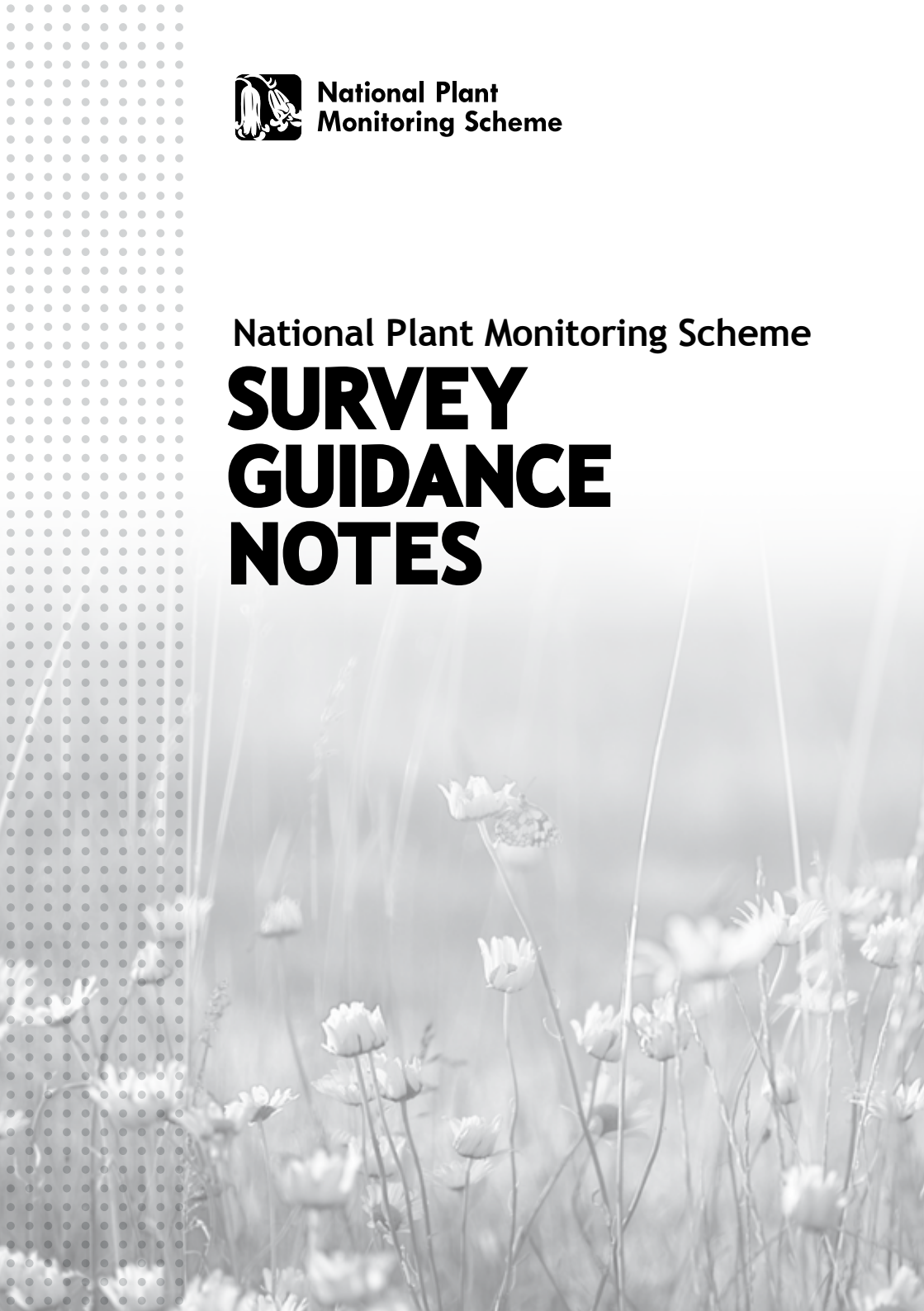




National Plant
Monitoring Scheme

National Plant Monitoring Scheme

SURVEY GUIDANCE NOTES



Support and advice

We value your time and effort and a dedicated team is able to support you with your survey. Keep up to date with workshops and training days by visiting www.npms.org.uk.

If you have questions about any aspect of this survey methodology or would simply like some more advice then please email support@npms.org.uk or phone (01722) 342730 (mobile) 07711 922098.

A separate document covering many FAQs is also available on the NPMS website, under the 'Resources' section.

Where data cannot be entered online, survey forms should be sent to:

NPMS Volunteer Coordinator
Plantlife
Brewery House
36 Milford Street
Salisbury
Wiltshire
SP1 2AP

You can also see updates, news and join in the conversation by following us on:



Twitter - @theNPMS



Facebook - National Plant Monitoring Scheme

You are also invited to join a closed Facebook group of registered NPMS volunteers: **NPMS Support**. This is a friendly point of contact between volunteers and a space for sharing survey experiences.



National Plant Monitoring Scheme

SURVEY GUIDANCE NOTES

Index

1.0 Background information.....	1
2.0 Carrying out the survey	8
3.0 How to record in your plots	19
4.0 Survey forms	24
5.0 Access rights and responsibilities	25
6.0 Health and safety	26
Appendix 1: Habitat types and descriptions.....	27

Background information

Thank you for volunteering to take part in the National Plant Monitoring Scheme (NPMS). This scheme is an exciting survey that focuses on plant recording in specific habitats (NPMS habitats) and provides statistically robust data that will enable us to:

- **learn more about where our wild plants are growing and how they are changing**
- **measure the condition of the habitats in which our wild plants grow**
- **use plants as ‘indicators’ to provide evidence to UK and national governments about the state of the natural environment**

In addition we will provide you with annual feedback on the survey results.

The scheme is being run by a partnership of the Botanical Society of Britain and Ireland (BSBI), Centre for Ecology and Hydrology (CEH), Joint Nature Conservation Committee (JNCC) and Plantlife. It is also supported by National Museums Northern Ireland, and the Northern Irish Department of Agriculture, Environment and Rural Affairs (DAERA). CEH acknowledges the support of the UK Natural Environment Research Council award number NE/R016429/1 as part of the UK-SCAPE programme delivering National Capability.

1.1

How does the survey work?

The survey has been designed to monitor the abundance of sets of species within fixed plots (square or linear plots) in 28 fine NPMS habitats, which can be combined into 11 broad NPMS categories, see below. The habitats are described on page 27 (Appendix 1). For any one of the 28 NPMS habitats there are up to 30 species to record depending on the level at which you are participating (see page 8). Those who wish to may record all species in their plots, whether flowering or not.

The species have been selected because they are associated with a particular habitat, either as positive or negative indicators, which enables the quality of a habitat to be monitored over time. The way that the kilometre squares and plots are selected means that the information you collect will be statistically robust for detecting change in plant communities across the UK. Species lists can be found in the NPMS Species Lists booklet.

Broad categories and fine habitats

There are 28 fine NPMS habitats which can be combined into 11 broad NPMS categories. Where possible we would like you to identify the fine habitat you are in and refer to the appropriate species list. However, we know that some habitats may be harder to classify than others, and in this instance we have provided species lists for broad categories. So, for example, if you cannot decide whether you are in neutral damp grassland or pasture and meadow (both fine scale habitats in the broad category lowland grassland) you should use the lowland grassland species list in order to complete the survey. Both broad and fine habitat species lists are provided within the NPMS Species Lists booklet. Surveyors recording all species at the inventory level do not need to refer to the NPMS species lists, but do still need to report the habitat in which they are recording. Habitats that are not included in the scheme can also be recorded (see page 9).

What do I have to do?

1 Set-up and survey plots in NPMS habitats

- ✓ We encourage you to survey a minimum of 5 plots within the kilometre square that you have been allocated, although any number of plot surveys can be submitted.
- ✓ Surveys should preferentially be carried out in the NPMS habitats which are described on page 27 of this guidance (see also page 9).
- ✓ We recommend that surveyors complete 3 square plot surveys and 2 linear plot surveys per kilometre square but the number and composition is up to you and will be influenced by the nature of your kilometre square.
- ✓ Most plots will be either 5x5m or 1x25m in size.
- ✓ Where possible we would like you to locate each of your plots in a different NPMS habitat. **Individual plots should always be located in a single habitat.**
- ✓ If you can locate an accessible pond or flush in your kilometre square, then please do try to survey that.
- ✓ Remember that you will need to decide on the survey level at which you will take part (see page 8).

2 Enter findings online

Please enter your data online at www.npms.org.uk. This provides the most efficient way of ensuring that your findings contribute to annual reporting on the state of habitats as well as building up a picture of how the habitats are changing over time. If you cannot enter your data online then please post your recording forms to us at the address provided on the inside front cover of this guidance. You can also take part in the scheme and enter your data by downloading our free NPMS App, available from Google Play and the Apple Store.

1.3

When should I survey?

We are asking you to visit your plots **twice per year**, once in late spring or early summer and once in late summer. In the first year of surveying you may wish to make an initial reconnaissance visit in order to confirm where your plots are and to get to know your kilometre square.

The time taken to complete the survey will vary depending on the level of survey being undertaken, terrain and the distance between plots. We envisage that as surveyors become more experienced, and get to know their square better, it will take less time.

1.4

What am I being provided with?

- 1 A kilometre square:** In order to take part in the scheme you will have registered with us and have been allocated a kilometre square in which to do your survey.
- 2 A map:** You have been provided with a map of your square. An example map can be found on page 5. The presence of many of the NPMS habitats may be shown by coloured shading on your map and this is intended to support you in making decisions about where to survey. Please note:
 - NPMS habitats may also be present in unshaded areas on your map
 - the habitat type indicated by the shading may not be what you encounter on the ground due to changes since information was captured or inaccuracies in the mapped data
 - some NPMS habitats, especially linear ones such as arable field margins, hedgerows, rivers etc., will not be indicated by shading

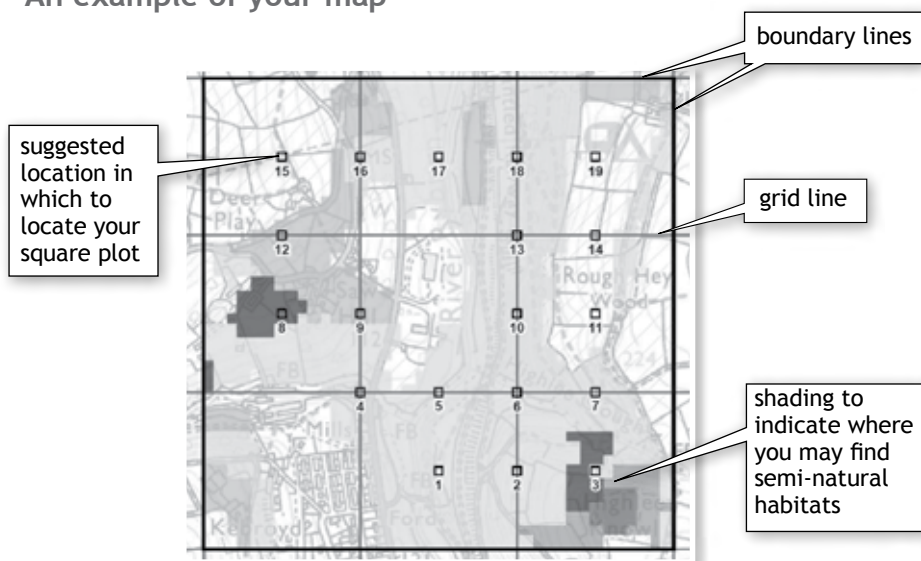
The map also shows gridlines to help you select linear plots (see below) and up to 25 pre-selected plot locations. **These pre-selected plot locations indicate areas within which we recommend you carry out your square plot surveys but only if these locations coincide with NPMS habitats.**

Remember, we are asking you to aim to complete 3 square plot surveys and 2 linear plot surveys, but this is flexible.

- 3 A species guide:** This has photos, illustrations, descriptions, and NPMS habitat information for all of the indicator species that we are asking you to record.
- 4 An NPMS Species List:** This provides the species lists for both broad NPMS categories and fine NPMS habitats and should be used when you are surveying at the Wildflower and Indicator levels (see page 8).
- 5 Monitoring forms:** We will be sending out monitoring forms each year to enable you to record your findings. Extra copies of these forms can be downloaded from the NPMS website.

Additional information, frequently asked questions and other sources of support can also be found on the NPMS website.

An example of your map



1.5

What if the species on the list are not present in my plot?

The number of species you are able to record for each plot you visit will depend on the quality of the habitat and on the level at which you are recording (see page 8). Each NPMS habitat we are interested in has a species list assigned to it and these can be found in the NPMS Species Lists booklet. The species have been carefully selected based on a number of factors including ease of identification, usefulness as indicators of habitat quality (both positive and negative) and distribution.

Recording fewer species does not mean that your observations are not of value. Where you are unable to record many species it may be that the particular habitat you are recording is in decline for some reason. This is very important information.

There is a facility online to record any additional species of interest you find within your kilometre square (the “Extra species entry” option), in case you find that our target species are largely absent from your plots; this extra information is still of use for broader-scale analyses of change in our wild plants, but will not directly feed into measures of habitat quality or species trends created from the NPMS survey results.

1.6

What if my habitat changes over time?

When you first visit your plot you should decide which NPMS habitat it should be assigned to using the guidance on page 27. However, over time your plots may change between habitat type due to management or other environmental changes. For example, dry heathland may change to dry acid grassland due to increased grazing or nitrogen deposition. This is not a problem for your survey and is the sort of change we would like NPMS to detect. Simply use the appropriate species list at the time of the survey.

If at some point your plot turns into a habitat that is not covered by the scheme, for example pasture and meadow to scrub, please continue surveying with the NPMS species list for as many years as possible. This will provide the most information on habitat change. It is important that these plots continue to be monitored in case they re-enter the scheme at some future point.

You do not need to select new plots if you find that, in one year, some of your plots fall outside of the NPMS habitat definitions, or have none of the NPMS species. “Empty” plots or “null returns” can be submitted through the NPMS website.

1.7

What if I am surveying multiple 1km squares?

If you have asked to be allocated multiple squares, but cannot survey each square annually, then you can visit your squares in alternate years using the intervals shown below. This means in any one year you are surveying at least one of your squares. No surveyor will be allocated more than 5 squares. This means the maximum interval between visits to any single square is five years.

Number of squares allocated	Minimum frequency of survey
1	Every year
2	Every other year
3	Every third year
4	Every fourth year
5	Every fifth year

1.8

What if I cannot do the survey in a particular year or wish to withdraw?

The aim of this survey is to build up data over many years to allow us to accurately assess how and why plant communities are changing. If you wish to withdraw from the scheme then please let us know. We will make your plots available to others to survey.

2.0

Carrying out your survey

2.1

What are the survey levels?

The NPMS has three survey levels, described below. The level you choose to survey at will depend on your confidence, knowledge and the time you have available. We encourage you to progress through the levels, for example starting at Wildflower Level and then moving to Indicator Level.

Survey levels

Wildflower Level - surveying at this level involves recording fewer species. All the species you record are a subset of the species at Indicator Level.

Indicator Level - as for the Wildflower Level but using all the species chosen to indicate different aspects of their habitats. This level gives us very robust data so where possible we would encourage you to aim to participate at this level.

Inventory Level - carrying out the survey at Indicator Level but in addition recording all other species of vascular plant present within each plot.

Note that at all levels species should be recorded whether they are flowering or not.

2.2

How do I select my square plots?

All square plots will measure 5x5m in size with the exception of woodlands which will be 10x10m. Every effort should be made to situate your square plots within the pre-selected plot locations shown on the map you have been given. Plots should only ever cover a single NPMS habitat (see page 12 for further details about setting up plots in the field).

The colour shading on the map indicates where you may find some of the NPMS habitats (but see page 4). Where possible, choose 3 square plots in different fine NPMS habitats, listed on page 27. In the first year it may be that you visit plots that turn out not to contain NPMS habitats. If you wish to you can record up to 3 of these plots as 'not in scheme'. You can enter these plots along with your surveyed NPMS habitat plots when you enter your data online. These plots can be checked in future years to see whether they have become NPMS habitats (e.g. neutral pastures and meadow restored from arable).

There may be reasons why you cannot survey the pre-selected plots. These include:

- **Safety factors;** for example, the plot might be too close to a cliff edge, water course or area of land under temporary closure because of shooting, military activities etc. On no account should you compromise your safety. For more information see page 26.
- **Accessibility;** for example, land which may have access restrictions. Please read our guidance on page 25.
- **Access restrictions due to plant diseases such as *Phytophthora*;** please pay attention to any access restrictions resulting from biosecurity and follow the information provided on any site you may visit.
- **The location of the pre-selected plots does not correspond to any of the NPMS habitat types;** the pre-selected plot locations lie on a systematic grid, and have not been specifically selected because of knowledge of their habitat type. It is possible that none of the pre-selected plot locations lie in relevant habitats; however, the selection of one kilometre squares has been purposely biased towards those with NPMS habitats.

If there are not 3 accessible pre-selected square plot locations within NPMS habitat types, you can:

- include a square plot centred on a flush, if present in your square - flushes are often in small patches and we are encouraging plots within these
- locate new square plots elsewhere within your square following Protocol A below
- increase the number of linear plots you do

For any plot you survey it is important that you are able to identify key features that will enable you to relocate those plots in subsequent years (see Table 2, page 15).

Protocol A - Self-selecting plots

Where possible, self-selected plots should be located in representative areas of an NPMS habitat type (i.e. in areas which match the ‘average’). Please resist the temptation to place plots in the most species-rich areas and avoid areas that have clearly been affected by disturbance (unless that is typical of the habitat type as a whole such as on arable land). Plots can be placed anywhere within the habitat type, including close to the edge, if that is typical or representative. When self-selecting square plots, it may be useful to consider the shaded areas on the map, as these are generally more likely to contain habitats of interest.

Plots should be located so that they can easily be relocated in the future. You may wish to mark your self-selected plots on your map for future reference.

Remember that the suggested locations for square plots given on the map for your 1km square should be investigated before falling back on this protocol. This is to minimise biases in the NPMS dataset.

2.3

How do I select linear plots?

Most linear plots will be 1x25m in size and be used to sample the following habitat types: arable field margins, standing and running waters, rock outcrops, screes, road verges and hedgerows (see Table 3, page 16). Use your map, aerial images* of your square or knowledge on the ground to decide where linear plots could be placed by finding where these linear features intersect one of the internal or boundary gridlines that are marked on the map you have been provided with. Your linear plot should start at the point where the feature intersects the gridline, and can be laid out in any direction along the feature from there. Aerial photographs are particularly useful to help you identify linear plots that may not be shown on an OS map, for example hedgerows and arable field margins.

Note that plots in ponds and some plots in flushes are also linear, but that these plots should be included even when they do not intersect with the gridlines.

When you visit your square try to select a minimum of 2 linear plots that are accessible to survey. If you cannot locate and survey 2 linear plots using the method described above then use Protocol A to self-select linear plots.

***aerial images can be viewed online. Try sites such as:**

Google maps: <https://www.google.co.uk/maps>

Get a map: www.getamap.ordnancesurveyleisure.co.uk

UK Grid Reference Finder: www.gridreferencefinder.com/

Grab a Grid Reference: www.bnhs.co.uk/focuson/grabagridref/html/index.htm

2.4

How do I select ponds and flushes?

Ponds and flushes may only be rarely encountered; ponds should be surveyed as linear plots, whilst flushes may be square or linear plots. If you only have one pond or flush in your square then survey that feature providing it is accessible. These plots can count towards your minimum, even though they are selected differently. If you have more than one pond or flush then you should identify which are accessible and survey the one closest to the centre of your square, this helps to add a random element to their selection.

2.5

How do I lay out plots?

Finding the precise location of the plots marked on your map may be tricky, but try to locate your plot as accurately as possible. A list of equipment that may be useful in helping you lay out plots is provided in Table 1.

- **Make sketches and take photos** to ensure that you will be able to relocate your plot in subsequent years and mark the plots you survey on your map. When you submit your data online you will be asked to indicate where your plots were located. It is important to identify any obvious features to aid relocation (see Table 2, page 15).
- You will then need to mark or pace out your plot.

Table 1: Useful equipment for surveyors

- **tape measure or a length of cord marked at 5m intervals sufficient to mark out 25m or 40m depending on plot dimension**
- **four corner markers such as tent pegs or bamboo canes. Markers should not be left in the ground**
- **NPMS recording forms, identification guide and guidance notes**
- **a clipboard or something you can use to create a right angle**
- **GPS if you have one and/or a compass**
- **camera**
- **pencils**

Square plots

- Locate your plot and decide how you want to position it.
- Plots will be 5x5m with the exception of woodlands which will be 10x10m.
- Using markers and cord or your tape measure, align the first side of the square in a way that will aid relocation if possible, for example parallel to a wall, fenceline, or other permanent feature.
- Use a clipboard or straight edge to create a right angle and lay out the next side of the plot. Fix the marker. Work round until you have completed a square plot.
- If you have a GPS then use it to establish the position of the square using the south west corner (or nearest equivalent). Please note which corner has been used on the sketch map. This information will be requested when you enter your data online.
- Take a photograph of your plot that shows its position in relation to its surroundings. This can be uploaded onto the NPMS website. This will help relocate your plot in subsequent years. Note the direction you are facing when you take the photo. You can upload multiple images of your plot for reference.
- Make a sketch of your plot in the space provided on your survey form. Photos or scans of these sketches can be uploaded to the “View squares and create plots” part of the NPMS website. These sketches will be invaluable when 1km squares are passed between surveyors.

Linear plots

- When you visit your kilometre square try to select two linear plots that are accessible to survey using the method described above.
- Linear plots will measure 1x25m, but they do not need to be rectangular as your plot may follow a winding feature (e.g. the edge of a water body or sides of an arable field).
- Use two markers to establish the 1m width, and then using your cord or tape measure out 25m in length. For this shape of plot it is useful to note where to measure your 1m width in different habitats (see Table 3, page 16).

- If you have GPS you can use it to record the position of both ends of the plot and take photographs from outside the plot showing its surroundings. This can be uploaded onto the NPMS website. This will help relocate your plot in future years and help to show changes over time. Note the direction you are facing when you take the photo.
- Make a sketch of the plot in the space provided on your survey form.

Please note that in some instances the linear habitat in which you are surveying may be shorter than the length of your linear plot. In such instances, record the complete length of the linear feature and note the length surveyed.

Vertical plots for rock outcrops, cliff bases or screens

For recording rock outcrops, the long dimension of the linear plot should be placed along the base of the rock outcrop and the shorter dimension should extend vertically up the face of the outcrop to around head height. The dimensions of this **vertical plot** are therefore 2m high x 12.5m long. Most species should be identifiable at this distance thereby avoiding the need for you to take unnecessary risks.

The same dimensions should be used on screens (12.5x2m) and should be recorded as a single traverse, noting species present within 1m either side of the route taken. In order to minimise the risk of injury, scree plots should follow contours (i.e. at the same altitude). **Do not take unnecessary risks and, if in doubt of your personal safety, do not attempt to record plots.**

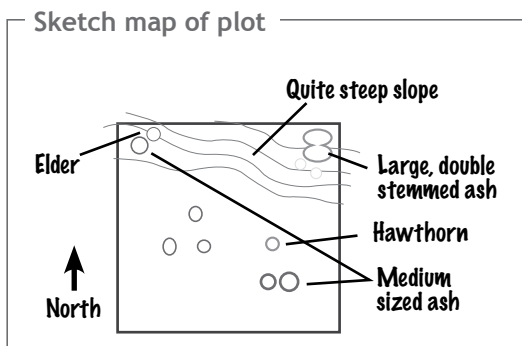
Further information about surveying in different habitats is provided in Table 3, page 16.

Table 2: Re-finding your plot in the future

The NPMS has been designed to monitor change over many years. It is therefore important that the location of plots remains fixed and you (or another surveyor should you choose to withdraw from the scheme) are able to relocate your plots.

Sketch map

Please provide a field sketch of the plot showing the orientation of the plot and key features. This can be scanned or photographed and uploaded onto the online data entry system for NPMS. An example field sketch is shown right. It is essential to include a compass direction



and mark down any permanent features that will help to relocate the plot e.g. gateposts. It is also important to mark the position and direction of any photographs taken. This information will be extremely useful in subsequent years.

Photos

Photos can also be taken to show your plot. These can be uploaded onto the online data entry system. Your internet browser should automatically resize these but in the unlikely instance that this is not the case, please ensure your photos are less than 5Mb. It would be helpful to record the direction you are facing with a compass when you take the photo and additional notes to support your photos are of always of use.

GPS

OS grid coordinates derived from a hand-held GPS can be used to increase the accuracy of your plot locations. Note GPS is more accurate in open habitats than in wooded habitats and should be seen as a support tool and should not replace field notes and sketches.

Table 3: Further information about plots in different habitats

Arable field margins

Linear plots on arable field margins should extend 1m from the edge of the cultivated area into the crop. These should only be placed on the margins of annually cultivated fields that are being cropped for cereals, maize, oil seed rape or root vegetables.

Fields that are being used to produce perennial crops such as fruit or biofuel crops (e.g. willow, elephant-grass, etc.) should be ignored. Where fields with annually cultivated crops have permanent strips sown with grasses, pollinator/wildflower mixtures, or game cover, plots should be placed on the boundary between the permanent strip and the crop and extend 1m into the cultivated area, see Diagram 1, page 18.

If there has been a change to your arable field margin - for example in Year 1 the field was cultivated and so you could record there and in Year 2 it wasn't cultivated (e.g. setaside, stubble, etc.) you would continue to record the field margin.

Road verges

Road verges are not a habitat targeted by NPMS in their own right, but they frequently contain NPMS habitats such as grassland, heath, etc. When road verges are found to correspond with target habitats, 25x1m linear plots should be recorded using the relevant species list.

Hedgerows

If possible, record a 25x1m plot that is 1m out from the centre of the hedge, using the NPMS species list for the ground flora and shrub species present. If the width of the hedge does not allow this (for example if shrub component is much wider) then just record the species present in the outer 1m. If you are doing the Inventory survey then record species rooted within the linear plot area.

Table 3: Continued

Standing waters, rivers, streams, ponds and canals

These habitat plots should be recorded without entering the water. Only survey from the bank. For running and standing freshwater, plots should extend for 25m along the bank and 1m out from the maximum edge of the normal water level, see Diagram 2, page 18. The plots will therefore encompass plants rooted on the margins of the water body (emergents) as well as plants growing in open water (aquatics) either underwater (submerged aquatics) or on the water surface (floating aquatics).

Due to fluctuations in water level, the position of water body plots can be difficult to define. Therefore water-bodies where water levels fluctuate markedly (e.g. turloughs, dew ponds, winterbournes, etc.) or where levels are artificially maintained should be ignored. For more permanent water-bodies, plots should be carefully selected and recorded to ensure that they can be relocated accurately.

Springs and flushes

Springs and flushes often occur in irregularly shaped habitat patches that are often too small for a 5x5m plot. When sampling small flushes and springs therefore, you should use a square or linear plot such that the dimensions maximise the proportion of the plot made up by the NPMS habitat, with the general rule that 50% or more should comprise the NPMS habitat. Where other habitats occur within the plot, recording of target species should only be undertaken within the flush or spring area using the appropriate species list.

Diagram 1: Laying out a plot in an arable margin

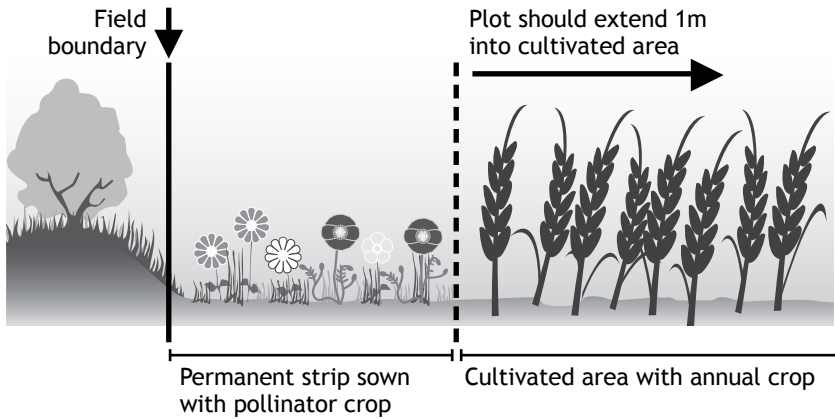
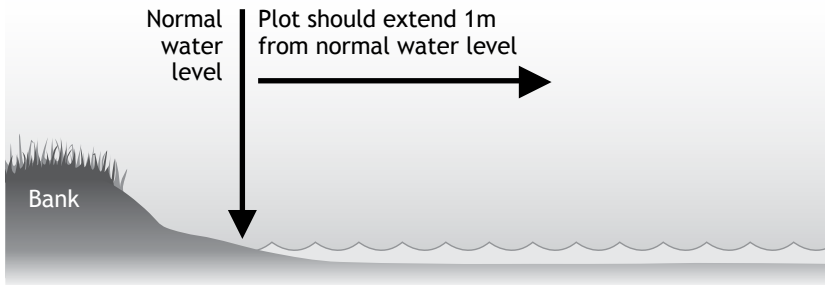


Diagram 2: Laying out a plot along standing waters, rivers, streams, ponds and canals



How to record in your plots

The method for recording is the same for all plots. **You will need to use the relevant species list provided for each habitat you survey, except if you are recording at Inventory Level, when all plants should be recorded.**

1 Record the species present

Search your plot to see what species are present. Square plots are searched most efficiently by recording intensively in one corner and then gradually moving out through the rest of your square until you have covered the whole area, adding new species as you go. Be careful not to trample or flatten areas that are yet to be surveyed. Linear plots are easier but the technique is the same; intensively search the first few metres, and then move along, picking up any additional species as you go.

2 Assess the abundance (% cover) of each species

This simply means estimating the amount of ground each species takes up as a percentage of the total area of the plot. As you are searching your plot you will get a good idea of how much of each species there is in it. When doing this it is easy to just focus on the flowers. Don't forget the leaves!

Remember also that plants often grow in layers and can therefore cover other plants growing beneath them, so always look beneath larger plants. It is important to assess each species separately. It helps to remember that 1% of a 5x5m or 25x1m plot is 50cm x 50cm and 1x1m in a 10x10m plot. You may want to create a square of this size to take out with you or simply measure and put in a marker.

% cover is estimated using the Domin scale on the inside back cover of this booklet. % cover can be thought of as the shadow cast by a plant species if a light source was shone down on (i.e. perpendicular to) the ground. This means that plants that overlap the plot should have their cover recorded even if they are not rooted within it. Inventory Level recorders will therefore record shrubs and trees overlapping their plot.

3 Assess the percentage of bare ground; litter cover; bare rock/gravel and moss/lichen

For each of the following assess the percentage cover and give a score using the Domin scale as outlined above.

- bare ground
- litter (e.g. dead stems, leaves, twigs and dead wood)
- bare rock/gravel
- moss/lichen

4 Recording additional information

We recommend that you record the following extra information for each plot as this will help greatly in interpreting the results. Please note that some of this information is optional.

Vegetation height - record the presence of vegetation within the following height classes: <10cm, 11-30cm, 31-100cm, 101-300cm and >300cm. Each class should be scored on a scale of 1 to 3 with 1 representing less than one-third of the area; 2 representing one-third to two-thirds; 3 representing more than two-thirds of the area of the plot. In woodlands this measure should only be applied to the ground and shrub layer and should exclude the woodland canopy.

Woodedness (density of trees and shrubs) - record the woodedness using the categories below.

- dense tree and/or shrub cover
- scattered trees and/or shrubs
- hedgerow
- no trees or shrubs

4 Take a plot photo

Take a photo of your plot from the same position each survey to help record any changes in your plot over time. These can be uploaded with your survey data each year at the point of data entry, and will form a valuable record of environmental change.

The following information is optional to record but where possible we would encourage you to report on the attributes below:

Aspect (optional) - if the plot occurs on a slope, record the main direction that the slope is facing from the following categories: N, NE, E, SE, S, SW, W, and NW.

Slope (optional) - record the main slope angle: flat ($0-5^\circ$), moderate ($6-30^\circ$), or steep ($>30^\circ$).

Management (optional) - note any obvious signs of management at the time of survey, such as the presence of livestock, ditch clearance, hedge-cutting, coppicing, etc., with an indication of the intensity (see Table 4 for examples). For arable land this could include evidence of weed or pest control. Field observations should be supplemented with more details where known (e.g. history of grazing on the site).

Grazing (optional) - the intensity of grazing including both livestock and wild animals (see Table 5 on page 23 for explanation of categories).

Table 4: Different management descriptions

- **Arable cropping**
- **Burning**
- **Coppicing**
- **Cutting / mowing**
- **Ditch-clearance**
- **Fenced to exclude grazing**
- **Fertilised to improve soil fertility**
- **Grazing - livestock**
- **Grazing - rabbits/deer**
- **Hedge-laying**
- **Herbicides to control weeds**
- **Path, track or road construction / maintenance**
- **Quarrying**
- **Scrub clearance / tree felling, silage production (i.e. black bags)**
- **Tree planting**
- **Water regime regulation (flood management in areas deliberately flooded e.g. sluice gates, weirs)**

Table 5: Level of grazing

Level	Grazing
High	Vegetation very short and clearly maintained by high levels of livestock and/or deer/rabbit grazing; there are often visible signs of their presence such as dung, animal fibres, tracks, warrens/dens and infrastructure associated with livestock (e.g. water-troughs, supplementary feeders, etc.). Trees and shrubs are likely to be rare on such sites or if present with clear signs of grazing (e.g. loss of lower leaves, bark, etc.). Many herbs and grasses lacking flowering stems.
Moderate	Evidence of grazing animals being present (tracks and signs) but the vegetation height is often variable with a mixture of taller and shorter areas; shrubs and trees more likely to be present and showing little evidence of grazing damage. Most herbs and grasses with flowering stems.
Low	No or very little evidence of grazing animals being present; the vegetation height usually being uniformly tall and often with an abundance of shrubs or trees. No evidence of flowering stems having been removed though many species unable to flower due to height of the vegetation.

Survey forms

Please make sure that you use the survey form provided to enter your data. This helps with administration.

Survey forms are included with these notes and more can be downloaded from the NPMS website. It is useful to have the forms on a clipboard when you are completing a survey, and it is often best to use a pencil to fill them in as pencil writes better than ink in the damp.

You will need one form per plot, but that form can be used for both visits if you are able to survey twice. Please make sure that you fill in as much as you can, particularly plot location, as that is very important, either as a grid reference or GPS co-ordinates.

What do I do with the data collected?

We would encourage you to enter your data online at www.npms.org.uk. You will need to register with the site. If you have previously registered with the site then you will not need to do so again.

Please contact us at:

support@npms.org.uk if you are having any difficulties.

If you cannot enter data online then please post forms to:

**NPMS Volunteer Coordinator
Plantlife
Brewery House
36 Milford Street
Salisbury
Wiltshire
SP1 2AP**

Access rights and responsibilities

We ask that wherever you are surveying you:

- **Respect the countryside and other countryside users.**
- **Respect other people and their interests.**
- **Protect and care for the natural environment.**
- **Take responsibility for your own actions.**
- **Enjoy the outdoors.**

Access rights and responsibilities are different in different countries of the UK. For England and Wales the Countryside Code gives advice on access. In Scotland the Scottish Outdoor Access Code defines rights and responsibilities, and in Northern Ireland guidance is given by the Northern Ireland Environment Agency.

Please be aware of your rights and responsibilities when conducting wild plant surveys. In England and Wales only enter private land with permission to do so - otherwise keep to public footpaths, rights of way and Open Access Land. Similar provision applies to Northern Ireland, although there is no defined Access Land as is the case in England and Wales.

In Scotland, everyone has the right to be on most land and inland water providing they act responsibly. For undertaking surveys of plots, the Scottish Outdoor Access Code advises surveyors to contact the land manager(s) if possible and follow advice on what precautions you might need to take at the time of your survey.

Unfortunately we are not able to arrange access for you, although we do provide a letter that you can use as a means of 'introduction' to landowners; this can be downloaded from the Resources page of the NPMS website.

Moving around in the countryside can lead to the accidental introduction and spread of harmful organisms such as pests, pathogens or invasive species. By taking simple biosecurity measures, you can help reduce this risk. Pests and pathogens can be transported in soil or plant debris on footwear, equipment and wheels of vehicles. Therefore, between visits (particularly in wooded areas, heathland or where livestock are present), remember to check and clean off mud and debris from footwear and equipment.

6.0

Health and safety

You are responsible for your own health and safety. We want you to enjoy taking part in the survey and for every visit to be trouble free, so we ask that you do not take any unnecessary risks.

- **Always check the forecast the day beforehand and be prepared to abandon fieldwork in the event of bad weather.**
- It is quite possible that the map you will receive will have plots shown on it that are inaccessible because they may be unsafe to survey. Habitats that are likely to pose potential dangers include those on steep slopes, cliff-tops, rock outcrops and screes as well as habitats in tidal areas. Extreme care should be taken when surveying any of these habitats. **If an area does not look safe then please do not survey there. If you have any concerns about accessing a plot then you should not approach it.**

We ask that you take all necessary precautions during your survey. If possible work with a 'buddy' or let someone know where you are planning to go and when you are likely to be back. This is essential when visiting remote areas. We recommend you carry a mobile phone, although remember that these are unlikely to work in remote regions. Always carry a first-aid kit and wear appropriate clothing, particularly footwear and protection from sun, wind and rain.

Appendix 1: Habitat types

There are 28 fine NPMS habitats which can be combined into 11 broad NPMS categories (Table 6). If you know which fine habitat you are in, then you should use this fine habitat classification to select the relevant species list. If you cannot decide on an appropriate fine scale habitat, then choose the broad category and its associated species list. Broad categories will have longer species lists. These habitat descriptions have been based in part on the excellent guide to British habitats (Lake, S. et al. 2015. *Britain's Habitats: A Guide to the Wildlife Habitats of Britain and Ireland*. Wildguides & Princeton University Press). A correspondence table showing how these NPMS habitats relate to those published in *Britain's Habitats* is available under 'Resources' on the NPMS website (www.npms.org.uk).

Table 6: Semi-natural habitats included in the NPMS and the number of species included in the Wildflower and Indicator Levels.

Broad category	Fine-scale habitat(s) included within Broad category	Wildflower species	Indicator species
1. Broadleaved woodland	Dry deciduous woodland Wet woodland Hedgerows of native species	49	75
2. Native Pinewood & juniper scrub	Conifer woods and juniper scrub	21	29
3. Arable field margins	Arable field margins	15	30

4. Lowland grassland	Dry acid grassland Dry calcareous grassland Neutral damp grassland Neutral pastures and meadows	62	98
5. Upland grassland	Montane acid grassland Montane calcareous grassland	31	53
6. Heathland	Dry heathland Dry montane heathland	28	48
7. Bog & wet heath	Blanket bog Raised bog Wet heath	31	53
8. Marsh & fen	Acid fens, flushes, mires and springs Base-rich fens, flushes, mires and springs	33	51
9. Freshwater	Nutrient-poor lakes and ponds Nutrient-rich lakes and ponds Rivers and streams	29	56
10. Rock outcrops, cliffs & screes	Inland rocks and scree Montane rocks and scree	34	52
11. Coast	Coastal saltmarsh Coastal sand-dunes Machair Coastal vegetated shingle Maritime cliff-tops and slopes	65	110

1. Broadleaved woodland comprising: Dry deciduous woodland, Hedgerows of native species and Wet woodland

This broad category includes all deciduous woodlands including newly planted woods (e.g. farm woodlands), and hedgerows made up of native species but excludes ornamental woods (e.g. within the grounds of country houses) and commercial plantations of native species.

Dry deciduous woodland includes a wide range of natural or semi-natural woodlands that have developed on free-draining acidic to calcareous substrates (e.g. Oak, Ash, Birch, Yew and Beech woodland, wooded limestone pavement, Atlantic Oak/Hazel wood). The canopies are usually over 5m tall and made up of one or more of the following native broad-leaved deciduous species: Ash, Beech, Downy/Silver Birch, Field Maple, Pedunculate/Sessile Oak, Rowan, and Wych Elm and more locally Aspen, Large/Small-leaved Lime, Wild-service Tree, whitebeams and Yew. In many deciduous woods non-native species such as Sycamore, Hornbeams and Sweet Chestnut have colonised or been planted. The shrub layer will usually comprise one or more of the following species: Blackthorn, Dogwood, Hawthorn (including Midland), Hazel, Goat/Grey Willow, Holly, Wild/Bird Cherry, Way-faring Tree and Spindle. Native conifers (Juniper, Scots Pine) occasionally occur naturally in some deciduous woods (e.g. Birch woodland, Ash woodland on limestone pavement/chalk).



Dry deciduous woodland with a ground flora dominated by Bluebells (*Hyacinthoides non-scripta*), Hackfall Wood, North Yorkshire

Wet woodland includes willow and Alder carr, floodplain, hill and plateau Alder woods and bog woodland. Wet woodland is usually dominated by willows, especially Goat/Grey Willow, Downy Birch, Alder and Pedunculate/Sessile Oak. It is associated with wetland habitats such as bogs, fens, rivers, streams and lakes, wherever the soil is permanently wet. It frequently occurs as a mosaic with drier woodland types and open habitats, for example along the frequently inundated or low-lying margins of rivers or streams.



Wet Woodland, Cow Myers SSSI, North Yorkshire

©Kevin Walker

Hedgerows of native species include all hedgerows made up of one or more native trees or shrubs such as Ash, Blackthorn, Elder, Field Maple, Hawthorn, Hazel, Holly, Pedunculate/Sessile Oak and Spindle. Ancient hedgerows are often the most species-rich with more than 5 native tree/shrub species per 25m length but hedgerows with fewer species, including those that have been recently planted with native species should also be recorded.



A thick hedgerow adjacent to weedy arable margin

©Sophie Lake & Durwyn Liley

2. Native pinewood and juniper scrub comprising: Conifer woods and juniper scrub

Conifer woods and juniper scrub - Juniper, Scots Pine and Yew are the only native conifer trees found in the UK. Yew woodland (a very rare habitat in UK) is confined to steep slopes with calcareous soils (chalk and limestone) and is included under dry deciduous woodland. Woodland of native Scots Pine (Caledonian Forest) are confined to the Highlands of Scotland on acid soils in valley bottoms to around 650m. Here Scots Pine forms an open canopy with birches and Rowan and shrubby understorey of Bell Heather, Bilberry (Blaeberry), Heather and Juniper. It is also home to a number of rarities including Creeping Lady's-tresses, One-flowered Wintergreen and Twinflower. Please avoid plantations of Scots Pine unless you are north of the central belt of Scotland. Juniper scrub occurs in a wide range of habitats on both acid and calcareous soils from sea-level to 900m throughout the UK. Stands in the upland regions of Scotland, northern England, Wales and within the Mourne Mountains in Northern Ireland should be included under this category. Lowlands stands of Juniper on calcareous soils or on sand dunes / shingle should be recorded under the relevant NPMS category (e.g. Dry calcareous grassland).



Mature Caledonian forest, Abernethy, Scotland

3. Arable field margins

Arable field margins are the areas alongside and following the edge of land cultivated to grow a variety of short-term crops such as cereals, oil-seed rape, beans, and root crops such as potatoes, as well as stubbles, annually cultivated but uncropped margins and cultivated fallow fields (ploughed fields with no crop). Fields that are being used to produce perennial crops of fruit or biofuel crops (e.g. strawberries, grapes, willow, elephant-grass, etc.) should not be included when initially setting up plots. Where fields with annually cultivated crops have permanent strips sown with grasses or pollinator/wildflower mixtures, or game cover, plots should be placed on the boundary between the permanent strip and the crop and extend 1m into the cultivated area.



An unsprayed arable margin (conservation headland) of winter wheat with poppies, mayweeds and crucifers

©Kevin Walker

4. Lowland grassland comprising: Dry acid grassland, Dry calcareous grassland, Neutral damp grassland and Neutral pastures and meadows

Dry acid grassland is found on acid, free-draining soils derived from sandstone and igneous rocks and on sands and gravels (including coastal shingle) throughout the lowlands (<300m) of the UK. These include inland ‘sand dune’ communities (e.g. Murlough Dunes, Co. Down; Wangford Warren, East Anglia). Dry acid grasslands tend to have a short, open sward dominated by fine-leaved grasses, lichens, mosses and a range of annuals such as Early Hair-grass and Common Stork’s-bill. Typical grasses include Bristle Bent, Common Bent, Sheep’s Fescue and Wavy Hair-grass. Similar acid grasslands on deeper soils with a more continuous cover of grasses and mosses occur throughout the uplands of the UK, although they descend to much lower levels in cooler and wetter climates, such as the North and West of Scotland; these grasslands are placed in Montane Acid Grassland. Dry acid grassland often occurs as a mosaic with heathland and so where the cover of Heather or Bilberry (Blaeberry) exceeds 25% the area should be regarded as dry heathland and the appropriate species list used.



Dry acid grassland at East Wretham Heath, Norfolk, with the characteristic red sheen of Sheep’s Sorrel (*Rumex acetosella*) in flower

©Sophie Lake & Durwyn Liley

Dry calcareous grassland is found on calcareous soils overlying chalk and limestone in lowland and submontane regions including on carboniferous limestones up to c.500m altitude in northern England and Scotland. In East Anglia, dry calcareous grassland also occurs very locally on ‘patterned’ ground amongst more acidic grass-heaths where freeze-thaw action has brought chalk flints to the surface. The very dry, thin soil is low in nutrients and home to a dazzling array of wild flowers and grasses, especially when heavily grazed by livestock and rabbits. On chalk in England these grasslands are often referred to as ‘downland’, with characteristic species such as Horseshoe Vetch and Common Rock-rose. On Carboniferous Limestone in hilly areas of northern England as well as in Scotland and Wales, Dry calcareous grassland is characterised by the abundance of Blue Moor-grass and Limestone Bedstraw. Dry calcareous grassland in Northern Ireland typically occurs on thin soils overlying limestone or basalt exposures. Roadside verges in areas of chalk and limestone may also support Dry calcareous grassland. ‘Calaminarian grasslands’ that have developed on soils contaminated by heavy-metals during mining activities should be included in this category as well as Juniper scrub on calcareous soils. Occasional scrub can be present in a plot.



©Kevin Walker

Dry calcareous grassland with abundant Moon Carrot (*Sesil libanotis*) and Greater Knapweed (*Centaurea scabiosa*) on chalk at Knocking Hoe National Nature Reserve, Bedfordshire

Neutral damp grassland includes a range of ‘marshy’ grasslands and rush pastures that occur throughout the lowland and submontane regions of the UK on moderately fertile or nutrient-poor clay and loam soils. These are either very ‘heavy’ due to impeded drainage / high water-table or are seasonally flooded in some cases by brackish water by the coast. These grasslands are typically found on the low-lying depressions within floodplain grasslands, on the margins of fens, marshes and swamps, alongside rivers and lakes, as well as on coastal grazing marshes on land that has been reclaimed from the sea. They also include rush pastures that are most prevalent on poorly-drained hillsides in the sheep-grazed fringes of the uplands (up to around 400m). These rush pastures are a conspicuous feature of many upland landscapes and are made up of short, species-poor grassland interspersed with dense clumps of Soft, Sharp-flowered and Hard Rush. On richer soils, the characteristic vegetation is dominated by one or more of the following grasses: Creeping Bent, False Oat-grass, Red Fescue, Tufted Hair-grass and Yorkshire-fog; these often occur with Soft Rush and a range of wildflowers such as Creeping/ Meadow Buttercup, Marsh-marigold, Purple-loosestrife and Ragged-robin. Similar damp grasslands that occur on more acid mineral peats, such as fen meadows, Purple Moor-grass and rush pastures, are included under Acidic fens, flushes, mires and springs.



Neutral damp grassland with abundant rushes, buttercups and Meadow Foxtail (*Alopecurus pratensis*), Beckwith Head, Harrogate

Neutral pastures and meadows occur on damp neutral clays or loams throughout the lowlands of the UK, extending up to around 400m in upland valleys in northern England and Scotland. They are usually flooded in the winter and occur as enclosed fields managed for hay and/or livestock grazing. The largest surviving examples include flood and water meadows on the floodplains of larger rivers but they also occur in a wide variety of other locations where they have escaped agricultural improvement. These include open commons or village greens, road verges, railway embankments, clifftops and riversides where these have been suitably managed, unimproved areas of enclosed fields managed intensively for hay or silage as well as meadows and pastures with a continuity of traditional management. This is often the result of a conservation designation. The vegetation is usually species-rich with a wide variety of grasses such as Crested Dog's-tail, Red Fescue and Sweet Vernal-grass and a dazzling array of herbs including buttercups, Common Knapweed, Cowslips, Oxeye Daisy, Red Clover, Rough Hawk-bit and Yellow-rattle. In northern England these meadows (termed 'upland hay meadows') have a distinctive flora with local specialities such as Lady's-mantles, Melancholy Thistle and Wood Crane's-bill. Hay meadows are not common within the Northern Ireland landscape, however small pockets can be found in Co. Fermanagh.



Neutral pasture and meadow on the floodplain of the River Nidd, North Yorkshire (Aubert Ings SSSI), with Fritillary (*Fritillaria meleagris*)

5. Upland grassland comprising: Montane acid grassland and Montane calcareous grassland

Montane acid grassland comprise all acid grasslands on acid, free-draining substrates above c.300m extending to the higher slopes and exposed ridges and summits of mountains throughout the UK, although some descend to much lower levels in cooler and wetter climates, such as north and west of Scotland. In milder and more humid upland regions Sheep's-Fescue-Brown-Bent is by far the most widespread acid grassland type often occurring as rough pasture (with bracken) on valley sides and in some regions across large featureless tracts of open moor, where it has replaced dry heathland as a result of centuries of grazing and burning. These grasslands have a more continuous cover of grasses and mosses than lowland acid grassland with characteristic species including Common Bent, Mat-grass, Heath Rush, Sheep's-fescue, Sweet Vernal-grass and Yorkshire-fog. At higher altitudes these grasslands occur where grazing and sometimes burning has reduced the cover on sub-shrubs associated with Montane heathland. On the most exposed ridges and summits, or in sheltered depressions and corries where snow lies for longer and the growing season is shorter, Montane heath gives way to more 'tundra-like' acid grasslands communities dominated by mosses, lichens, grasses, rushes and sedges, of which Stiff Sedge (*Carex bigelowii*) is probably the most characteristic.



Montane acid grassland on a summit ridge on Rum, Inner Hebrides, Scotland

Montane calcareous grassland occurs on calcareous soils, mainly on limestones and basic metamorphic schists above 500m on mountains throughout the UK but extend down to sea-level in the north and west of Scotland (note that the distinctive grasslands dominated by Blue Moor-grass on limestones in Northern England and Scotland are included under Dry calcareous Grassland). These grasslands are amongst the most species-rich in montane regions, with a high proportion of arctic-alpine species such as Alpine Lady's-mantle, Mountain Avens and Purple Saxifrage. They typically occur around calcareous rock-outcrops, on slopes below rock faces, in snow-beds and on soils that are rich in heavy-metals (e.g. serpentine). Most related 'calaminarian grasslands' that have developed on soils contaminated by heavy metals during mining activities occur below 500m and therefore should be included under dry calcareous grassland.



Montane calcareous grassland on steep slopes below rock outcrops, Caenlochan Glen, Scotland

©Kevin Walker

6. Heathland comprising: Dry heathland and Dry montane heathland

Heathlands are semi-natural habitats that have developed on relatively nutrient-poor and acidic soils as a result of forest clearance since the start of the Bronze Age; below 600m they represent an early successional (open) stage of woodland maintained by grazing and burning. Heathland is found from sea-level up to about 1,000m in both dry and waterlogged substrates. Wet Heath occurs where soils are permanently waterlogged and these give way to blanket bog and valley mire on more level ground, in depressions and on valley floors (see Bog & Wet Heath and Marsh & Fen). In all these habitats Dry Heathlands are distinguished by the cover of heathers (technically termed Ericaceous dwarf-shrubs) which make up more than 25% of the vegetation cover. Typical dwarf-shrubs in Dry Heathland include Bell heather and Heather; in the uplands these are joined by Bilberry, Cowberry and Crowberry.

Dry heathlands develop on free-draining acid sands, gravels and other superficial substrates (e.g. china clay) in the lowlands (<300m) and on thin acidic peats and mineral soils on acidic rocks in the uplands (300-700m) although they are also found down to sea-level in the northern and western Scotland. Lowland stands of Dry heathland range from the “grass-heaths” of East Anglia which are dominated by grasses and Heather to the more “humid” heaths of southern and southwest England and Wales which typically have a deeper canopy and cover of Heather, Bell Heather and Gorse (including Western/Dwarf Gorse). Distinctive lowland variants of dry heathland also occur on coastal slopes and cliff-tops, sand dunes and shingle throughout the UK as well as inland stands on acidic sands and gravels overlying chalk and limestone (e.g. Breckland, Salisbury Plain). Dry heathland also occurs locally in southwest England (e.g. Bodmin Moor, Exmoor, Dartmoor), and more extensively in milder and wetter upland regions of Wales, northern England and Scotland where it is more commonly called ‘moorland’ or ‘grouse moor’. Heavy grazing by sheep or deer can eliminate Heather and Bilberry (resulting in Acid grassland), while burning of moorland encourages the regeneration of Heather (for Red Grouse) but eliminates most other species. As well as Heather and other dwarf-shrubs, characteristic species of dry heathland include Heath Bedstraw, Heath Milkwort and Tormentil.



Dry heathland on rocky slopes above a valley mire on Colonsay, Inner Hebrides, Scotland

Dry montane heathland is found on free-draining, stony, acid soils above 600m in the north of Wales, England, Scotland and Northern Ireland, descending to sea-level in northern and western Scotland. It tends to occur in similar places to montane acid grassland on the higher slopes and exposed ridges and summits of mountains where the extreme climate keeps the vegetation naturally free of woodland cover and grazing and burning management have traditionally been low. It also occurs in areas less accessible to grazing animals (e.g. rock outcrops, steep slopes). Dry montane heathland is usually dominated by mosses, lichens, Heather, Bilberry (Blaeberry) and Dwarf Juniper. On the most exposed ridges and summits where snow lies for longer and the growing season is shorter, montane heath gives way to more ‘tundra-like’ communities dominated by mosses, lichens, grasses, sedges and rushes; these should be recorded under Montane acid grassland.



Dry montane heathland at 850m on Creag Meagaidh, Scotland

7. Bog and wet heath comprising: Blanket Bog, Raised Bog and Wet Heath

Bogs are wetland habitats underlain by deep, saturated, acidic peats that receive most of their water from rainfall rather than from the ground or surface water from surrounding landscape. They occur in the wettest regions of the UK, with characteristic vegetation including abundant Sphagnum mosses, Purple Moor-grass, sedges, cottongrasses, Heather and Cross-leaved Heath. Wet heath shares many of the same species but is confined to shallower peats on slopes where they receive most of their water from the surrounding slopes.

Blanket bog mainly occurs in upland areas although it is also found at lower altitudes in the cooler, wetter oceanic climates of the north and west of the UK including upland sites in Northern Ireland. Blanket bog forms in wet, cloudy climates where rainfall outstrips evapotranspiration and causes the formation of iron-pans in the soils, creating waterlogged conditions. Areas of blanket bog are mainly rain-fed and tend to be large, level or gently sloping areas where there has been a deep accumulation of peat. Typical species include *Sphagnum* mosses, along with Bog Asphodel and sundews. They are often hummocky in appearance with mossy depressions and small bog pools abundant in some areas. Wet heaths which occur on shallower peats are often found on more sloping terrain surrounding blanket bogs. Valley mires tend to occur amongst areas of blanket bog in shallow valleys or depressions where the topography creates a flow of groundwater.

In the UK large areas of blanket bog have been modified by management, especially in the uplands of northern England and in southern and eastern Scotland. Drainage ('gripping') has caused many bogs to 'dry out' with the gradual loss of 'wet site' indicators such as Sphagnum mosses, sundews and cottongrasses. In comparison the abundance of 'dry site' indicators such as Heather has increased especially on moorlands periodically burnt to create habitat for Red grouse. Here vast areas of former blanket bog now resemble dry heathland. In comparison, drainage combined with heavy grazing by sheep has led to the disappearance of Heather and other sub-shrubs and dominance of grasses, sedges and rushes (e.g. Purple Moor-grass, Soft-rush, cottongrasses) producing a vegetation resembling dry acid grassland. These degraded Blanket bogs are often characterized by exposures of bare peat ('haggs') which indicate the collapse of the bog surface due to drying-out and/or excessive burning. This process has probably been accelerated by

atmospheric pollution (particularly sulphur deposition) in areas close to former industrial centres (e.g. the Peak District). A useful guide to identifying different types of modified blanket bog can be found at: <http://www.moorsforthefuture.org.uk/blanket-bog-land-management-guidance>.

©Kevin Walker



Intact blanket bog with grouse butts with Great Whernside in the distance, Upper Nidderdale, North Yorkshire

©Michael Pettipher



Degraded (modified) blanket bog on moorland managed for red grouse in South Yorkshire. This has been drained and burned and now resembles dry heathland

©Michael Pettipher



Degraded (modified) blanket bog on moorland in South Yorkshire. This has been drained and intensively grazed by sheep and now resembles grassland although it retains some bog species such as Hare's-tail Cottongrass (*Eriophorum vaginatum*)

Raised bogs are large, dome shaped bogs raised above the level of the surrounding land, usually with drainage ditches around the edges. They are mainly rain-fed and are underlain by acidic peat, several metres deep in the most well-developed examples. They are found in lowland regions of Wales, England (from the English Midlands northwards) and scattered throughout Scotland and Northern Ireland (e.g. Garry Bog, Fairy Water bogs). Sedges, heathers, Cranberry and *Sphagnum* mosses are characteristic species of raised bogs. Small bog pools are sometimes present although these are usually less frequent than in blanket bog. Many raised bogs have been degraded due to drainage, the removal of peat ('peat cutting') to create agricultural land or for fuel or the production of compost, or afforestation. Drained degraded raised bogs are more heathery and sometimes support a more open canopy of birch, Scots Pine and Rhododendron.



Raised bog with abundant Hare's-tail Cottongrass (*Eriophorum vaginatum*), Wedholme Flow, Cumbria

©Kevin Walker

Wet heaths occur on shallow peat (<0.5m) and acid mineral soils that are waterlogged for at least part of the year but are too dry or too shallow for active peat formation. Wet heaths often occur on gently-sloping hillsides in the north and west of the UK where there is some movement of water, above blanket bog but below more free-draining steeper slopes with dry heathland. In the lowlands wet heaths occur anywhere on heathland where the drainage is impeded for example in depressions, around pools or on gentle slopes in the transition between dry heathland and valley mires (included under marsh & fen). Unlike dry heathlands, species such as Bog Asphodel, Common Cottongrass, Cross-leaved Heath and Purple Moor-grass predominate, along

with abundant *Sphagnum* mosses although the key peat-forming species (e.g. *Sphagnum* mosses, cottongrasses) are less prominent than in blanket and raised bog. Lowland wet heaths are characterized by the greater cover of Cross-leaved Heath than Heather. If the peat is deeper than 0.5m then the habitat is more likely to be blanket or raised bog. As with blanket and raised bog, drainage, burning and over-grazing can lead to an impoverished vegetation, leaving only Purple Moor-grass, Heather and Cross-leaved Heath.



NPMS plot in wet heath on sloping ground. Colonsay, Inner Hebrides, Kevin Walker

©Kevin Walker

Table 7: How to tell apart blanket and raised bog and wet heath.

	Blanket Bog	Raised Bog	Wet Heath
Hydrology	Rain- and ground/surface water fed	Rain-fed	Ground/surface water-fed
Peat depth (m)	Deep (>0.5m)	Very deep (usually several metres)	Shallow (<0.5m)
Topography	Flat or gently sloping	Flat or gently sloping, often 'domed'	Moderate to gently sloping
Altitudinal distribution	Mainly upland (up to 1,000m) but lowland in humid, oceanic regions	Mainly lowland but extending into uplands	Both lowland and upland (up to 1,000m)

8. Marsh and Fen comprising: Acidic fens, flushes, mires and springs and Base-rich fens, flushes, mires and springs

A broad category including a range of wetlands types (springs, flushes, fens and mires) on mineral or peaty soils that are permanently wet due to high ground / surface water or from water-level fluctuations close to water courses or the seashore. They are differentiated by water chemistry (whether acid or alkaline) and the origin and flow of the water (whether from a single point or diffusely over a large area). Note that the majority of vegetation commonly termed marsh or swamp is included in this category whereas 'marshy grasslands' are included under Neutral damp grassland.

Springs - where groundwater water percolates to the surface at an obvious point. If the substrate downslope is impermeable or is saturated then the water flows over the surface in narrow channels ('rills') or more diffusely as flushes. Usually small features amongst other habitats, mainly in the uplands but extending to sea-level. Dominated by mosses and sedges. Typical species of acidic springs include Blinks, Opposite-leaved Golden Saxifrage and Round-leaved Water-crowfoot whereas those that are calcareous are often very species-rich with Carnation Sedge, Common Butterwort, Flea Sedge and Grass-of-Parnassus.

Flushes - where groundwater seeps over the vegetation from a spring (as described above), or from the ground diffusely over a large area for example where impermeable substrates occur (e.g. over rock or boulder clays). Usually small to medium-sized features in the uplands but extending to sea-level. Often similar in composition to springs/rills. Acidic flushes are often very species-poor and typically share many of the same species as wet heath such as Bottle Sedge and Star Sedge. In comparison, calcareous flushes are usually species-rich supporting populations of many nationally rare and scarce such as Bird's-eye Primrose and Globeflower. At high altitudes they are often home to a rich assemblage very rare arctic-alpines.

Fen - wetlands on shallow peaty or mineral soils that are waterlogged for most of the year or inundated seasonally in floodplains, in basins or adjacent to open water. Fens can also be spring-fed (i.e. there is a constant supply of water from above). Usually occurring in areas with alkaline soils although they can occur in more acidic habitats when fed by base-rich ground and surface water. Fens are often extensive features and are dominated a wide range of tall herbs and sedges. They are usually base-rich supporting a very diverse range of wetland and grassland species. These and fen-meadows and Purple

Moor-grass and rush-pastures, which were probably derived from lowland fens through management, should be included under base-rich fens, flushes, mires and springs.

Mires - where water flows through a shallow valley or depression in an acidic, nutrient-poor heathland system, fed by groundwater and surface water (as well as rainwater). Usually found in acidic upland regions and more locally on lowland heaths. Distinguished from wet heaths, with which they often occur, by surface patterning, with hollows, hummocks formed of mosses and bog pools, and from Blanket bog by the abundance of Bog Myrtle, Bog Asphodel and Purple-moor Grass. Most upland valley mires are acidic and species-poor with bog-mosses with a scattering of plants such as Bog Asphodel and Round-leaved Sundew. These should be included under acid fens, flushes, mires and springs. Lowland valley mires are often more species-rich due to more alkaline ground water and these should be included under base-rich fens, flushes, mires and springs.



Acid flush with abundant mosses at high altitude, Caenlochan, Scotland

©Kevin Walker

©Kevin Walker



Base-rich flush above a stream in the Yorkshire Dales (Marsett Rigg SSSI), home to Bird's-eye Primrose (*Primula farinosa*) and Small-white Orchid (*Pseudorchis albida*)

©Kevin Walker



Acidic mire surrounding bog pools, Lochan a Baghrad, Colonsay, Inner Hebrides, Kevin Walker

©Kevin Walker



Lowland fen. Thelnetham Fen, Suffolk

9. Fresh water comprising: Nutrient-poor lakes and ponds, Nutrient-rich lakes and ponds and Rivers and streams

For NPMS you can survey any bodies of standing or running water, including ponds, canals, and ditches that have a shoreline long enough to accommodate a 25m long linear plot (if a smaller linear plot is surveyed then please record the length). Plants growing within 1m of the shoreline within this plot, whether emerging, submerged or floating, should be recorded; plant fragments that have washed up on shorelines should be excluded. Extra care should be taken when surveying these habitats. Please survey from the bank edge and do not enter deep water. Water bodies with widely fluctuating water-levels should be excluded. These will include temporary pools, ponds and streams, fluctuating meres/turloughs, man-made lakes, reservoirs, and saline and brackish lakes or lagoons affected by tides. Small bog pools should be recorded under Blanket or Raised bogs.

Nutrient-poor lakes and ponds (technically termed dystrophic and oligotrophic) include lakes, lochs, tarns and bog pools with low levels of nutrients and pH in the uplands of the north and west of the UK as well as pools/ponds on acidic substrates in the lowlands. The water is usually very clear due to low levels of biological activity but is often stained dark brown due to leaching of humic substances from the surrounding catchment. The vegetation is usually very sparse with limited stands of emergent and marginal species. Typical species include bladderworts, Bogbean, Bog pondweed, Floating Bur-reed, Marsh Cinquefoil, Quillwort, Water Lobelia and White Water-lilly.



Nutrient-poor (oligotrophic) lochan on Rum (Loch Fiachanis), Inner Hebrides, Scotland

Nutrient-rich lakes and ponds (technically termed mesotrophic and eutrophic) include all water bodies of still water with moderate to high levels of nutrient and pH. These include the majority of ponds and lakes in lowland areas that are not associated with acidic habitats such as heathland (see nutrient-poor lakes and ponds) but also many water bodies in the uplands where calcareous and acidic bedrocks meet; canals and ditches are also included here as they essentially linear bodies of still water and are usually relatively rich in nutrients (either naturally or due to agricultural run-off). Unlike nutrient-poor water bodies, these waters will usually have abundant (and sometimes luxuriant) algal and higher plant growth, either fringing the water body or growing in the water itself. Typical aquatics include pondweeds, water-milfoils, Yellow Water-lilly whereas the are often extensive fringing beds of Bulrush, Common Club-rush and Common Reed.



Nutrient-rich lake with abundant aquatic and emergent vegetation, Hoveton Great Broad, Norfolk

©Sophie Lake & Durwyn Liley

Rivers and streams include the aquatic and emergent vegetation growing on the margins of both fast-flowing rivers and streams in the uplands as well as more sluggish stretches in the lowlands and tidal sections upstream from estuaries. Fast-flowing sections are often devoid of vegetation with the exception of algae, mosses and the odd marginal plant. More sluggish sections can have a rich aquatic and fringing vegetation with typical species including Amphibious bistort, duckweeds, pondweeds, Water-cress, water-lillies, water-crowfoots and water-parsnips. This category excludes small rivulets, runnels, burns, and streams that will not accommodate a 1m wide plot and temporary running waters that only flow for part of the year leaving a dry bed or pools.

©Kevin Walker



Fast flowing river,
River Nidd, North
Yorkshire

©Sophie Lake & Durwyn Litley



Slow flowing
river, River Nene,
Earls Barton,
Northamptonshire

10. Rock outcrops, cliffs and screes comprising: Inland rocks and scree and Montane rocks and scree

Inland rocks and scree include vegetation growing on ledges and in the crevices of cliffs, crags, rocky outcrops and screes in lowland and submontane regions (<600 m) including quarries, cuttings, and the grykes of limestone pavements. These rocky habitats are usually very rich in ferns, with typical species including Wall-rue and Maidenhair Spleenwort. Vegetation on man-made structures such as dams, stonewalls and buildings, should not be surveyed.

Only survey easily accessible areas such as the base of cliffs.



Inland rocks and scree with Juniper, Moughton Scars, Ingleborough

Montane rocks and scree include vegetation growing on ledges and in the crevices of natural cliffs, crags, rocky outcrops and screes in montane regions (>600 m) of the Scottish Highlands, northern England, north Wales and within the Mourne Mountains in Northern Ireland. These rocks tend to be acidic in nature, with ferns such as Parsley Fern along with Fir Clubmoss and Bilberry (Blaeberry). Calcareous cliff communities are much more localised but usually support a rich assemblage of arctic-alpine species including saxifrages, mountain willows and Alpine Lady's-mantle.

Only survey easily accessible areas such as the base of cliffs.



Montane rock outcrop with Purple Saxifrage (*Saxifraga oppositifolia*), Ingleborough, North Yorkshire, Kevin Walker

©Kevin Walker

11. Coast comprising: Coastal saltmarsh, Coastal sand dunes, Coastal vegetated shingle, Machair and Maritime cliff tops and slopes.

The United Kingdom has a very long and varied coastline with many different habitat types and a diverse flora. Care should always be taken when accessing coastal habitats with particular attention being paid to tide times and weather forecasts. Please stay away from cliff edges and be particularly careful of tides and channels when surveying saltmarshes.

Coastal saltmarshes are areas of vegetation that develop in sheltered coastal locations within the intertidal zone. The lower areas (mud and sandflats) support a sparse vegetation dominated by Samphires and Cord-grasses; this zone is inundated at high tide as so is not included in NPMS. Upper (mature) saltmarshes develop just above the high tide level and are therefore only inundated during very high (Spring) tides. These are dominated by salt-tolerant plants (halophytes), especially grasses and rushes such as Common Saltmarsh-grass, Creeping Bent, Saltmarsh Rush and Sea Couch. They tend to be relatively species-poor with just a few herbs present such as Sea Aster, Sea-lavender, Sea-milkwort and Thrift. You should record NPMS plots on these higher vegetated areas, avoiding lower (pioneer) communities of Samphires and Cord-grasses on open mud within saltmarsh pools, pans or creeks.



Grazed saltmarsh with abundant Sea Thrift (*Armeria maritima*) and Common Saltmarsh-grass (*Puccinellia maritima*) on Colonsay, Inner Hebrides, Scotland

Coastal sand dunes develop wherever sandy beaches are wide enough for sand to dry out and blow inland in some cases up to several kilometres. The vegetation is often represented by a succession from bare, mobile sand with just a few specialist plants, to permanent (fixed) grasslands, heathlands, wetlands (slacks) and scrub. The mobile dunes, often termed “embryo” and “yellow” dunes, are highly unstable and dominated by pioneer species such as Oraches and Marram Grass. These are not included in NPMS. Vegetated dunes, often termed “grey” or “fixed” dunes are stable enough for soil development to have taken place and therefore have a greater cover of mosses, lichens, fine-leaved grasses such as Red Fescue as well as a wide variety of herbs including orchids, Cat’s-ear, clovers, dune pansies, Lady’s-bedstraw and Wild Thyme. On some dunes there are lower-lying areas called “dune slacks” that are inundated by ground-water in winter and therefore support a wetland flora that often includes marsh orchids (*Dactylorhiza*) and Creeping Willow. Machair is similar to fixed dune grassland but is covered by a separate species list. In some regions stabilised dunes support dry heathland, scrub or woodland (including conifer plantations); where found these should be included under the relevant NPMS habitat category.



Coastal sand dunes,
Whiteford Burrows,
Gower, Wales

©Sophie Lake & Durwyn Liley

Machair is a distinctive coastal habitat related to dunes that is restricted to the north west coast and western isles of Scotland in the UK. It is essentially a calcareous fixed dune grassland maintained by farming practices and the constant supply of calcareous shell fragments and seaweed carried inland by strong onshore winds. These prevent the soil from becoming leached despite the very wet climate. The grassland is rich in wild flower species, such as buttercups, Harebell, Lady's-bedstraw, marsh and spotted orchids (*Dactylorhiza*), Red/White Clover, Silverweed and Yellow-rattle. Most traditional machair is either grazed or lightly cultivated; please only survey the grasslands, not the cultivated areas or associated wetlands/marshlands.



Machair grazed by highland cattle, Tiree, Inner Hebrides, Scotland

©John Bowler

Coastal vegetated shingle - Only a small proportion of the shingle beaches in the UK are stable enough to support vegetation due to the impacts of storms and shifting currents. Vegetation is usually best developed on the leeward (sheltered) side of shingle features such as shingle spits, barriers, islands and bars where the shingle is stable enough to allow colonisation by plants. In these locations shingle communities vary from a pioneer strandline community, open communities of shingle specialists, fixed grassland/heathland, scrub and even woodland. NPMS plots should be placed in the intermediate stage (shingle specialists) where characteristic plants include Yellow Horned-poppy, Sea-holly, Sea-kale and Curled Dock. Pioneer (strandline) communities should be avoided whereas grassland, heathland, scrub and woodland should be recorded under the relevant NPMS category. Shingle areas colonised by scrub, including bramble scrub, should be avoided.



Vegetated coastal shingle with abundant Sea Pea (*Lathyrus japonicus*) and Shrubby Sea-blite (*Suaeda vera*), Cley, North Norfolk

©Kevin Walker

Maritime cliff tops and slopes include maritime grasslands or heathlands that occur on coastal slopes or between the cliff top edge and managed agricultural fields or residential properties inland. These habitats are subject to constant exposure and salt spray (especially during storms) and include a wide variety of vegetation depending on the hardness and alkalinity of the rock/sediment, its steepness and aspect (hot and southerly or cool and northerly). Vegetation can range from scattered plants growing in rock crevices on vertical cliffs to closed maritime grassland and heath communities on slopes and cliff tops. Vegetation growing on vertical sea cliffs should be ignored; the vegetation on slopes and cliff tops usually has abundant grasses such as Red Fescue and a range of typical herbs including Bluebell, Primrose, Rock Samphire, Sea Campion, Scurvygrass and Thrift.



Maritime cliff-slopes with maritime grassland and heathland, Kynance Cove, Lizard Peninsula, Cornwall

©Kevin Walker

Take extreme care when surveying these areas and only attempt to sample areas that are easily accessible; keep well away from the cliff edge and steep slopes and any areas prone to erosion.

Domin scale

Class	1	2	3	4	5	6	7	8	9	10
% cover	<1	<1	1-4	5-10	11-25	26-33	34-50	51-75	76-90	91-100
	1-2 individuals	several individuals								

- For a 5x5m square plot a 50x50cm square area is equivalent to 1%.
- For a 10x10m square plot a 1x1m square area is equivalent to 1%.

For a 5x5m plot, if you can only find one individual of a species in your plot then that species will score 1 on the scale. If there are several of a species dotted about the plot, but you can tell that they will not fill a 50x50cm square, then that species will score 2.

A large clump of one species that covers more than one, but no more than four, 50x50cm squares will score 3.

Where you have individual plants from a species scattered around the plot try to imagine them clustered into one corner: how much space, including their leaves, would they occupy?

Remember to include plants, particularly shrubs and trees, that overlap your plot. This will be especially relevant for Inventory Level surveyors.



National Plant Monitoring Scheme

The National Plant Monitoring Scheme (NPMS) is organised and funded by the Centre for Ecology and Hydrology, Botanical Society of Britain and Ireland, Plantlife and the Joint Nature Conservation Committee. The NPMS is indebted to all volunteers who contribute data to the scheme.



Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL



An Agency within the Department of
Agriculture, Environment
and Rural Affairs
www.daera-ni.gov.uk

www.npms.org.uk

ISBN: 978-1-910212-83-7

2nd edition printed May 2019 by Acanthus Press,
Wellington, Somerset.

Design, illustration, cover photo: evansgraphic.co.uk