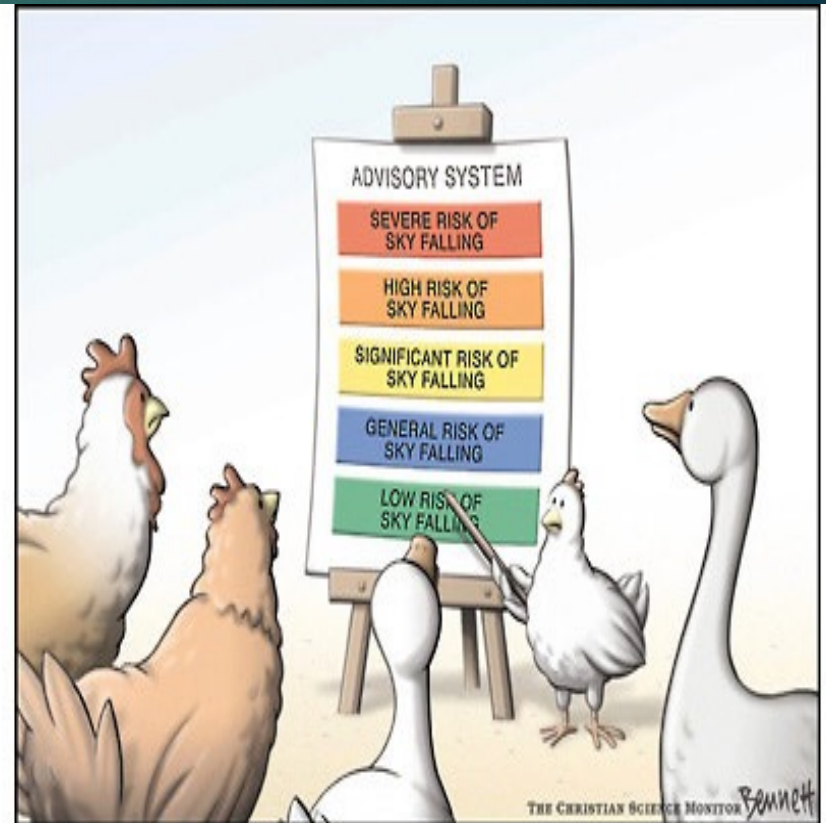
Hard Times for Hard Maples

The convergence of historic stress, dramatic shifts in weather patterns, and periodic defoliation have resulted in unprecedented levels of stress in sugar maples.

Paul Hetzler, ISA Certified Arborist

paul.j.hetzler@gmail.com

(613) 255-4966



Hard Maple = Sugar Maple =
Acer saccharum



Norway maple



Sugar Maple (*Acer saccharum*)



Red Maple (*Acer rubra*)



Silver Maple (*Acer saccharinum*)

Some recent hard times: Eastern Tent Caterpillar (ETC) & Forest Tent Caterpillar (FTC)



ETC: make “tents” (pennies optional); egg masses more tapered at ends; larvae have “road” down their backs



FTC: NO TENTS; egg masses more squared-off at ends;
larvae have “footprints” down their backs.



Forest-Tent Caterpillar (*Malacosoma disstria*)

2nd and 5th instar larvae





Red Maples NOT defoliated by tent-cats.

How Many Caterpillars?

“During outbreaks, caterpillar biomass **greatly exceeds the collective biomass of all other animals in the forest.** Dr. Jens Roland, University of Alberta, estimated the biomass (total weight) of FTC per square kilometer of forest during the peak of an outbreak to be **equivalent to that of 657 caribou.**”

Terence Fitzgerald, *The Tent Caterpillars*, 1995, Cornell Univ. Press



Spongy Moths:

Just to compare with tent-cats.



Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org





**Some tents are not a
problem.**

Fall Webworm



Cat Tents:

Unlike tent-cats, they do not pose a significant threat to maples.



Setting the Stage: SUNY-ESF Study

Bishop et al, 21 October 2015, *Ecosphere*

“The last few decades have brought warmer and wetter conditions, typically good for plant growth. Meanwhile, there have been big strides in reducing acid rain, which is especially damaging to sugar maple.

Given these changes, we would expect these trees to be thriving, but they are not.”

- Dr. Colin Beier, associate professor of ecology at SUNY-ESF

“Outside of studies of red spruce in the 1970s, I have never seen anything quite like this.”

Tree-ring studies in the region do not show a decline like what we see in sugar maple.

Combined with evidence of reduced natural regeneration of sugar maple, it is a concern.”

- Dr. Neil Pederson, ecologist & climate-change expert at Harvard Forest in Massachusetts

Enter Sandman: 2012, 2016, 2108, 2020 Droughts



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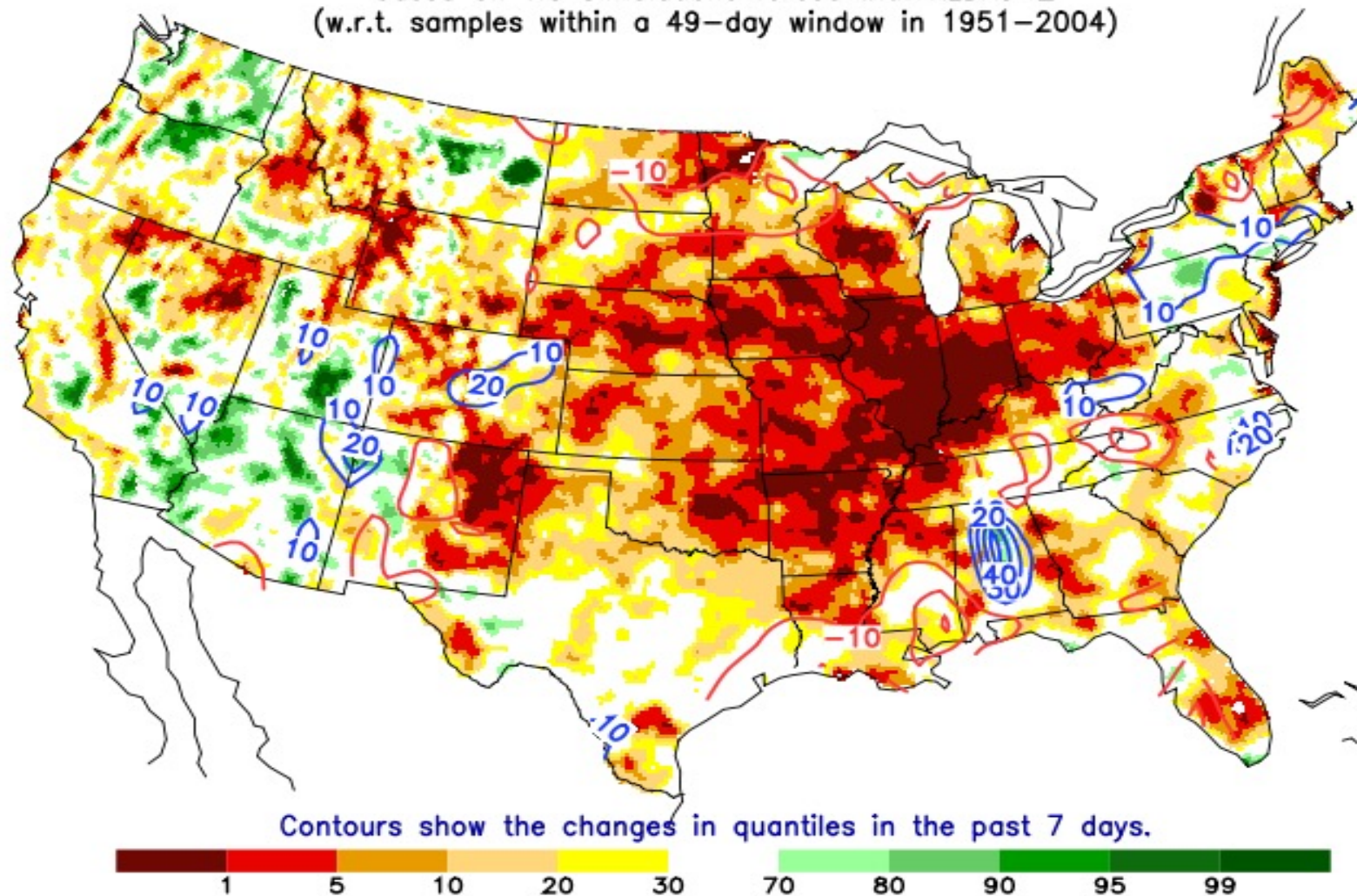
Droughts: Not just for deserts anymore.

noun: **drought**

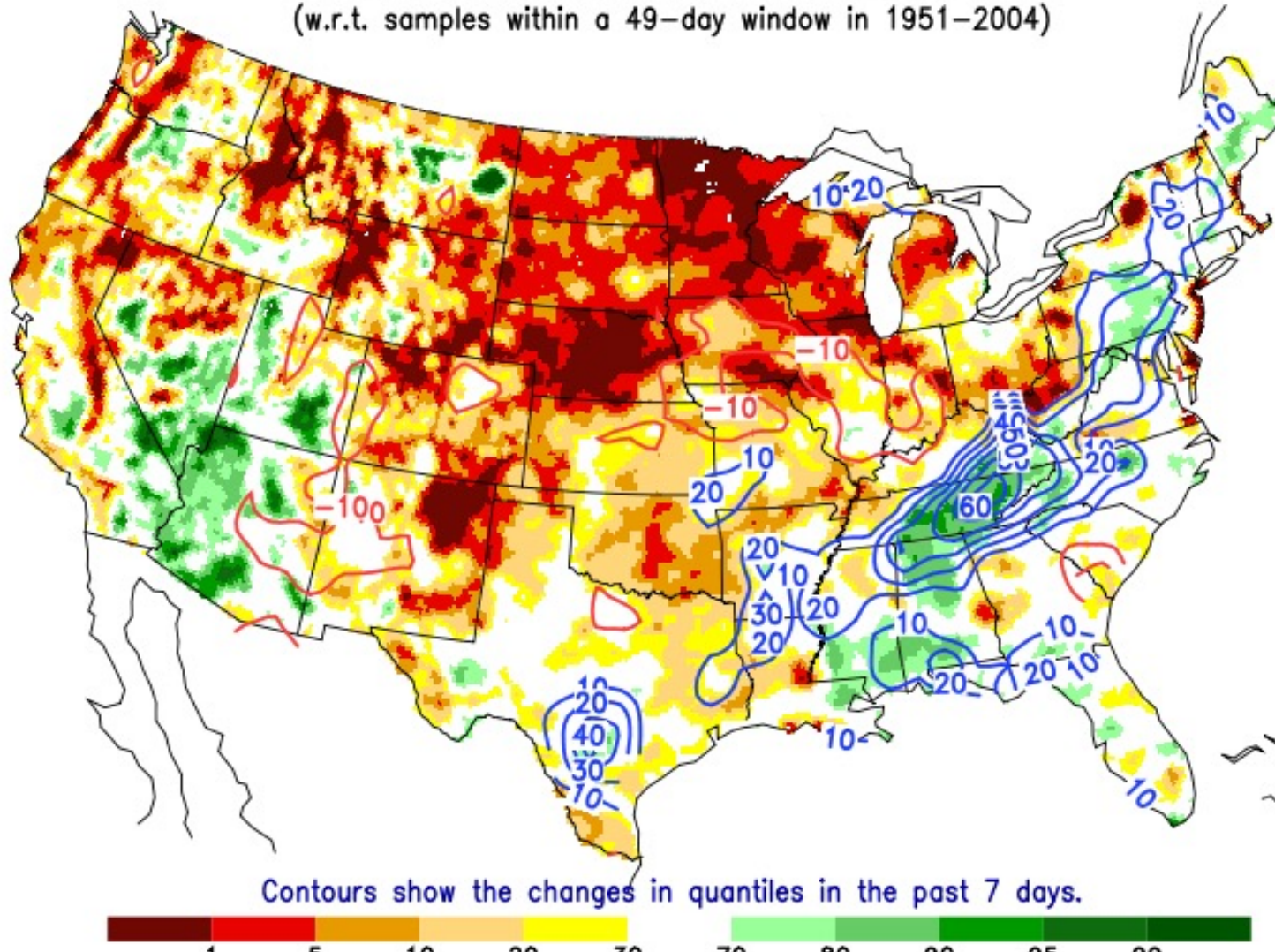
1. a prolonged period of abnormally low rainfall or a shortage of water resulting from weather conditions.

synonyms: dry spell, lack of rain, **shortage of water**

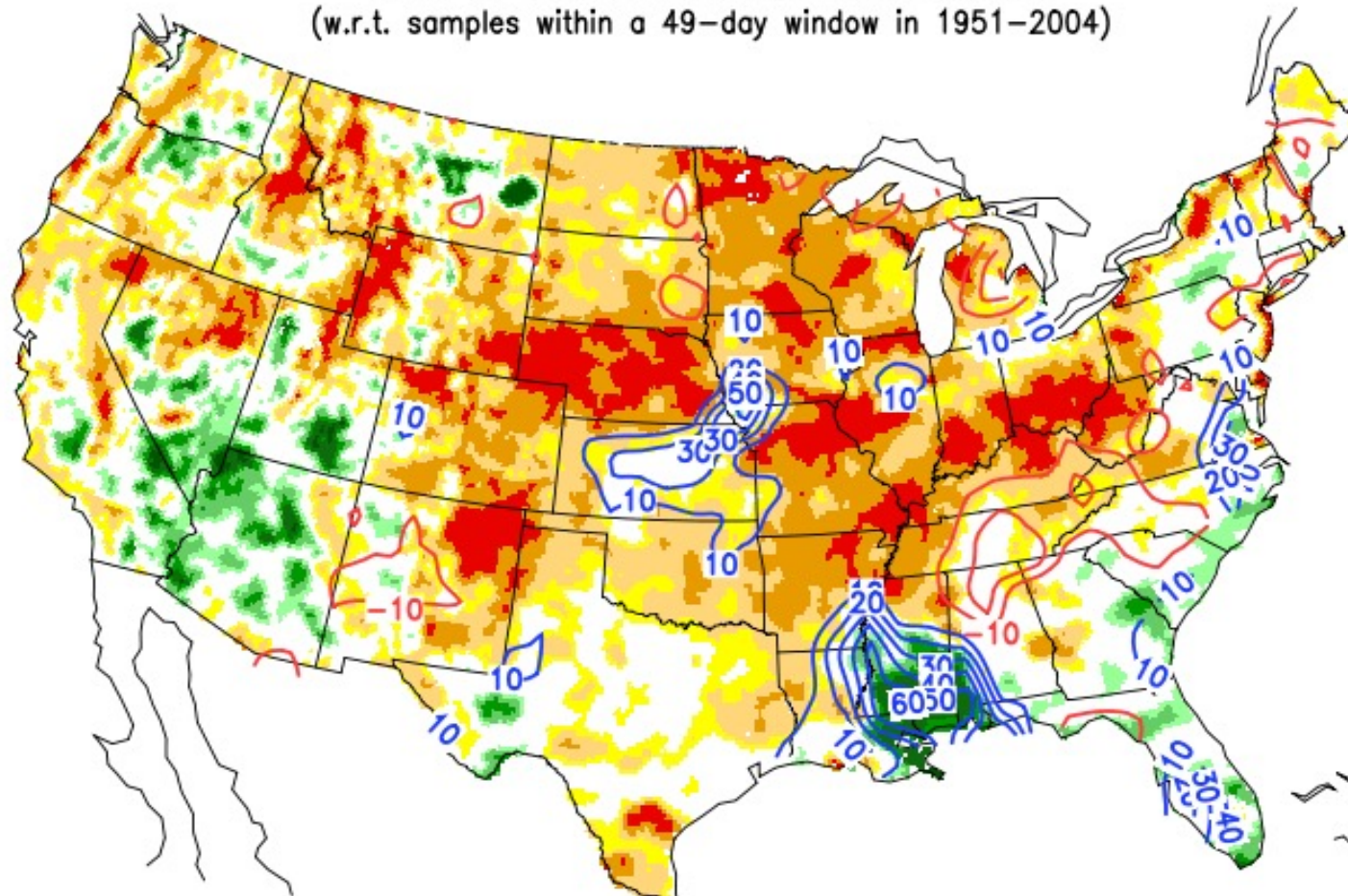
Total Column Soil Moisture Percentiles for 2012/08/02
based on VIC Simulations forced with NLDAS-2
(w.r.t. samples within a 49-day window in 1951-2004)



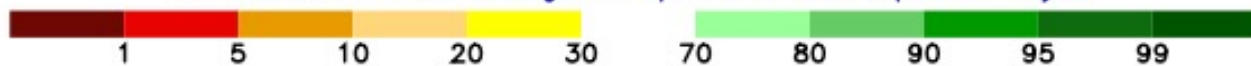
Total Column Soil Moisture Percentiles for 2012/09/20
based on VIC Simulations forced with NLDAS-2
(w.r.t. samples within a 49-day window in 1951-2004)



Total Column Soil Moisture Percentiles for 2012/08/30
based on VIC Simulations forced with NLDAS-2
(w.r.t. samples within a 49-day window in 1951-2004)



Contours show the changes in quantiles in the past 7 days.



Tree Responses to Drought

- ▶ Root death
- ▶ Release of stored reserves to replace tissues
- ▶ Less resistant to disease, decay (CODIT reaction)
- ▶ Distress crop production in extreme cases
- ▶ 2-3 year recovery period (Hudler)
- ▶ Lower sugar levels, wood production
- ▶ Altered chemical signature attracts other forest pests



Mystery Bleeding Canker, 2013



Stress leads to helicopters.

Distress Crop vs. Mast Year



And, helicopters lead to stress...



Other tree species affected by distress crops as well.



2016: Unprecedented low soil moisture.

2017: Distress Crop, FTC Outbreaks cause further damage.



Christmas in July



According to the NYS DEC, over **200,000 acres** of FTC-defoliated maples in NNY **FAILED TO REFOLIATE** in 2017.

Maple stands looked like winter from June through October. Minus the snow...

Near Altona, NY: One maple producer lost 1,000+ acres of sugar maples.

Sugar maples are the only species which failed to refoliate.



Better late than never?

October 27, 2017: leaf-out on South-facing slopes





Note proliferation of adventitious buds. And terminal bud scar spacing for past 5 years...
End buds are mush—frozen while still succulent.





By 2019, this operator had **LOST 20%** of his crop trees across all size- and age-classes.

Another 40% of his maples had gone into severe decline.

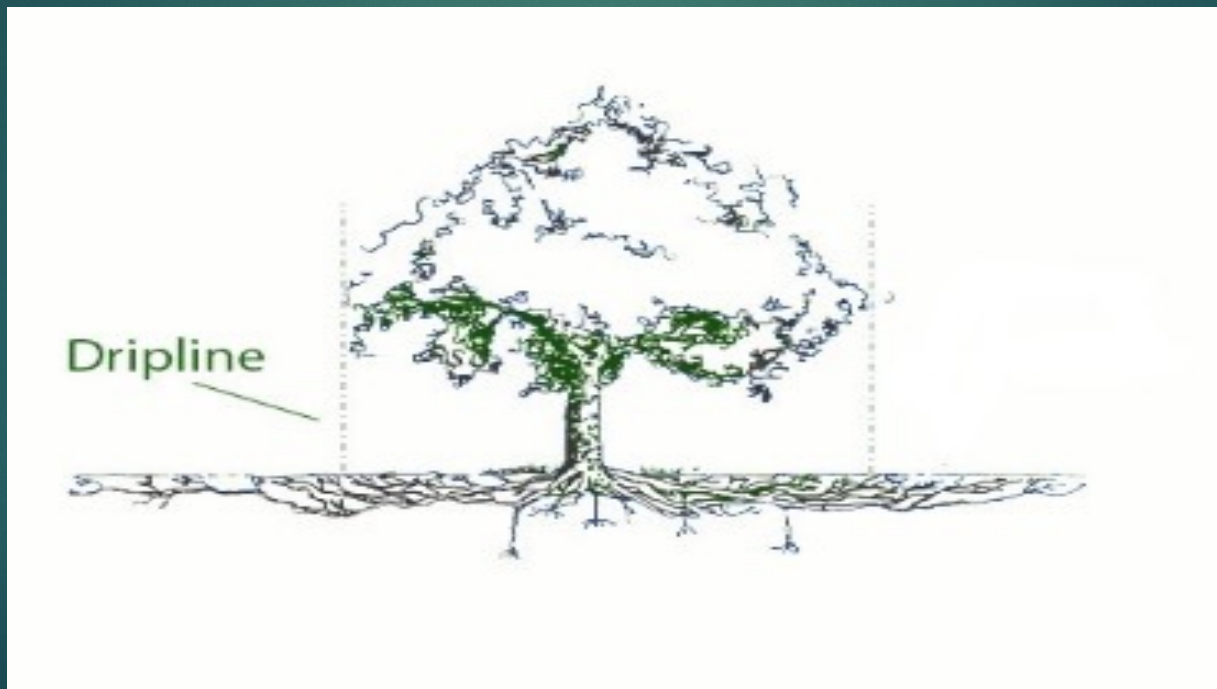


Other Stressors

NOOOOOOOOO!!



Better...a little.





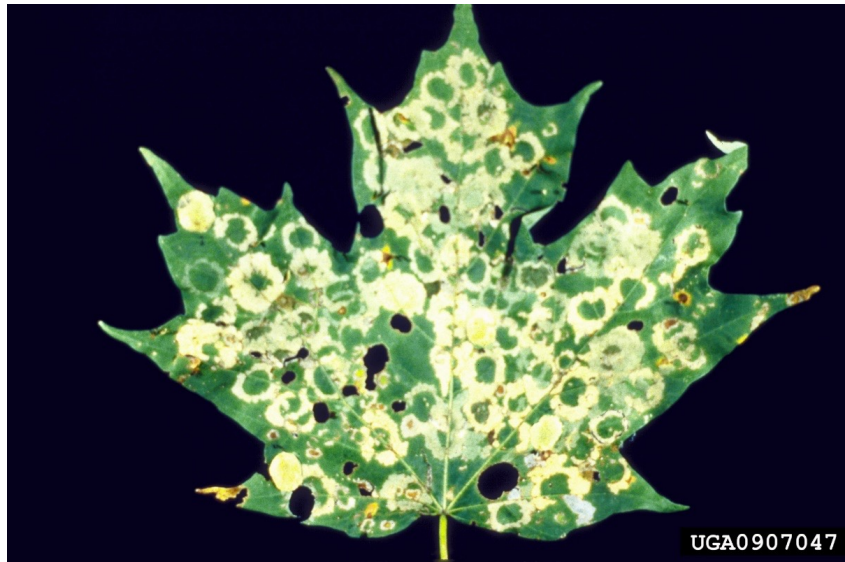
Root-zone damage



Maple Leafcutter

Paraclemensia acerifoliella

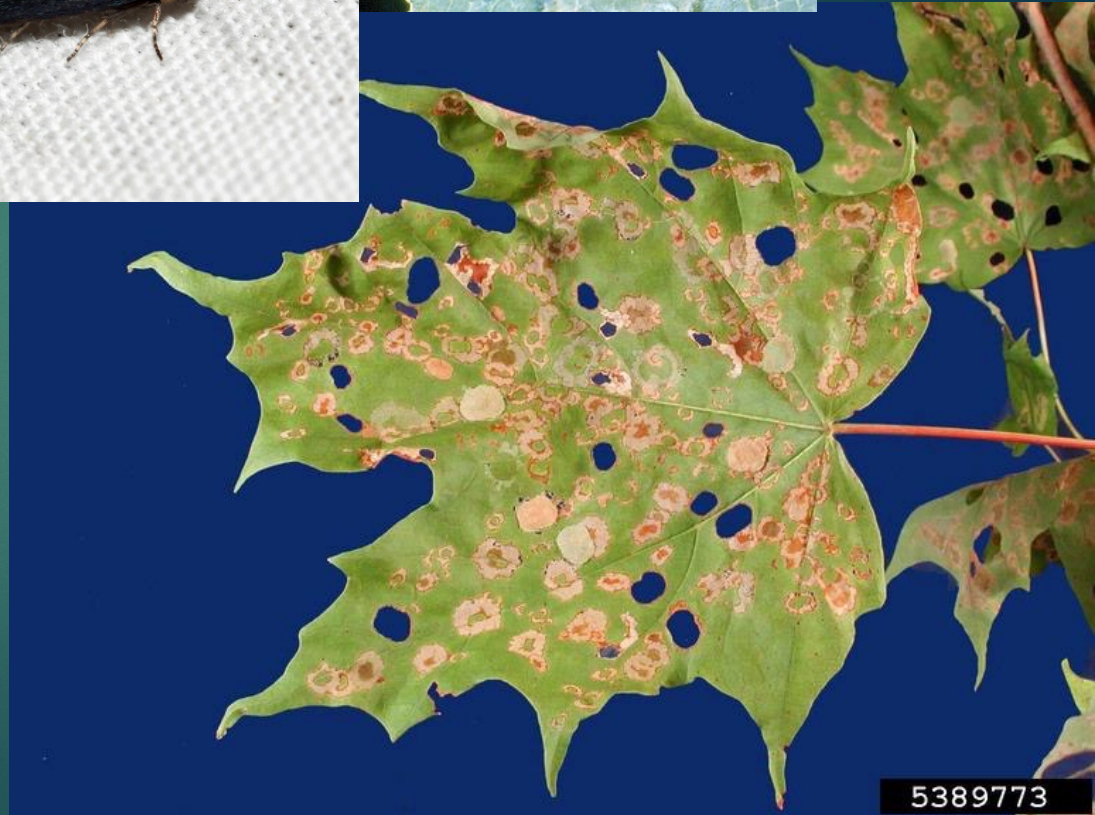




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UGA0907048



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European Fruit Lecanium Scale



Excessive Tapping





Evaluating maple vitality

Early fall colour, in part or whole crown.

E. Shea, Loyola U, Baltimore



marathonpundit.blogspot.com

Crown thinning/ dieback



Yum...honey mushrooms



Armillaria mellea, a virulent pathogen



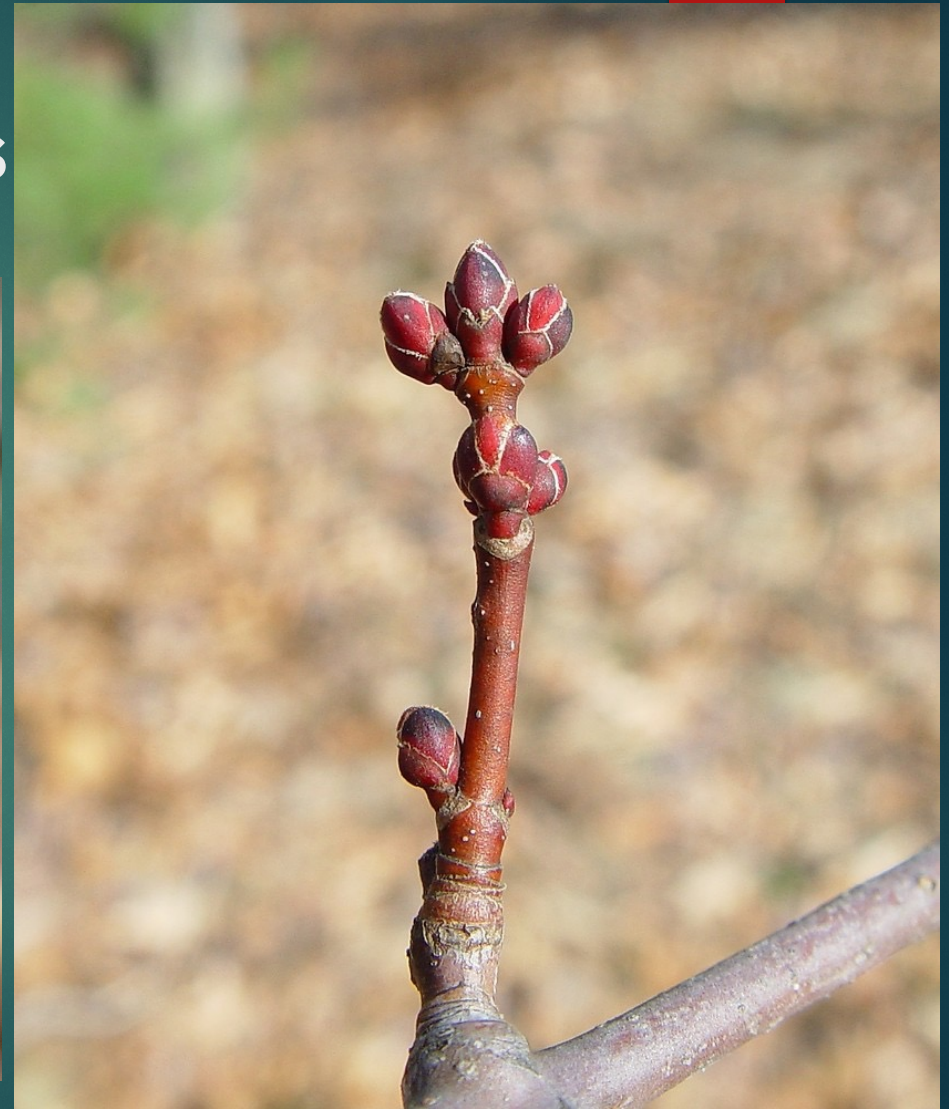
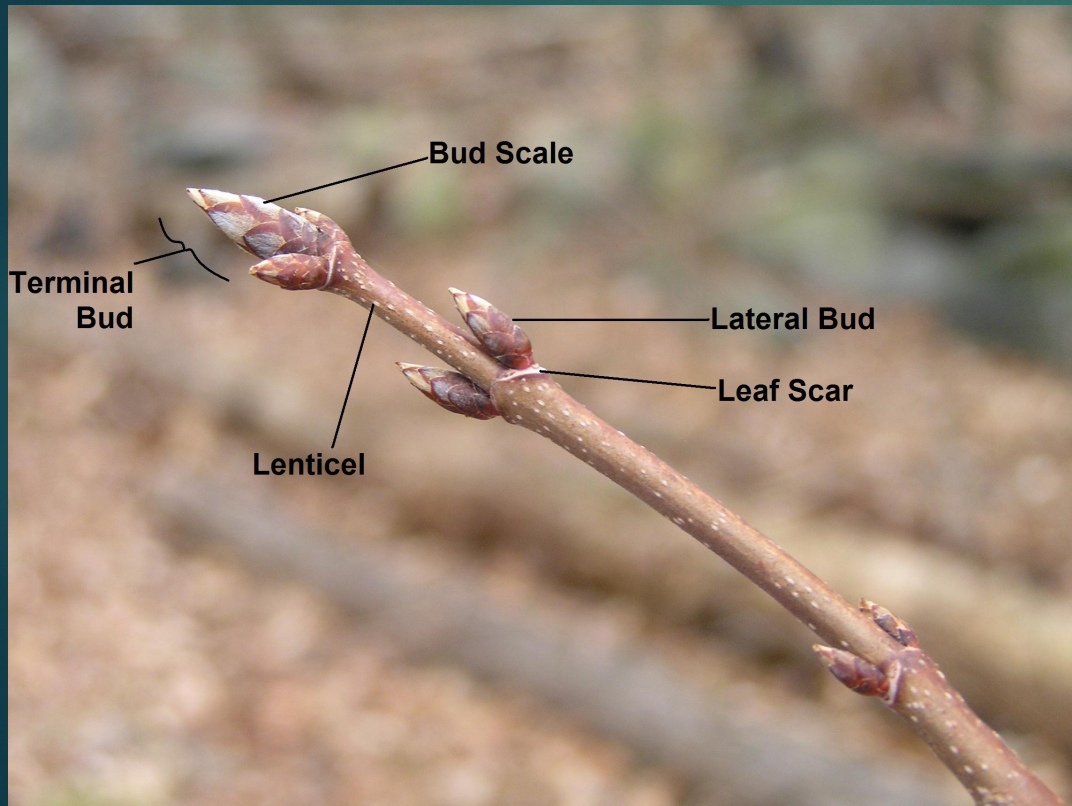
Wound response/ tap-hole closure: 1-2 years

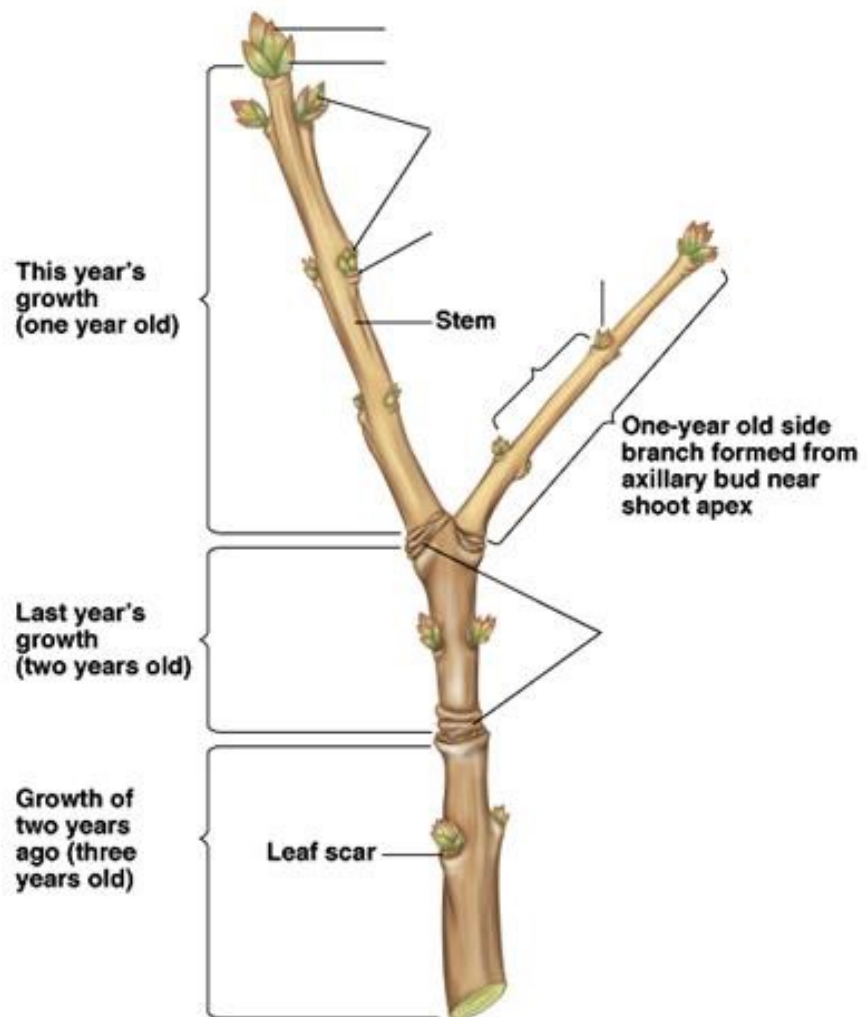


Diameter growth

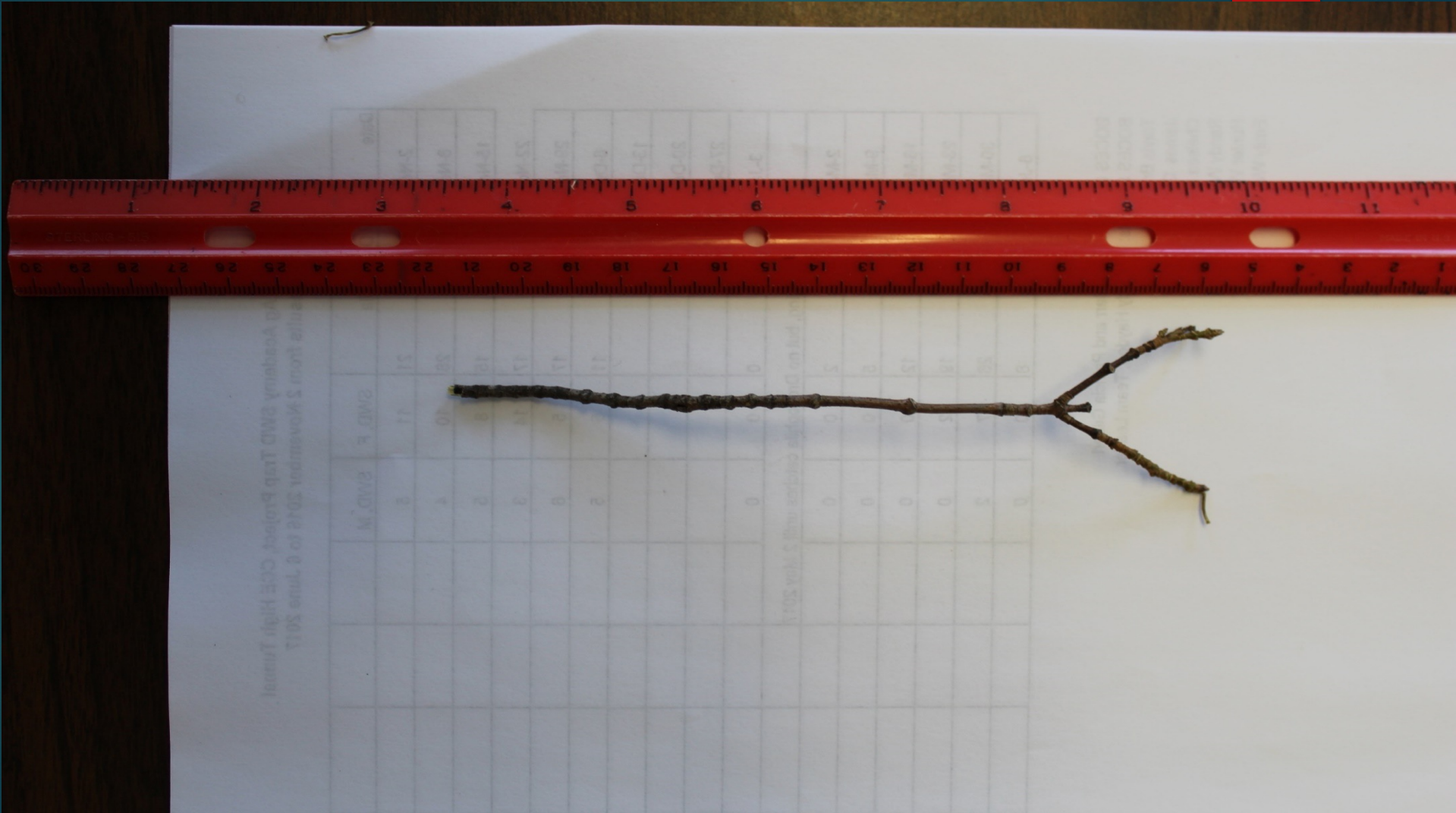


Twig elongation: reading between terminal-bud scars





Poor



Good



Monitor potential stressors

- ▶ Check for insect activity
- ▶ Record rainfall
- ▶ Check soil moisture maps
- ▶ Supervise logging—**no work in wet-soil conditions!!**
- ▶ Relocate “bad” skid or tractor trails
- ▶ Evaluate crown closure and stocking level

Cull diseased trees

“Diseased and damaged stems may spread inoculum, or may break and fall and damage other trees. Minimally they occupy growing space that doesn’t produce a high quality product.”

–Peter Smallidge, Cornell State Extension Forester



Other strategies:

Wear hardhats at
all times...

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THE SKY IS FALLING!!!



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