# Training Module 1: Forest District Fleckertshöhe - Results

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## Species composition

The number of species in each main survey plot varied considerably, from only 2 in the mouflon-grazed plot 5, to 35 in the young coppice plots of 1B. There are no species in common between plot 5 and plot 1B, and very few between plots 5 and 1A and 2 and 3. As would be expected, the two adjacent coppice plots have a very high similarity of 0.66. Plots 2 and 4 are also quite similar in species composition. The species accumulation curves showed a steady rise as the quadrat area increased, except for plot 5 which had only 2 species.

Similarity matrix

| PLOT        | 1B   |      |      |      |      |   |
|-------------|------|------|------|------|------|---|
| 1A          | 0.66 | 1A   |      |      |      |   |
| 2           | 0.23 | 0.35 | 2    |      |      |   |
| 3           | 0.2  | 0.36 | 0.13 | 3    |      |   |
| 4           | 0.23 | 0.31 | 0.63 | 0.33 | 4    |   |
| 5           | 0    | 0.11 | 0.44 | 0.25 | 0.27 | 5 |
| No. species | 35   | 27   | 16   | 14   | 16   | 2 |

The stem diameter data on the whole looked reasonable, with basal areas ranging from 14.8 m<sup>2</sup> ha<sup>-1</sup> in recently converted, open oak woodland (plot 3) to 37.1 in the dense canopy nutrient-rich of plot 5. We would expect low basal area figures in young and fire-affected stands of plots 1A and 1B. They also have a high stocking of stems at this stage, before self-thinning or conversion has taken place, and a large proportion have a coppice stool origin. Plot 5 appears not ever to have been thinned, as it has a very stocking. All of the plots have a majority of sessile oak and all but plots 1A, 1B and 5 have a significant amount of hornbeam; scattered amongst these are a few stems of lime, beech and rowan. When we did the plotless sampling, we often found a few more species because the sample ranged wider, outside the confines of the 500m<sup>2</sup> main sample plot.

|                       | PLOT 1A | PLOT 1B | PLOT 2 | PLOT 3 | PLOT 4 | PLOT 5 |
|-----------------------|---------|---------|--------|--------|--------|--------|
| Quercus petraea ba    | 14.52   | 16.38   | 15.87  | 14.80  | 11.90  | 18.43  |
| Carpinus betulus ba   |         |         | 12.55  |        | 8.14   | 18.69  |
| Betula pendula ba     | 1.08    |         |        |        |        |        |
| Sorbus aucuparia ba   | 1.49    |         |        |        |        |        |
| Tilia cordata ba      |         |         | 2.15   |        |        |        |
| Fagus sylvatica ba    |         |         |        |        | 0.83   |        |
| Total ba m²/ha        | 17.81   | 16.38   | 30.15  | 14.80  | 20.87  | 37.12  |
| No. stems/ha          | 1580    | 2680    | 760    | 460    | 880    | 2380   |
| No. coppice stools/ha | 380     | 380     | 100    | 20     | 120    | 580    |
| No. single stems/ha   | 600     | 1540    | 500    | 440    | 460    | 540    |
| % coppice stools      | 62%     | 43%     | 34%    | 4%     | 48%    | 77%    |

### **Plotless sampling**

Plotless data were only available for plot 4 (the only raw data sheets returned – see Appendix). This indicated a total of 421 trees/ha and a total basal area of 22.62 m<sup>2</sup> ha<sup>-1</sup>. The basal area data compares pretty well with that for the 500 m<sup>2</sup> plot, but the density of stems here is influenced by whether the trees in each of the four quadrants around the sampling point were coppice stools or single stems. For each coppice stool, we would need to record the sum of the basal area of all the stems on a stool. Oak is dominant in this plot, in terms of importance value (relative density + relative dominance + relative frequency) it scores 187, compared with hornbeam (69), beech (27) and hazel (8).

## **Dead Wood Assessment**

I have checked through these figures (see accompanying spreadsheet), but am not confident that they properly interpret the data from site 4 or site 5. However, it is pretty clear that the two young coppice sites 1A and 1B have the least amount of dead wood per hectare, as would be expected when there is as yet little standing biomass. Fallen wood quantities always exceeds the amount standing, usually by 4 -10 times. Plots 3 and 4, the converted stands, both have large amounts of fallen and dead wood, presumably accumulated through past self-thinning and logging residues. Plots 1B and 5 are based on readings from only two transects, so these results will be less reliable, and in plots 2 and 5 there no fallen dead wood recorded.

In general, the total amounts of dead wood are what would be expected in young coppice, i.e.  $< 20m^3 ha^{-1}$ , whereas the threshold for a comparatively higher biodiversity of saproxylic organisms (fungi, beetles, etc.) would be  $> 50m^3 ha^{-1}$ , with many pieces > 20cm diameter.

It is easy to make simple arithmetic mistakes, and many derive from the calculation of the density ha<sup>-1</sup> of fallen dead-wood contacts, as well as standing dead trees in the plot. For example, in a calculation based on 10 transects,  $\pi 10^4$ N is should be divided by 2t (50) x 10 = 500, and conversely the number of standing dead wood (snags) per hectare multiplied by 10000/1000 (10x25x4) =100. For the standing dead wood it is necessary to assume an average length of each piece, as we could not measure all heights: therefore for the low snags I assumed an average height of 3m, and for tall snags 8m.

### APPENDIX

### Plotless sampling record sheet: PLOT 4

| Sample | Quarter | Species  | Distance | Dbh (cm) | BA (cm <sup>2)</sup> |
|--------|---------|----------|----------|----------|----------------------|
| point  |         |          | d (m)    |          |                      |
| 1      | NW      | Quercus  | 9        | 25       | .0491                |
|        | NE      | Quercus  | 2.3      | 31       | .0755                |
|        | SW      | Quercus  | 10       | 27       | .0573                |
|        | SE      | Quercus  | 12       | 28       | .0616                |
| 2      | NW      | Quercus  | 2        | 30       | .0707                |
|        | NE      | Carpinus | 6        | 15       | .0177                |
|        | SW      | Carpinus | 8        | 9        | .0064                |
|        | SE      | Carpinus | 12       | 10       | .0079                |
| 3      | NW      | Quercus  | 5        | 35       | .0962                |
|        | NE      | Carpinus | 8        | 17       | .0227                |
|        | SW      | Quercus  | 5        | 24       | .0452                |
|        | SE      | Quercus  | 7        | 25       | .0491                |
| 4      | NW      | Carpinus | 4        | 21       | .0346                |
|        | NE      | Quercus  | 8        | 24       | .0452                |
|        | SW      | Quercus  | 13       | 27       | .0573                |
|        | SE      | Quercus  | 8.9      | 33       | .0855                |
| 5      | NW      | Quercus  | 4.5      | 29       | .0661                |
|        | NE      | Quercus  | 7        | 22       | .0380                |
|        | SW      | Quercus  | 4        | 23       | .0415                |
|        | SE      | Quercus  | 5        | 33       | .0855                |
| 6      | NW      | Quercus  | 14.4     | 31       | .0755                |
|        | NE      | Quercus  | 1.6      | 12       | .0113                |
|        | SW      | Fagus    | 14.4     | 35       | .0962                |
|        | SE      | Carpinus | 7.1      | 9        | .0064                |
| 7      | NW      | Quercus  | 10.6     | 26       | .0531                |
|        | NE      | Fagus    | 14.2     | 35       | .0962                |
|        | SW      | Fagus    | 14.5     | 7        | .0038                |
|        | SE      | Quercus  | 16       | 27       | .0573                |
| 8      | NW      | Quercus  | 7.2      | 32       | .0804                |
|        | NE      | Carpinus | 10.5     | 12       | .0113                |
|        | SW      | Quercus  | 10.5     | 29       | .0661                |
|        | SE      | Quercus  | 8.8      | 26       | .0531                |
| 9      | NW      | Carpinus | 7        | 15       | .0177                |
|        | NE      | Quercus  | 8        | 49       | .1886                |
|        | SW      | Quercus  | 12.5     | 40       | .1257                |
|        | SE      | Carpinus | 5.5      | 13       | .0133                |
| 10     | NW      | Quercus  | 12.2     | 25       | .0491                |
|        | NE      | Carpinus | 4        | 25       | .0491                |
|        | SW      | Corylus  | 2.5      | 5        | .0020                |
|        | SE      | Quercus  | 6        | 32       | .0804                |
| TOTALS |         |          | 8.205    |          | 2.1497               |
|        |         |          |          |          |                      |

### Mean distance d = 8.205/40 = 4.875m

Absolute density (no of trees/ha) = area/d² = 10000/23.77 = 420.8/haQuercus 26/40 = 0.65.0.65 x 420.8 = 273.5 trees/haCarpinus 10/40 = 0.250.25 x 420.8 = 105.2 trees/haFagus 3/40 = 0.0750.075 x 420.8 = 31.6 trees/haCorylus 1/40 = 0.0250.025 x 420.8 = 10.5 trees/ha

#### Absolute dominance (mean basal area per tree x no of trees of each species) Quercus mean ba = $0.0679 \times 273.5 = 18.56 \text{ m}^2/\text{ha}$

Carpinus mean ba =  $0.0187 \times 105.2 = 1.97 \text{m}^2/\text{ha}$ Fagus mean ba =  $0.654 \times 31.6 = 2.07 \text{ m}^2/\text{ha}$ Corylus mean ba =  $0.0020 \times 10.5 = 0.02 \text{ m}^2/\text{ha}$ Total ba/ha = **22.62** m<sup>2</sup>/ha

### Absolute frequency

Quercus 10/10 = 100%Carpinus 7/10 = 70%Fagus 2/10 = 20%Corylus 1/10 = 10%Total for all species = 200%

#### **Relative values**

Density: Quercus 273/421 = 65%; Carpinus 105/421 =25%; Fagus = 32/421 =8%; Corylus = 11/421=3% Dominance: Quercus 1.7664/2.1497 = 82%; Carpinus 0.1871/2.497= 9%; Fagus = 0.1962/2.1497 = 9%; Corylus = 0.002/2.1497 = 0.1% Frequency: Quercus = 80/200 = 40%; Carpinus = 70/200 = 35%; Fagus =20/200 = 10%; Corylus = 10/200 = 5%

**Importance values** (relative density + relative dominance + relative frequency) Quercus = 65+82+40 = **187**; Carpinus = 25+9+35 = **69**; Fagus = 8+9+10 = **27**; Corylus = 3+0.1+5 = **8.1**