NATURE'S PHARMACY PROJECT

Field Measurement Instructions

How to select plots and collect the three VHP field measurements · Version 3.8 · August 2026

Overview

Three measurements are taken in a 20 × 20 m plot: native woody species richness, coarse woody debris volume, and identifiable surface-litter depth. All three use ordinary forestry equipment. Record raw observations on the Field Datasheet. After fieldwork, enter the raw observations in the VHP Plot Workbook; the workbook performs the CWD and litter calculations and assigns each completed measurement to its reference range. Use the Practitioner's Interpretation Guide to read the resulting profile.

Plot size is not adjustable. The 400 m² square is the area at which the richness reference is defined, and species counts depend steeply on area. A different plot size produces counts that cannot be compared against the reference ranges.

Study design

Routine VHP use. Select plot locations in advance rather than choosing them because they appear especially convenient or distinctive in the field. The VHP defines the measurements at the 20 × 20 m plot level; it does not require four sites or five plots per site for routine practitioner use.

Project field pilot. The Project uses five plots at each of four forest sites. Plot centres are randomly generated in advance using GIS, with a minimum spacing of 50 m. At two plots per site, a second observer independently repeats the measurements for the reproducibility check described in Part V.

Part I. Plot selection (before fieldwork)

Tools: computer, QGIS (free), mymaps.google.com, Gaia GPS.

- **Trace the site boundary.** At mymaps.google.com, draw the site perimeter on the satellite basemap, save, and export the layer as KML.
- **Generate random points.** Load the site boundary in QGIS, use a projected coordinate system measured in metres, and generate the intended number of points inside the site. For the Project pilot, generate five primary points and two backup points per site, with at least 50 m between points so plots do not overlap.
- **Export coordinates.** Right-click the points layer → Export → Save Features As → CSV with GEOMETRY = AS_XY.
- **Load for navigation.** Import the CSV to a new My Maps map (latitude = Y, longitude = X), export as KML, and open in Gaia GPS. Download the offline map before travel.

Pre-selecting plot locations reduces the chance of choosing unusually convenient or visually distinctive places in the field. If a primary plot cannot be established as a 20 × 20 m square, or a road, trail, stream, open water, safety issue, or other obstacle prevents the three measurements from being completed, use the first unused preselected backup point. Do not relocate a plot because it appears atypical or inconvenient. Record the change and reason on the datasheet.

Part II. Plot layout: 20 × 20 m square

Tools: centre stake, masking tape, marker, compass, two 10 m ropes (or one 30 m tape), 4 corner flags.

- Navigate to the plot coordinates in Gaia GPS (within 3 m). Place the centre stake and label it with the plot ID.

- From the centre, run 10 m due North and due South; these are the midpoints of the north and south plot edges. From each midpoint, measure 10 m East and 10 m West and place the four corner flags. The result is a 20 × 20 m square centred on the stake, edges oriented N–S and E–W.
- All measurements are taken within this square.

Part III. The three measurements

1. Native woody species richness

What counts: living woody plants — trees, shrubs, and woody vines — with at least one stem ≥1 cm diameter at breast height (1.37 m). This matches the reference census definition. Herbaceous plants, seedlings below 1 cm DBH, mosses, and lichens do not count.

- Systematically walk the full plot in parallel passes 2–3 m apart.
- Record each qualifying native species once. Use iNaturalist for unfamiliar species; photograph unresolved plants and identify them after the visit before finalising the native count. Non-native species do not enter the richness count and need not be recorded systematically.
- **The richness result is the native count only. No conversion is required.**

2. Coarse woody debris (line-intercept, Van Wagner method)

- Lay two 20 m transects through the plot centre, one N–S and one E–W (the layout ropes already mark these lines). Total transect length L = 40 m.
- Walk each transect. Record every downed log or branch the line crosses with diameter ≥7.6 cm at the crossing point and length ≥1 m. The 7.6 cm minimum matches the convention used by the regional inventory behind the reference ranges; changing it makes the volumes non-comparable. For every qualifying crossing, record its position along the transect to the nearest 0.1 m, measured from the south end of the N–S transect or the west end of the E–W transect. Position does not enter the volume calculation; it is retained so individual pieces can be matched between observers when needed.
- **Stumps and standing dead trees (snags) do not count.** Note notable stumps or snags in plot notes as context.
- **Workbook calculation. Enter each qualifying CWD crossing on the workbook's CWD_PIECES sheet, including transect, position, and crossing diameter in centimetres, using the same Plot ID, Site, and Observer as PLOT_DATA. The workbook squares the diameters, adds them, and calculates V (m³/ha) = π^2 / (8 × 40) × Σd^2, where Σd^2 is the sum of squared crossing diameters in cm².**
- **Worked example.** For crossing diameters of 8, 10, and 12 cm, $\Sigma d^2 = 8^2 + 10^2 + 12^2 = 308$ cm², and CWD volume = 9.50 m³/ha. The workbook performs this calculation automatically.

3. Identifiable surface-litter depth (5 replicate points)

Measure identifiable surface litter only. Insert the ruler through the recognisable leaf layer and stop where the material is no longer identifiable as leaves or plant parts. Do not push through the dark, decomposed layer below it, and do not measure to mineral soil. The reference ranges are for this surface layer; measurements that include deeper organic material are not directly comparable.

- Measurement points: the plot centre, plus four points 1 m from the centre in each cardinal direction (5 total).
- At each point, insert the rigid ruler vertically without compressing the litter.
- Read depth (cm) at the top of the litter layer. Record 0 where no litter is present.
- **Workbook calculation.** Enter all five readings in the Plot Workbook. The workbook calculates their mean automatically. Retain all five values because the replicates also describe within-plot variability.

Do not measure within 48 hours of significant rainfall. If measurement cannot wait, flag the plot on the datasheet for potential re-measurement.

Part IV. Optional contextual notes

Use the plot-notes field for notable conditions that may help interpret a result, such as non-native or invasive vegetation, browsing, recent disturbance, unusual hydrology, or management history. These observations are optional context, not standardized VHP measurements.

Part V. Pilot reproducibility check

For the Project pilot, a second observer independently repeats all three standard measurements on two pre-designated plots per site. Observer 2 uses the same plot centre and boundaries as Observer 1, including any relocated centre, but does not see Observer 1's measurements. Use a separate datasheet marked Observer 2. For CWD, the recorded transect positions allow individual crossed pieces to be matched between observers when reviewing disagreements. The five litter readings on every plot are retained to describe within-plot variation.

Part VI. Equipment checklist

Datasheets (2 per second-observer plot) · clipboard and pencils · Gaia GPS with offline map and loaded waypoints · iNaturalist · centre stakes and corner flags · masking tape and marker · compass · two 10 m layout ropes plus a 20–30 m measuring tape (or marked transect tapes) for CWD position · flexible tape or calipers for diameters · rigid ruler · DBH gauge or calipers · camera or phone.

Part VII. After fieldwork

- Enter the raw observations in the VHP Plot Workbook. On PLOT_DATA, enter plot information, native richness, and the five litter readings. On CWD_PIECES, enter each qualifying CWD crossing with transect, position, and diameter, then mark the CWD tally complete on PLOT_DATA. The workbook calculates CWD volume, mean litter depth, and the three reference-range placements automatically.
- Use the Practitioner's Interpretation Guide to interpret each result and identify any habitat feature that may warrant closer management attention.

Measurement	**Reference ranges**	Reference data
Native woody richness (species / 400 m²)	<6 / 6–11 / >11	Harvard Forest ForestGEO, 875 quadrats
CWD volume (m³/ha)	<8.4 / 8.4–46.7 / >46.7	FIA, 185 plots in VT, NH, MA, CT, and RI
Identifiable surface-litter depth (cm)	<2.2 / 2.2–3.5 / >3.5	FIA, 185 plots in VT, NH, MA, CT, and RI