Habitat Condition Assessment Method: Duke of Burgundy

(version 2025)

This methodology has been devised as an output of the Natural England funded SRP 'Chalk Species Revival – The Wiltshire Chalk Partnership' project. This builds on previous assessment methods developed by Butterfly Conservation. Through further testing and refinement, this revised method has been adjusted to provide flexibility of use on both occupied and unoccupied sites and locations where colonisation is possible and/or re-introduction may be considered.

When should this method be used?

- **The aim is to determine the general condition (suitability) of a habitat patch occupied by a population (colony) of the Duke of Burgundy butterfly.**
- **This is for grassland, grassland/wood edge or grassland with scrub sites. It will not work well for coppice glades or young plantations.**
- This survey is fairly rapid and easy to carry out and analyse without complex statistics, but still retains enough detail to indicate positive ecological features for the species and an alert to where changes to management might be required.
- The method involves repeat recording of vegetation structure and relevant attributes (based on ecological research studies) that are currently known to influence the suitability of grassland sites for the Duke of Burgundy.
- The data can be used to a) score habitat suitability to make an initial assessment of the condition of the site for this species, b) provide an alert if suitability is poor and c) provide a baseline from which management changes can be monitored.
- The scoring and analysis system (via a dedicated spreadsheet) allows for a simple collation, presentation and interpretation of the results. If in the future, further research findings suggest that there are changes in the habitat requirements for this species, then the weighting features can be adjusted on the spreadsheet.
- This initial analysis is designed to be an alert for land managers and advisors, if the results indicate that a site, or features at a site are unfavourable, then further detailed analysis might be required.

Preparation before undertaking the assessment

SURVEY EQUIPMENT

- Duke of Burgundy habitat condition assessment form – printed out or downloaded to a mobile device if collecting the information digitally. A print-ready version of the field form is given in the spreadsheet file and a copy at the end of these instructions.
- Clipboard plus pen and/or pencil if using a printed form.
- Assemble relevant information including a good map of the site with the area to be surveyed marked (and preferably the sample pattern such as a grid or w-shape).
- A ruler for measuring Cowslip or Primrose leaves and vegetation height.
- Download GPS Logger app and/or another free GPS app to your smartphone if you have one or bring a GPS unit.

FREQUENCY, TIME OF YEAR AND CONDITIONS

- Surveys should be carried out either around the peak flight period for the Duke of Burgundy in May-June and/or when the caterpillars are present in July (but estimating larval foodplant can be more difficult then). Timings may vary between sites, regions and years.
- Surveys can be done in any weather, but it is quicker in dry weather and foodplants are more visible.
- The time of day does not matter and sites can be surveyed over multiple days if required.
- A single assessment per year (or every 2 to 3 years) should usually be adequate.
- The method is designed to be time-efficient and completed easily. For example, a medium sized site with a fairly steep and moderately scrubby slope took about 30 to 45 mins to walk and complete 10 sample stops. Then each trial survey compartment of between 1.5 to 3 ha took between 1.5 to 2 hours.
- Ensure formal permission is obtained from the landowner/land manager, even if public access land. Permission to survey land is essential to building relationships with land managers and to ensure appropriate habitat management can be implemented.

Carrying out the field survey

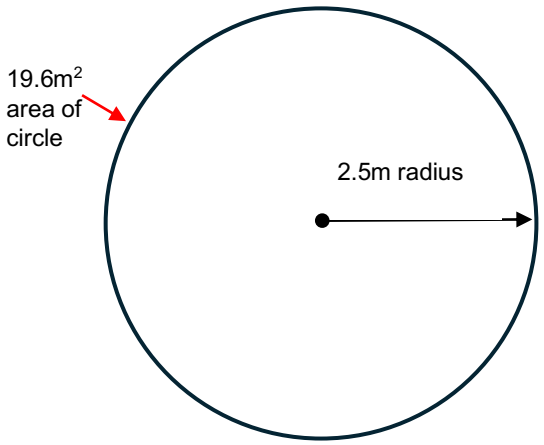
DETERMINE SURVEY COMPARTMENTS

- If necessary, divide the site into survey compartments that are based on management units and/or habitat changes. Avoid sampling only the best areas, but don't sample habitat that is never used by Duke where there is no larval foodplant (i.e.: inside a dense mature conifer patch or the trampled enriched patches around water troughs).
- Deciding survey compartments can be difficult particularly on unknown sites. It is easy to combine for future surveys if results suggest this is best, but splitting a previously recorded compartment is tricky. For the initial set-up of long-term monitoring it might be best to seek expert advice.
- On small sites (less than 1 ha) it is probably best to record as a single unit, unless there are obvious management/habitat changes across the unit.
- On very large sites, it may not be practical to survey the entirety and in such cases concentrate on the area/s likely to hold the majority of potential breeding habitat.
- Note that Duke of Burgundy adults are usually seen in sheltered zones towards the bottom of slopes, however these are often predominately males and the secretive females can be more widely spread across a site as they search for Cowslip or Primrose plants. Don't ignore the top of slopes, unless the habitat is obviously totally unsuitable with no larval foodplant. Also remember that larval foodplant distribution can quickly change between years, so do cover low density patches.
- In all cases, accurately map/record the survey compartments.

SAMPLING AND STOPPING DISTANCES

- This survey involves carrying out point sampling of habitat features across the site or sub-sites. Work out a grid or W shape (zigzag) route that will cross thoroughly and evenly the whole of each survey compartment (as far as is possible with natural barriers such as dense scrub thickets).
- W-shaped or zig-zags will be better at sites where scrub or other features limit access and it is difficult to physically reach or find set grid points. Grid sampling patterns may be more appropriate on large open sites.

- Make sure that the sample points (stops) are evenly spread across whichever route is being used. If this is a repeat survey, try to use a similar survey route/grid to the original baseline survey so that there is a direct comparison, but stop points do not need to be identical. If management has taken place, such as scrub clearance then adjustments to sample these areas will be needed.
- Decide rough stopping distances along this route where repeat recordings of habitat condition will be made e.g. every 20-50 paces. The survey circles are large in area (2.5m radius) and therefore 25 stops should be sufficient for most sites/survey compartments. In trials, 25 stops seemed to give enough detail for sites between about 1 to 3 ha, without becoming too time-consuming. The dedicated spreadsheet allows up to 30 stops to be entered & more can be added (see ASSESSMENT SPREADSHEET & ANALYSIS below)
- Using a GPS/GPS Logger app, record the start of your structured walk to map your route, remembering to press stop and name the file at the end. This can also be used to 'mark' your sample points (stops) if this would add useful detail.
- Alternatively, you could (if this is useful detail) record the British National Grid Reference of each sample point using a phone app or GPS unit and send this in with your survey form (10 figure grid reference preferred).
- At each stop record the attributes as listed on the recording form using a 2.5 metre radius sampling point (see below diagram).



FEATURES TO RECORD

The top of the fieldsheet asks for details of the site, survey date/ s, surveyor, the larval foodplant species that are present and also brief notes on site management. Feel free to provide additional notes on management if known, including if rabbit or deer grazing has a noticeable impact, stock type and numbers, if management has changed recently and any scrub management /treatment that has occurred.

For the sampled features, on paper a tick can be used to indicate presence of a feature. When entering onto the spreadsheet, to allow for calculations use "1" to indicate presence. For absence it is usually easier to leave the cell blank. Be careful about using a zero on the fieldsheet, because this can be mistaken for "O" = occasional on the abundance scorings (see ASSESSMENT SPREADSHEET & ANALYSIS below).

1. Grassland height

- Take the height as the main bulk of the grassland sward, not flowering heads.
- Three height categories are listed, mark all that apply within the 2.5 radius sampling circle. This might mean all categories are ticked. Leave blank if the category isn't present.

2. Larval foodplant leaf size

- It's not necessary to check every plant, just look at a representative sample within the circle taking the longest leaf on each plant. Three length categories are listed, mark all that apply, which might mean all categories are ticked.
- Leave blank if no larval foodplants are present.

3. Larval foodplant abundance

- Give an overall estimate, don't go searching for every plant.
- For each sampling circle make an estimate of larval foodplant using the DAFOR scale of abundance (D - dominant, A - abundant, F - frequent, O - occasional, R - rare). See notes on estimating DAFOR below.
- Use "X" if no larval foodplants are present or can be left blank, but do not use a zero when writing on the fieldsheet because this could be interpreted as "occasional".
- On paper, D, A, F, O or R can be used, but when entering onto a spreadsheet use D=5, A =4, F= 3, O= 2, R=1 and none = 0 (or can be left blank).

4. Moss

- Only record if moss is an obvious feature within the sward, don't go searching deep within vegetation.
- For each sampling circle make an estimate of abundance using the DAFOR scale of abundance (D - dominant, A - abundant, F - frequent, O - occasional, R – rare and use "X" or blank for none) see **Larval foodplant abundance** above for details.

5. Bramble (ground/creeping)

- The difference between ground-growing bramble and scrubby bramble (see below) will be slightly arbitrary but the idea is to differentiate between bramble that is growing as part of the sward and bramble that has enough structure / height to be acting like scrub within the habitat. As a suggestion, if the bramble is less than 40 cm in height then it can be considered as ground/creeping.
- For each sampling circle make an estimate of abundance using the DAFOR scale of abundance (D - dominant, A - abundant, F - frequent, O - occasional, R – rare and use "X" or blank for none) see **Larval foodplant abundance** above for details.

6. Bramble (scrubby/thicket)

- Consider bramble as falling into this category when it is creating the same structure and shading opportunities as woody scrub. As a rough estimate if bramble is more than 40 cm in height then it could be considered as scrubby/thicket.
- For each sampling circle make an estimate of abundance using the DAFOR scale of abundance (D - dominant, A - abundant, F - frequent, O - occasional, R – rare and use "X" or blank for none) see **Larval foodplant abundance** above for details.

7. Scrub less than 1m height

- Leave blank if no low growing scrub is present.
- Bramble is assessed above and therefore not considered in this category, but Wild Rose should be included.

- Four abundance categories are listed, mark the category that best applies within the 2.5 radius sampling circle, but don't go searching for every small shoot.

8. Scrub more than 1m height

- Roughly estimate the percentage canopy cover within the sampling circle to nearest 5%.
- Bramble is assessed above and therefore is not considered in this category, but Wild Rose should be included. Hedges should be noted separately under **11. Other features present.**

9. Grassland/herb sward

- Roughly estimate the percentage cover within the sampling circle to nearest 5%. Note that grassland sward can continue under scrub or Bramble.
- Do not include dense patches of Stinging Nettle or similar, unless the grassland sward continues beneath.

10. Bare ground if more than 5% cover

- There is always likely to be some small patches, but if this covers more than or equal to 5%, then roughly estimate the percentage cover to nearest 5%.
- Do not include rubble, concrete, large rocks or piles of dead vegetation.

11. Other features present

- Clematis
- Docks (excl. Sorrel)
- Creeping/ Spear Thistle
- Stinging Nettle
- Ant-hills/ bank/ ditch/ pit/ terracettes
- Hedge

Indicate the presence of any of these features. Note that terracettes are small step-like formations on steep slopes, which seem to be formed by soil creep/ erosion, exacerbated by livestock trampling. These can also form alongside fence boundaries. Only indicate ant-hills, banks, ditches, pits, terracettes when they are a fairly strong defined feature, not just the typical uneven surface of grazed grassland.

NOTES ON ESTIMATING DAFOR ABUNDANCE (for sections 3, 4, 5 and 6)

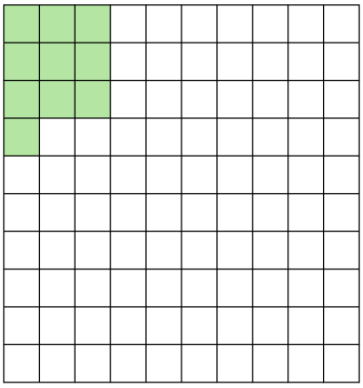
While the DAFOR scale is sometimes defined in the literature as directly equivalent to a range of percentage cover, it is not usually intended to be used with this level of accuracy. In this survey it should be used as a very rough, quick description of abundance and not as directly equivalent to percentage cover.

DAFOR is used here because when faced with a large sample point, it is difficult to correctly estimate the percentage cover of small plants such as Cowslips, which are very patchy and often only flowering heads are showing above the sward. Percentage cover then tends to underestimate abundance, but DAFOR seems to be more accurate and better indicate small differences.

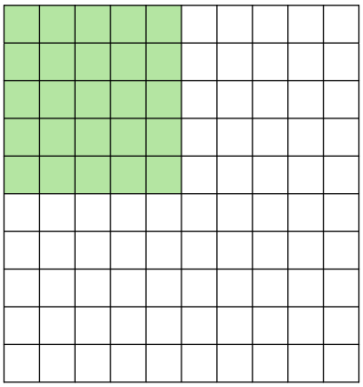
However, one version of the DAFOR range is given here to help with understanding the categories. Dominant (>75% cover), Abundant (50-75% cover), Frequent (25-50% cover), Occasional (10-25% cover) and Rare (<10% cover).

NOTES ON ESTIMATING PERCENTAGE COVER (for sections 8, 9 and 10)

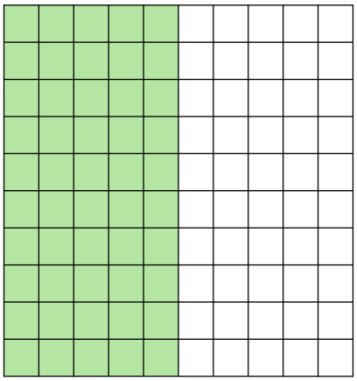
The easiest way is to imagine the plant/ feature is grouped into a corner of a sample point. The coverage can then be estimated depending on the number of squares filled by that feature on an imaginary 10x10 grid. Each square represents 1%. Using a circular sample point makes it a little trickier to visualise, but the same principle applies.



10 % cover



25% cover



50% cover

ASSESSMENT SPREADSHEET & ANALYSIS

Spreadsheet entry

The spreadsheet is locked so that only the field data can be entered. This protects any accidental deletion of the calculations. However, if changes or extra stops are needed then the spreadsheet can be unlocked using the password = “password”.

- For any present/absence features, use “1” for presence, “0” can be used for absence but if “absence” is left blank on the spreadsheet then it takes less time and makes checking the input clearer.
- For any DAFOR abundance features use 5 for D, 4 for A, 3 for F, 2 for O, 1 for R and 0 for none. This is also shown on the spreadsheet for ease of entry.
- Remember to enter the number of sample stops in the red-bordered box at the top right of the spreadsheet, otherwise the calculations will not work!

Interpreting the results

Once the field results are inputted into the spreadsheet, the results are automatically calculated and displayed on the adjacent tables.

An average is used for every recorded feature, to accommodate the use of different numbers of sample points (so unused stop columns do not have to be removed). A weighting is then given to each category within that feature, to reflect relative suitability of the attribute for the species. There is a maximum score of 10 for every feature. Full details of the weighting and scoring system are given in Appendix 1 below.

In the scoring table shown below, “suitable” suggests this feature fits Duke of Burgundy requirements, “adequate” is when conditions only just meet requirements so habitat could be considered marginal. “Poor” suggests that this feature does not supply what is needed to support Duke of Burgundy.

Summary of feature suitability scoring

Feature	Suitable	Adequate	Poor	Maximum
Grassland height	7 or more	≥4 and <7	below 4	10
Larval foodplant leaf size	4 or more	≥3 and <4	below 3	10
Larval foodplant abundance	4 or more	≥3 and <4	below 3	10
Scrub less than 1 m high	5 or more	≥4 and <5	below 4	10
Scrub more than 1 m high	10	6	1 or 0	10

These scores can also be combined to give three overall site conditions scores as detailed in the table below. These could be used to compare between sites or between years at the same site.

Overall site suitability scores – results & interpretation

Overall site suitability is divided into three categories, below. Larval foodplant conditions are kept separate from habitat structure features. Sites often have excellent habitat structure for Duke of Burgundy breeding, but lack larval foodplant, or conversely have foodplant but unsuitable habitat structure. This would clearly show under this system.

1. Site structure suitability score (maximum score =30)

This is the sum of the overall grassland height suitability score + overall low scrub suitability score + overall taller scrub suitability score. This indicates the gross structural suitability of the site at the time of the survey.

2. Site larval foodplant suitability score (maximum score =20)

This is the sum of the overall larval foodplant leaf size score + overall larval foodplant abundance score.

3. Total site problem features score (maximum score =15)

This is the sum of scores from bramble (creeping & thicket combined) + the low scrub over 16+ plants per stop score + scores from the presence of Clematis, docks, Stinging Nettle, thistles.

A breakdown of this score is given in the lower orange table on the spreadsheet to allow the main features to be quickly identified.

This score is useful in early detection of issues. On one trial site the overall structure and larval foodplant condition scored as fully suitable, but a high site problem score indicated bramble growth as an issue and indeed this has become a management problem over the last few years.

For full details on entering data onto the spreadsheet and the subsequent analysis, see Appendix 1 below.

APPENDIX 1

Spreadsheet details and rationale for analysis

Details on scoring and rationale are given below for information and to aid consistency.

1. SCORING

An average is used for every recorded feature, to accommodate the use of different numbers of sample points. A weighting is then given to each category within that feature, to reflect relative suitability of the attribute for the species. There is a maximum score of 10 for every feature.

1.1 Scoring grassland height suitability

- Uses "1" for each height category present at a sample point. More than a single category can be noted and so the final score is given as a total from all height categories.
- In general, field studies suggest that the most advantageous spring sward height for Duke of Burgundy is between 5 to 20 cm. Therefore, this has a weighting of x5.5 on the final average score.
- The butterfly can cope with longer swards so the category of higher than 20 cm has a weighting of x3.5, but on very short swards the foodplant can drought before the caterpillars develop, so swards shorter than 5 cm have a weighting of x1.
- It is assumed there is an advantage in having a variability of sward across a site. Therefore, if every stop point has some patches of every height category then this gives the maximum score of 10.

Sward height	Score weighting
<5cm	x1
5-20cm	x5.5
20cm+	x3.5

Maximum overall score of 10
≥7 is "Suitable" condition
≥4 and <7 is "Adequate"
<4 is "Poor"

1.2. Scoring for largest larval foodplant leaf size

- Leaf size uses "1" for each category present at a sample point with the weightings given below to the final average.
- More than a single category can be recorded per sample point and all are included in the final score (it is assumed it is likely to be an advantage to have diversity in leaf size) giving a maximum overall score possible of 10.

Leaf size	Score weighting
<4cm	x1
4-8cm	x4
8cm+	x5

Maximum overall score of 10 **≥4 is ”Suitable” condition** **≥3 to <4 is “Adequate”** **< 3 is “Poor”**

1.3 Scoring for larval foodplant abundance

- Foodplant abundance uses a single estimate for each sample point on a rough DAFOR scale. This can be entered into the spreadsheet as D=5, A=4, F=3, O=2 and R=1 and then doubled to give a maximum score of 10 if all sample points have larval foodplant abundance as “Dominant”

Maximum overall score of 10 **≥ 4 is ”Suitable” condition** **≥3 to <4 is “Adequate”** **< 3 is “Poor”**

1.4. Scoring for scrub cover suitability

A Duke site does not always need a significant scrub component; much depends on the nature of the site and aspects of structural shelter. However, on many sites scrub is the vital feature that provides much of the needed shelter and protection of the foodplant from desiccation. Balancing appropriate scrub cover is an important issue in site management and will require monitoring.

1.4.1 Scrub less than 1 m high

The survey uses number of plants within the survey sample rather than percentage cover (as used for tall scrub) because the low scrub are often small “whips” which give a very small percentage cover even when numerous. A large number of such plants (although useful to Duke of Burgundy) do indicate future site management issues even if their actual ground cover is very small at present.

- Uses “1” for presence at a sample point with the following weightings given to the final average. Only a single category can be noted. Maximum score possible =10 if all stops have a few low scrub plants.
- Some presence of low growing scrub seems to be liked by Duke of Burgundy, but large numbers of such plants does indicate potential problems for future management, so the category 16+ plants is also used to calculate the total site problem score (see **Overall site suitability scores** below).

Number of low scrub plants	Score weighting
none	0
1 to 5 plants	x10
6 to 15 plants	X5
16+ plants	X1

Maximum overall score of 10 **≥ 5 is ”Suitable” condition** **≥4 to <5 is “Adequate”** **< 4 is “Poor”**

1.4.2 Scrub more than 1 m high

- This is given as a rough estimation of percentage cover (to nearest 5%). The average for the site is then scored as shown below with a maximum score possible of 10.

Average percentage cover of scrub more than 1 m high	Score weighting
None / less than 5%	0
5% to 10%	6
10 to 20 %	10
20 to 40%	6
40%+	1

Maximum overall score of 10
10 is ”Suitable” condition
6 is “Adequate”
1 or 0 is “Poor”

2. NOTES ON ANALYSIS

- An average is used for every recorded feature, so as to accommodate the use of different numbers of sample points.
- For the key structures and features that are considered most important for supporting Duke of Burgundy, a weighted score is applied to the average. So sward height, scrub level and larval foodplant condition are given a higher score when falling within the known suitability range for Duke of Burgundy. This has been used to provide a rapid, direct indication of overall site suitability, with the assumed most advantageous outcomes scoring a maximum of 10 for each of the key features.
- All weightings and the categorisations of the final scores can easily be altered on the dedicated spreadsheet if further research suggests shifts in the niche range for Duke of Burgundy. Any changes in scoring could also be quickly applied retrospectively to previous survey data allowing for continued comparison.
- An assessment of “Poor” should be considered as an alert for further investigation of that feature. For example, if grassland height scores as “Poor” then it should be obvious from the height category averages if this is due to under or over-grazing. However, it might be that more detailed field investigation of a feature is required.
- Not all recorded features are weighted or used in the final assessment scoring. However, these unscored features are included because they are useful indicators of habitat suitability. If an assessment scoring gives “Poor condition”, then these additional features can pinpoint problems. For example, if moss doesn’t feature on a site then it could indicate that sward becomes too dry during the summer and might not be very suitable for supporting larval foodplants while the caterpillars are developing.

Habitat Condition Assessment Form - Duke of Burgundy

Site name & county	Survey date	Site grid reference (central 6 figure)
Surveyor	Most frequent larval foodplant on site	Any other larval foodplant/s on site
Management (grazing/mowing/stock type etc)	Survey section number	Survey section gid reference (central 6 figure)

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		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Grassland height (tick all that apply)	**<5cm**																														
	5-20cm																														
	20cm+																														
Largest larval foodplant leaf size (tick all that apply)	**<4cm**																														
	4-8cm																														
	8cm+																														
Larval foodplant abundance	**D5,A4,F3,O2,R1, X0**																														
Moss	**D5,A4,F3,O2,R1, X0**																														
Bramble (ground/creeping)	**D5,A4,F3,O2,R1, X0**																														
Bramble (scrubby/thicket)	**D5,A4,F3,O2,R1, X0**																														
Scrub <1m height	**1 to 5 plants**																														
	6 to 15 plants																														
	16+ plants																														
Scrub >1m height	**% cover (nearest 5%)**																														
Grassland/herb sward	**% cover (nearest 5%)**																														
Bare ground if ≥ 5% cover	**% cover (nearest 5%)**																														
Other features present	**Clematis**																														
	Docks (excl. Sorrel)																														
	Creeping/ Spear Thistle																														
	Stinging Nettle																														
	Anthills/ bank/ ditch/ pit/ terracettes																														
	Hedge																														