

## ANNUAL TREE MORTALITY SURVEY\_ ForestGEO-SCBI\_2019

At the SCBI large plot, a blue re-bar located in the SW corner gives the quadrat names. Locate the rebar and orientate yourself. Locate trees within quadrat. Coordinates (x, y) are given in reference to a 20x20m square.

*Tree data (pre-existing data)*

**Codes 2013:** refers to stem conditions given in 2013 (last core census): **A:** alternate pom (point of measurement), **B:** stem broken above breast height, **C:** dead above 1.3m, **F:** Incorporated into fence, **G:** ID to Genus certain, **I:** stem irregular where measured, **J:** Bent, **L:** leaning stem, **M:** multiple stems, **main:** main stem, **P:** prostrate stem, **S:** secondary stem, **V:** Vine, **X:** stem broken below 1.3 m. Dead codes: **DS:** Dead, stem standing, **DC:** Dead, stem fallen, **DT:** Only tag found, **DN:** No plant nor tag found.

**DBH (mm):** Diameter at breast height in millimeters. Given for all trees as last core census.

**Live status in previous mortality census:** A (Alive), DS, DC, DN, and PD. PD: "previously dead": tree found dead during a previous census. If the tree is found alive, change status and write in comments. If DN, try to relocate the tree again and indicate the FAD.

**New status:** use A, AU, DC, DS. There shouldn't be a DN; you need to find all trees in the list. AU is used for trees that are alive but noticeably unhealthy (e.g. fallen and uprooted but not yet dead).

### PROCEDURE

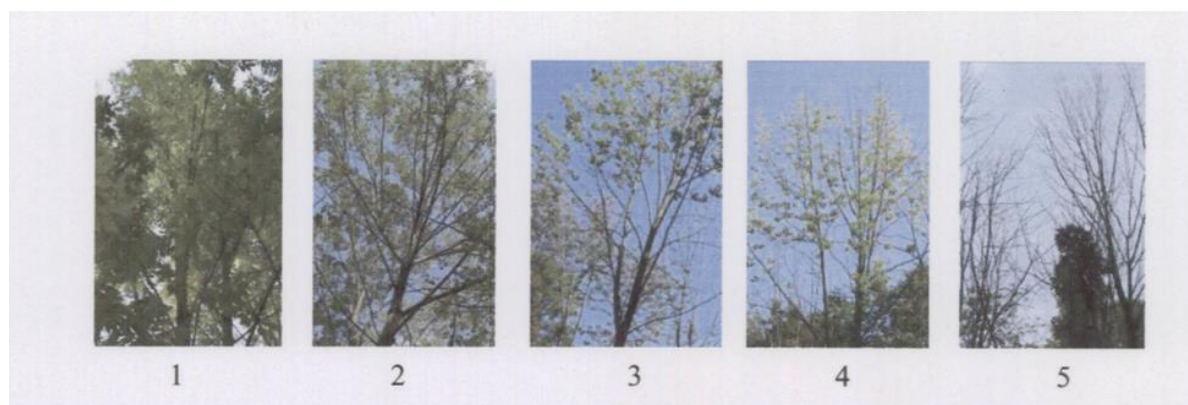
1. Locate all stems on datasheet and classify as "A", "AU", "DC", or "DS".
2. If the status is "AU"
  - Record FADs in order of importance (at least 1 factor).
  - Record crow.position (D, CD, I,S,OG).
3. If a stem is dead:
  - **Pictures:** Take a picture of every dead tree found. Take tag picture first then make 2-3 pics of main FADS. Make close-ups if any insect or insect galleries are found.
  - Measure **DBH** (mm). If stem has fallen, measure it later using the big caliper.
  - Take 1 **core**, aiming to hit the center: only at breast height and for the following species: ceca, amar, cofl, ploc, prav, rops, saal, and all Quercus. Save these in straws for future analyses. Label each straw with tag #, species, and date. Mark in datasheet cored=yes/no.
  - Record **Percentage of crown** still intact:
    - 1 = only 0-25% of the crown is intact (almost gone)
    - 2 = 26-50% of the crown is intact
    - 3 = 51-75% of the crown is intact
    - 4 = 76-100% of the crown is intact (none or few branches lost)
  - Record **Crown Position:**
    - Dominant (D):* Crown extends above the general level of the canopy receiving full sunlight.
    - Codominant (CD):* Crown forms main level of canopy, tree receives full sunlight from above.
    - Intermediate (I):* Shorter trees with smaller crowns, receive little light from above and none from sides.
    - Suppressed (S):* Crown below canopy, small crown receives no direct light.
    - Open grown (OG):* Crown on open areas of the stand.
  - **Liana load.**
    - 0 = lianas absent
    - 1 = up to 25% of the tree crown covered by lianas
    - 2 = 26-50% liana cover
    - 3 = 51-75% liana cover
    - 4 = 76-100% liana cover.
  - Record **FAD** (Factors associated with death) in order of importance.

To scrutinize the FAD's look at "*Guide to Identify Tree Diseases at the SCBI-CTFS Forest-GEO Plot*".

FAD Categories:	Biological agents
<p><b>U</b>= Unable to determine cause of death</p> <p><i>Mechanical damage</i></p> <p><b>B</b>= Broken stem (note cause, indicate level on tree)</p> <p><b>CR</b>= Crushed by other tree or tree parts</p> <p><b>UP</b>= Uprooted tree (root bole exposed)</p> <p><b>S</b>= Slope failure (evident landslide even if small)</p> <p><b>L</b>= Lightning (tree splitting, straight scars from above)</p> <p><b>Fi</b>= Fire (stem charred, fire scars on bark)</p>	<p><b>AN</b>= Animal damage (specify animal if possible)</p> <p><b>BB</b>= Bark beetles present, beetle galleries.</p> <p><b>I</b>= Insect infection (e.g. EAB, other)</p> <p><b>DF</b>= Complete defoliation ((record crown condition using Smith/Flower method below 1 – 5 scale).</p> <p><b>F</b>= Fungi visible (give names if known)</p> <p><b>K</b>= Canker or swelling present (cause by fungi)</p> <p><b>LF</b>= Leaf damage (look for leaf spots, blotch, etc.)(new 2019)</p> <p><b>R</b>= Rotting stem.</p> <p><b>R1</b>= Root damage</p> <p><b>R2</b>= Armillaria root disease</p>

4. For *Fraxinus* species and trees code chvi: All trees  $\geq 1$  cm will be visited during a mortality survey.

- Record **crown position** (D, CD, I, S or OG. see above)
- Estimate **crown thinning** via visual assessment per Smith/Flower 2013:
  - 1 = healthy tree with no symptoms of decline, no defoliation
  - 2 = slight reduction in leaf density (thinning), yet all top branches exposed to sunlight have leaves
  - 3 = thinning canopy and some top branches exposed to sunlight are defoliated (<50% dieback)
  - 4 = >50% defoliation/dieback
  - 5 = Dead tree with no leaves in canopy (excluding epicormic sprouting)



- Epicormic shoots:** Use the 6-class dwarf mistletoe rating system (Hawksworth 1977) to evaluate epicormic growth

Instructions		Example
<b>STEP 1:</b> Divide stem into thirds.		
<b>STEP 2:</b> Rate each third separately. Each third should be given a rating of 0, 1 or 2:		If this third has no epicormic shoots, its rating is <b>0</b> .
<b>(0)</b> No epicormic shoots <b>(1)</b> Few epicormic shoots ( $\frac{1}{2}$ or less of total branches in third are epicormic) <b>(2)</b> Many epicormic shoots (more than $\frac{1}{2}$ of total number of branches in the third are epicormic)		If this third has few epicormic shoots, its rating is <b>1</b> .
		If this third has many epicormic shoots, its rating is <b>2</b> .
<b>STEP 3:</b> Add ratings of thirds to obtain rating for total tree.		The tree in this example will receive a rating of <b>0+1+2=3</b> .

- Record **EABF** (EAB Factors)

VB = Vertical bark splitting

SS = Stump sprouts

AS = Ash snap of the branches/limbs

W = Bark blinding from woodpecker predation. In comment section, write percentage estimate.

DE = D-shaped exit hole presence

- a. Count visible D-shaped exit holes around the circumference of the tree in an area about half of a meter long at breast height and record this for every ash tree.