

8. Verification of carbon stocks in forest biomass using forest inventory data (WP 2.4)

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8.1 Introduction

The monitoring methodology of forest carbon stock and stock changes (milestone WP2.4: II) is intended to integrate with the second FC National Inventory of Woodland Trees (NIWT2). Its purpose is to evaluate the extent and the properties of woodland over large areas. This will be achieved through a comprehensive mapping exercise coupled with systematic sample of inventory plots across the GB forest estate.

The main focus will be to determine properties of woodlands over a large geographic area by aggregating the results of observations made on the individual plots – thus, there is less intrinsic interest in the properties of any individual plot forming the sample.

Brewer *et al.* (2006) have described the main inventory plot assessment protocol, which permits estimating of a range of tree and stand variables including carbon stocks. A degree of flexibility is needed in the method of observation and assessment in order to deal with plots falling in woodlands that will vary considerably in composition and structure. Accordingly, the protocol provides alternative assessment methods. Despite this, the information gathered using the different methods can be summarised in a common format for both aggregation and comparative purposes.

8.2 Summary of protocol

Location 1 ha sample-squares

The location and orientation of the 1 ha sample-squares are predetermined as part of the NIWT2 survey design.

Overview of the procedure for assessment of each sampled 1 ha square

Prior to the assessment visit an aerial photograph is taken of the square and its surrounds. Boundaries of the square are superimposed on the photograph and an initial assessment is made of separate identifiable sections of woodland within the square according to the conventions. The boundaries of these sections are also superimposed upon the photograph, both within and outwith the sample-square. Each section falling inside the square is measured and recorded. Provisional sampling points for the mensuration assessment will be assigned to each section within the square as below.

The assessor will be provided with this information in advance, and upon reaching the site, the sectioning of the square (on the basis of the aerial photograph) will be verified by ground survey of the site. If inaccuracies are detected, or if features are observed during the ground level inspection which affect the optimum partitioning of the square into sections, adjustments to the section plan will to be made on site.

A survey is made of the square in which an inventory of the tree species present in the square is made, and each identified section is assessed for the presence of separate strata.

The main assessment protocol is undertaken for each stratum within each section of the square.

At the end of the survey of each stratum, a list is made of the species captured in the survey. The list is annotated with an assessment of the type of spatial distribution of the species within the section and its representation in the stratum. A code will be assigned according to whether the species is pure, intimate, patchy or linear.

8.3 Detailed specification of protocol

The full protocol of Brewer *et al.* (2006) cannot be repeated here. To illustrate the level of detail in the protocol, the description of how to make assessments of tree vertical structure used in stratification of tree forming sections is repeated below.

Before attempting to group trees into separate storeys according to their general vertical stature, it is necessary to identify a definitive concept of the height of any tree for this purpose. Ultimately, a storey is defined by the similarity of the vertical positioning of the canopies of the trees belonging to that storey - since tree canopies can vary considerably in shape and form, the overall tree height will not always be the best representation of its vertical 'presence'. A better representation of the general vertical positioning in the canopy of a tree would be the mid-point between the bottom and top of the crown (the 'mid-crown' height).

Precise definition of the top and bottom of the crown of any tree can be made with reference to the crown measurements described fully in the protocol. The top of the crown is the apex of the tree, while the bottom of the crown is identical to the lower crown height. The mid-crown height is therefore the midway point between the lower crown height and the total height of the tree. Figure 8-1 illustrates examples of the positioning of the lower, total and mid-crown heights for both conifer and broadleaf species.

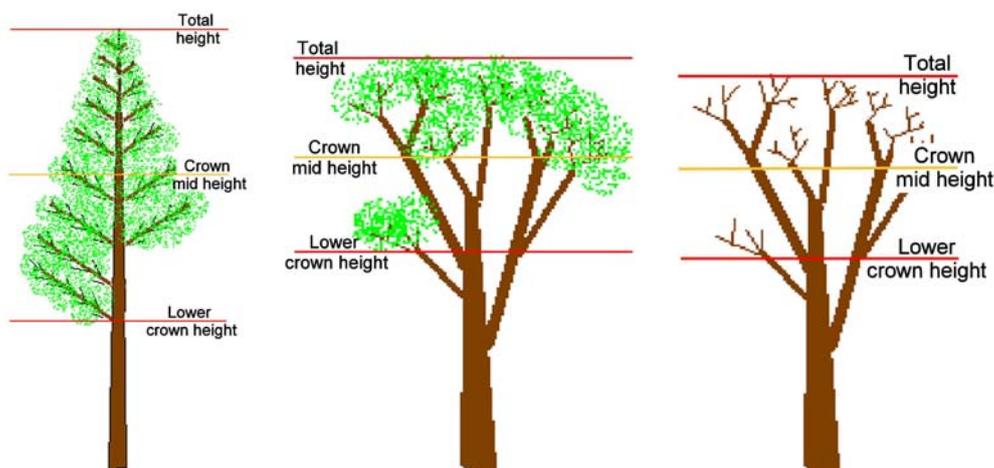


Figure 8-1: Assessment of total height, lower crown height and mid height in conifer and broadleaf trees.

Using mid crown height to determine storeys

It is likely that woodlands may contain a range of canopy profiles, particularly if a mixed woodland. Figure 8-2 shows two bands of projected crown mid-heights; in this instance the members of the upper storey are widely spaced and therefore sparse. This storey is still treated as a separate stratum but its properties may dictate a different method of assessment than is used for the lower storey:

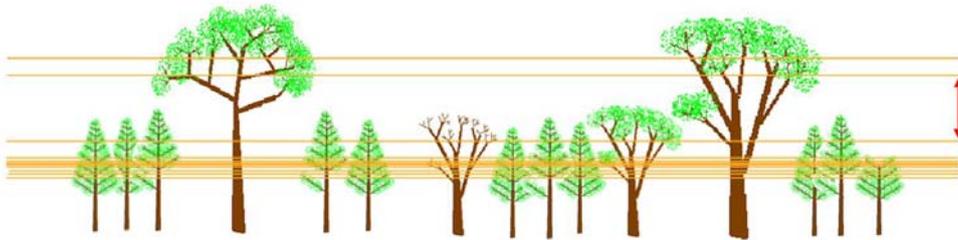


Figure 8-2: Identification of two storeys in a stand of trees.

8.4 References

Brewer A., Matthews R., Mackie E. and Baldwin M. (2006) *NIWT 2: Protocol for assessment of woodland composition, structure and growing stock*. FR internal report for the NIWT management board.