13.0 Tree Assessment Procedures

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13.0 Tree Assessment Procedures (New squares)

13.1 Circular Plots – Tree Assessment

Once the plot centre has been located and pegged: (Chapter 12)

Locate the plot boundary (5.64m radius <u>horizontal</u> distance from plot centre) and identify which measurable stems (≥4cm DBH), whether alive or dead, are within the plot.

1. It is recommended to either use the North bearing, or an easily identifiable object (e.g. a thinning rack, large rock), as a starting & finishing point and work clockwise.
2. Measure the diameter at breast height (DBH) using standard conventions and map accurately the location of all measurable stems.
3. Fill out all tree level data as per the NFI software. Data is entered into the 'Trees' folder. All stems are assumed Normal at this point whether maiden/standard or coppice.
4. Visually estimate the height of any dead tree to its actual top (whether snapped or not), do not 'add on' any snapped tops to the height.
5. Select one Dominant Height Tree (the largest live DBH stem, not leaning excessively or snapped) *per Storey* for all those Storeys captured within the plot only. If there is more than one candidate dominant tree per storey, select the one closest to the plot centre.
6. Change Tree Type to Dominant for stems chosen in step 5 above.
7. Assess Total Height, Timber Height (if a broadleaf ≥20cm DBH) and Crown width of the Dominant Tree for each Storey within the plot.
8. Use software Auto-Assign function to identify 2nd and 3rd Sample Height trees for each Storey within the plot.
9. Accept the software selection, unless this places Height Trees of the **same storey** within the same coppice stool or shared rootstock. In this instance, change the 'non-permitted' Height Tree back to a Normal Tree and manually select a replacement from the remaining trees within the plot. Use the '3rd nearest' rule. Do not look for height trees outside the plot.
10. Note Height Trees of different storeys can be on the same coppice stool or shared rootstock.
11. Navigate to 2nd Sample Height Tree for a storey, and complete all mandatory fields.
12. As per step 11 above for 3rd Sample Height Tree.

13. If there are insufficient trees within a storey inside the plot for the software to identify 2nd and 3rd Sample Height Trees <mark>then there is no need to look further for sample height trees outside the plot.</mark>
14. If the 2nd and\or 3rd Sample Trees are not present then a note to this effect should be made under 'note' at the circular plot level in the software
15. Repeat 8 to 14 for any other storeys.

13.1.1 3rd nearest neighbour

This method is used when having to manually assign a 2nd or 3rd sample tree. For the 2nd sample tree; from the Dominant height tree simply select a tree of the same storey that is the third nearest to it. For the 3rd sample tree select the tree third nearest to it from that storey within the plot.

13.2 Leaning trees and Sample Trees within Circular and Whole Section Plots

It is imperative that, where a plot is deemed accessible, and a Dominant candidate for a particular storey is present in the plot, a surveyor provides the mensuration data for the Dominant, 2nd and 3rd Sample Trees for that Storey.

Normally, a leaning tree cannot be nominated as a Dominant, 2nd or 3rd sample tree for mensuration purposes.

A Dominant tree must be a tree within the plot and, preferably, be non-leaning. If the Dominant tree is leaning then a non-leaning replacement tree, of the same storey, with the same, or next smallest DBH should be selected as the Dominant tree in the plot. If no non-leaning Dominant candidate trees are available in the plot, the original leaning tree of largest DBH must be selected as the Dominant. The 'Excessive Lean' box in the software should be set to 'No'. Height measurement is the vertical height of that tree. See the document on assessing height trees in the Mensuration Assessments sub-folder in the Additional Documents folder for how to assess leaning trees.

Once the Dominant tree has been selected, if the 2nd and\or the 3rd sample candidates are leaning within the plot and no non-leaning replacements are present within the plot, then non-leaning replacements should **not** be sought outwith the plot as per bullet point 13 above.

13.3 Whole Section Plots – Tree assessments

Once the Points have been located and pegged (Chapter 12):

1. Measure the diameter at breast height (DBH) using standard conventions and map accurately the location of all measurable stems and fill out all tree level data as per the NFI software. Data is entered into the 'Trees' folder. All stems are assumed Normal at this point whether maiden/standard or coppice
2. Visually estimate the height of any dead tree to its actual top (whether snapped or not), do not 'add on' any snapped tops to the height.
3. Use the software auto-assign function to allocate Sample Trees. Note that the software allocates 3 height trees per storey per Point, a 1st Stand Height Tree, a 2nd Sample Tree and a 3rd Sample Tree. Note that the Height Trees have no reference to the mensuration Point, i.e. they could be any tree within the Section Plot.
4. If three height trees per Storey, per plot (a minimum of 9 trees for a single Storey crop, 18 trees for a two Storey crop and 27 trees for a three Storey crop) are present within the Section the software will generate the full suite of 1st Stand Height, 2nd and 3rd Sample Trees for each point.
5. If the number of trees present in the Section falls short of the minimum numbers above per Storey, per point, then the software will prioritise 2nd Sample trees for each point , then 3rd Sample trees, then 1st Stand Height Trees. For example, in a single Storey crop with only four trees present, three 2nd Sample trees and one 3rd Sample Tree will be auto-assigned. This is due to older versions of the software requiring more data from 2nd sample height trees.
6. Surveyors should accept the software selection, unless this places Height Trees of the **same storey** within the same coppice stool or shared rootstock. In this instance, change the 'non-permitted' Height Tree back to a Normal Tree and manually select a replacement from the remaining trees **within** the Section. Use the '3rd nearest neighbour' (see Section 13.1.1) rule unless there are insufficient stems of that storey, in which case randomly select any stem without bias.
7. Note Height Trees of different storeys can be from the same coppice stool or shared rootstock.

8. If there are insufficient Sample Trees within the Section, due to overall number or ineligibility due to trees of the same Storey being auto-assigned to the same rootstock and with no possible replacements in the Section, <mark>trees should not be sought outside the square boundary.</mark>

9. Where the full complement of Height Trees cannot be recorded, the 'Note' data field at Section Plot level must be completed to explain the reason for the missing trees.

13.3.1 Tree Data Entry

Data entry is via the Trees folder.

Click on the Trees folder to access the 'Normal' folder.
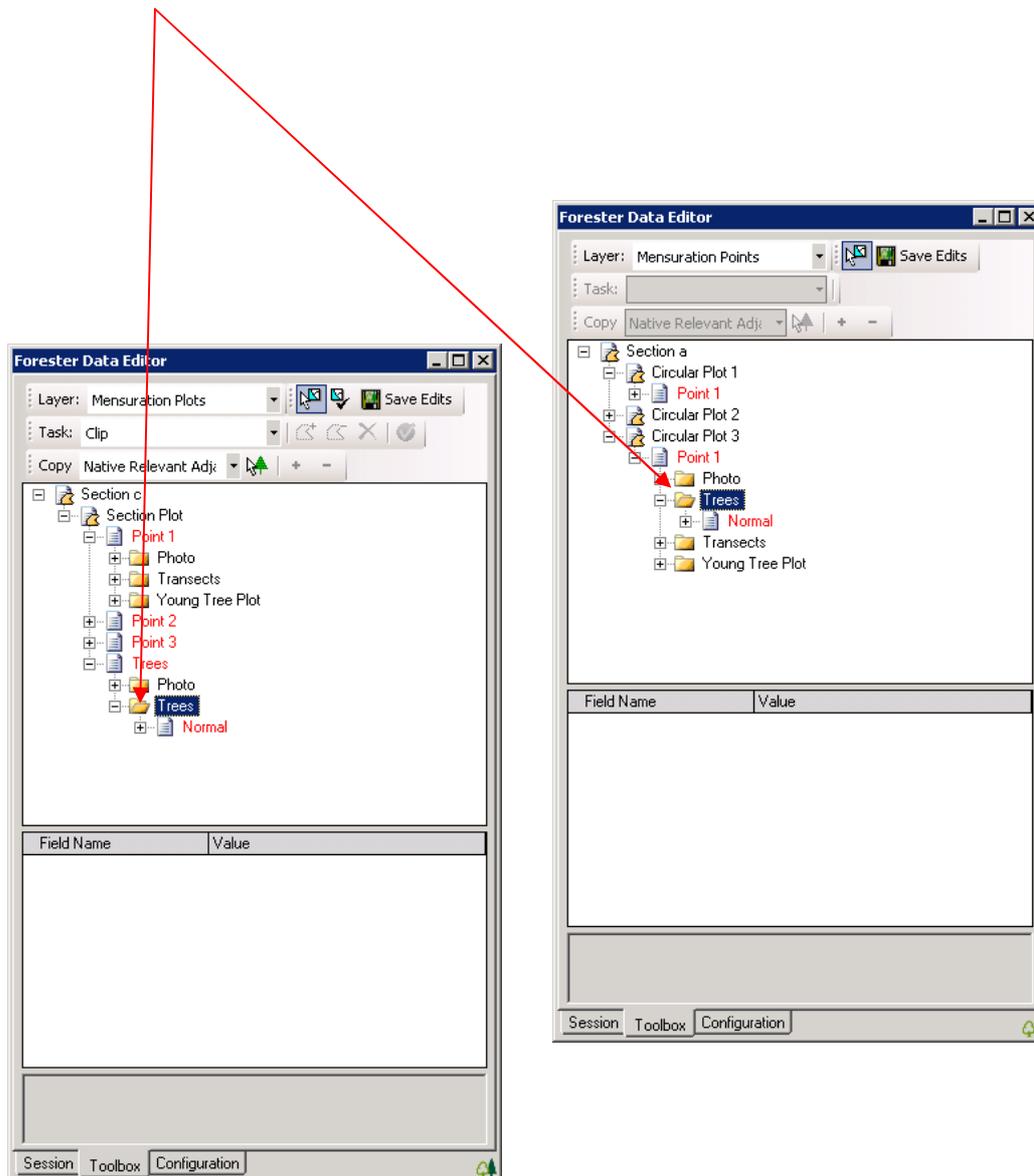
Click on the Normal record to show the Data Fields to be completed
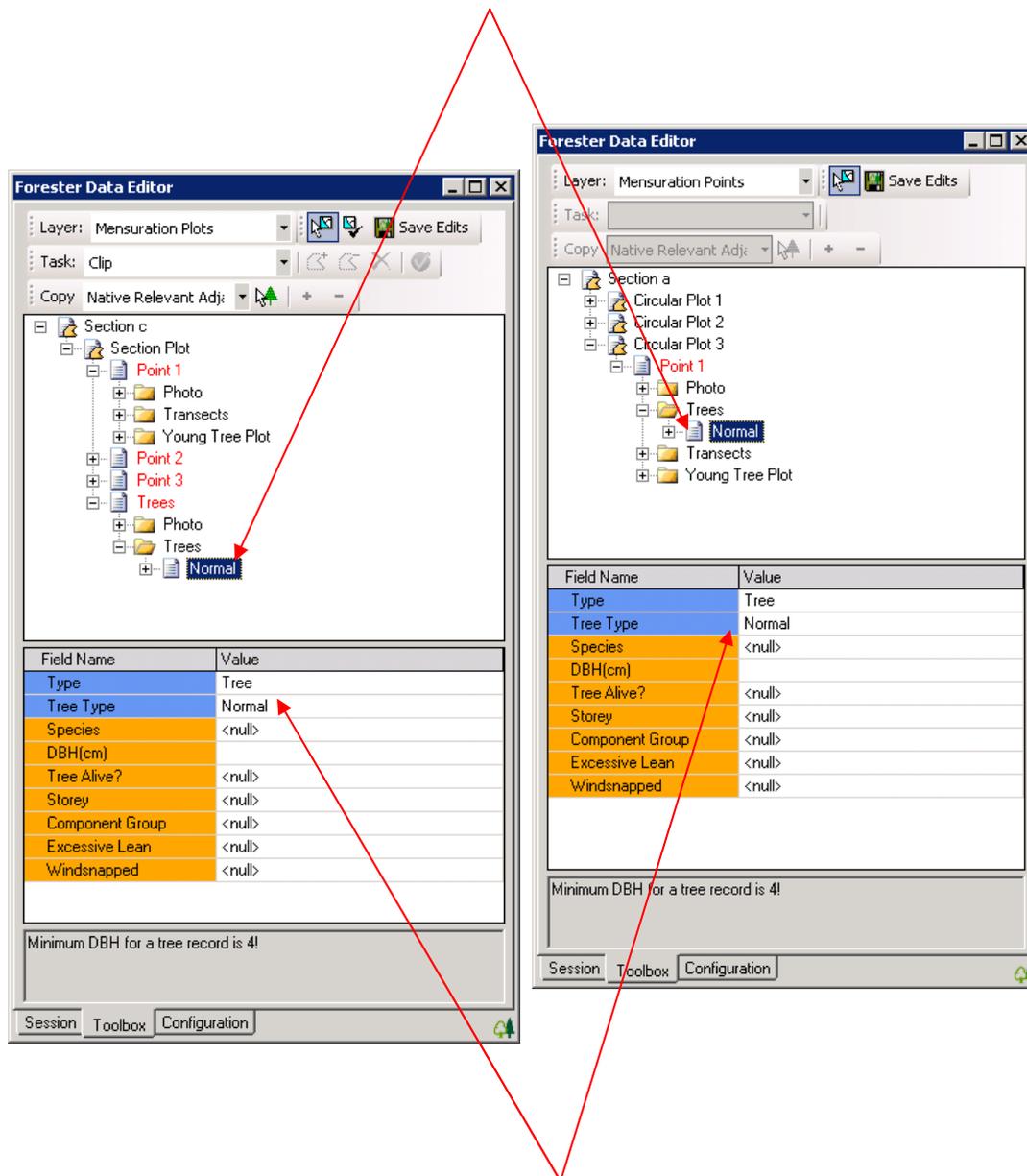
('Normal' in this context simply refers to a stem which is **not** a Sample Height Tree):

Table 13 - 1: Tree Data Fields – Normal Trees

Data Field	Options	Comments
Location	Locate tree within the plot. **13.4 Mapping the tree position.**	This is required for all measurable stems (≥4cm DBH).
Type	 • Frozen Stump • Tree • Stump • Coppice Stool • Coppice Stem • Multi-stem tree • Tree stem • Frozen shrubs acting as trees • Frozen tree • Frozen coppice stool • Frozen coppice stem • Frozen Multi-stem tree • Frozen tree stem • Shrub acting as a tree	Choose the type of tree/stump to be assessed. For Re-measure squares **Re Measure Squares Only. Entity 'frozen' from survey due to protocol status.**

Tree Type	• Normal	Not a Sample Height Tree
	• Dominant	The largest DBH tree within the plot within each Storey present in the plot. This tree cannot be leaning excessively or be snapped UNLESS it is representative of the majority Component in which case it needs to be noted as not being snapped or excessively leaning in order for height assessments to be taken.
	• 1st Stand Height Tree. • 2nd Sample Tree • 3rd Sample Tree • Pre-mensuration height tree	(Height assessment of 4-6cm DBH Tree – to be updated once software updated.)
Species	Various	
DBH	Free text, whole number only	DBH MUST be a whole number 4cm or greater. The software will prompt for confirmation if a DBH of 50cm or more is recorded.
Tree Alive?	• No • Yes	If 'No' then the two following *extra Data Fields are added plus total height is requested after Component Group*. Note that Dominant or 2nd or 3rd Sample tree CANNOT be dead. **Note that a Component for the dead tree MUST be created at the Section level and the tree species recorded (Not MC or MB in this case).**
Data Field	**Options**	**Comments**
Dead Tree Cause	• Not discernible • Natural mortality • Diseases • Insects • Fire • Windthrow	Choose which option best describes the cause of death.

	• Physical damage – operations • Waterlogging • Windsnap • Vandalism • Chemical • Mammal • Deer • Rabbit • Squirrel • Sheep • Horse • Ring barking • Effluent • Erosion • Snow	Select the specific mammal where known otherwise select 'Mammal' which covers all mammal damage.
Decay Class	• 3 - 7	See Chapter 18 for more details on decay classes.
Storey	• Upper • Middle • Lower • Complex • Sapling • Seedling	Surveyors should NOT use Sapling or Seedling here as they are <4cm DBH.
Con Straightness	• 1 - 7	NB: this Data field only appears for Conifers 14cm DBH and above. See **file 'FC IN 39 Stem straightness protocol for SS.pdf'** in the Additional Document folder for more details.
Component Group	• 1 - 5	Choose the Component Group number for that tree.
Age of Felling	0-1 year 1-2 years 2-3 years 3-4 years 4-5 years	Where a Re-survey Tree has been converted to a Stump the approx. age of felling is required since the last survey.

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If Tree Type = Dominant, 1st Stand Height, 2nd Sample or 3rd Sample then the following Data Fields will need to be filled in:

Table 13 - 2: Trees Data Fields – Height Sample Trees

Data Field	Options	Comments
Total Height	Free text to 1 decimal place	See Height and Crown Diameter Assessments V3.doc in the Mensuration Assessments sub-folder of the Additional Documents folder for more details.
Timber Height (for broadleaf trees ≥20cm DBH)	Free text to 1 decimal place	See Height and Crown Diameter Assessments V3.doc in the Mensuration Assessments sub-folder of the Additional Documents folder for more details.
Crown Dia. 1	Free text to 1 decimal place	See Height and Crown Diameter Assessments V3.doc in the Mensuration Assessments sub-folder of the Additional Documents folder for more details.
Crown Dia. 2	Free text to 1 decimal place	See Height and Crown Diameter Assessments V3.doc in the Mensuration Assessments sub-folder of the Additional Documents folder for more details.
Excessive lean	• No • Yes	Any lean, of a line drawn from the middle of the stool of the tree to its growing tip, greater than 20° from vertical is considered excessive. If the answer is 'Yes' then normally this tree cannot be a height sample tree. However, if the leaning tree is representative of a leaning Component (majority of Component is leaning) then height can be assessed although in the software a 'No' must be the answer to allow height assessments.
Windsnapped	• No • Yes	If the answer is 'Yes' this tree cannot be a height sample tree. However, if the snapped tree is representative of a snapped Component (majority of Component is snapped) then height can be assessed although in the software a 'No' must be the answer to allow height assessments.

By right clicking on Normal the following options become available.

- Delete Tree Record
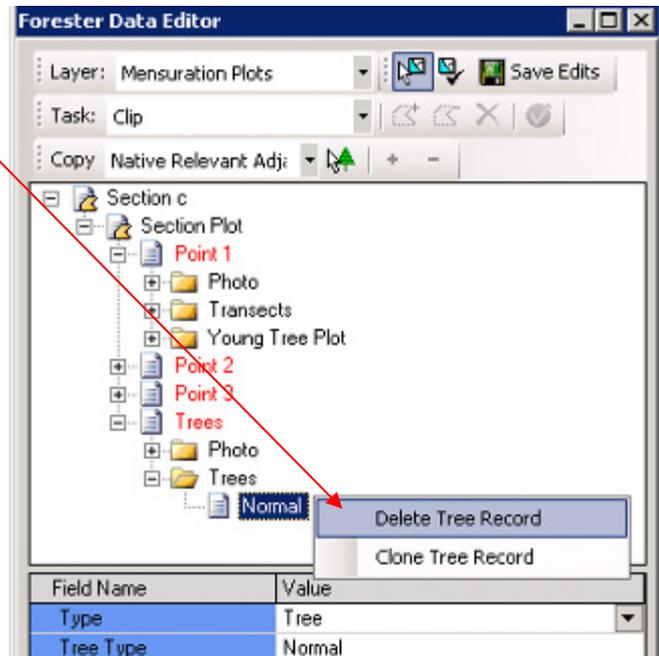
- Clone Tree Record – used for adding multiple records of the same species of tree. *Surveyors must remember to edit any cloned data correctly.*
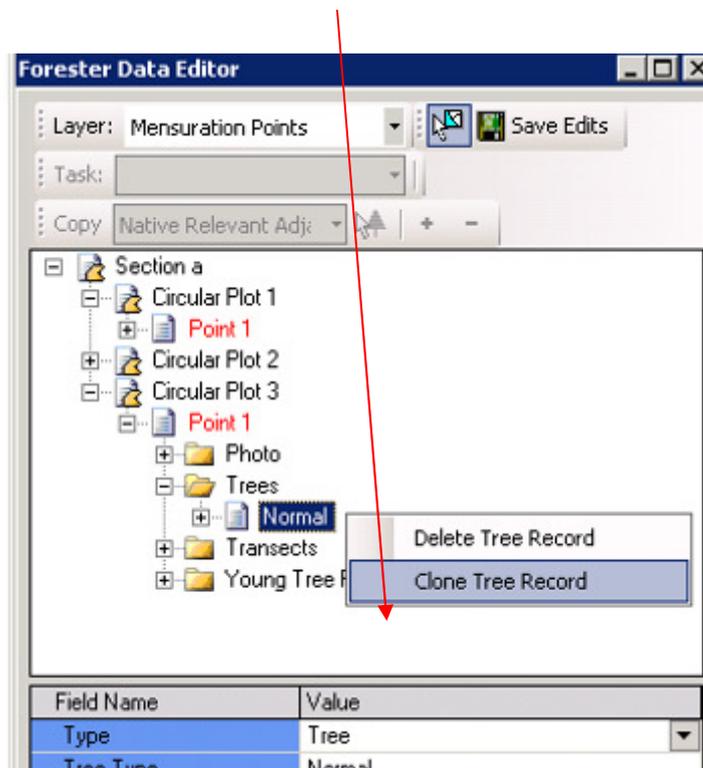
13.4 Mapping the tree position.

In the example below Plot 2 is being assessed (the centre of the plot is yellow).
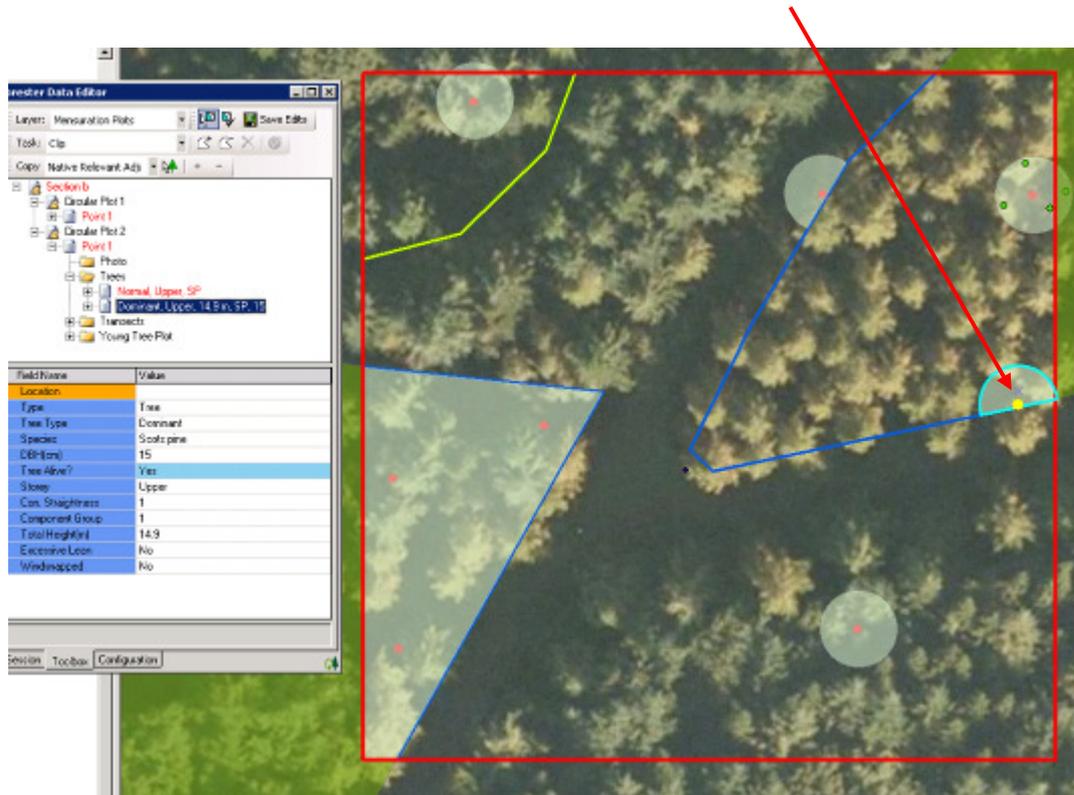
Before selecting the location of the tree/stump it is best to zoom in to the plot using the zoom tool.

Click on the white space next to the Location Data Field and to show a small grey box with the word 'Set' in it. Click on this and then click on the tree/stump/stool position within the Plot.
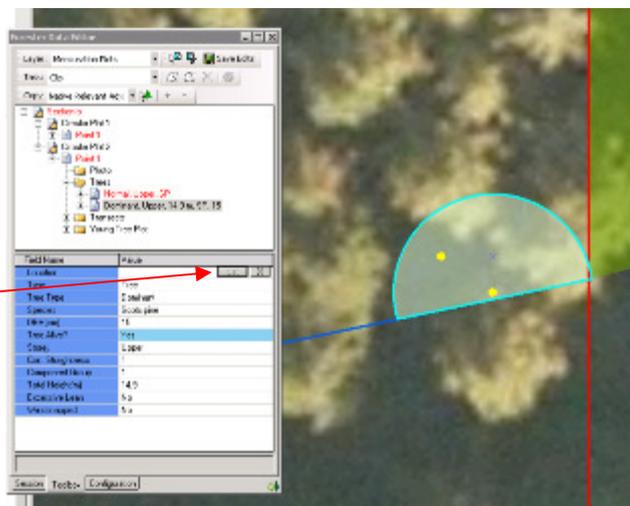
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Click on the plot area to locate the tree/stump:

Repeat the assessments for all trees ≥4cm DBH within the plot.

When Locating 2nd and 3rd Sample Trees the location must be within the plot. It may help to zoom out from the plot to be able to locate its position on the map.
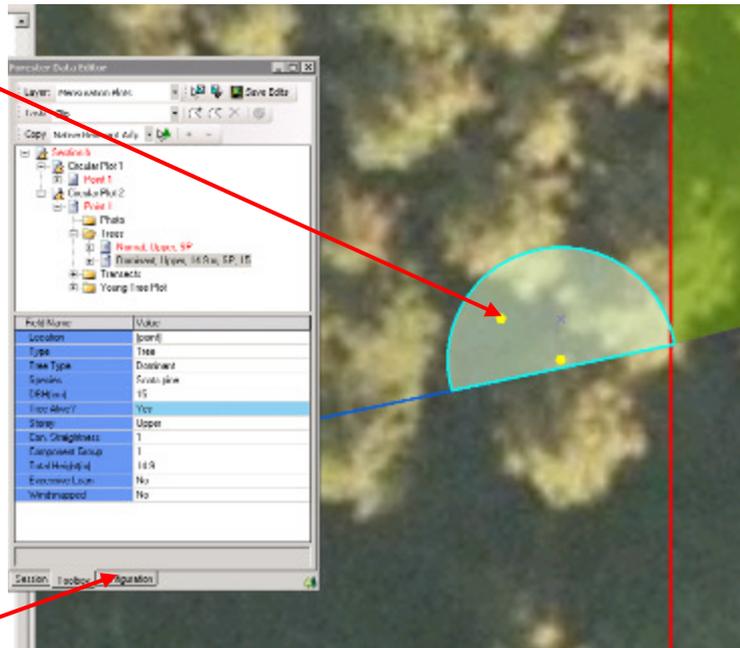
Clicking on the Configuration tab gives access to the Configuration section of the Forester Data Editor.

Ticking the 'Display plot target on active point' will give a guide at each plot to help map stems and stumps/stools more accurately.

Mapping should be accurate enough to allow surveyors to re-locate the trees in 5 years' time without being overly precise. **As a minimum, trees/stumps/stools should be mapped into the correct 'octant' of the plot target.**
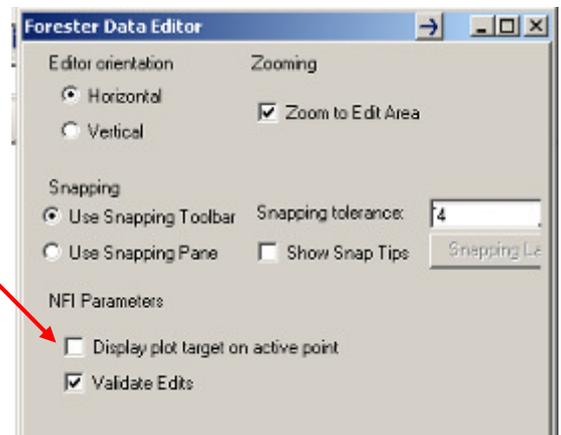
Good Practice Methodology where trees are difficult to locate:
- You may use 4-8 sticks to show the cardinal compass points on the ground within the plot.
- You can use the vertex to get the distance between the plot centre and the tree.
- Rarely you may need to take a bearing
- Locate the tree within the correct 'Octant' of the plot target.
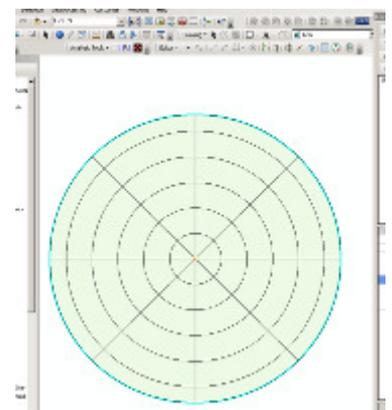
- ## 13.5 Adding new tree records

By right clicking on Trees folder the following options become available:
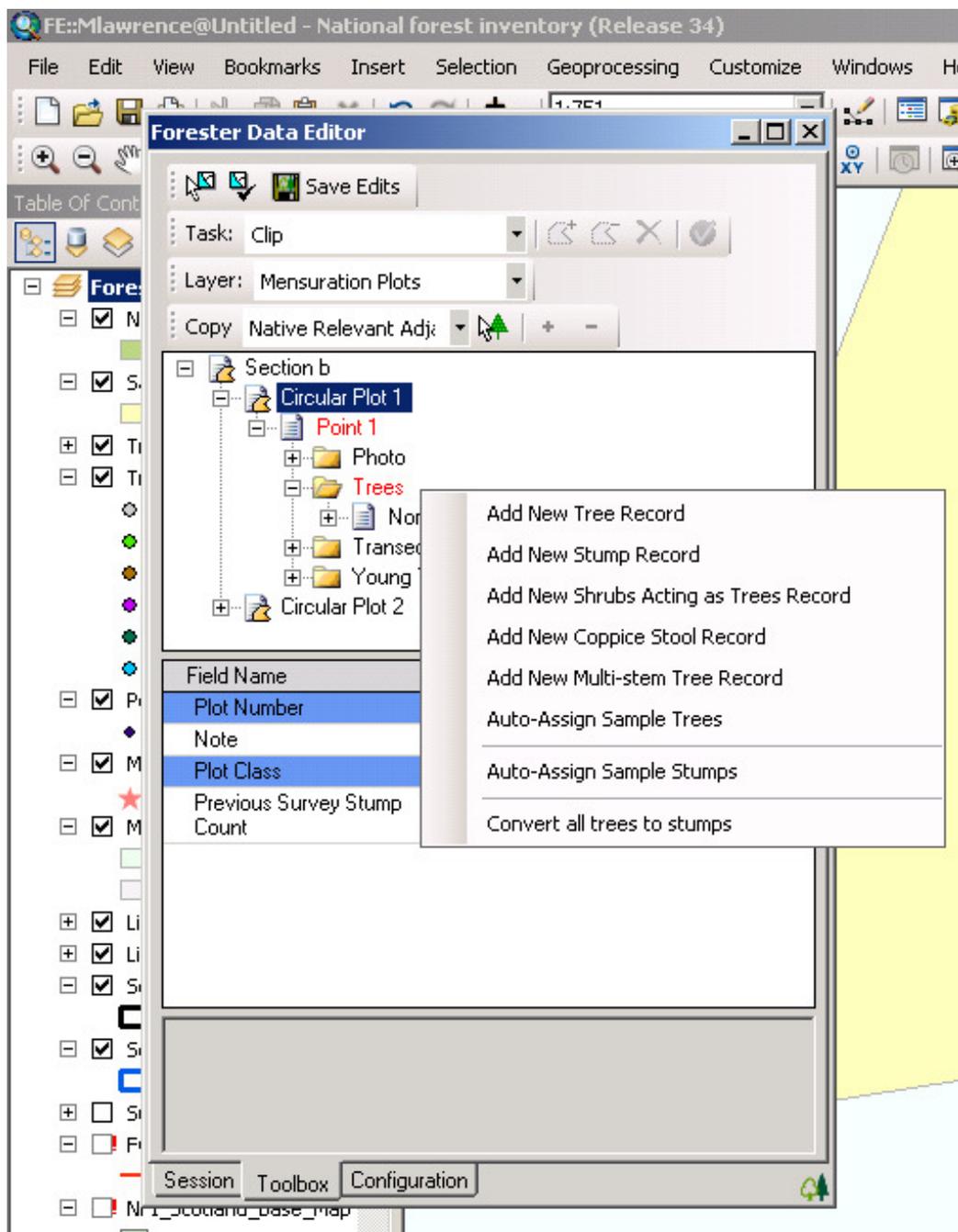
Table 13 - 3: **New Tree Records Data Fields**

Option	Comment
Add New Tree Record	Allows a new, blank tree record to be added. If there are a number of trees of the same species it is better to fill in one complete record for that tree species and then to Clone the data (see later). In this instance it is better to carry out the Cloning *before* entering the DBH of the tree to be cloned. This is a good way to ensure that new DBH's need to be entered. If cloning after DBH is entered it is possible to forget to edit the tree data correctly. This is true for any of the fields within the tree data.
Add New Stump Record	Within each plot the nearest stump to the plot centre, where stumps are present, needs to be mapped and measured objectively. To record the stump measures a Stump Record needs to be added. NB: Surveyors can also add a stump by turning a Normal Tree record into a stump in the Tree Data fields under the Field name 'Type'.
Add New Shrubs Acting as Trees Record	Where a shrub is acting like a tree a Shrubs Acting as Trees Record needs to be added and filled in. NB: Surveyors can also add this by turning a Normal Tree record into a Shrubs Acting as Trees in the Tree Data fields under the Field name 'Type'.
Add New Coppice Stool Record	Add New Coppice stools here. NB: Surveyors can also add this by turning a Normal Tree record into a Coppice Stool in the Tree Data fields under the Field name 'Type'. See 13.5.1 to add stems to the stool
Add new Multi stem tree record	Where a tree is multi-stemmed, but not from coppicing, then a multi-stem root stock can be assigned. To add the stems to this root stock right-click on the multi-stem to get options: see below.

Auto-Assign Sample Trees (for Mensuration Plots)	In Mensuration Plots, once all the Normal trees have been added/cloned, the data completed and dominant trees manually allocated, use Auto-Assign Sample trees to assign the 2nd and 3rd sample trees
Allocate Sample Trees (for Whole Section Plots)	In Whole Section plots once all the Normal trees have been added/cloned and the data completed, use Allocate Sample Trees to assign the 1st Stand height, 2nd and 3rd sample trees.
Auto-assign sample stumps	
Convert all trees to stumps	Re-measure squares only – where a surveyor finds that all the trees within a plot have been felled this option allows them to convert all the trees simultaneously to stumps rather than deal with each individually.

13.5.1 Coppice tree records

Stems are added to a Coppice stool by right clicking on the Coppice Stool record. The following options can be chosen:
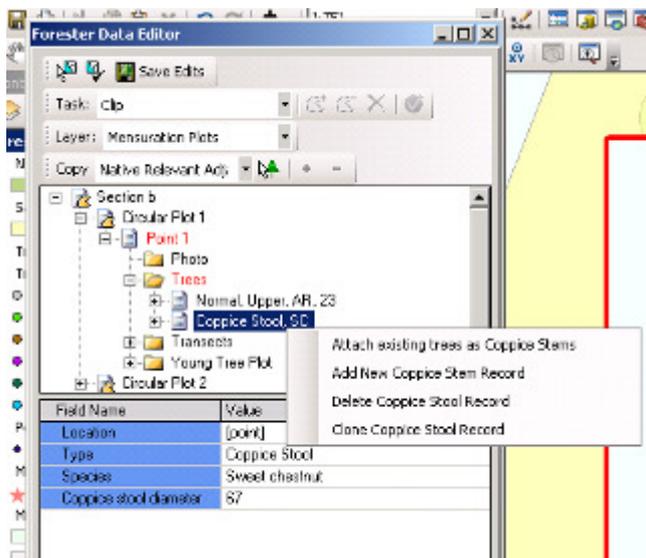
Option	Comment
Attach existing trees as Coppice Stools	Re-measure: In early versions of the software during the 1st cycle of the NFI it was not possible to add more than 1 stem to a stool. This option allows surveyors to add existing stems to a stool to correct this. See 13.5.1.1 for more information.
Add New Coppice Stem Record	Adds a new stem to a coppice stool
Delete Coppice Stem Record	Deletes a coppice stem record
Clone Coppice Stem Record	Clones coppice stems (onto same stool)

Assessment of Coppice stool diameter: use a DBH tape at ground level to assess the diameter of the coppice stool.

13.5.1.1 Attaching existing trees as Coppice Stools (Re-measure)

The example opposite shows a Coppice stool (yellow dot) amidst a number of coppice stems. The stems need to be attached to the stool.

Right click on the Coppice Stool and choose – Attach existing trees as Coppice Stems.

Check the trees you wish to attach as coppice stems in the pop-up box (opposite). Press OK and those stems that have been checked will be attached to the coppice stool.

See Chapter 17: Coppice for more information on coppice.
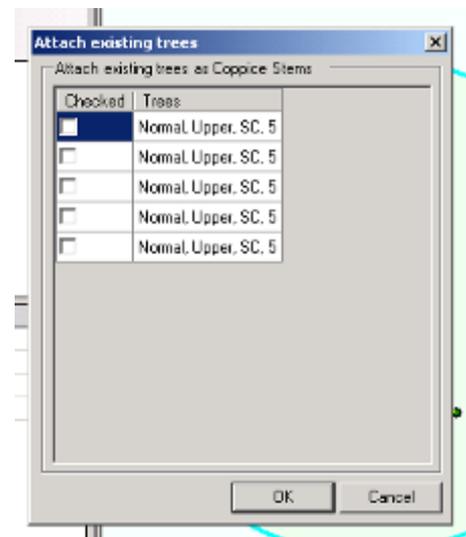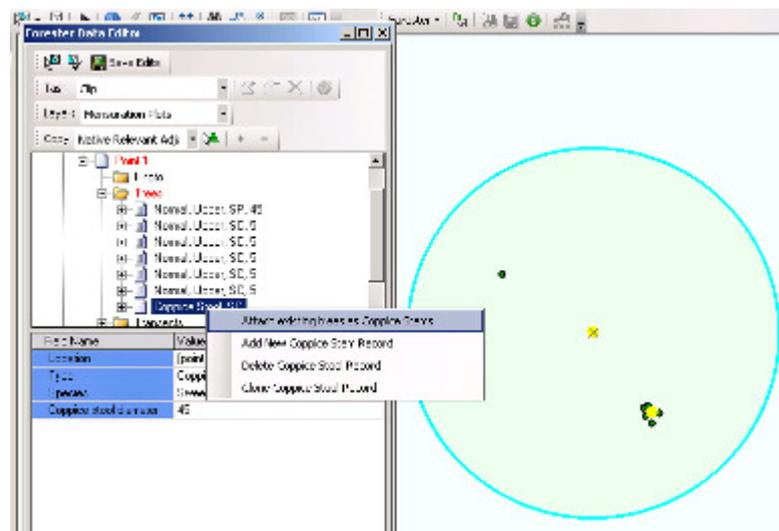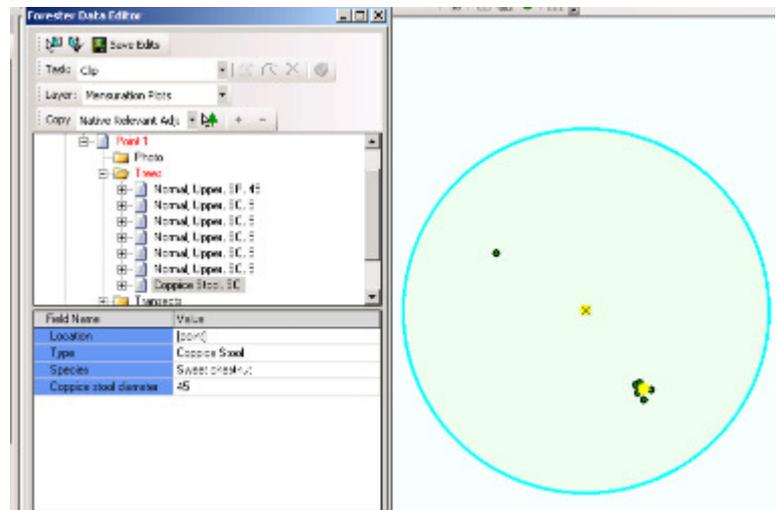
13.5.2 Multi-stem tree records

Multi-stem records are treated in exactly the same way as Coppice records utilising the same software procedures and menus.

13.6 Locating trees using the Data Editor

The software allows survey staff to highlight trees either directly in the Data Editor window or by clicking on them within a plot.

To highlight a tree within the plot the Trees layer must be selected.

A tree within a plot can then be chosen using the mouse pointer or stylus allowing easy access to specific trees.
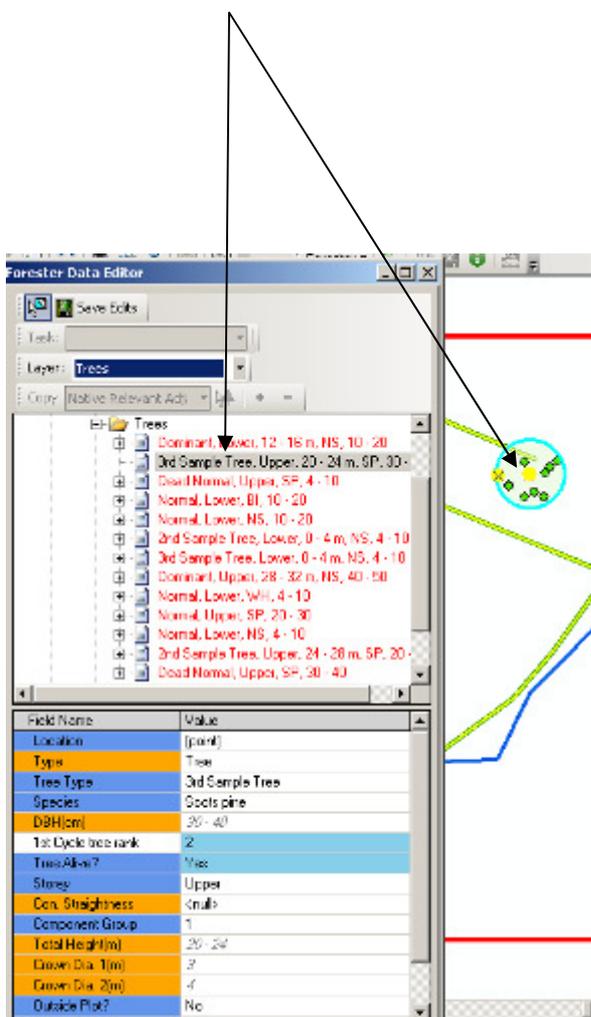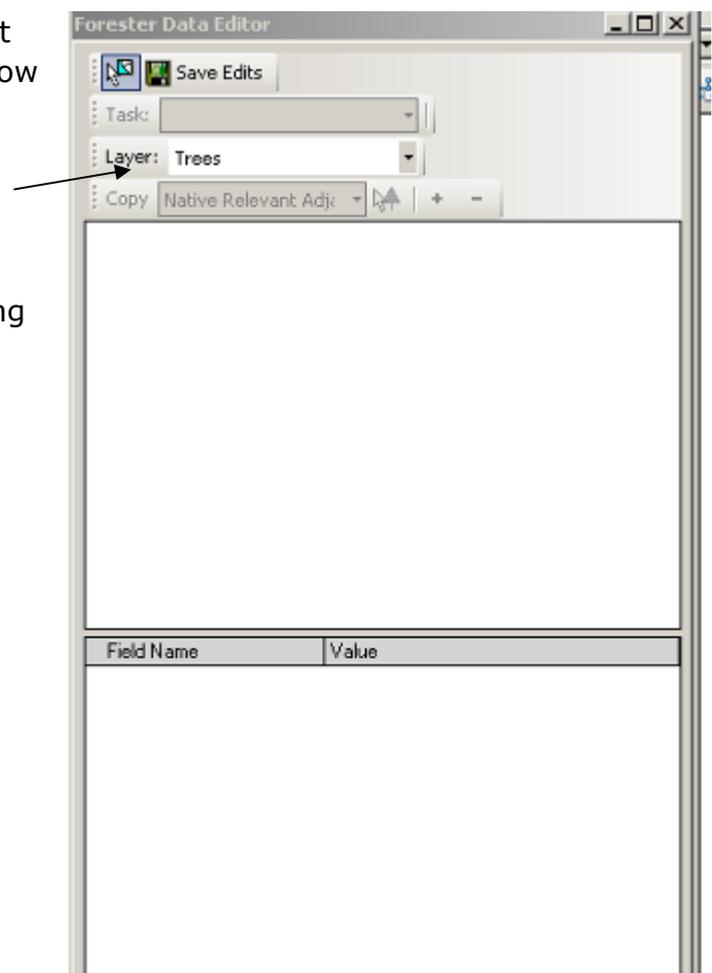
13.7 Tolerances for Re-measure squares

There are no tolerances set for the mensuration plot data.

To aid navigation and orientation approximate DBH and tree height bands are supplied. These are based upon the first cycle assessment values and fall randomly within the ranges given. They should not be used for comparison purposes or for estimating what a DBH or height may be. You need to take your own measurements.

Once you have found each tree, you need to take your measurements and record these against the DBH and Height fields. The re-measure values will fall either within the supplied range or above it. In some circumstances it is possible that the previous surveyor recorded the data incorrectly. The main objective is to be sure you have the orientation correct, you have the same tree as the previous surveyor and for you to make your own independent assessment of that same tree. NFI analysts will compare your measurements to the actual values of the previous surveyors to check if credible growth has been recorded. QA staff will measure a sample of your squares to check if your assessment process is correct. The same approach applies for crown diameters.