

SCBI-ForestGEO Tree Health and Mortality Census Protocol 2025

Supplies

- ☐ iPad - set up with FieldMaps app and maps
- ☐ Binoculars, to check live status of very tall trees and to distinguish between leaves of lianas or tree under inspection.
- ☐ Printed copies of visual guides, if desired
- ☐ List of tree species codes, available here, if desired
- ☐ Personal gear/ safety equipment

Procedure

Plot Navigation & Tree Location

At the SCBI plot, a blue re-bar located in the SW corner gives the quadrat name (3 or 4 digits). Locate the rebar and orientate yourself (N-S). Coordinates (x, y) are given in reference to a 20x20m square. The iPad contains maps of each quadrat with the trees to be censused and their status in the previous census. *It is important to locate and complete census for all trees within the quadrat you are working on before moving to the next quadrat.* To find a tree, review info (species, size, position) of tree for which you're searching. Locate the based on x-y coordinates and/or map, check tag to ensure you've got the right tree. If you can't find a tree: (1) double check that quadrat matches the FieldMaps App (2) look on the ground for fallen trees/ lost tags (3) check trees that otherwise don't seem to match what you're looking for (5) if a thorough search yields nothing, record it as not found DN status, or "Dead not found" in FieldMaps App. Avoid giving a tree the DN status; you need to do a thorough search for all trees on the list.

Data Entry in FieldMaps

Status (status_2025) **Alive (A)** = Alive. **Dead Standing (DS)** = dead with no living foliage above breast height (can be dead with resprouts; see below). **Dead on the ground (DC)** = dead (no living foliage) and fallen. Note: a tree that has fallen but has living foliage is AU. **Dead not found (DN)** = neither stem nor tag could not be found following a *thorough* search. Presumed dead.

Guide to measurements needed based on status:

If the status is "A": (1) Mark status (2) Record percentage of crown still intact (%) (3) Record percentage of crown living (%) (4) Record lean angle (if leaning > 15°) (5) Record liana load.

****** **If the percentage of crown living ≤ 90% "":** (6) Record FADs in order of importance* (at least 1 factor)- See FAD codes below.

If the status is "DS" & previously "A": (1) Mark status (2) Record Percentage of crown still intact (%). (3) Record percentage of crown living (%) (4) Record FADs in order of importance (at least 1 factor)- See FAD codes below. (5) Record lean angle (if leaning > 15°) (6) Record liana load.

If the status is "DC" & previously "A": (1) Mark status (2) Record Percentage of crown still intact (%). (3) Record percentage of crown living (%) (4) Record FADs in order of importance (at least 1 factor)- See FAD codes below. (5) Record liana load.

If the status is “DS” & previously “DS”: (1) Mark status (2) Record percentage of crown still intact (%) (3) Record percentage of crown living (%) (4) Record lean angle (if leaning > 15°) (5) Record liana load.

If the status is “DC” & previously “DS” or “DC”: Record status and continue.

–Additional Fields–

DWR (Dead with resprouts) If the tree is dead but with living resprouts at its base, record as yes. Otherwise, leave as is.

Percentage of Crown Intact (levels: 1-5) This is the percent of the tree crown intact.

1 = <25% of the tree crown intact **2** = 25-50% of the tree crown intact **3** = 50-75% of the tree crown intact
4 = 75-90% of the tree crown intact **5** = >90% of the tree crown intact

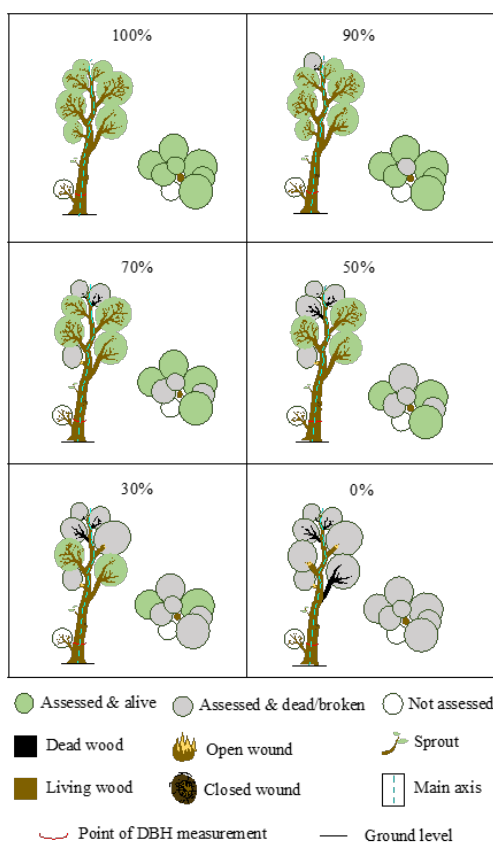


Figure 1: Crown Assessment (taken from Arellano et al., 2020). Top left is 100% crown intact and 100% crown living, top right—100% intact and 90% living, middle left—90% intact and 70% living, middle right—90% intact and 50% living, bottom left—70% intact and 30% living, bottom right—40% intact and 0% living

Percentage of Crown Living (levels: 1-5) Percentage of crown living (indicated by live foliage). **This is relative to an 100% intact crown, and therefore should be \leq Percentage of Crown Intact.**

1 = <25% of the tree crown living **2** = 25-50% of the tree crown living **3** = 50-75% of the tree crown living
4 = 75-90% of the tree crown living **5** = >90% of the tree crown living

Lean angle (levels 1-4) If tree is still rooted and is leaning *ge* 15°, estimate the angle of lean in degrees from vertical. This angle is measured in degrees from the base through the POM.

1 = <15° (no lean) **2** = 15-45° **3** = >45° **4** = On the ground

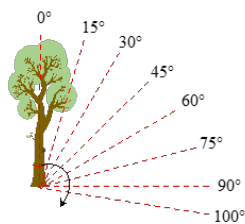


Figure 2: Lean angle (Taken from Arellano et al., 2020)

Liana load in tree crown (levels: 0 – 4) **0** = lianas absent *from tree crown* (category includes trees with lianas present only on trunk) **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.

FAD (Factors Associated with Death/Decline)

- Record Factors associated with death (FAD) **in order of importance** (will be listed in order selected).
- To scrutinize the FAD's, look at our Tree Disease Guide and Visual Guides.
- For tree conditions or agents of mortality not specifically defined below, record diagnosis in the notes or comments section of the form.

FAD list :

Mechanical Damage:

B = Broken stem (note cause, indicate level on tree); **CR = Crushed by other tree or tree parts**; **UP = Uprooted tree or slope failure** (root system exposed or evident landslide even if small - rarely at SCBI);

Biological agents:

I = Insect or pathogen infection (e.g. EAB, Beech bark disease, Armillaria root disease etc.); **DF = Complete defoliation for a portion of stem** (record crown condition using Smith/Flower method below 1-5 scale); **F = Fungi visible on stem** (includes fruiting mushroom bodies, fungal mats, and discoloration inside wounds or cankers. if canker is present, also record K. if wound is present, record W.; Note that Armillaria root disease is included in I instead); **K = Large canker or swelling present** Big canker/deformity (Size 2 or 3). Greater in area than a square of DBH × DBH in shape.(if fungi is visible, also record F. if open wound, also record W); **LF = Leaf damage** (Leaf spots, blotch, mildew, discoloration etc.); **W = Large wound** Big wound (Size 2 or 3). Greater in area than a square of DBH × DBH in shape.(any situation where the bark has been removed and wood is exposed to the air or soil. not mutually exclusive with F or K); **R = Large area of trunk rot**; Big rotting area (or hollow) on/ in trunk.(Size 2 or 3). Greater in area than a square of DBH × DBH in shape. (This may be caused by a fungal infection. not mutually exclusive with F or K);

Wounded main axis (levels: 1 = small, 2 = large, 3 = massive) Size of wound (any situation where the bark has been removed and wood is exposed to the air or soil) on main trunk. **1** = small damage, smaller in area than a square of DBH × DBH in shape. **2** = large damage, greater in area than a square of DBH × DBH in shape. **3** = massive damage, affecting >50% of the basal area (i.e., a very deep and extensive wound) or >50% of the living length. These are cases of main stem breakage in which the breakage

is not complete and the broken part is still connected and alive, and trunks that have been longitudinally split in two.

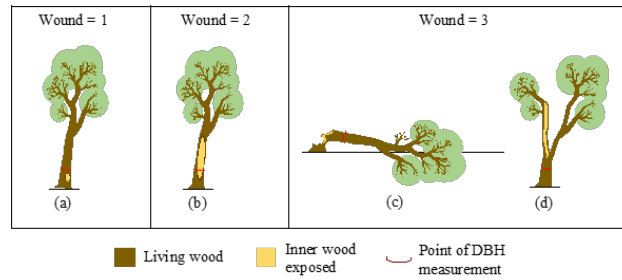


Figure 3: Schematic of wound size (taken from Arellano et al., 2020)

Swelling, deformity (levels: 1 = small, 2 = large, 3 = massive) Size of patch of swelling/deformity on trunk. Note: swelling or deformity is commonly caused by a canker. **1** = small canker/ deformity area, smaller in area than a square of $DBH \times DBH$ in shape. **2** = big canker/ deformity, greater in area than a square of $DBH \times DBH$ in shape. **3** = massive deformity or canker, greater than $>50\%$ of the basal area or $>50\%$ of the main axis length.

Rotting trunk (levels: 1 = small, 2 = large, 3 = massive) Size of patch of rot (hollow) on/ in trunk. This may be caused by a fungal infection. **1** = small rotting area, smaller in area than a square of $DBH \times DBH$ in shape. **2** = big rotting area, greater in area than a square of $DBH \times DBH$ in shape. **3** = massive rotting, affecting $>50\%$ of the basal area or $>50\%$ of the main axis length.

Notes Record any relevant info for which there's no place in the form:

- Disease/ decline symptoms, or important details about these, not recorded in fields
- Plot/previous data problems: incorrect coordinates, missing tree tags, suspected problems with previous data
- Sometimes a tree recorded dead in a previous year is “back to life”. If a dead tree is alive in the current census (meaning you are 100% sure it is alive), mark the tree as **A** or **AU** and make a note in comments.

Coring of Dead Trees

If time allows, cores will be taken at the end of survey and saved for future analyses.

Target species: ceca, amar, coff, ploc, prav, rops, saal, and all Quercus.

Follow steps in document “Coring_instructions_SCBI” located in ‘Protocol’ folder.

We will need to take data on trees cored (instructions to be determined later).