

# Handbook for the Irish

# Vegetation Classification





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Perrin, P. M.



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**T**his handbook is but one part of the Irish Vegetation Classification (IVC) project that started back in 2015, commissioned by the National Biodiversity Data Centre with funding from the National Parks and Wildlife Service. Especial thanks are due to Úna FitzPatrick (National Biodiversity Data Centre) and Deirdre Lynn (National Parks and Wildlife Service) who have championed the project from the start and I would like to thank them for their encouragement and support.

Producing a national vegetation classification has been, as may be imagined, a considerable endeavour. I have been most fortunate to have had throughout the support and advice of my colleagues at BEC Consultants and many other ecologists with a wealth of experience of Irish habitats. I am grateful to them all for the numerous—and often lengthy—discussions that have shaped the project as it now stands. Particular thanks are due to Simon Barron, Orla Daly, Fiona Devaney, Jim Martin and Fionnuala O’Neill (BEC Consultants), Rory Hodd (Nimbosa Ecology) and George Smith (Blackthorn Ecology). Attendees at the many IVC workshops organised by the National Biodiversity Data Centre also provided useful feedback. George Smith reviewed a draft of the manuscript of this handbook and his comments greatly improved the final version.

Statistical analyses of vegetation data lie at the heart of this project and in this regard I was fortunate in two respects. Firstly, the R package ‘vegclust’ by Miquel de Cáceres (currently Centre de Recerca Ecològica i Aplicacions Forestals, Spain) was available to do the heavy lifting of the multivariate calculations and Miquel was kind enough to add some additional capabilities to the package at my request. Secondly, much of the available vegetation data had already been collated into the National Vegetation Database by a team from the National Biodiversity Data Centre that included Úna FitzPatrick, Lynda Weekes, Ellen O’Sullivan, Colette O’Flynn, Melinda Swann and Nicola Foley. This work was possible thanks to the support and encouragement of Naomi Kingston (previously National Parks and Wildlife Service). Further thanks are due to all who originally recorded these datasets and those who contributed them to the National Vegetation Database. Likewise, I am grateful to those who contributed their data directly to this project. All datasets and contributors are listed in Part III of this handbook. The cross-generational effort involved in recording such a volume of field data cannot be overstated.

## **Dr Philip Perrin, BEC Consultants**

### **Dedicated to Dr Julie Fossitt, a fearless champion of Irish nature.**

A Guide to the Habitats of Ireland by Julie Fossitt is the seminal Irish habitat classification textbook, and Julie’s work has inspired the preparation of this publication.

Julie worked as a Divisional Ecologist for the National Parks and Wildlife Service until her passing in August 2022. Julie became a Fellow of CIEEM in 2021, in recognition of her stellar work over decades for biodiversity in Ireland.

She was an inspiration, an expert, a rigorous scientist, and a fearless protector of nature. In addition, she was tenacious, dedicated, driven, passionate, funny, warm-hearted and she is sorely missed by all who knew her.

# Introduction

## Why an Irish Vegetation Classification?

**C**lassifying, mapping and describing habitats and vegetation are cornerstone tasks for many people involved in ecological research, environmental management and nature conservation. A standard classification system provides a common language for such information to be relayed between workers in various relevant fields. It can inform the planning process, provide a framework for ecological research, aid in the identification of protected habitats and facilitate monitoring of vegetation amongst other benefits.

The development of a vegetation classification for Ireland has been an action of the National Biodiversity Plan since 2011 (DAHG, 2011; DCHG, 2017), following on from the work of the National Biodiversity Data Centre in compiling the National Vegetation Database (NVD; Weekes and FitzPatrick, 2010). When faced with fulfilling this action, an initial question was whether to build on an existing scheme or to start afresh? Several classification systems have already been used in Ireland, each with their advantages but each also with some limitations (see discussion of these in Box 1). In simple terms, it was desired to produce a system more detailed than Fossitt (2000), more accessible than the Braun-Blanquet approach, more directly relevant to Ireland than the British NVC and which also unified existing habitat-specific schemes.

A new system, the Irish Vegetation Classification (IVC), was thus planned with the overall objective to classify, describe and map in detail all aspects of natural and semi-natural vegetation in Ireland within a single, unified framework.



## Box 1: Classifications systems used in Ireland

Vegetation science in Ireland for many decades largely followed the floristic-sociological approach popular in continental Europe, but somewhat eschewed in Britain. The adoption by Irish scientists of this method, popularly known as the Braun-Blanquet approach (van der Maarel, 1975), was stimulated by the International Phytogeographical Excursion to Ireland in 1949 and the resulting publication (Braun-Blanquet and Tüxen, 1952). The application of this method to Irish habitats became the subject of numerous academic theses and papers, for example O'Sullivan (1965), Kelly and Moore (1975), O'Connell (1981), White and Doyle (1982), O'Connell et al. (1984), Ó Críodáin (1988), Mooney (1991), McKee (2000) and Gaynor (2008). The Braun-Blanquet approach allows vegetation to be classified to quite detailed levels (associations and sub-associations) and, importantly, to be placed within an international framework. Unfortunately, with its roots deep within academia, it cannot be described as a user-friendly system and there is a high knowledge threshold, problems not aided by the lack of readily accessible documentation and literature. The application of the approach in Ireland is also hindered by some diagnostic taxa being either absent here, rare or occupying niches different to those on the continent. In the view of Kent (2012, p. 292) *'much strange and perhaps unnecessary terminology is used at all stages'* and *'the whole approach can only be applied by very experienced workers in the field.'*

Published by The Heritage Council over 20 years ago, *A Guide to Habitats in Ireland* (Fossitt, 2000) has been widely adopted by those working in the public and private sectors, being often referred to simply as the 'Fossitt classification'. Within a hierarchical system, it provides descriptions of natural, semi-natural and artificial habitats (not vegetation communities) and is analogous to the Phase I habitat classification used in the UK (JNCC, 2010). The accounts of terrestrial and freshwater habitats in this scheme were a synthesis of existing research at the time. It was intended to be a

*'working document that will evolve and be revised over time'* (Fossitt, 2000, p. 8) but this has not yet come to pass, although some useful refinements were suggested by Smith et al. (2011). The classification lacks the detail typically required for studies focussing on specific habitats — saltmarsh, for example, is divided into just two habitat categories — but it was only intended to be *'for widespread and general use, and not as a basis for detailed study and evaluation'* (Fossitt, 2000, p. 8) and should not be unduly criticised if, in the absence of an alternative, it has been used outside of its original scope.

The National Vegetation Classification (NVC; Rodwell, 1991a, 1991b, 1992, 1995, 2000) provides very detailed and knowledgeable descriptions of British vegetation communities. It is an industry-standard method in the UK and as such is employed in Northern Ireland, although no data from there were used to construct the classification. It has also been used by some projects in the Republic (e.g., Crawford et al., 1998). Whilst there are many similarities between British and Irish vegetation, there are also significant differences in the flora (Webb, 1983) and its applicability in some Irish contexts (e.g., turloughs) could be questioned. The classification has not been updated in the form of a second edition although gaps in the NVC have been readily acknowledged (Rodwell, 2000). However, updated maps are available in some of the field guides (e.g., Hall et al., 2004) and some revisions to communities have been published (Wallace and Prosser, 2017).

National-scale habitat-specific vegetation classifications have been developed for a limited number of habitats based on the results of national surveys, including woodlands (Perrin et al., 2008), grasslands (O'Neill et al., 2013) and saltmarsh (Devaney and Perrin, 2015). These classifications are organised in broadly similar structures but have been constructed using different statistical methods and lack a common style of presentation or 'branding'. With the exception of the woodlands classification, which was adapted for use by the Native Woodland Scheme (Cross et al., 2010), they have not been widely utilised. They are essentially precursors to the IVC and should be considered superseded by it.

## Some underlying principles

From the start, six underlying principles or basic tenets were set down, to steer the project and to clarify its purpose (cf. Rodwell, 1991a, p. 8).

### Statistically-based

The classification was to be based on a numerical analysis — using contemporary statistical methods — of existing vegetation plot data, rather than being a synthesis of existing knowledge. These data would consist of those contained within the NVD or sourced elsewhere. The use of numerical analysis would not make the process wholly objective as there would be, as will later be discussed, numerous subjective decisions and compromises that needed to be made for the sake of practicality.

### Vegetation classification

As the name states, the IVC was to be a vegetation classification whose basic categories (the communities) were defined purely on floristic composition, with data on environmental parameters (e.g., substrate, altitude or inundation frequency) and management (e.g., mowing or fertilisation) being used only to interpret the categories ecologically *post hoc*, rather than helping to define the categories in the first place, as would be the case in a habitat classification such as the Fossitt (2000) or Phase I schemes (JNCC, 2010).

### Hierarchical organisation

A classification was to be produced with categories organised in a hierarchy. Categories at lower levels would be combined at higher levels to produce categories of increasingly broader scope. The production of a hierarchy would facilitate application of the classification at different scales and for a variety of purposes, as well as aiding users to more easily grasp the relationships between categories.

### User-friendly

The IVC was to be designed to be accessible for a range of potential users, including field surveyors, environmental managers, planners, scientific officers, policy-makers, researchers and students. To this end, we would steer away from using the less intuitive phytosociological conventions of the Braun-Blanquet approach when naming our categories and creating the hierarchy. Furthermore, we would shamelessly cherry-pick some of the most helpful aspects of the NVC system. Having previously used both the MAVIS and Tablefit programs to assign Irish vegetation to the NVC in other projects, it was decided that some form of software application to conduct similar analysis and to reduce inter-observer variation<sup>1</sup> was a requisite. Also, rather than weighty descriptions of communities like those in the main NVC volumes (e.g., Rodwell, 1991a), we would aim for succinct descriptions at a level more akin those by Averis et al. (2004).

### Expandable and updatable

The IVC was to be based on the data available at the time, and whilst a review of the NVD showed that there was a critical mass of data for the majority of habitats, it was inevitable that there would be some parts of the scheme that would significantly benefit from the incorporation of additional data in the future. Thus, it was important to make the IVC a dynamic system, insofar as this was possible. This would be tackled in two main ways. Firstly, by selecting an analytical approach from the wide selection available that specifically facilitated defining and managing dynamic vegetation classifications (Wiser and De Cáceres, 2013). Secondly, by producing the majority of the outputs as individual digital documents that could be easily updated and readily disseminated through a website (an approach inspired by the alliance factsheets of the Canadian National Vegetation Classification).

<sup>1</sup> Inter-observer variation in assigning vegetation to categories within a classification can be significant even when professional ecologists are using well-described categories (Cherrill, 2013) with potential consequences for decision making based on such data (Cherrill, 2016).

## Vegetation continuum

The IVC was to recognise the existence of a vegetation continuum and the occurrence of transitional vegetation types. A discussion of Gleasonian versus Clementsian views on the concept of plant communities is beyond the scope of this handbook<sup>2</sup>. However, in essence, species abundances change along environmental gradients. Gradients may be sharp, leading to rapid changes in vegetation over a short space, or they may be gradual, producing longer ecotones in which vegetation changes over a greater distance. According to Webb (1954):

*‘...the pattern of variation shown by the distribution of species among quadrats of the earth’s surface chosen at random hovers in a tantalizing manner between the continuous and the discontinuous’.*

Vegetation classifications — which typically impose discrete categories on to this pattern — are thus inherently artificial frameworks, but we need them so that we can demarcate this continuum into practicable units for important tasks such as mapping and management. Between these units there will be transitional assemblages of vegetation that do not fit easily into the framework. This issue is succinctly summarised by Smith et al. (2011):

*‘Habitat or vegetation types are not real. They are simply approximations — artificial labels for the purpose of convenience — and therefore no classification system is perfect. Some areas encountered on the ground will be transitional types, hopelessly intimate mosaics, or just plain strange, and will be difficult or impossible to classify neatly.’*

Having accepted the crucial concept of the continuum and the occurrence of transitional vegetation types, it can be seen that a methodology that identified these types would be highly advantageous.

## The aim of this handbook

The intention of this handbook is to compile into one place useful information to assist you in getting the most out of the IVC, whether you are employing it in your own projects or studies or interpreting the work of others. The rest of the book is divided into three parts:

**Part 1** provides background information on the development of the classification, including the data sources, the statistical methods used, the hierarchical structure and parts of the decision-making process. It also describes in detail how to use the various parts of the IVC toolbox, including the community synopses, software applications and keys. Finally, there is a brief discussion of some of the limitations of the classification and what is needed to address these issues in future revisions.

**Part 2** goes through each of the divisions and groups within the IVC, providing descriptions and keys to the constituent communities.

**Part 3** provides a list of communities, a species index, a list of datasets used, summary data on Ellenberg indicator values, diagrams showing how communities fit into the landscape, a phytosociological conspectus, and tables summarising the affinities of IVC communities with Fossitt (2000) categories and EU Habitats Directive Annex I habitats.

## What is not in this handbook?

The handbook is intended to be used in concert with the information provided on the National Biodiversity Data Centre website. It does not contain the community synopses that are one of the core parts of the system and are available on the website as .pdf files. This is quite intentional for two reasons. Firstly, it would swell the size of this handbook by many hundreds of pages. Secondly, as stated above, one of the key principles behind the system is that it should be easily updated. The individual synopsis files can be amended much more easily and therefore far more frequently than a lengthy book. This flexibility is vital for the IVC to remain dynamic and relevant.

<sup>2</sup> For such a discussion, see Kent (2012, p. 29) and Austin (2005).

## Part I

# Development of the classification

### Scope

The scope of the classification encompasses vegetation of all Irish natural and semi-natural habitats (and some artificial habitats) that are dominated by vascular plants and/or bryophytes (mosses and liverworts) but not by lichens or algae. It thus includes terrestrial, freshwater and brackish communities, and some marine assemblages. The scope includes both habitats in good ecological condition and those which have become degraded, for example, due to invasion by alien plant species. In terms of geography, only data from Ireland have been used, with data from Northern Ireland being excluded at this time (but see 'Improving geographic coverage', p. 43).

### Sources of data

The basic units of data upon which the classification was built were quantitative vegetation samples recorded from quadrats. A quadrat is a defined area of vegetation,

usually, but not always, square in shape. The presence of different species within this area is recorded and, in the case of quantitative sampling, the abundance of each of these species is either measured or estimated. A quadrat is sometimes referred to as a *relevé*, but this term should really only be used when vegetation samples have been taken for the purposes of the Braun-Blanquet approach, as there are then associated requirements regarding homogeneity and minimal area (Kent, 2012). Much of our data would not have been collected in this fashion, so instead we will use the neutral term 'plot' when referring to vegetation samples.

The main source of plot data for the IVC was the NVD (see background information in Box 2). Following a review, 166 of the datasets within the NVD were taken forward to the analysis stage whilst 9 datasets were excluded in their entirety for various reasons (for details of all datasets see the list in Part III, p. 105.). In addition, a number of datasets external to the NVD were sourced and used; these are listed in Part III, p. 114.



## Box 2: National Vegetation Database

The NVD was established in 2007 by the National Biodiversity Data Centre in conjunction with the National Parks and Wildlife Service (NPWS). Ireland has a rich history in the collection of vegetation data, and it was recognised that this information is a valuable resource that should be digitally captured in a centralised national database. The NPWS funded a national vegetation audit and a dedicated digitisation initiative from 2007-2012. An Irish plant checklist, 'Ireland2008', was specially constructed by the National Botanic Gardens for use within the NVD. It includes vascular plants, bryophytes, lichens and charophytes and incorporates known synonyms that have been used in Ireland. The NVD contains records of over 30,000 plots which are held in a specialist database application called Turboveg (Hennekens and Schaminée, 2001). A review of the data contained within the NVD at the end of the initial acquisition phase was conducted by Weekes et al. (2012). Guidelines and standards for the collection of vegetation data in Ireland have also been published (Weekes and FitzPatrick, 2010) so that future data can be collected in a format suitable for inclusion in the NVD. The NVD is listed in the Global Index of Vegetation-Plot Databases (GIVD) and is part of the European Vegetation Archive.

### Data standards

The plot data within these datasets had been collected by generations of ecologists stretching back to the late 1940s. They were originally collected for various purposes and used different vegetation abundance scales, plot sizes and nomenclature. Inevitably, when viewed with regard to combining such data for the purposes of a vegetation classification, there were issues with suitability and consistency. An important first stage of the analysis was therefore filtering and standardising the data.

### Excluded plots

During an initial review, some plots were excluded outright for a variety of reasons. Some had only presence-absence data, others contained only algal records<sup>3</sup>, had missing abundance scores or data entry errors, were recorded using an unsuitable abundance scale, were duplicates of other plots, or were from Northern Ireland (or even Wales). For a small number of plots, permission to use them was not granted.

### Cover abundance scales

For the analysis, species abundance data in the form of percentage cover were needed. Most plots had not been recorded using percentage cover but rather using a wide variety of ordinal scales. The most frequently used of these were the Braun-Blanquet and Domin scales. These data were all converted to percentages using mid-range values.

### Nomenclature

Species names can change over time with advances in taxonomy and the treatment of species can also differ between floras depending upon the judgement of the authors. Therefore, there were differences in the nomenclature that had been used by the original fieldworkers and it was essential for the analysis that this nomenclature was standardised. A large part of this task had already been tackled for the NVD datasets as the Ireland2008 species checklist had been used as the nomenclatural standard when these were digitised. As part of this project, species names in the external datasets were changed to match that checklist.

Records made at the subspecies or variety rank were combined with those made at the species rank, as these lower taxonomic ranks had been inconsistently recorded. Similarly, microspecies of *Rubus fruticosus* agg., *Hieracium* agg. and *Taraxacum officinale* agg. had been, understandably, rarely distinguished, so any such records were combined with those at the aggregate rank.

Acknowledged difficulties with the identification of some other taxa (e.g., *Euphrasia officinalis* agg.) had resulted in them being also inconsistently recorded. Likewise, some of the changes in taxonomy that had occurred over the years had led to a degree of ambiguity regarding records of

<sup>3</sup> Algal species can be significant components of some vegetation communities but within the available datasets as a whole they had been inconsistently recorded (more so than bryophytes and lichens). Algal species records were therefore not included in the formal analysis, but notes on the more frequently recorded taxa are included in the vegetation description in the community synopses.

certain taxa. For example, older records of *Agrostis canina* might reflect occurrences of *Agrostis canina* sensu stricto or of *A. canina* subsp. *montana*, which is now treated as *Agrostis vinealis*. To address such issues and to retain as much information as possible, records for several groups of taxa were combined into aggregates or couplets (Table 1).

**Table 1.** Taxa that were combined to address nomenclatural ambiguities or identification difficulties.

Original taxa	Combined taxa
<i>Agrostis canina</i> , <i>A. vinealis</i>	<i>Agrostis canina/vinealis</i>
<i>Arctium minus</i> , <i>A. nemorosum</i>	<i>Arctium minus/nemorosum</i>
<i>Cochlearia officinalis</i> , <i>C. pyrenaica</i>	<i>Cochlearia officinalis</i> agg.
<i>Drepanocladus cossonii</i> , <i>D. revolvens</i>	<i>Drepanocladus cossonii/revolvens</i>
all <i>Euphrasia</i> species	<i>Euphrasia officinalis</i> agg.
<i>Galium elongatum</i> , <i>G. palustre</i>	<i>Galium palustre</i>
<i>Limonium binervosum</i> , <i>L. procerum</i> , <i>L. recurvum</i>	<i>Limonium binervosum</i> agg.
<i>Poa humilis</i> , <i>P. pratensis</i>	<i>Poa pratensis/humilis</i>
<i>Rorippa nasturtium-aquaticum</i> , <i>Rorippa microphylla</i> , <i>Rorippa</i> × <i>sterilis</i>	<i>Rorippa nasturtium-aquaticum</i> agg.
<i>Ruppia cirrhosa</i> , <i>R. maritima</i>	<i>Ruppia cirrhosa/maritima</i>
all <i>Salicornia</i> species	<i>Salicornia</i> agg.
<i>Seligeria trifaria</i> , <i>S. patula</i>	<i>Seligeria patula/trifaria</i>
all <i>Spartina</i> species	<i>Spartina</i> agg.
<i>Sphagnum denticulatum</i> , <i>S. inundatum</i> , <i>S. subsecundum</i>	<i>Sphagnum subsecundum</i> agg.
<i>Sphagnum angustifolium</i> , <i>S. fallax</i> , <i>S. flexuosum</i> , <i>S. recurvum</i>	<i>Sphagnum recurvum</i> agg.
<i>Trichophorum cespitosum</i> , <i>T. germanicum</i> , <i>T. × foersteri</i>	<i>Trichophorum cespitosum / germanicum</i>
<i>Ulota bruchii</i> , <i>U. crispa</i>	<i>Ulota bruchii/crispa</i>
<i>Utricularia australis</i> , <i>U. vulgaris</i>	<i>Utricularia australis/vulgaris</i>
<i>Viola riviniana</i> , <i>V. reichenbachiana</i>	<i>Viola riviniana/reichenbachiana</i>

## Genus level records

Genus level records were not suitable for inclusion in the analysis as they might be amalgams of species with markedly different ecological preferences and therefore misleading to utilise (e.g., *Carex* sp.). Therefore, with the exception of those that were accommodated by the amendments detailed in Table 1, all genus level records were omitted. Where genus level records omitted from a particular plot totalled 5% or more cover, the plot itself was excluded due to the lack of data on a significant portion of the vegetation.

## Bryophyte records

The recording of bryophytes (moss and liverwort) species varied considerably between datasets in terms of effort and quality. In a few datasets, it was manifest that bryophyte recording had not actually been attempted, in others it had been exhaustive. These differences were more evident in habitats such as bogs, fens and woodland, where an abundance of bryophyte species would be expected, and less obvious in habitats such as saltmarsh and grasslands, where bryophytes might be naturally scarce or absent. Whilst requiring all plots to have comprehensive bryophyte lists may have been unreasonably strict, it was desired that at least the main bryophytic components of vegetation should have been recorded for plots to be included in the analysis. Therefore, plots with an apparent significant deficiency in the recording of bryophytes were excluded, with one major exception: bryophyte data were very scanty or absent from both of the main datasets pertaining to arable weed communities and excluding these plots on this basis would have precluded the definition of any such communities.

## Plot sizes

As a rule of thumb, when recording vegetation plots, their size should be proportional to the scale, density and variation of the vegetation. Plots which are too small may not adequately capture the range of species present nor accurately represent their relative abundances. When plots are too large, it is easier to miss species that are present and harder to accurately estimate the abundances of species that are recorded. With regard to using plot data to produce a classification, larger plots also run the risk of conflating what might be perceived as two or more distinct

communities. When it comes to statistics, there are also conceptual problems, discussed by Peet and Roberts (2013), with comparing vegetation samples from plots of different sizes.

Within our datasets, there was considerable variation in the plot sizes that had been used, even when looking at individual habitats. Being overly prescriptive in terms of plot sizes would have resulted in the exclusion of large amounts of data, so instead ranges of acceptable plot sizes were decided upon for different habitat groups (Table 2). Plots with sizes outside these ranges (or for which no plot size was recorded) were excluded. The aim was to exclude plots that were very much smaller or very much larger than the typical plot size.

**Table 2.** Minimum and maximum acceptable plots sizes by habitat group.

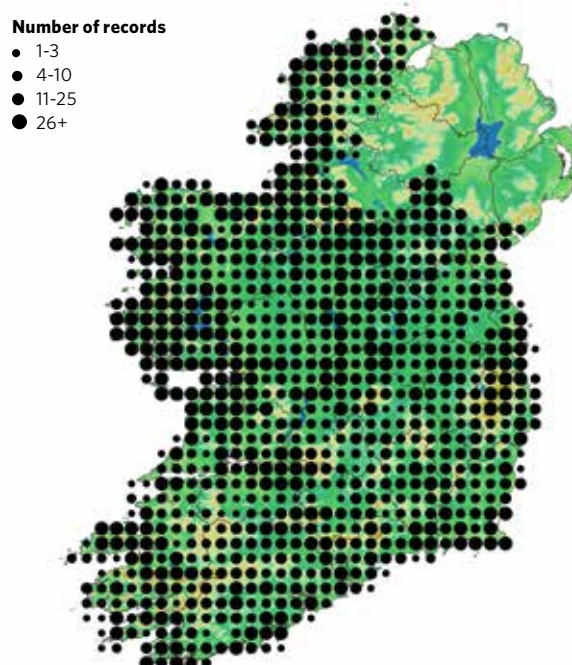
Habitat groups	Minimum plot size (m <sup>2</sup> )	Maximum plot size (m <sup>2</sup> )
Grasslands, marsh, saltmarsh, bogs, heaths, dunes, shingle, swamp, fens, springs, scree, limestone pavement, littoral sediment, brackish waters	1	25
Woodland	25	400
Rocky crevices, walls, hepatic mats, cliffs, mine-spoil	0.1	4
Bracken and tall-herb assemblages	4	25
Scrub	4	100
Weed communities	1	64

The observant will note that rivers and streams are not mentioned in Table 2. The methodology used to collect the vast majority of data from these habitats posed some significant problems. Many of the plots had been recorded for the purposes of defining river typology or assessing river quality rather than strictly recording vegetation communities. Samples had thus been taken not from quadrilateral plots targeting relatively homogeneous patches of vegetation but rather from the full width of watercourses along measured stretches, typically 50-100 m in length. This approach resulted in large to very large sampling areas, or 'plots' in a broad sense.

For example, plot sizes in dataset EPA001 ranged from 250 m<sup>2</sup> to 8000 m<sup>2</sup>. These plots potentially conflated data on midstream vegetation (being typically submersed or floating) and marginal vegetation (being typically emergent) as well as any variation in vegetation along the stretch. The NVC (Rodwell, 1995) rejected data collected in this fashion for these reasons. Taking the same approach, however, would have severely diminished the amount of data available for these habitats and precluded the definition of aquatic river communities. Data from these habitats were thus retained, with the exception of 'plots' longer or shorter than the typical range of 50-100 m. As these data were likely to be suboptimal for classification purposes, the communities based on them are not as tightly defined as might be wished.

## Data coverage

Following the review of data standards, 29,699 plots were selected for the analysis, with plots excluded on the basis of genus levels records, bryophyte recording or plot size totalling 6,127. The distribution of selected plots at the hectad scale is shown in Fig. 1. In total, these plots represented vegetation samples from 828 hectads, with very few hectads providing no plots at all.



**Figure 1.** Distribution at the hectad scale of plots selected for analysis.

## Analysis of data

### Analytical methods

In selecting an analytical approach from the wide selection available, we were influenced by recent work on defining and managing dynamic vegetation classifications (De Cáceres et al., 2010; Wiser and De Cáceres, 2013) and decided to use a version of fuzzy C-means clustering called noise clustering. The bulk of the calculations were conducted using the 'vegclust' package (De Cáceres et al., 2010) within the R statistical environment (R Core Team, 2021). A detailed description of this method is beyond the scope of this handbook and interested readers are referred to the papers cited above as a starting point. As it is handy for users to have a grasp of some of the concepts, however, so that they can better interpret the output from ERICA, a few technical ideas are introduced here.

To start with, fuzzy set theory (Zadeh, 1965) is an extension of classical set theory in mathematics. This latter concept holds that objects either belong discretely to a set (a collection or category) or not, thus their membership can be defined in binary terms, as either 0 (does not belong) or 1 (belongs). Fuzzy set theory holds that objects have a degree of membership to different available sets, with these membership values ranging from 0 to 1. Thus, in this context, 'fuzzy' indicates vagueness or ambiguity, whereas the term 'crisp' is used in fuzzy set theory to refer to classical (discrete) sets. Referring back to the discussion of the vegetation continuum and transitional vegetation on p. 11 it should be apparent that an approach incorporating fuzzy set theory would have certain advantages.

K-means clustering is a non-hierarchical partitioning method, meaning that it divides datasets into a pre-determined number ( $k$ ) of clusters and does not inherently create a hierarchy linking those clusters at different levels of similarity or dissimilarity (Kent, 2012). The general procedure is as follows:

1. Define each object (e.g., vegetation plot) within the dataset as a point in a multidimensional space defined by the dataset variables (e.g., each dimension is the cover abundance of a different species)
2. Create  $k$  random centroids within this multidimensional space, either by picking  $k$  random values for each of the dimensions or by picking  $k$  random points
3. Calculate the distance within the multidimensional space from each point to each centroid, using a suitable distance measure
4. Assign each point to the nearest centroid, with all points assigned to the same centroid forming a cluster
5. For each cluster, recalculate the centroid as the mean position of its constituent points in the multidimensional space
6. Iterate steps 3-5 using the recalculated centroids each time for a fixed number of times or until some stability criterion is reached

Fuzzy C-means clustering (Bezdek et al., 1984) is a variant of K-means clustering that incorporates fuzzy set theory, with points having degrees of membership to each of the clusters. A characteristic of this method is that the sum of these membership values for any given object will equal 1 (De Cáceres et al., 2010). The degree of fuzziness is determined by a fuzziness exponent that can be set by the analyst.

Noise clustering (Davé and Krishnapuram, 1997) is a further variant that addresses one of the shortcomings of fuzzy C-means clustering. Outliers are objects within a dataset which are significantly different to the vast majority of other objects. Within the multidimensional space, their points will be located far from any of the centroids, yet with fuzzy C-means the sum of their membership values must still equal 1. Noise clustering provides an additional cluster, the 'noise cluster' which scoops up all points that

lie a certain distance from the real cluster centroids and thus reduces the membership values of such points to those real clusters (De Cáceres et al., 2010). Again, it should be apparent that such an approach would be highly advantageous within a vegetation classification system by segregating and highlighting outlying plots. Plots assigned to the noise cluster may represent unusual assemblages that may be the result of peculiar environmental conditions or human impacts, or that may be outside the scope of the classification. Alternatively, such plots may be samples of recognisable communities that have simply been under-recorded.

Finally in this section, a note on distance measures. The K-means clustering algorithm and its relatives use some form of Euclidean (geometric) distance during step 3 of the procedure outlined above. Euclidean distance is typically unsuitable for sparse species datasets, that is those with lots of zeros (Kent, 2012). This is because Euclidean distance measures treat plots in which the same species is absent as more similar to each other, when in fact the species may be absent from different plots for very different reasons. For example, a species may be absent from plot A because soil pH is too low and absent from plot B because soil pH is too high. Fortunately, the algorithms implemented by package 'vegclust' allow one to provide a pre-calculated matrix of dissimilarities between pairs of plots (a dissimilarity matrix, of dimensions  $n \times n$ , where  $n$  is the number of plots), rather than a raw plot-by-species table (of dimensions,  $n \times p$ , where  $p$  is the number of species). Thus, we were able to use the non-Euclidean Bray-Curtis dissimilarity measure, which is frequently recommended for ecological datasets (Magurran, 2004; McCune and Grace, 2002), for our analysis.

### Analytical sequence

Rather than being constructed through a single analysis of all available data, the IVC was developed through a phased approach with each phase focussing on a subset of the data. The division of data between the phases largely followed the subjective assignment of plots to categories from Fossitt (2000) (Table 3).

**Table 3.** The phased approach to development of the IVC. The data utilised column lists level 2 codes of Fossitt (2000).

Phase	Year	Data utilised
1	2015	Mainly GS (grassland) and GM (marsh)
2	2016	Mainly WN or WD (woodland) and CM (saltmarsh)
3	2017	Mainly PB (bog), HH (heath) and ER (rocky habitat)
4	2018	Mainly PF (fen and flush), CW (brackish waters) and FW (freshwater)
5	2019	Mainly CD (sand-dunes), CB (shingle), WS (scrub), CS (sea-cliffs), ED (disturbed ground), HD (bracken), BL (built land), BC (cultivated land) and LS (littoral sediment)
6	2020	Review and reanalysis

In Phase 1, the classification developed by the Irish Semi-Natural Grasslands Survey (O'Neill et al., 2013) that consisted of a number of communities in four groups, was cast into a noise clustering framework. Relevant additional plot data were then used to revise the classification. In Phase 2, plot data used in the classification developed by the National Survey of Native Woodlands (Perrin et al., 2008) were used to create a separate noise clustering framework. Initially, this consisted of four groups that broadly mirrored those of the previous woodland classification. These four subsets of data were then independently analysed to define a number of communities. Similarly, to the previous phase, this classification was revised using additional plot data. The grassland and woodland models were then simply combined.

Also in Phase 2, the saltmarsh classification of Devaney and Perrin (2015) was revised and integrated into the system. However, this round of analysis and all subsequent ones built around the existing model. New clusters for the classification (see steps 1-6 in the previous section) were formed with respect to the centroids (or average characteristics) of the existing clusters in vegetation space, so that the centroids of the new clusters were essentially 'pushed' into new space thus preventing overlap. As with the woodlands, there was a two-step process, producing groups and then dividing those groups up into individual communities. From Phase 3 onwards, the model developed independently of any existing classifications using this two-step process.

Phase 6 comprised two important tasks. Firstly, during Phases 3-5, it was not uncommon to find that some of the new plots brought into the analysis fitted better into a community from a previous round of analysis rather than into one of the new communities from the current analysis. For example, in Phase 4 some of the PF plots used were assigned to a grassland community rather than to a new fen community. Conversely, it was considered that some of the plots used in earlier phases might fit better into one of the communities defined later in the project. Thus, a further round of analysis was conducted to allow plots to move between communities to find their optimal placement and to alleviate the consequences of the subjective division of plots between phases. Secondly, all plots placed in the noise class and those only weakly assigned to vegetation communities were reanalysed to see if there were sufficient data for any new communities to be defined.

## Structure of the classification

There are four levels within the IVC hierarchy as detailed in Table 4. The groups defined by the analysis described above were organised into a number of divisions with each given a two-letter code. Within each division, the groups were numbered and within each group the communities were identified by different letters (A, B, C etc.), thus producing a four-character code. Lastly, some, but by no means all, of the communities were subjectively divided into two or more sub-communities identified by suffixes of i, ii, iii etc. There are currently 14 divisions, 42 groups and 186 communities. The communities may be regarded as the fundamental units of the classification, being roughly analogous in terms of resolution to phytosociological 'associations' and the communities of the NVC (Rodwell, 1991a, 1991b, 1992, 1995, 2000). A list of all the categories can be found in Part III, p. 83.

Level within hierarchy	Defined by...	Example
Division	...physiognomy and broad sets of diagnostic species	Rocky habitats (RH)
Group	...significant vegetation differences reflecting the major environmental gradients such as pH, soil moisture, altitude, inundation frequency	RH2 <i>Saxifraga spathularis</i> - <i>Racomitrium lanuginosum</i> group
Community	...relatively specific differences in overall floristic composition	RH2A <i>Hymenophyllum wilsonii</i> - <i>Isothecium myosuroides</i> crevice community
Sub-community	...specific indicator species or subtle differences in floristic composition	RH2Ai <i>Hymenophyllum wilsonii</i> - <i>Isothecium myosuroides</i> crevice community <i>Saxifraga spathularis</i> - <i>Festuca vivipara</i> sub-community

**Table 4.** Levels within the IVC hierarchy, how they are defined and examples for each level.

# Using the IVC

The IVC and its tools can be employed in a few different ways depending upon the purpose, resources and scope of the project at hand. For example, if you are engaged in the monitoring of vegetation at a particular site, perhaps as part of a field experiment, then the approach taken may be to record data from multiple quantitative vegetation plots and to formally assign those data to communities using the ERICA application when back in the office. Changes in the membership values of individual plots could thus be tracked over time. If, on the other hand, you are tasked with producing a vegetation map for an area of land, there may not be time available to record plots in each potential community and decisions may need to be made in the field. Thus, the approach could be to subjectively assign areas to IVC communities based on the community synopses and expert judgement, perhaps with assistance from the dichotomous keys or by plugging some species lists into the ERICOID mobile app where choices are less certain. In this chapter, we go through the available tools and provide some general guidance.

As discussed on p. 13, standardising the nomenclature of the source data was an important part of data preparation. However, the shifting sands of nomenclature and taxonomy mean that the Ireland2008 checklist itself is no longer up-to-date. When using the available tools (the community synopses, keys and software applications) users should be aware of this. In the keys and group descriptions, recent nomenclature for vascular plants and bryophytes has frequently been added following Stace (2019) and Blockeel et al. (2021) respectively. For example, '*Senecio jacobaea* (= *Jacobaea vulgaris*)' indicates that the name *Senecio jacobaea* has been used for common ragwort in the tools, but that the name for this plant in Stace (2019) is *Jacobaea vulgaris*. Another example would be '*Sphagnum magellanicum* (= *S. divinum/medium*)', which indicates that *Sphagnum magellanicum* has been split into two species in Blockeel et al. (2021).

## Community synopses

Each community within the IVC has a community synopsis available as a .pdf file. These can be downloaded from the webpage for that community on the National Biodiversity Data Centre website. Community synopses can also be download as a compilation for each division from the IVC homepage. An example of a community synopsis is presented on the following pages (Figures 2, 3 and 4) and below is an explanation of the various numbered components.

### First page

- 1 Scientific name:** Each community is named after species which are indicative of that community and they will usually occur with high frequency within it. Most community names use two species, some simple communities use only one, but a few communities use a third to help in distinguishing from similar assemblages. The name also contains a habitat epithet which indicates the typical habitat context in which the community occurs.
- 2 Common name:** This is the name of the community using common names for species. For vascular plants these are usually the ones in Preston et al. (2002) and for bryophytes they usually follow Atherton et al. (2010).
- 3 Community code:** This is a four-character code where the first two characters indicate the division (e.g., HE for Heaths), the third character is the group number and the fourth character is a letter indicating the community.
- 4 Vegetation:** A description of the physiognomy and the typical composition of the vegetation is given here. Following a phytosociological convention, the term 'constant' is used to describe species which are present more than 60% of the time (that is, they occur with a frequency of IV or V) and does not always mean that the species is omnipresent.

- 5 Ecology:** This section deals with the landscape context in which the habitat is most likely to be encountered and often provides information of soil conditions, slope, altitude and other environmental features. Where reliable data are available, mean values with sample sizes are provided for some of these variables. These data are almost invariably drawn from a subset of the plots which define the habitat; this subset is not necessarily an unbiased representation of the community as a whole, and this should be borne in mind when assessing the community.
- 6 Sub-communities:** Not all communities have sub-communities, but when they do, they are detailed in this section with some notes on how they are differentiated. Sub-communities are named after one or two diagnostic species, but some are just referred to as 'typical' sub-communities and have the general characteristics of the parent community. Sub-community codes are formed by suffixing 'i', 'ii' or 'iii' to the community code.
- 7 Similar communities:** Some guidance is given here on how to differentiate the present community from others which have characteristic species in common. These other communities will typically be those from the same group, but occasionally are from elsewhere in the classification. Always refer to synopses of the other communities for the full details.
- 8 Records and distribution:** This box presents a synthesis of the distribution data that are currently available for the community and breaks down the records by time period following the style of Blockeel et al. (2014).
- 9 Number of records (all):** The total number of records assigned to this community is given, broken down by whether those records are clearly assigned (i.e., with a membership value for that community  $\geq 50\%$ ) or somewhat transitional<sup>4</sup> to another community (i.e., with a maximum membership value  $< 50\%$ ). Only plots which are clearly assigned and meet the necessary data standards are used to define the habitat.
- 10 Number of records (mapped):** The total number of records assigned to this community that can be mapped is given, broken down by the time period in which the record was made. Suitable co-ordinates do not exist for all records.
- 11 Number of hectads (by most recent time period):** The total number of hectads (10 km  $\times$  10 km squares of the Irish National Grid) from which the community has been recorded is given, broken down by the time period in which the most recent record from that hectad was made. The numbers here will match the number of symbols on the map.
- 12 Number of hectads (records in each time period):** The total number of hectads from which the community has been recorded in each time period is given.
- 13 Map:** The map shows the distribution of records at the hectad scale, colour-coded by the most recent period in which a record was made in each hectad, and size-coded by the total number of records for that hectad. For some communities, the maps give a pretty good indication of the true distribution of the community within the country, but for others they clearly demonstrate under-recording or lack of co-ordinate data. Where hectads have only older records, this may highlight areas where there is a lack of recent data and possibly areas from which vegetation communities have been lost.

<sup>4</sup> When plots are labelled as 'transitional' by the IVC, this term should be interpreted in a broad sense. Such plots may be spatially transitional, being located on an ecotone between recognizable communities, or they be temporally transitional, being examples of vegetation that is succeeding from one community to another. Alternatively, such plots may just be otherwise intermediate in character between two or more communities.

<b>Scientific name</b>	<i>Calluna vulgaris</i> – <i>Racomitrium lanuginosum</i> heath ①
<b>Common name</b>	Heather – Woolly Fringe-moss heath ②
<b>Community code</b>	HE3D ③

**Vegetation** ④

*Calluna vulgaris* and *Racomitrium lanuginosum* dominate in this low-growing, wind-clipped heath, together forming a carpet of springy vegetation. *Erica cinerea* and *Vaccinium myrtillus* are also constants and *Empetrum nigrum* frequently adds to the dwarf shrub component. *Potentilla erecta* and some thin tufts of *Deschampsia flexuosa* are likely to be found. The bryophyte layer is scarcely lower than the other plants and here *Hypnum jutlandicum* and *Rhytidiadelphus loreus* join the hoary mounds of *Racomitrium*. Lichens are a regular feature of this community, with the forking shoots of *Cladonia uncialis* a constant presence and *Cladonia portentosa* frequent. These heaths are dotted with occasional, clustered shoots of *Huperzia selago*.

**Ecology** ⑤

This is a montane heath community of exposed upper mountain slopes, ridges and plateaux (mean altitude = 535 m,  $n = 205$ ; mean slope =  $16.3^\circ$ ,  $n = 163$ ). The soil is shallow, acidic and infertile. These heaths are typically strewn with rock fragments (mean extent of bare rock = 10.2%,  $n = 163$ ).

**Sub-communities** ⑥

Two sub-communities have been described. The *Arctostaphylos uva-ursi* – *Juniperus communis* sub-community (HE3Di) is easily identified as *Arctostaphylos* is invariably present and *Juniperus communis* is frequent. These species are not found in the typical sub-community (HE3Dii).

**Similar communities** ⑦

The abundance of *Racomitrium lanuginosum* makes this a striking community. It could be confused with HE3E *Racomitrium lanuginosum* – *Festuca vivipara* heath, but in that assemblage *Calluna vulgaris* is less abundant and there is a greater grass component. In community HE3B *Calluna vulgaris* – *Scapania gracilis* heath, pleurocarpous mosses and *Sphagnum capillifolium* tend to be more prominent. The present community lacks the *Nardus stricta* patches of community HE3C.

**Records and distribution** ⑧

*Number of records (all)*

Clearly assigned:	231	⑨
Transitional:	16	
Total:	247	

*Number of records (mapped)*

2001-2020:	162	
1986-2000:	61	⑩
1971-1985:	5	
Pre-1971:	14	
Total:	242	

*Number of hectads (by most recent time period)*

2001-2020:	35	
1986-2000:	2	⑪
1971-1985:	1	
Pre-1971:	2	
Total:	40	

*Number of hectads (records in each time period)*

2001-2020:	35	⑫
1986-2000:	3	
1971-1985:	3	
Pre-1971:	6	

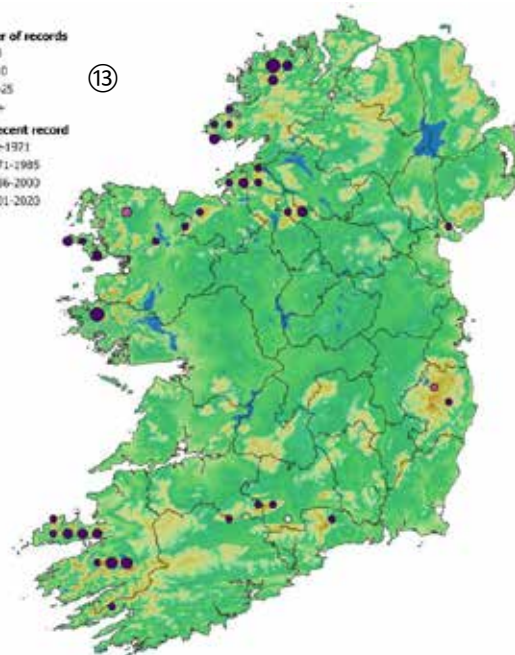


Figure 2. First page of an IVC community synopsis with annotations.

Synoptic table ( <i>n</i> = 224) ①						
Species ②	③	Frequency (from I-V)	④ Cover min (med) max	Species	Frequency (from I-V)	Cover min (med) max
<i>Calluna vulgaris</i>		V	3-(8)-9	<i>Galium saxatile</i>	II	+(2)-3
<i>Racomitrium lanuginosum</i>		V	2-(7)-9	<i>Festuca vivipara</i>	II	+(2)-3
<i>Hypnum jutlandicum</i>		V	+(2)-7	<i>Herbertus aduncus</i>	II	+(3)-7
<i>Cladonia uncialis</i>		IV	+(2)-7	<i>Agrostis canina/vinealis</i>	II	+(2)-4
<i>Erica cinerea</i>		IV	+(3)-8	<i>Carex binervis</i>	II	2-(2)-5
<i>Potentilla erecta</i>		IV	+(2)-5	<i>Dicranella heteromalla</i>	II	2-(2)-3
<i>Vaccinium myrtillus</i>		IV	+(2)-7	<i>Arctostaphylos uva-ursi</i>	I	+(5)-8
<i>Deschampsia flexuosa</i>		IV	+(2)-5	<i>Campylopus flexuosus</i>	I	+(2)-3
<i>Rhytidiadelphus loreus</i>		IV	+(2)-5	<i>Cladonia subcervicornis</i>	I	+(2)-3
<i>Diplophyllum albicans</i>		III	+(2)-5	<i>Sphagnum capillifolium</i>	I	+(3)-9
<i>Empetrum nigrum</i>		III	+(3)-8	<i>Juncus squarrosus</i>	I	+(3)-5
<i>Agrostis capillaris</i>		III	+(3)-5	<i>Trichophorum cesp./germanicum</i>	I	+(2)-5
<i>Hylocomium splendens</i>		III	+(2)-7	<i>Frullania tamarisci</i>	I	+(2)-3
<i>Scapania gracilis</i>		III	+(2)-3	<i>Nardus stricta</i>	I	1-(2)-4
<i>Cladonia portentosa</i>		III	+(2)-7	<i>Cladonia furcata</i>	I	+(2)-3
<i>Dicranum scoparium</i>		III	+(2)-3	<i>Juniperus communis</i>	I	2-(3)-7
<i>Pleurozia purpurea</i>		II	+(3)-5	<i>Lophozia ventricosa</i>	I	+(2)-3
<i>Pleurozium schreberi</i>		II	+(2)-5	<i>Rhytidiadelphus squarrosus</i>	I	+(2)-3
<i>Huperzia selago</i>		II	+(2)-3	<i>Breutelia chrysocoma</i>	I	+(2)-5
<i>Cladonia arbuscula</i>		II	+(2)-7	<i>Carex panicea</i>	I	+(2)-5

**Affinities ⑤**

GHI: HH4 Montane heath ⑥

ZM: AC01A Loiseleurio procumbentis-Vaccinion Br.-Bl. in Br.-Bl. et Jenny 1926 ⑦

EUNIS: F2.251 Hiberno-Scotian dwarf mountain heaths ⑧

NVC: H12a *Calluna vulgaris*-*Vaccinium myrtillus* heath *Calluna vulgaris* sub-community (57.7%), but also H14c *Calluna vulgaris*-*Racomitrium lanuginosum* heath *Arctostaphylos uva-ursi* sub-community (56.5%) ⑨

Annex I:4060 Alpine and subalpine heath ⑩

**Proxy environmental data ⑪**

Light: 6.9 Reaction: 2.2 Wetness: 5.3 Fertility: 1.7 Salinity: 0.0

**Conservation value ⑫**

Almost all of the examples of this vegetation qualify as EU HD Annex I habitat 4060 Alpine and subalpine heath. This is on average a heath community of middling diversity (species/4 m<sup>2</sup> = 18.7, *n* = 209).

**Management ⑬**

These heaths, which often form parts of commonages, may be used as rough grazing land (typically for sheep) and overgrazing can be a problem. Climate change threatens arctic-alpine species which are restricted to montane communities such as this.

**Key references ⑭**

Hodd, R. (2012) A study of the oceanic montane vegetation and bryophyte communities of Western Ireland and their potential response to climate change. (Ph.D. thesis). National University of Ireland Galway.

Perrin, P.M., Barron, S.J., Roche, J.R., O'Hanrahan, B. (2014) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. *Irish Wildlife Manuals* No. 79. National Parks and Wildlife Service, Dublin. [*and associated series of site reports from the National Survey of Upland Habitats*]

⑮ **Synopsis version:** V2.2      **Synopsis date:** August 2024      **Synopsis author(s):** P.M. Perrin

Figure 3. Second page of an IVC community synopsis with annotations.

## Second page

- 1 **Synoptic table:** This table presents frequency and cover abundance data for the 40 species most frequently recorded in the community (or all the species recorded for the community if there are less than 40 of these). The sample size denotes the number of plots on which the data are based.
- 2 **Species:** The scientific name of each species or taxon is listed in order of decreasing frequency. Species only occur once each- there are not separate entries for the same species in different woodland strata, for example.
- 3 **Frequency:** Frequency is the percentage of plots in which each species occurs, irrespective of its abundance within plots. Roman numerals here represent the frequency of each species where I = 0.1-20.0%, II = 20.1-40.0%, III = 40.1-60.0%, IV = 60.1-80.0% and V = 80.1- 100.0%.
- 4 **Cover:** Numbers here represent the minimum, median and maximum cover abundance of each species amongst the plots in which it occurs; this approach follows that of Stevens et al. (2010). A version of the Domin scale is used for simplicity (Table 5).
- 5 **Affinities:** In this section, correspondence between the IVC community and categories of five other classification systems are provided. Note that these are seldom one-to-one relationships and other categories not listed may also be relevant.
- 6 **GHI:** Listed here are the main corresponding categories of *A Guide to Habitats in Ireland* (Fossitt, 2000) in alphabetical order.
- 7 **ZM:** Listed here are corresponding alliances of the Zürich-Montpellier school of phytosociology founded by Braun-Blanquet; for a description of this phytosociological method, see Kent (2012). For details of how correspondence was decided upon, see p. 126.
- 8 **EUNIS:** Listed here are corresponding categories of the EUNIS (European Nature Information System) habitat classification system<sup>5</sup>: <https://eunis.eea.europa.eu/habitats-code-browser.jsp>

**Table 5.** Version of Domin scale used to express cover abundance of species in the community synopses.

Domin	Percentage range
10	>90.00%
9	75.01 - 90.00%
8	50.01 - 75.00%
7	33.01 - 50.00%
6	25.01 - 33.00%
5	10.01 - 25.00%
4	4.01 - 10.00%
3	1.01 - 4.00%
2	0.51 - 1.00%
1	0.31 - 0.50%
+	0.01 - 0.30%

- 9 **NVC:** Listed here are corresponding communities and sub-communities of the British National Vegetation Classification (NVC) (Rodwell, 1991a, 1991b, 1992, 1995, 2000). Correspondence was calculated statistically using the MAVIS (Modular Analysis of Vegetation Information System) Plot Analyser v1.04 (Centre for Ecology and Hydrology, UK). The top match is given with a percentage score indicating how good the correspondence is. Other matches with high scores are also occasionally given if they are deemed relevant (as in the example).
- 10 **Annex I:** Listed here are corresponding habitats of Annex I of the EU Habitats Directive that are worth considering. The interpretation of these habitats in an Irish context can change over time, so it is important to always go back to the current definition of the habitat and make an independent decision.
- 11 **Proxy environmental data:** Ellenberg values are indices which express a species' environmental preferences. Presented here are data for five indices: Light, which uses a scale of 0 (deep shade) to 9 (full light); Reaction (or acidity), which uses a scale of 0 (very acidic) to 9 (basic); Wetness, which uses a scale of 0 (very dry) to 12 (submerged); Fertility, which uses

<sup>5</sup> The EUNIS classification is currently being revised, but revised information is only available for a few groups so we have used categories from the original classification for all synopses.

a scale of 0 (very infertile) to 9 (enriched); and Salinity, which uses a scale of 0 (salt intolerant) to 9 (strongly salt tolerant). We used the values calibrated for plants in Ireland and Britain (Hill et al., 2004, 2007) and calculated for each plot the mean value for each index based on the plants present, weighted by cover abundance. The figures presented are the means of these values for all plots which define the community.

- 12 **Conservation value:** An indication of the species richness of the community is often given here in the context of communities from similar habitats, together with some further details on corresponding Annex I habitats and any associated rare species.
- 13 **Management:** Some brief notes are presented here on the typical management of the community and the main threats and pressures.
- 14 **Key references:** Listed here are the reports, theses and other documents from which the majority of the plot data that define the habitat are derived.
- 15 **Synopsis version and date:** Because individual synopses are updated as new data become available (and any oversights are spotted), the version number and date enable users to keep track of exactly which version of the community description they are dealing with.

### Third page

On the third page of the synopses some photographs of the community are presented if they are available, together with location information, date and a photo credit. Most of the photographs specifically represent the location of a plot that has been assigned to community, but expert judgement has been used in selecting a few others. For several communities, suitable photographs are still required.



Figure 4. Third page of an IVC community synopsis.

## Using ERICA

In this section, we describe how to use the ERICA software application for analysing your own vegetation data. ERICA is based on the same statistical methodology used to create the classification so some understanding of this (see p. 16) will help users get the most out of their results. Much of the information related here can also be found in the User's Manual that can be downloaded from within ERICA.

### What is ERICA?

ERICA, which stands for 'Engine for Relevés to Irish Communities Assignment', is a web application for assigning your own vegetation data to communities defined by the IVC and can be freely accessed from the IVC homepage. The application has been produced using the 'shiny' package for the R statistical environment. Data can be uploaded, checked for errors and analysed and the results can then be downloaded. ERICA works with both quantitative vegetation cover data (such as are recorded in relevés and other types of botanical recording plots) and presence/absence data, such as species lists. Version 6.2 of ERICA covers all the communities in the current IVC. ERICA has been tested on platforms running Microsoft Windows 7 to 11 through Mozilla Firefox 121 Google Chrome 125 and Opera 110. Users on Android platforms may experience some loss of table formatting, but functionality seems unaffected.

### Preparing your data

When analysing data with a piece of software, half the battle is often getting your data into the correct format, so the following details are important. For them to be uploaded to ERICA, your data need to be in a simple but specific table format (Table 6) This can be achieved with most spreadsheet packages, including freeware.

	Juncus_ maritimus	Festuca_ rubra	Glaux_ maritima	Plantago_ maritima	...
Plot1	90	5	0.3	0	
Plot2	50	45	1	5	
Plot3	0	20	5	40	
....					

**Table 6.** Example of how data should be formatted for upload to ERICA.

The top left-hand cell of the spreadsheet must be left blank, but apart from this the first column should contain labels for your recording plots<sup>6</sup>. ERICA can analyse data from multiple plots – indeed hundreds of plots – at the same time or you can just analyse a single plot if you want. Any duplicate plot labels will be suffixed '.1', '.2', '.3' etc. by ERICA upon upload to differentiate them. Any plot labels starting with a number will be prefixed with an 'X' by ERICA.

The first row should contain the scientific names of the species recorded within these plots. ERICA does not allow you to have multiple columns with the same species name. Upon upload, a duplicate name is therefore suffixed in the table with '.1' on the second occurrence, '.2' on the third occurrence, and so forth. These names will be flagged as errors (see 'Data checks' below).

Quantitative data should be added to the tables as cover percentages, therefore if your data have been recorded using an ordinal scale, such as Domin, you will need to convert them. If you are entering species lists, use 1 and 0 to indicate presence and absence respectively.

The following important conventions should be observed when creating your data table:

1. Nomenclature in the IVC and ERICA follows that used in the Ireland2008 plant checklist produced by the National Biodiversity Data Centre, with some minor amendments. A checklist of the accepted nomenclature can be downloaded from the 'Info' tab within ERICA. Aggregates (e.g., *Euphrasia officinalis* agg., *Hieracium* agg.) and couplets (e.g., *Agrostis canina/vinealis*, *Trichophorum cespitosum/germanicum*) are used to overcome taxonomic difficulties.
2. When entering species names, single underscores should be used instead of spaces or hyphens between words, e.g., *Juncus\_effusus*, *Taraxacum\_officinale\_agg*, *Agrostis\_canina\_vinealis*, *Lychnis\_flos\_cuculi*.
3. Records should not be differentiated at the subspecies, variety or form level, e.g., enter all records for *Luzula multiflora*, *Luzula multiflora* ssp. *hibernica* and *Luzula multiflora* ssp. *congesta* as *Luzula\_multiflora*.
4. Data recorded only to the genus level, e.g., *Agrostis* sp., should be excluded.

<sup>6</sup> The term 'plot' is used in this section to denote the samples of vegetation but sample units could be defined by any reasonable means.

5. Records should not be differentiated by stratigraphical layer, enter only one value for each species in each plot.
6. All absences of species should be recorded as 0; do not leave any cells in the main table blank.
7. When you have finished compiling your data, you should save the file in comma-separated values format (it will have a .csv file extension).

## An overview of the interface

The interface of the application with the 'Info' tab open is shown in Figure 5 and below is an explanation of the various numbered components.

- 1 **Upload data:** Browse for the .csv file containing your data. The data need to be in a particular format: see the section 'Preparing your data' above. There is a file upload limit of just over 5000 KB.
- 2 **File information:** After a file is successfully uploaded, the size of the file, the type of data detected, the number of plots detected and the number of species detected are shown here. If the maximum number in the data table is 1, the data type is assumed to be 'Presence/absence', otherwise it is assumed to be 'Percentage cover'. Blank columns and rows are automatically deleted. Always check that the figures here match what you expected.
- 3 **Data checks:** ERICA conducts some basic checking of your data to highlight format errors before you attempt analysis and presents the results here. The following issues are checked for:
  - A. Species (columns) with non-numeric values (e.g., unconverted entries of '+' from the Domin scale)
  - B. Species that have missing values (i.e., empty cells), excluding species identified in step A
  - C. Species with negative values or (for quantitative data only) values greater than 100, excluding species identified in steps A and B
  - D. Species names that do not match any species name in the IVC checklist

As well as the number of species detected by each check, a list of the highlighted species is given (in the example, *Cirsium arvense* has been spelt incorrectly). Note that due to the sequential nature of checks A to C, there may be, for example, species flagged for non-numeric values that also have missing values.

Any duplicate species names that have been suffixed as '.1', '.2' etc. will be highlighted by check D as the suffixed names do not occur in the checklist. Thus if 'Sphagnum\_capillifolium.1' is listed as a highlighted species, this means that you have (at least) two columns of data labelled 'Sphagnum\_capillifolium'.

All problems identified by checks A to C need to be resolved before analysis is conducted. For species highlighted by check D, you need to ensure that exactly the correct nomenclature and spelling have been used; refer to the species checklist for assistance. The analysis can still be conducted if you have genuinely recorded a species not on the checklist, but this will be unusual.

- 4 **Export:** Clicking this button will download a .csv file listing the species highlighted because of errors (see 3), which may be helpful if there are several problems. The file also tells you which of the checks has highlighted each species.
- 5 **Analyse:** Clicking this button will start the analysis and a progress bar will appear. A handful of plots will only take a few seconds to analyse. If you have a couple of thousand plots, it may take about 25 minutes.
- 6 **Download:** Clicking this button after running the analysis will download a .csv file with the full set of results. This file contains more detail than is shown within the application as it contains, for each plot, the membership values for all IVC communities.
- 7 **ERICA manual:** Clicking this button will download a copy of the most recent manual in the case that this handbook is not to hand.
- 8 **Example data:** Clicking this button will download a .csv file with an example dataset of grassland plots.
- 9 **Species list:** Clicking this button will download a list of the accepted species names.

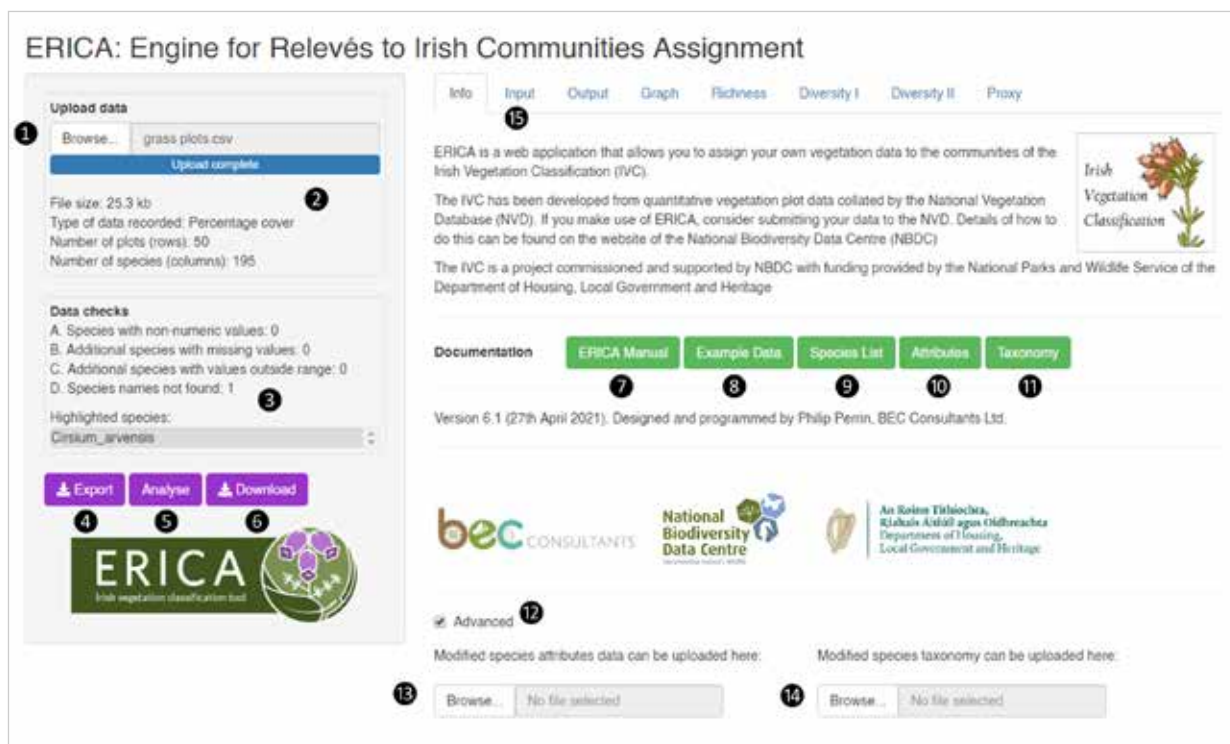


Figure 5. Interface and Info tab for the ERICA application with annotations.

- 10 **Attributes:** Clicking this button will download a .csv file with the reference data on rarity, native status and taxon group that is used by some of the ancillary analyses.
- 11 **Taxonomy:** Clicking this button will download a .csv file with the taxonomic reference data used by one of the ancillary analyses.
- 12 **Advanced:** Ticking this checkbox reveals two further options (see 13 and 14) that are less likely to be needed.
- 13 **Modified species attributes:** If you have downloaded the reference data on rarity, native status and taxon group (see 10), you can modify it as you see fit; it is important that the data format is maintained as no error checks are performed. For example, when working with datasets containing species that are regarded as native in only certain parts of Ireland, you may want to check that the reference data are valid for your area of study. Here you can browse for a .csv file containing the modified data and upload it. It will be used instead of the default file. Note that, if a modified dataset is used, comparisons with the results of other studies may not be valid.

- 14 **Modified species taxonomy:** If you have downloaded the taxonomic reference data (see 11), you can modify it as you see fit; it is important that the data format is maintained as no error checks are performed. Here you can browse for a .csv file containing the modified data and upload it. It will be used instead of the default file. Taxonomic diversity is only calculated if taxonomic data are available for all input species, so this upload facility allows you to append data for any missing species. Note that, if a modified dataset is used, comparisons with the results of other studies may not be valid.
- 15 **Input tab:** The uploaded data table is displayed under here (see example in Figure 6). As with the other tables displayed by ERICA, the widget at the top left allows you to choose how many plots are shown at one time (10, 25, 50 or 100), whilst the table section numbers at the bottom right allow you to move through the table. Note that when values greater than 10 are selected in the widget a vertical scroll bar is activated. The table can be sorted in ascending or descending order of the values for any of the species (but note that it cannot be reset to default order). The search box enables you to filter the table based on cover values. To remove the filter, just delete the contents of the search box. The search box does not search within plot labels or species names.

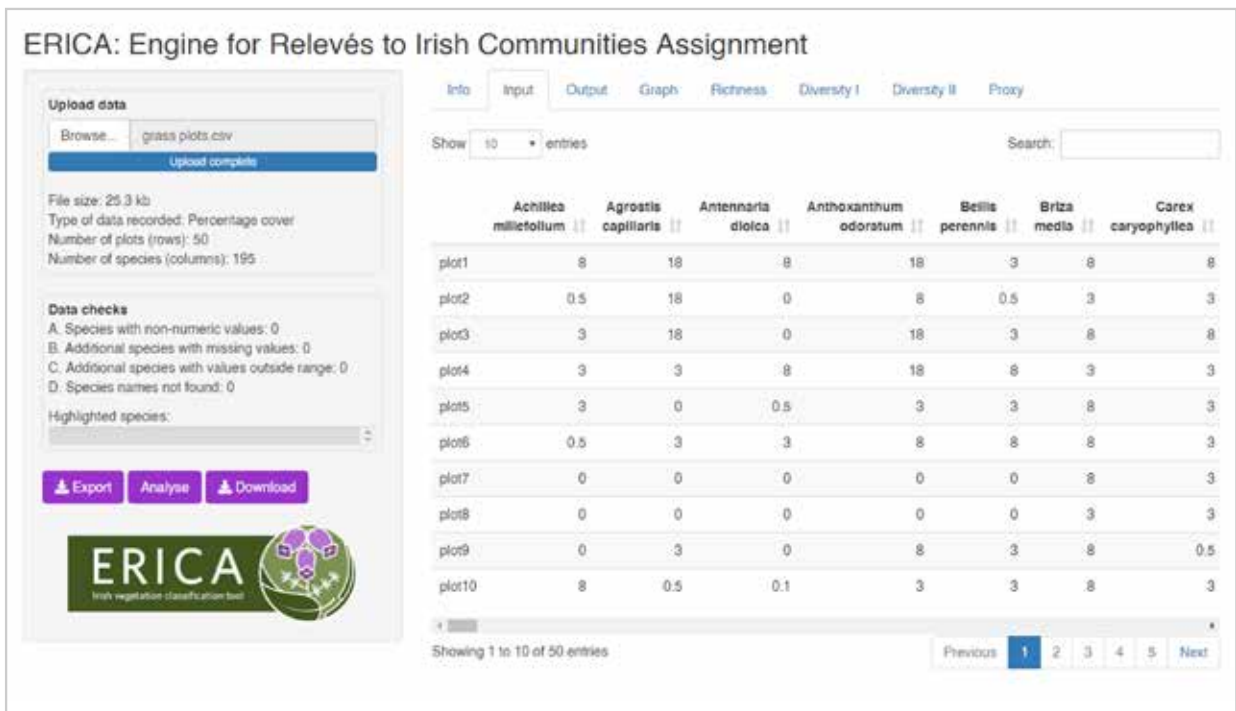


Figure 6. Input tab of ERICA displaying uploaded data.

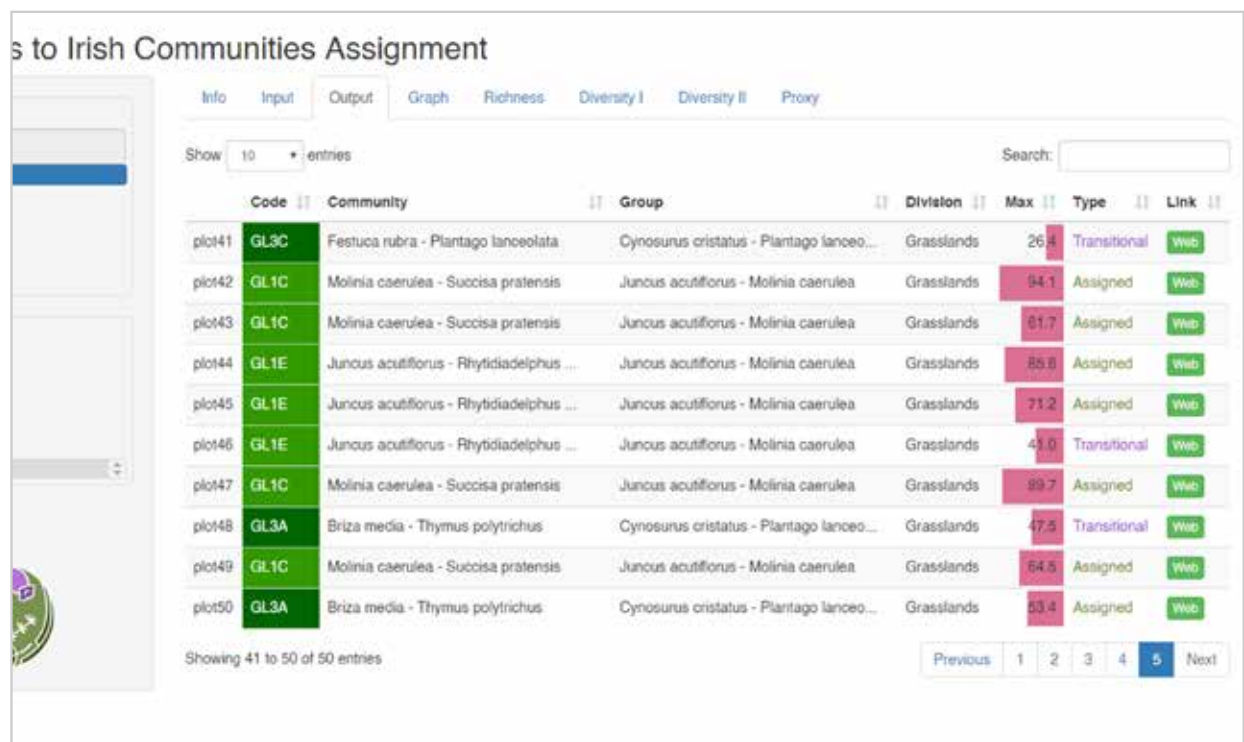


Figure 7. Output tab of ERICA displaying the main analysis results.

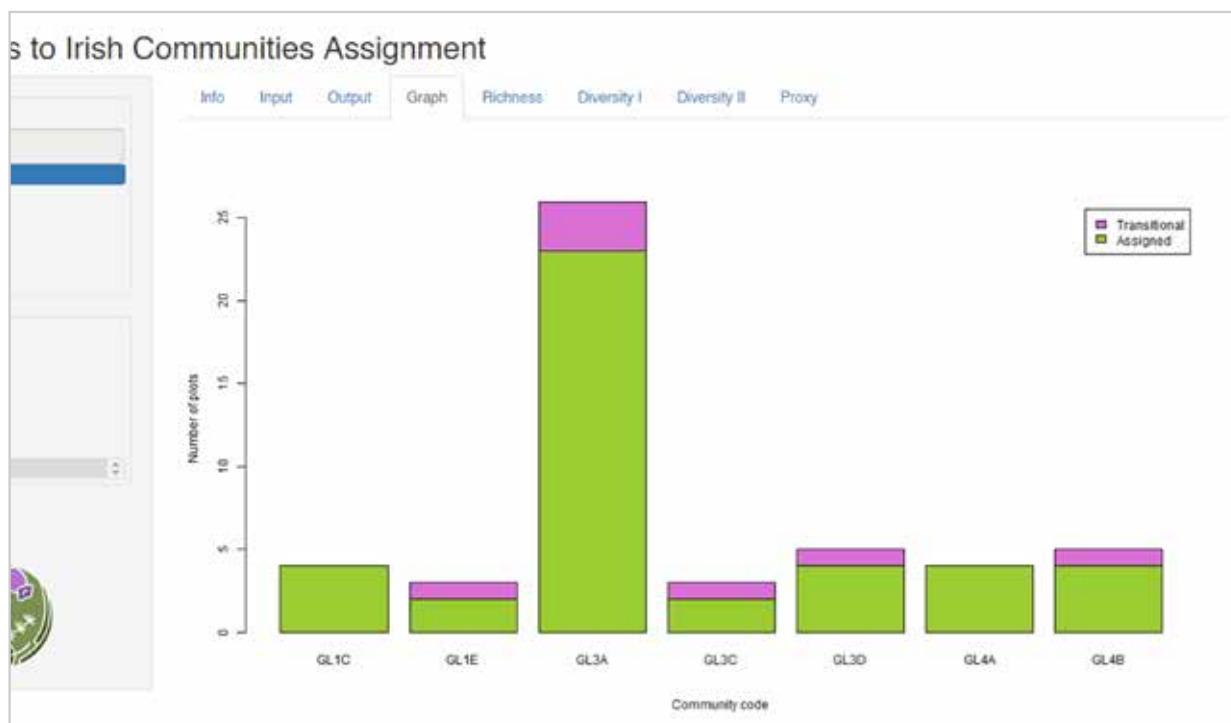


Figure 8. Graph tab of ERICA displaying overview of the main analysis results.

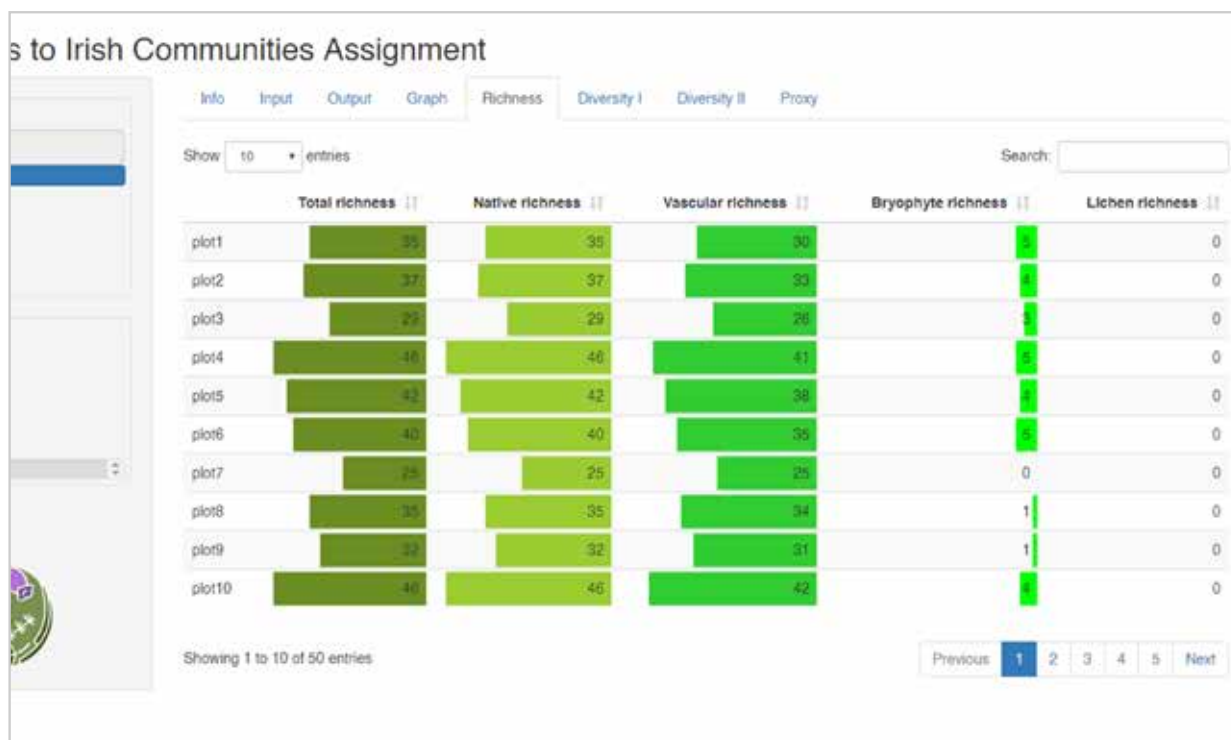


Figure 9. Richness tab of ERICA displaying species richness data.

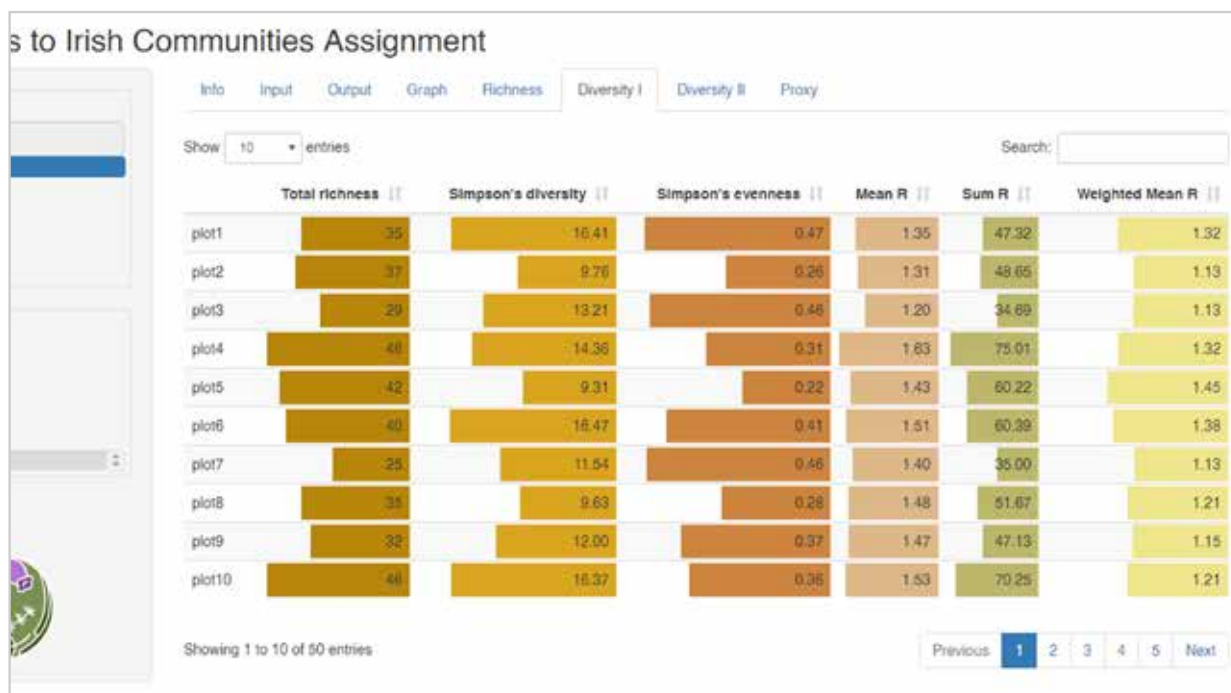


Figure 10. Diversity I tab of ERICA displaying species diversity and species rarity indices

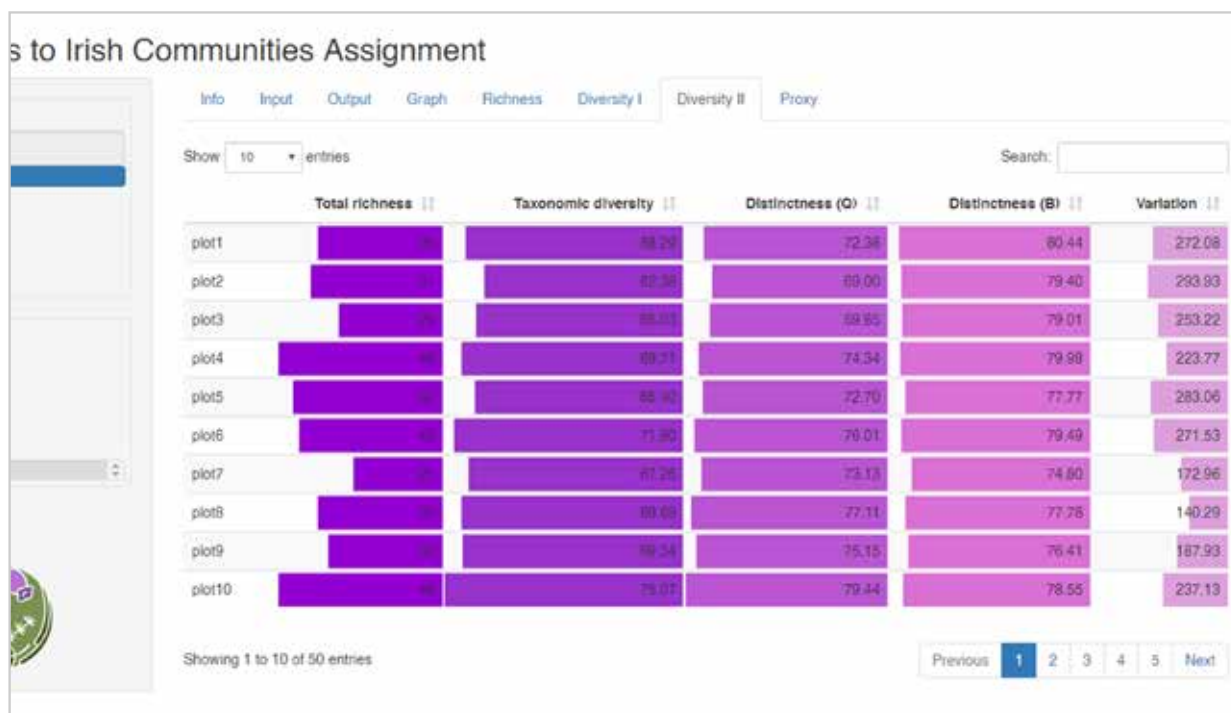


Figure 11. Diversity II tab of ERICA displaying taxonomic diversity indices.



Figure 12. Proxy tab of ERICA displaying mean Ellenberg values weighted by cover abundance.

## Interpreting the results

Once the analysis has been completed, the results are displayed in a series of six tabs. Remember that all results can be saved using the download button (see 6 in the previous section).

**Output:** This tab presents the results of the main assignment analysis (see example in Figure 7). Under 'Max' in the table is the maximum membership value for each plot, and under 'Code' is the code of the community for which each maximum membership value<sup>7</sup> was calculated. The names of the 'Community', 'Group' and 'Division' relating to each code are presented. The table can be navigated, ordered and searched as before. The 'Link' column provides a series of buttons, each of which links to the relevant community description page on the National Biodiversity Data Centre website. You can mouse over truncated entries to see the full text and mouse over the column headings for reminders of what each represents.

If a plot has a 'Max' value of 50% or more for a community it is labelled as 'Assigned' in the 'Type' column. If a plot has a 'Max' value of 50% or more but has been placed in the noise class (which captures outliers) it is labelled as 'Unassigned' in this column. If a plot has a 'Max' value of less than 50 it is labelled as 'Transitional'. Caution should be exercised in interpreting transitional results,

especially when the 'Max' value is particularly low, and it would be wise to download the full results table to see what communities have the second or even third highest membership values.

For example, plot 42 in Figure 7 has a high maximum membership value of 94.1% and this is for the **GL1C** *Molinia caerulea - Succisa pratensis* grassland community. This plot is labelled as 'Assigned' and **GL1C** can be regarded as a good match to the plot data. Plot 46, in contrast, has a maximum membership of only 41.0% and this is for **GL1E** *Juncus acutiflorus - Rhytidadelphus squarrosus* grassland. It is thus labelled as 'Transitional'. Looking at the full results table, it is seen that the second highest membership value for that plot is 25.2% for **GL1D** *Molinia caerulea - Potentilla erecta - Agrostis stolonifera* grassland. Depending upon the project at hand, it may be desirable to (i) treat this plot as **GL1E** even though the score is a bit low; (ii) treat this plot as transitional or intermediate between **GL1E** and **GL1D**, perhaps mapping it using a 'GL1E/GL1D' category; or (iii) exclude the plot from subsequent analysis.

Note that the 50% threshold is arbitrary and you may, again depending upon the purpose of your analysis, wish to scrutinize 'Assigned' plots with values in the 50s or low 60s. Importantly, note also that 'Transitional' plots will not necessarily represent vegetation of lower

<sup>7</sup> As noted above, you should refer to p. 16 for details of analysis method. Membership values are presented in the table as percentages rather than values from 0 to 1.

conservation value or naturalness than 'Assigned' plots. Indeed, zones of natural transition between communities could be regarded as desirable in many landscapes prone to human interference. With that said, some of the IVC communities do represent degraded habitat types and if a plot is transitional to one of these it may signal an unwanted impact.

**Graph:** This tab gives you a simple overview of your results by displaying the frequency of plots assigned to each IVC community, broken down by 'Assigned', 'Unassigned' and 'Transitional' types (see example in Figure 8).

**Richness:** This tab presents five different values for richness (number of species): total species richness, native species richness, vascular plant richness, bryophyte richness and lichen richness. See example in Figure 9.

**Diversity I:** This tab presents some species diversity statistics for each plot (see example in Figure 10). For percentage cover datasets, values are given for the reciprocal form ( $1/D$ ) of Simpson's index of diversity (Eq. 1) where  $p_i$  is the proportion of species  $i$  and  $S$  is the number of species. This index emphasizes dominance, which is defined by Magurran (2004), who recommends the use of this index, as 'the extent to which one or a few species dominate the community'. Simpson's measure of evenness (Eq. 2) is also presented for percentage cover datasets. Evenness is a measure of how similar species are in their abundances and thus contrasts with dominance. Conventional wisdom equates high diversity with high evenness and low dominance (Magurran, 2004).

Also presented are three related metrics of the conservation value of the vegetation in each plot, Mean R, Sum R and Weighted Mean R (only the first two are presented for presence/absence data). These metrics address the issue that species are not all equal in their perceived contributions to biodiversity, something that is overlooked by simple species richness. These indices are based on the co-efficient R which reflects species rarity at the hectad scale for Ireland. Species found all across Ireland (e.g., *Rubus fruticosus* agg.) have R values close to 1. Species found in only a few hectads in Ireland (e.g., *Carex depauperata*) have R values around 9. Non-native species (e.g., *Picea sitchensis*) have an R value of zero regardless of their rarity. Mean R is the mean of these R values for the species in a plot. Sum R is simply the sum

$$D = \sum_{i=1}^S p_i^2 \quad [1]$$

$$E = \frac{(1/D)}{S} \quad [2]$$

of the R values of all the species in a plot, a higher value indicating greater conservation value. Weighted Mean R is the mean of R values weighted by cover abundance. Therefore, for a given Sum R value, a sample dominated by a common species will have a lower Weighted Mean R value than a sample dominated by a rare species. Again, mouse over the column headings in the table for a brief explanation of the values. For full details on how these metrics are calculated see Perrin and Waldren (2020).

**Diversity II:** On this tab are presented indices of taxonomic diversity (see the example in Figure 11), a concept explained by Magurran (2004) as follows:

*'If two assemblages have identical numbers of species and equivalent patterns of species abundance, but differ in the diversity of taxa to which the species belong, it seems intuitively appropriate that the most taxonomically varied assemblage is the more diverse.'*

For percentage cover data, the taxonomic diversity index of Warwick and Clarke (1995) is given, a measure that combines species abundances with a component of taxonomic relatedness. It can be defined as the average taxonomic distance between any two randomly chosen individuals (in the case of our vegetation plots, imagine these being chosen using a point quadrat). For percentage cover data, the taxonomic distinctness index of Warwick and Clarke (1995) is also given under 'Distinctness (Q)', a measure that does not incorporate species abundances and is a pure measure of taxonomic relatedness. In the case of presence/absence data, both indices reduce to the same statistic (Clarke and Warwick, 1998) presented under 'Distinctness (B)' which is defined as the average taxonomic distance between any two randomly chosen species. The final column on this tab presents the variation in this second measure of distinctness (Clarke and Warwick, 2001).

Taxonomic distances between taxa are calculated from a reference table, with each basic taxon being a row and each column giving the classification at different taxonomic levels. Successive taxonomic levels are separated by steps of equal length; in previous versions of ERICA step length was relative to the proportional decrease in the number of classes (Clarke and Warwick, 1999). This has been changed to ensure that index values for individual plots remain consistent regardless of other plots in the dataset. See the above references for details of the equations.

The reference table classifies each basic taxon of the IVC checklist according to genus, family, order and subclass. For vascular plants, Stace (2019) was used to classify basic taxa according to genus and family. Some amendments were made to the families of angiosperms to comply with the Angiosperm Phylogeny Group IV (APG IV, 2016) which was used to determine the orders of these plants. National Biodiversity Network was used for the order of gymnosperms, ferns and fern allies. For bryophytes, genera, families and orders followed the 2009 checklist of the British Bryological Society. Subclasses for all plants followed Chase and Reveal (2009). Lichens were largely classified using National Biodiversity Network.

**Proxy:** When analysing quantitative data, this tab provides mean values for Ellenberg indicator values, weighted by percentage cover (see example Figure 12). See 'Proxy environmental data' on p. 23 for more details. You can mouse over the column headings for reminders of the indices.

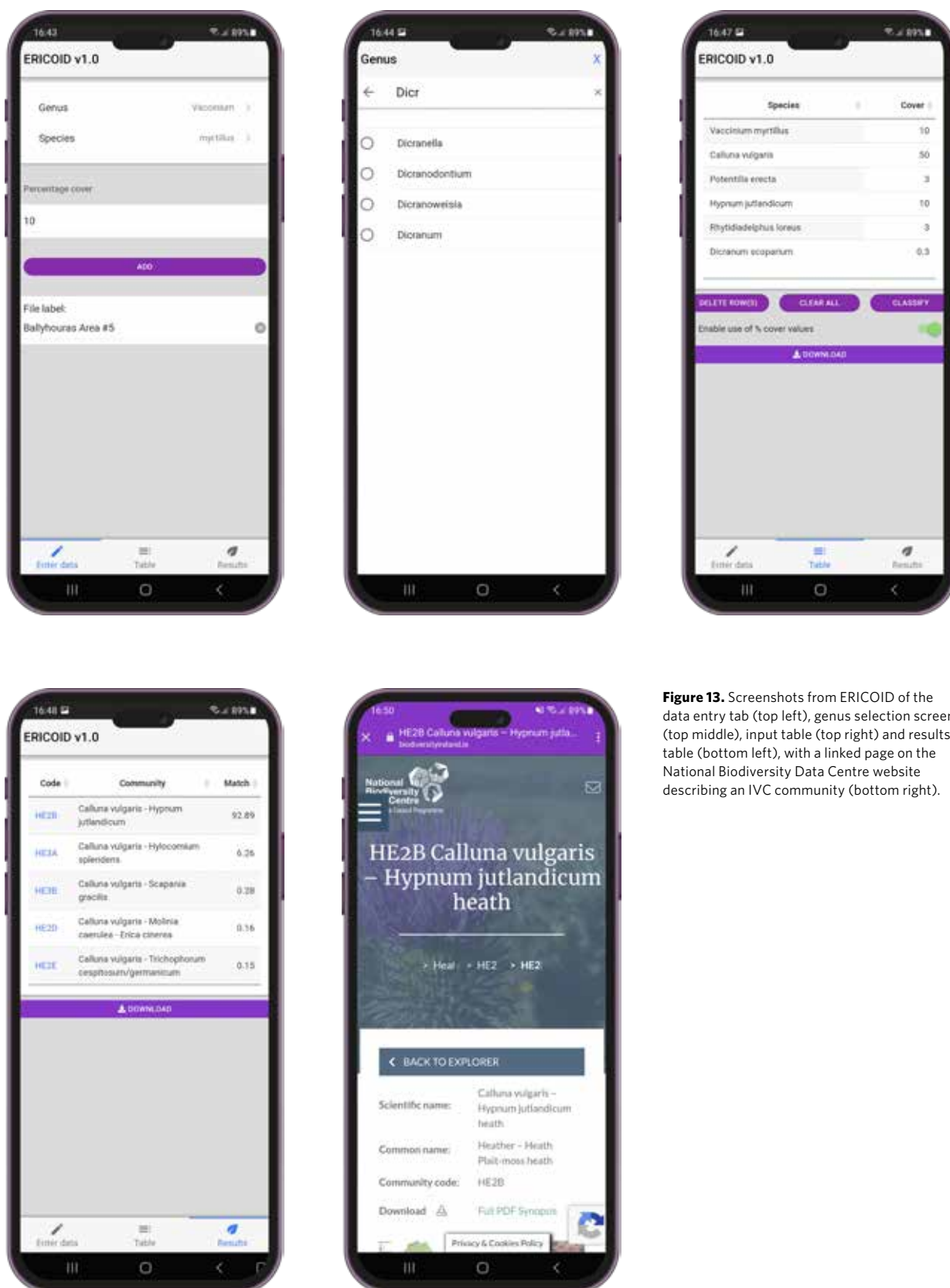
## Using ERICOID

ERICOID can be thought of as ERICA's more agile little sister. With its requirements for a correctly formatted comma-separated values (.csv) file, ERICA is primarily designed for use on PCs and tablets and for situations where the user has already recorded their data, potentially comprising numerous samples. This is not particularly helpful for users out in the field who may need some quick guidance on how to classify an area of vegetation using the IVC, perhaps as part of a mapping task. To address this need, the ERICOID progressive web application has been developed, optimised for use on mobile phones (see screenshots in Figure 13). ERICOID is short for 'ERICA for Android' but it should work on all mobile phone types. Like ERICA, it is a 'shiny' application built using R and can be accessed via the IVC homepage. The interface is optimised for use on mobile phones by using the 'shinyMobile' package which is built on top of the latest Framework7 template.

ERICOID includes the following features:

- Users can input a single vegetation sample and classify this to the IVC community level.
- Percentage cover scores can be entered but optionally presence-absence can be used.
- For each species entry, a genus is selected from a smart select drop-down list.
- Species epithets are selected from a drop-down list that is generated dynamically based on the genus.
- Individual species or all species can be deleted from the input table.
- Following analysis, the top five matches with IVC communities are displayed in order.
- Links in the results table redirect the user to the relevant community description on the National Biodiversity Data Centre website.
- Input tables and output tables can be downloaded separately as timestamped .csv files.
- A file label can be entered which will be added to any subsequently downloaded files.
- The application is easily deployed by following a link to the relevant webpage, then using "Add to Home Screen".

ERICOID is intended as a quick reference tool only — it lacks the facility to record environmental data or other associated information and deals with only one sample at a time. It is not intended as an alternative to vegetation recording software such as Turboveg or VegApp. Also, as ERICOID is a web application, a connection to the internet is required — in remote locations, such as the uplands, it may not function and if the connection to the server is lost due to an intermittent signal, inputted data will be lost.



**Figure 13.** Screenshots from ERICOID of the data entry tab (top left), genus selection screen (top middle), input table (top right) and results table (bottom left), with a linked page on the National Biodiversity Data Centre website describing an IVC community (bottom right).

## Keys to communities

The British NVC provides a key to communities for each of its major habitat types (e.g., Rodwell, 2000, p. 27) and a similar feature was thought to be a useful addition to the IVC toolbox alongside ERICA and ERICOID, especially as all botanists and most ecologists are already familiar with how to use such keys. However, there are obvious issues when attempting to reduce an inherently complex multivariate system down to a simple sequence of frequently dichotomous options. Indeed, it is worth here quoting the boilerplate text which accompanies the NVC keys (Ibid.):

*‘With something as complex and variable as vegetation, no key can pretend to offer an infallible short cut to diagnosis. The following should thus be seen as simply a crude guide ... and must always be used in conjunction with the data tables and community descriptions.’*

For technical details on how the IVC keys were constructed see Box 3. Using them is a two-step process. First, use the set of keys (1-6) included below to guide you to an appropriate group. Then, look up this group in Part II of the handbook and you will find a further key for its constituent communities. As discussed above, caution should be exercised when using these keys. This is particularly the case where no affirmative options are selected (for example, none of the specified species are present), as the user will default to the last option in the key. Note also that the invasive plants group, **IN1**, is not included in keys 1-6.

### Box 3: Production of the keys

All the keys (apart from Key 1) were produced using a method called ‘recursive partitioning’ available as part of the ‘rpart’ package for R (Thernau and Atkinson, 2019). This method seeks to correctly classify members of a dataset by recursively partitioning that dataset using a series of dichotomous splits based on individual independent variables. At each recursion, potential splits are assessed by measures of impurity (e.g., information index, Gini index) and the split with maximal impurity reduction is selected. In the case of our dataset, the variables were the percentage cover scores of individual species and impurity was reduced if splits resulted in clusters that were less heterogeneous in terms of groups or communities. Splits in the resulting decision trees were then translated into dichotomies in the keys. By varying the complexity parameter for each analysis, keys could be made more or less complex as appropriate, with longer keys being more accurate but increasingly cumbersome.

An example will help clarify the procedure. In Key 2, which deals with woodlands, forests and scrub (divisions **WL** and **SC**), the first split in the dataset selected by the analysis was whether the cover abundance of *Quercus*

*petraea* was greater than or equal to 13% because the affirmative branch from this split yielded a cluster that was 84% composed of **WL1** plots. The remaining cluster of plots, defined by the negatory branch, was then analysed to determine a second split. This was whether cover abundance of *Betula pubescens* was greater than or equal to 19% because the affirmative branch from this split yielded a cluster that was 84% composed of **WL4** plots. This recursive procedure continued until the point determined by the complexity parameter.

For each key, accuracy rates in cross-validation were calculated; all of the group level keys had accuracies over 80%. Some minor reworking to the keys was done for the sake of practicality. For example, **FE4** was added to the top of Key 6 as it was unused in the decision tree and some splits were combined into single dichotomies.

Within the keys, cover abundance thresholds from the analysis have been roughly transcribed using the following terms (sometimes with qualifiers): ‘dominant’ (for abundances  $\geq 50\%$ ), ‘abundant’ ( $< 50\%$  but  $\geq 20\%$ ), ‘very common’ ( $< 20\%$  but  $\geq 10\%$ ), ‘common’ ( $< 10\%$  but  $\geq 3\%$ ), ‘scarce’ ( $< 3\%$  but  $\geq 1\%$ ), ‘very scarce’ ( $< 1\%$ ). The terms ‘frequent’ and ‘occasional’, used in the DAFOR scale, have been avoided as these are used in the community synopses strictly to describe frequency and not cover abundance.

## Key 1 - Divisions

- |                                                                                                                                                                                                        |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1. Vegetation dominated by tall-growing woody species ( <i>woodlands, forestry and scrub</i> ) .....                                                                                                   | <b>Key 2</b> |
| Vegetation dominated by short-growing woody species, or herbaceous species, or is a mixture of both these types of species .....                                                                       | 2            |
| 2. Vegetation predominantly aquatic, comprising submerged, floating and/or emergent species ( <i>rivers, lakes, pools, ditches and coastal waters</i> ) .....                                          | <b>Key 3</b> |
| Vegetation predominantly terrestrial .....                                                                                                                                                             | 3            |
| 3. Vegetation of habitats with high cover of exposed rocks and minimal soil depth ( <i>cliff crevices and ledges, scree, limestone pavement, walls, mine-spoil and fellfield</i> ) .....               | <b>Key 4</b> |
| Vegetation of habitats with low or no cover of exposed rocks and typically deep soils .....                                                                                                            | 4            |
| 4. Vegetation of coastal ecosystems growing on deposits of sediments, sand or shingle ( <i>saltmarsh, duneland, strandline and shingle banks</i> ) .....                                               | <b>Key 5</b> |
| Vegetation of inland ecosystems or on the coast but not growing on deposits of sediments, sand or shingle ( <i>grassland, heaths, bogs, mires, fens, springs, weed and wayside communities</i> ) ..... | <b>Key 6</b> |

## Key 2 - Woodlands, forests and scrub

- |                                                                                       |                     |
|---------------------------------------------------------------------------------------|---------------------|
| 1. <i>Quercus petraea</i> very common to dominant .....                               | <b>WL1</b>          |
| <i>Quercus petraea</i> absent or if present then not very common .....                | 2                   |
| 2. <i>Betula pubescens</i> abundant to dominant .....                                 | <b>WL4</b>          |
| <i>Betula pubescens</i> absent or if present then not abundant .....                  | 3                   |
| 3. <i>Alnus glutinosa</i> common to abundant .....                                    | <b>WL3</b>          |
| <i>Alnus glutinosa</i> absent or if present then uncommon .....                       | 4                   |
| 4. <i>Thamnobryum alopecurum</i> present .....                                        | <b>WL2</b>          |
| <i>Thamnobryum alopecurum</i> absent .....                                            | 5                   |
| 5. <i>Picea sitchensis</i> and/or <i>Larix kaempferi</i> abundant to dominant .....   | <b>WL5</b>          |
| Neither <i>Picea sitchensis</i> nor <i>Larix kaempferi</i> abundant to dominant ..... | 6                   |
| 6. <i>Fraxinus excelsior</i> present .....                                            | 7                   |
| <i>Fraxinus excelsior</i> absent .....                                                | 8                   |
| 7. <i>Salix cinerea</i> abundant to dominant .....                                    | <b>WL3</b>          |
| <i>Salix cinerea</i> absent or if present then not abundant .....                     | <b>WL2</b>          |
| 8. <i>Thuidium tamariscinum</i> present .....                                         | 9                   |
| <i>Thuidium tamariscinum</i> absent .....                                             | 10                  |
| 9. <i>Luzula sylvatica</i> scarce to abundant .....                                   | <b>WL1</b>          |
| <i>Luzula sylvatica</i> absent or if present then very scarce .....                   | <b>WL2</b>          |
| 10. <i>Salix cinerea</i> very abundant to dominant .....                              | <b>WL3</b>          |
| <i>Salix cinerea</i> absent or if present then not very abundant .....                | <b>probably SC1</b> |

## Key 3 - Rivers, lakes, pools, ditches and coastal waters

- |                                                                                                                |            |
|----------------------------------------------------------------------------------------------------------------|------------|
| 1. <i>Fontinalis antipyretica</i> present .....                                                                | <b>FW2</b> |
| <i>Fontinalis antipyretica</i> absent .....                                                                    | 2          |
| 2. <i>Juncus bulbosus</i> present .....                                                                        | <b>FW1</b> |
| <i>Juncus bulbosus</i> absent .....                                                                            | 3          |
| 3. <i>Ruppia maritima/cirrhosa</i> (= <i>R. maritima/spiralis</i> ) and/or <i>Zostera marina</i> present ..... | 4          |
| <i>Ruppia maritima/cirrhosa</i> (= <i>R. maritima/spiralis</i> ) and <i>Zostera marina</i> absent .....        | 5          |

4.	<i>Potamogeton pectinatus</i> (= <i>Stuckenia pectinata</i> ) common to abundant .....	<b>FW2</b>
	<i>Potamogeton pectinatus</i> (= <i>Stuckenia pectinata</i> ) absent or if present then uncommon .....	<b>SW1</b>
5.	<i>Littorella uniflora</i> present .....	<b>FW1</b>
	<i>Littorella uniflora</i> absent .....	6
6.	<i>Potamogeton pectinatus</i> (= <i>Stuckenia pectinata</i> ) and/or <i>Rhynchosstegium riparioides</i> present .....	<b>FW2</b>
	Neither <i>Potamogeton pectinatus</i> (= <i>Stuckenia pectinata</i> ) nor <i>Rhynchosstegium riparioides</i> present .....	7
7.	<i>Najas flexilis</i> present .....	<b>FW1</b>
	<i>Najas flexilis</i> absent .....	<b>8</b>
8.	<i>Ranunculus penicillatus</i> present and/or <i>Potamogeton natans</i> common .....	<b>FW2</b>
	Neither <i>Ranunculus penicillatus</i> present nor <i>Potamogeton natans</i> common .....	9
9.	<i>Lobelia dortmanna</i> present .....	<b>FW1</b>
	<i>Lobelia dortmanna</i> absent .....	10
10.	<i>Nymphaea alba</i> and/or <i>Nuphar lutea</i> abundant to dominant and/or <i>Rorippa nasturtium-aquaticum</i> agg. present .....	<b>FW2</b>
	Vegetation not as above .....	<b>probably FW3</b>

#### Key 4 - Cliff crevices and ledges, scree, limestone pavement, walls, mine-spoil and fellfield

1.	<i>Sesleria caerulea</i> present .....	<b>RH1</b>
	<i>Sesleria caerulea</i> absent .....	2
2.	<i>Racomitrium lanuginosum</i> present .....	<b>RH2</b>
	<i>Racomitrium lanuginosum</i> absent .....	3
3.	<i>Asplenium ruta-muraria</i> present .....	<b>RH1</b>
	<i>Asplenium ruta-muraria</i> absent .....	4
4.	<i>Armeria maritima</i> present .....	5
	<i>Armeria maritima</i> absent .....	7
5.	<i>Plantago coronopus</i> present .....	<b>RH4</b>
	<i>Plantago coronopus</i> absent .....	6
6.	<i>Silene uniflora</i> present and/or <i>Cephaloziella stellulifera</i> very common .....	<b>RH3</b>
	Neither <i>Silene uniflora</i> present nor <i>Cephaloziella stellulifera</i> very common .....	<b>RH4</b>
7.	<i>Cephaloziella stellulifera</i> and/or <i>Dicranella varia</i> (= <i>D. howei/varia</i> ) present .....	<b>RH3</b>
	Neither <i>Cephaloziella stellulifera</i> nor <i>Dicranella varia</i> (= <i>D. howei/varia</i> ) present .....	8
8.	<i>Asplenium marinum</i> present .....	<b>RH4</b>
	<i>Asplenium marinum</i> absent .....	9
9.	<i>Neckera crispa</i> and/or <i>Parietaria judaica</i> present .....	<b>RH1</b>
	Neither <i>Neckera crispa</i> nor <i>Parietaria judaica</i> present .....	10
10.	<i>Silene uniflora</i> present .....	<b>RH3</b>
	<i>Silene uniflora</i> absent .....	<b>probably RH2</b>

## Key 5 - Saltmarsh, duneland, strandline and shingle banks

1.	<i>Galium verum</i> present .....	2
	<i>Galium verum</i> absent .....	3
2.	<i>Carex nigra</i> and/or <i>Hydrocotyle vulgaris</i> present and/or <i>Salix repens</i> abundant to dominant .....	<b>DU3</b>
	Neither <i>Carex nigra</i> nor <i>Hydrocotyle vulgaris</i> present nor <i>Salix repens</i> abundant to dominant .....	<b>DU2</b>
3.	<i>Puccinellia maritima</i> abundant to dominant.....	<b>SM2</b>
	<i>Puccinellia maritima</i> absent or if present then not abundant .....	4
4.	<i>Juncus maritimus</i> common to dominant .....	5
	<i>Juncus maritimus</i> absent or if present then uncommon .....	6
5.	<i>Succisa pratensis</i> present .....	<b>DU3</b>
	<i>Succisa pratensis</i> absent.....	<b>SM5</b>
6.	<i>Festuca rubra</i> very common to dominant.....	7
	<i>Festuca rubra</i> absent or if present then not very common.....	10
7.	<i>Ammophila arenaria</i> present .....	<b>DU2</b>
	<i>Ammophila arenaria</i> absent .....	8
8.	<i>Prunella vulgaris</i> present.....	<b>DU3</b>
	<i>Prunella vulgaris</i> absent .....	9
9.	<i>Plantago lanceolata</i> present.....	<b>DU2</b>
	<i>Plantago lanceolata</i> absent.....	<b>SM4</b>
10.	<i>Agrostis stolonifera</i> present.....	11
	<i>Agrostis stolonifera</i> absent .....	14
11.	<i>Calliergonella cuspidata</i> and/or <i>Carex arenaria</i> present .....	<b>DU3</b>
	Neither <i>Calliergonella cuspidata</i> nor <i>Carex arenaria</i> present.....	12
12.	<i>Elytrigia repens</i> (= <i>Elymus repens</i> ) very abundant to dominant .....	<b>SM7</b>
	<i>Elytrigia repens</i> (= <i>Elymus repens</i> ) absent or if present then not very abundant.....	13
13.	<i>Prunella vulgaris</i> present.....	<b>DU3</b>
	<i>Prunella vulgaris</i> absent .....	<b>SM6</b>
14.	<i>Plantago maritima</i> common to dominant .....	15
	<i>Plantago maritima</i> absent or if present then uncommon .....	17
15.	<i>Juncus gerardii</i> dominant.....	<b>SM6</b>
	<i>Juncus gerardii</i> absent or if present then not dominant .....	16
16.	<i>Atriplex portulacoides</i> very abundant to dominant .....	<b>SM2</b>
	<i>Atriplex portulacoides</i> absent or if present then not very abundant.....	<b>SM3</b>
17.	<i>Ammophila arenaria</i> present .....	18
	<i>Ammophila arenaria</i> absent .....	19
18.	<i>Syntrichia ruraliformis</i> present.....	<b>DU2</b>
	<i>Syntrichia ruraliformis</i> absent.....	<b>DU1</b>
19.	<i>Elytrigia juncea</i> (= <i>Elymus junceiformis</i> ) present .....	20
	<i>Elytrigia juncea</i> (= <i>Elymus junceiformis</i> ) absent.....	21
20.	<i>Honckenya peploides</i> present.....	<b>ST1</b>
	<i>Honckenya peploides</i> absent .....	<b>DU1</b>
21.	<i>Atriplex portulacoides</i> abundant to dominant.....	<b>SM2</b>
	<i>Atriplex portulacoides</i> absent or if present then not abundant .....	22
22.	<i>Salicornia</i> agg. present.....	23
	<i>Salicornia</i> agg. absent.....	26
23.	<i>Puccinellia maritima</i> common.....	24
	<i>Puccinellia maritima</i> absent or if present then uncommon .....	<b>SM1</b>

<b>24.</b> <i>Armeria maritima</i> very common to dominant.....	<b>SM3</b>
<i>Armeria maritima</i> absent or if present then not very common.....	25
<b>25.</b> <i>Spartina</i> agg. abundant to dominant.....	<b>SM1</b>
<i>Spartina</i> agg. absent or if present then not abundant.....	<b>SM2</b>
<b>26.</b> <i>Spartina</i> agg. abundant to dominant.....	<b>SM1</b>
<i>Spartina</i> agg. absent or if present then not abundant.....	27
<b>27.</b> <i>Juncus gerardii</i> and/or <i>Bolboschoenus maritimus</i> present.....	<b>SM6</b>
Neither <i>Juncus gerardii</i> nor <i>Bolboschoenus maritimus</i> present.....	28
<b>28.</b> <i>Puccinellia maritima</i> present.....	29
<i>Puccinellia maritima</i> absent.....	30
<b>29.</b> <i>Armeria maritima</i> very common to abundant.....	<b>SM3</b>
<i>Armeria maritima</i> absent or if present then not very common.....	<b>SM2</b>
<b>30.</b> <i>Trifolium repens</i> present.....	<b>DU3</b>
<i>Trifolium repens</i> absent.....	31
<b>31.</b> <i>Elytrigia repens</i> (= <i>Elymus repens</i> ) and/or <i>Elytrigia atherica</i> (= <i>Elymus athericus</i> ) very abundant to dominant.....	<b>SM7</b>
Neither <i>Elytrigia repens</i> (= <i>Elymus repens</i> ) nor <i>Elytrigia atherica</i> (= <i>Elymus athericus</i> ) very abundant to dominant.....	<b>probably ST1</b>

## Key 6 - Grassland, heaths, bogs, mires, fens, springs, weed and wayside communities

<b>1.</b> <i>Philonotis fontana</i> and/or <i>Palustriella commutata</i> present.....	<b>FE4</b>
Neither <i>Philonotis fontana</i> nor <i>Palustriella commutata</i> present.....	2
<b>2.</b> <i>Plantago lanceolata</i> present.....	3
<i>Plantago lanceolata</i> absent.....	11
<b>3.</b> <i>Juncus acutiflorus</i> present.....	<b>GL1</b>
<i>Juncus acutiflorus</i> absent.....	4
<b>4.</b> <i>Cynosurus cristatus</i> present.....	<b>GL3</b>
<i>Cynosurus cristatus</i> absent.....	5
<b>5.</b> <i>Sesleria caerulea</i> common to abundant.....	<b>HE1</b>
<i>Sesleria caerulea</i> absent or if present then uncommon.....	6
<b>6.</b> <i>Anagallis arvensis</i> present.....	<b>WE1</b>
<i>Anagallis arvensis</i> absent.....	7
<b>7.</b> <i>Agrostis capillaris</i> abundant to dominant.....	<b>GL4</b>
<i>Agrostis capillaris</i> absent or if present then not abundant.....	8
<b>8.</b> <i>Dactylis glomerata</i> present.....	<b>GL3</b>
<i>Dactylis glomerata</i> absent.....	9
<b>9.</b> <i>Agrostis stolonifera</i> very common to abundant.....	<b>GL2</b>
<i>Agrostis stolonifera</i> absent or if present then not very common.....	10
<b>10.</b> <i>Molinia caerulea</i> present.....	<b>GL1</b>
<i>Molinia caerulea</i> absent.....	<b>GL3</b>
<b>11.</b> <i>Calluna vulgaris</i> present.....	12
<i>Calluna vulgaris</i> absent.....	27
<b>12.</b> <i>Erica tetralix</i> present.....	13
<i>Erica tetralix</i> absent.....	19
<b>13.</b> <i>Sphagnum capillifolium</i> (= <i>S. capillifolium/rubellum</i> ) common to abundant.....	<b>BG2</b>
<i>Sphagnum capillifolium</i> (= <i>S. capillifolium/rubellum</i> ) absent or if present then uncommon.....	14

14.	<i>Eriophorum angustifolium</i> present .....	15
	<i>Eriophorum angustifolium</i> absent.....	18
15.	<i>Calluna vulgaris</i> common to dominant.....	<b>BG2</b>
	<i>Calluna vulgaris</i> uncommon .....	16
16.	<i>Rhynchospora alba</i> common to dominant .....	<b>BG1</b>
	<i>Rhynchospora alba</i> absent or if present then uncommon.....	17
17.	<i>Trichophorum cespitosum/germanicum</i> abundant to dominant.....	<b>BG2</b>
	<i>Trichophorum cespitosum/germanicum</i> absent or if present then not abundant.....	<b>HE4</b>
18.	<i>Calluna vulgaris</i> abundant to dominant.....	<b>HE2</b>
	<i>Calluna vulgaris</i> not abundant.....	<b>HE4</b>
19.	<i>Vaccinium myrtillus</i> present .....	<b>HE3</b>
	<i>Vaccinium myrtillus</i> absent.....	20
20.	<i>Erica cinerea</i> present.....	21
	<i>Erica cinerea</i> absent.....	22
21.	<i>Racomitrium lanuginosum</i> common to dominant .....	<b>HE3</b>
	<i>Racomitrium lanuginosum</i> absent or if present then uncommon .....	<b>HE2</b>
22.	<i>Sesleria caerulea</i> present .....	<b>HE1</b>
	<i>Sesleria caerulea</i> absent.....	23
23.	<i>Calluna vulgaris</i> very abundant to dominant .....	24
	<i>Calluna vulgaris</i> not very abundant .....	25
24.	<i>Rhytidiadelphus loreus</i> present.....	<b>HE3</b>
	<i>Rhytidiadelphus loreus</i> absent.....	<b>HE2</b>
25.	<i>Agrostis capillaris</i> common to dominant.....	<b>GL4</b>
	<i>Agrostis capillaris</i> absent or if present then uncommon .....	26
26.	<i>Molinia caerulea</i> very abundant to dominant.....	<b>HE4</b>
	<i>Molinia caerulea</i> absent or if present then not very abundant.....	<b>BG2</b>
27.	<i>Menyanthes trifoliata</i> common to dominant.....	28
	<i>Menyanthes trifoliata</i> absent or if present then uncommon .....	29
28.	<i>Schoenus nigricans</i> very common to dominant.....	<b>FE1</b>
	<i>Schoenus nigricans</i> absent or if present then not very common.....	<b>FE2</b>
29.	<i>Agrostis stolonifera</i> common to dominant.....	30
	<i>Agrostis stolonifera</i> absent or if present then uncommon .....	33
30.	<i>Carex nigra</i> common to dominant.....	<b>FE3</b>
	<i>Carex nigra</i> absent or if present then uncommon .....	31
31.	<i>Juncus acutiflorus</i> very common to dominant .....	<b>GL1</b>
	<i>Juncus acutiflorus</i> absent or if present then not very common.....	32
32.	<i>Eleocharis palustris</i> present .....	<b>FE3</b>
	<i>Eleocharis palustris</i> absent.....	<b>GL2</b>
33.	<i>Agrostis capillaris</i> common to dominant.....	34
	<i>Agrostis capillaris</i> absent or if present then uncommon .....	35
34.	<i>Lolium perenne</i> very common to dominant.....	<b>GL3</b>
	<i>Lolium perenne</i> absent or if present then not very common .....	<b>GL4</b>
35.	<i>Campylium stellatum</i> present .....	<b>FE1</b>
	<i>Campylium stellatum</i> absent.....	36
36.	<i>Eriophorum angustifolium</i> present .....	37
	<i>Eriophorum angustifolium</i> absent.....	39

<b>37.</b> <i>Molinia caerulea</i> abundant to dominant .....	<b>HE4</b>
<i>Molinia caerulea</i> absent or if present then not abundant .....	38
<b>38.</b> <i>Carex panicea</i> present .....	<b>FE1</b>
<i>Carex panicea</i> absent .....	<b>BG1</b>
<b>39.</b> <i>Stellaria media</i> present .....	<b>WE1</b>
<i>Stellaria media</i> absent .....	40
<b>40.</b> <i>Eleocharis palustris</i> present .....	<b>FE3</b>
<i>Eleocharis palustris</i> absent .....	41
<b>41.</b> <i>Molinia caerulea</i> abundant to dominant .....	42
<i>Molinia caerulea</i> absent or if present then not abundant .....	43
<b>42.</b> <i>Filipendula ulmaria</i> and/or <i>Festuca rubra</i> present .....	<b>GL1</b>
<i>Filipendula ulmaria</i> and <i>Festuca rubra</i> absent .....	<b>HE4</b>
<b>43.</b> <i>Juncus acutiflorus</i> present .....	44
<i>Juncus acutiflorus</i> absent .....	45
<b>44.</b> <i>Rhytidadelphus squarrosus</i> abundant to dominant .....	<b>GL4</b>
<i>Rhytidadelphus squarrosus</i> absent or if present then not abundant .....	<b>GL1</b>
<b>45.</b> <i>Juncus effusus</i> abundant to dominant .....	<b>GL2</b>
<i>Juncus effusus</i> absent or if present then not abundant .....	46
<b>46.</b> <i>Rubus fruticosus</i> agg. present .....	<b>SC1</b>
<i>Rubus fruticosus</i> agg. absent .....	47
<b>47.</b> <i>Sesleria caerulea</i> common to dominant .....	<b>HE1</b>
<i>Sesleria caerulea</i> absent or if present then uncommon .....	48
<b>48.</b> <i>Trifolium repens</i> common to dominant .....	<b>GL3</b>
<i>Trifolium repens</i> absent or if present then uncommon .....	49
<b>49.</b> <i>Racomitrium lanuginosum</i> common to dominant .....	<b>HE3</b>
<i>Racomitrium lanuginosum</i> absent or if present then uncommon .....	50
<b>50.</b> <i>Poa annua</i> present .....	<b>WE1</b>
<i>Poa annua</i> absent .....	51
<b>51.</b> <i>Equisetum fluviatile</i> present .....	<b>FE2</b>
<i>Equisetum fluviatile</i> absent .....	52
<b>52.</b> <i>Carex nigra</i> very common to dominant .....	<b>FE3</b>
<i>Carex nigra</i> absent or if present then not very uncommon .....	53
<b>53.</b> <i>Rhytidadelphus squarrosus</i> present .....	<b>GL4</b>
<i>Rhytidadelphus squarrosus</i> absent .....	54
<b>54.</b> <i>Festuca rubra</i> present .....	<b>GL3</b>
<i>Festuca rubra</i> absent .....	55
<b>55.</b> <i>Molinia caerulea</i> present .....	56
<i>Molinia caerulea</i> absent .....	57
<b>56.</b> <i>Narthecium ossifragum</i> present .....	<b>BG1</b>
<i>Narthecium ossifragum</i> absent .....	<b>probably FE1</b>
<b>57.</b> <i>Juncus bufonius</i> present .....	<b>WE2</b>
<i>Juncus bufonius</i> absent .....	58
<b>58.</b> <i>Taraxacum officinale</i> agg. present .....	<b>WE1</b>
<i>Taraxacum officinale</i> agg. absent .....	59
<b>59.</b> <i>Lolium perenne</i> present .....	<b>GL2</b>
<i>Lolium perenne</i> absent .....	<b>probably SC1</b>

## General advice

When recording in the field, always try to identify and record bryophytes (mosses and liverworts). They are important components of many vegetation types, particularly in bogs and fens. Indeed, some of the IVC communities are essentially bryophyte communities, for example the **FW2A** *Fontinalis antipyretica* – *Myriophyllum alterniflorum* aquatic community and the **BG1A** *Sphagnum cuspidatum* – *Sphagnum subsecundum* agg. hollow. Identifying bryophytes can be difficult and time-consuming, so if you lack experience or resources at least try to identify the species that make up the bulk of the bryophytic cover, or take specimens for identification later. If possible, also record any macrolichen species.

If you are recording data from plots and intend to use those data to assign your vegetation to the classification (or to submit the data to the National Biodiversity Data Centre), try to use plot sizes appropriate for the scale of the vegetation. In woodlands — where it is important to note that all strata should be recorded, not just the field layer — plots of 10 m × 10 m work well with 5 m × 5 m plots probably the absolute minimum and plots of 20 m × 20 m the maximum. Below this range, plots are likely to not adequately sample the variation in the canopy, whereas above this range it becomes very difficult to accurately estimate cover scores. In scrub and tall swamps, plots of 5 m × 5 m are usually appropriate. In many habitats, such as grasslands, saltmarshes, dunelands, scree, bogs and fens, 2 m × 2 m plots are usually fine.

Don't get overly fixated on the habitat epithets in the names of communities and remember that the communities have been defined purely on floristic data. The intention of the epithets is primarily to give users a quick grasp of the usual context of the community, but other contexts may occur on occasion. For example, a community labelled as a 'heath' could occur on what, due to peat depth, you might consider habitat-wise as a bog, especially if the habitat has been burned or drained. Indeed, due to the close alignment of heath and bog vegetation, some communities have simply been called 'peatlands'. Likewise, don't expect all the species in the names of the communities to always be present. It is hard to conceive of the **IN1A** *Rhododendron ponticum* invasive community without *Rhododendron*, but it is certainly possible to have stands of **FE1D** *Juncus subnodulosus* – *Mentha aquatica* fen without *Mentha*.



# Further development

As has been discussed in previous sections, the IVC is intended to be a dynamic system that can be revised and improved as more data become available. This section briefly outlines where future efforts in gathering such data and making improvements could best be focussed.

## Improving floristic coverage

The IVC has good sample sizes for communities from many habitats, including semi-natural grassland, native woodland, saltmarsh, blanket bogs and heaths. Sample sizes tend to be smaller, however, for communities from habitats that are (i) perceived to be of low conservation value and thus unlikely to be the focus of funded surveys, and/or (ii) unpleasant or difficult to survey. These other communities include those of thorny scrub, forestry plantations, waysides, walls, disturbed ground, swamps, lake bottoms and both coastal and inland cliff faces. These communities are by no means rare; indeed, some can be regarded as commonplace and are likely to be regularly encountered during mapping exercises. Future projects and surveys should target these assemblages as additional data will help flesh out the descriptions of the current communities and/or form the basis for new communities and sub-communities. For example, casual observations in the field suggest that a community representing *Phalaris arundinacea* beds could be added if suitable data were gathered. Similarly, a *Pinus contorta* community would be an obvious addition to the woodland and forests division.

Data from rivers and streams is worthy of special mention in this context. As described on p. 15, the data currently used to define some of the aquatic communities (particularly those in the **FW2** *Ranunculus penicillatus* - *Fontinalis antipyretica* group) are sub-optimal due to the recording methodology used, as it may, amongst other things, conflate emergent vegetation near the banks or in backwaters with submerged or floating-leaf vegetation in the midchannel. Future projects and surveys should seek to record from rivers and streams data at the level of vegetation communities, as these could be used to replace or reinforce the current samples.

## Improving geographical coverage

The overall geographic coverage of the records selected for the analysis (Figure 1) is admirable. Nevertheless, perusal of the distribution maps for the individual communities reveals that several would benefit from additional data as they likely do not currently reflect true distribution patterns. This issue is, of course, partly linked to the sparsity of data for some communities (see comments above), but even for communities with reasonable sample sizes there may be gaps in the maps where one might reasonably expect those communities to occur. Future projects and surveys could target these areas. Additionally, in the case of two of the NVD datasets (NPWS 057, NUIG 019), many of the plots currently lack hectad-accurate co-ordinate data but with further effort it should be possible to remedy these shortcomings using extant sources.

Incorporation of vegetation plot data from Northern Ireland is another avenue that could be explored, allowing distribution patterns to be assessed for the whole island of Ireland. Northern Ireland includes geological formations absent or rare in the Republic, for example basalt and chalk, and it is possible that novel vegetation assemblages may occur in these areas. Whilst the NVC is regularly used in Northern Ireland, ecologists working there may still find it enlightening to have their data cast into the IVC framework.

## Other improvements

For some of the defined communities, field photographs of verified instances are lacking. These can be added to the community synopses over time as more field work is conducted. Data are also missing for some of the communities on landscape position (e.g., altitude and slope), edaphic conditions (e.g., soil pH and type), vegetation structure (e.g., field layer height) and physical conditions (e.g., cover of bare rock or soil). Future projects and surveys could seek to address these lacunae.

The need for a standardised nomenclature and the issues associated with this have already been discussed on pp. 13 and 19. Inevitably, some of the nomenclature within the Ireland2008 checklist itself has now been superseded. To remain user-friendly, future revisions of the IVC will need to update the nomenclature used or allow newer names to be used as synonyms within ERICA and ERICOID.

## Part II

# Bogs

**B**ogs are ombrogenous peatlands which, in the form of blanket bogs, cover large tracts of the Irish uplands and the western seaboard. Raised bogs were once found across a large area of the midlands, but only a limited number of sites remain unexploited by peat harvesting and thus exhibit typical bog assemblages. Much of the vegetation on bogs is composed of ericaceous dwarf shrubs, sedges and bog mosses. Several specialist species have adapted to cope with the wet, acidic and infertile conditions (e.g., sundews). As well as bogs proper, this division also includes some related assemblages of wet heaths. The bogs division is split into two groups on the basis of degradation and wetness of the communities. See Figure 17 in Part III, p. 125, for an example of how bog communities fit into the upland landscape.



## BG1 *Rhynchospora alba* – *Sphagnum cuspidatum* group

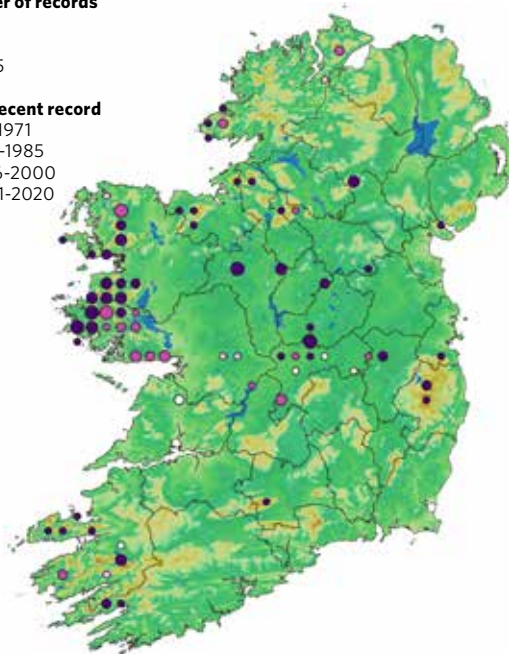
This group contains communities of eroded, heavily grazed or cutover bogs, bog hollows and depressions, acidic spring heads and the margins of ombrotrophic pools. The main vascular plants are *Rhynchospora alba*, *Eriophorum angustifolium*, *Molinia caerulea* and *Schoenus nigricans*, accompanied by *Calluna vulgaris*, *Drosera rotundifolia*, *Erica tetralix*, *Menyanthes trifoliata* and *Narthecium ossifragum*. *Sphagnum* cover ranges from very low in degraded areas to very high in hollows, depressions and pool margins. *Sphagnum cuspidatum*, *Sphagnum subsecundum* agg. (predominantly *Sphagnum denticulatum* = *S. auriculatum*) and *Sphagnum papillosum* are the most abundant species. Substrates are deep, acidic, ombrogenous peats.

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



1. *Rhynchospora alba* common to dominant ..... **BG1B**  
*Rhynchospora alba* absent or if present  
then uncommon..... 2
2. *Sphagnum cuspidatum* very common to  
dominant (*Sphagnum subsecundum* agg.  
usually also present)..... **BG1A**  
*Sphagnum cuspidatum* absent or if present  
then not very common..... 3
3. *Schoenus nigricans* present ..... **BG1C**  
*Schoenus nigricans* absent (*Eriophorum*  
*angustifolium* the main species)..... **BG1D**

BG1

## BG2 *Erica tetralix* – *Sphagnum capillifolium* group

This group comprises communities of relatively intact bogs, including both raised bogs and blanket bogs from the lowland to submontane zones. It also includes boggy vegetation from some peatlands that could be deemed wet heaths. Dwarf and prostrate shrub species are often abundant and include *Andromeda polifolia*, *Calluna vulgaris*, *Erica tetralix* and *Vaccinium oxycoccos*. The sedges *Eriophorum vaginatum*, *Schoenus nigricans* and *Trichophorum cespitosum/germanicum* can each dominate, while *Eriophorum angustifolium* is typically also present. *Drosera rotundifolia*, *Molinia caerulea*, *Potentilla erecta* and *Narthecium ossifragum* are the other usual herbaceous species to be seen. Bryophyte cover is characteristically high, and composed chiefly of *Sphagnum* spp. such as *Sphagnum capillifolium* (= *S. capillifolium/ rubellum*), *Sphagnum cuspidatum*, *Sphagnum tenellum*, *Sphagnum magellanicum* (= *Sphagnum divinum/medium*), *Sphagnum papillosum* and *Sphagnum subnitens*. Other bryophytes include *Aulacomnium palustre*, *Hypnum jutlandicum*, *Odontoschisma sphagni*, *Pleurozia purpurea* and *Racomitrium lanuginosum*. Substrates are deep, acidic, ombrogenous peats.



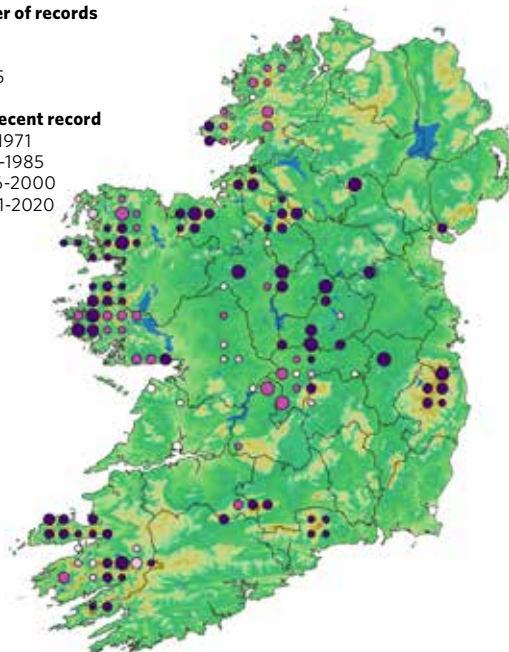
1. *Molinia caerulea* very common to dominant .....2  
*Molinia caerulea* absent or if present then not very common.....3
2. *Schoenus nigricans* common to dominant ..... **BG2D**  
*Schoenus nigricans* absent or if present then uncommon.....4
3. *Trichophorum cespitosum/germanicum* abundant to dominant..... **BG2F**  
*Trichophorum cespitosum/germanicum* absent or if present then not abundant.....5
4. *Trichophorum cespitosum/germanicum* abundant to dominant and *Sphagnum capillifolium* (= *S. capillifolium/rubellum*) absent or if present then not very common..... **BG2F**  
*Trichophorum cespitosum/germanicum* absent or if present then not abundant and/or *Sphagnum capillifolium* (= *S. capillifolium/rubellum*) very common to abundant..... **BG2C**
5. *Aulacomnium palustre* common to abundant..... **BG2A**  
*Aulacomnium palustre* absent or if present then uncommon.....6
6. *Andromeda polifolia* present ..... **BG2B**  
*Andromeda polifolia* absent.....7
7. *Eriophorum vaginatum* very common to dominant ..... **BG2E**  
*Eriophorum vaginatum* absent or if present then not very common.....8
8. *Schoenus nigricans* present ..... **BG2D**  
*Schoenus nigricans* absent (*Rhynchospora alba* and *Drosera rotundifolia* often present) ..... **BG2B**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



# Dunelands

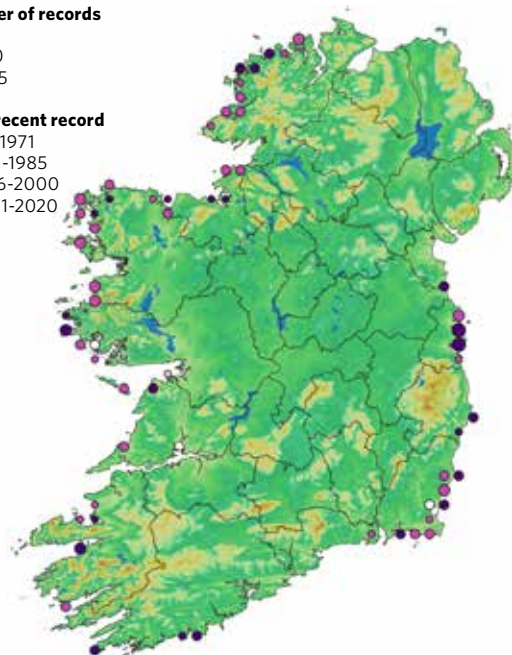
**D**unelands are dynamic ecosystems created by the accumulation and binding by plants of wind-blown sand and they occur around the Irish coastline where there are large sandy beaches. Duneland morphology and vegetation are zoned, with height, age and stability generally increasing as one moves away from the beach. Towards the front of a system are found the embryonic and mobile dunes where sand-loving (psammophilic) plants are particularly prevalent. Towards the back of a system are found semi-fixed dunes, fixed dunes, dune slacks and, along the western coast, machair plains. As well as dunelands proper, this division also includes some related assemblages from inland grasslands, such as seasonally flooded swards. The duneland division comprises three groups, ordered to represent a general progression from front to back of duneland systems. See Figure 15 in Part III, p. 124, for an example of duneland zonation.



## DU1 *Elytrigia juncea* – *Ammophila arenaria* group

This group consists of communities from embryonic dunes and mobile dunes. The vegetation is typically open with considerable areas of bare sand. The diversity of plants is generally low and the dominant species is one of *Elytrigia juncea* (= *Elymus junceiformis*), *Ammophila arenaria* or, much less often, *Leymus arenarius*. The strandline species *Atriplex prostrata*, *Honckenya peploides* and *Salsola kali* may be encountered towards the front of the dunes. On slightly more stable sands, one may occasionally spot *Festuca rubra*, *Hypochaeris radicata*, *Taraxacum officinale* agg. or *Senecio jacobaea* (= *Jacobaea vulgaris*).

- Number of records**
- 1-3
  - 4-10
  - 11-25
  - 26+
- Most recent record**
- pre-1971
  - 1971-1985
  - 1986-2000
  - 2001-2020



1. *Ammophila arenaria* very common to dominant.... **DU1B**  
*Ammophila arenaria* absent or if present then not very common (*Elytrigia juncea* = *Elymus junceiformis* or *Leymus arenarius* is the main species)..... **DU1A**

## DU2 *Festuca rubra* – *Galium verum* group

This group collects communities of semi-fixed dunes, fixed dunes and machair. These include types of dune grassland and similar vegetation can occur within inland grasslands. The main species are *Ammophila arenaria* and *Festuca rubra*. These are usually accompanied by forbs such as *Galium verum*, *Hypochaeris radicata*, *Lotus corniculatus*, *Thymus polytrichus* (= *T. drucei*) and *Trifolium repens*. Bryophytes are most abundant where there are some patches of bare sand, with *Homalothecium lutescens*, *Rhytidiadelphus squarrosus* and *Syntrichia ruraliformis* being the species most often found. The rather calcareous substrate is usually very sandy but some mor humus has often developed.

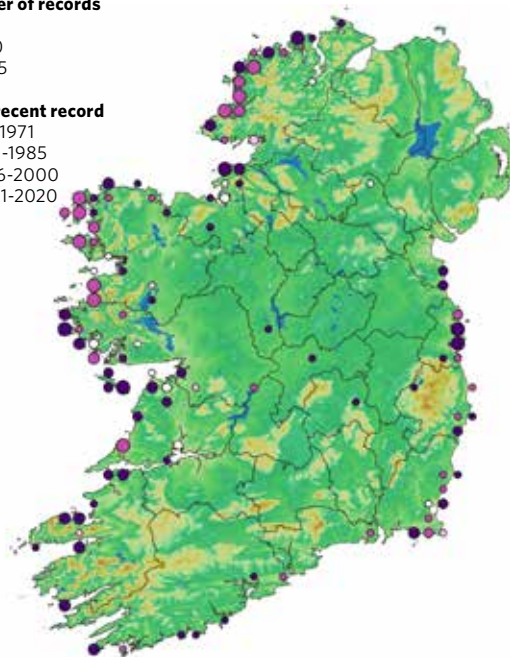
1. *Ammophila arenaria* very common to dominant .....2  
*Ammophila arenaria* absent or if present then  
not very common.....3
2. *Syntrichia ruraliformis* scarce to dominant ..... **DU2B**  
*Syntrichia ruraliformis* absent or if  
present very scarce.....4
3. *Thymus polytrichus* (= *T. drucei*) common to  
dominant ..... **DU2D**  
*Thymus polytrichus* (= *T. drucei*) absent or if present  
then uncommon.....5
4. *Thymus polytrichus* (= *T. drucei*) common  
to dominant ..... **DU2D**  
*Thymus polytrichus* (= *T. drucei*) absent or  
if present then uncommon ..... **DU2A**
5. *Festuca rubra* abundant to dominant  
and/or *Syntrichia ruraliformis* absent ..... **DU2C**  
*Festuca rubra* scarce to very common  
and *Syntrichia ruraliformis* present..... **DU2B**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



## DU3 *Agrostis stolonifera* – *Carex arenaria* group

Communities in this varied group mainly occur on somewhat disturbed or improved fixed dunes and machair plains and within and around dune slacks. The prostrate shrub *Salix repens* can be dominant, but graminoids are also prevalent, indeed also included here are some grassland assemblages from inland locations. The main graminoid species are *Agrostis stolonifera*, *Festuca rubra*, *Carex arenaria*, *Carex flacca* and *Carex nigra*. Other vascular plants include *Bellis perennis*, *Hydrocotyle vulgaris*, *Lotus corniculatus*, *Potentilla anserina*, *Prunella vulgaris*, *Succisa pratensis* and *Trifolium repens*. Some stands are seasonally inundated.

1. *Bellis perennis* present .....2  
*Bellis perennis* absent.....3
2. *Prunella vulgaris* present..... **DU3D**  
*Prunella vulgaris* absent (*Carex arenaria* usually present, *Carex flacca* usually absent)..... **DU3C**
3. *Calliergonella cuspidata* very common to dominant ..... **DU3B**  
*Calliergonella cuspidata* absent or if present then not very common .....4
4. *Succisa pratensis* present ..... **DU3E**  
*Succisa pratensis* absent.....5
5. *Salix repens* common to dominant ..... **DU3A**  
*Salix repens* absent or if present then uncommon .....2

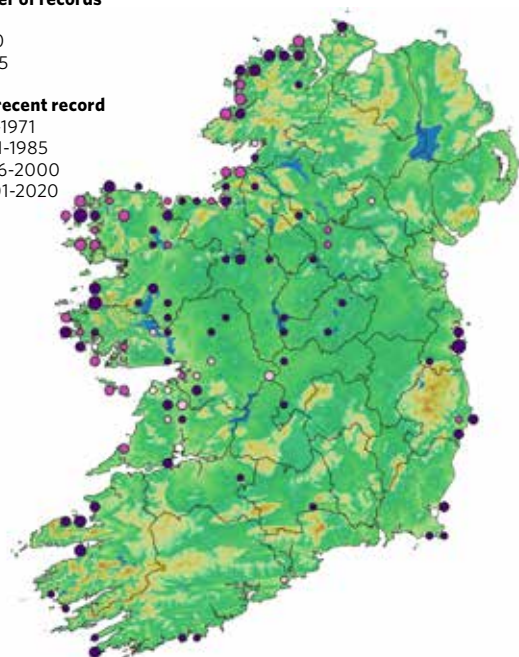


### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



# Fens, mires and springs

**F**ens, mires and springs are groundwater-fed wetland systems that are found across the country in lowland, upland and coastal landscapes, although their previous abundance has undoubtedly been reduced by the widespread introduction of drainage. The main species are typically sedges, forbs and bryophytes. Systems are usually peat-forming and conditions can range from acidic to circumneutral to base-rich. The fens division comprises four groups, three of which represent differences in acidity, whilst the fourth represents springs.



FE1



FE1

## FE1 *Schoenus nigricans* – *Campylium stellatum* group

This group comprises base-rich fens, flushes and flood meadows. The main vascular species include various small carices, such as *Carex echinata*, *Carex nigra*, *Carex panicea* and *Carex viridula* (= *C. flava* group), as well as *Anagallis tenella* (= *Lysimachia tenella*), *Juncus subnodulosus*, *Mentha aquatica*, *Molinia caerulea*, *Schoenus nigricans* and *Succisa pratensis*. Bryophytes include several of the so-called 'brown mosses' that are indicative of calcareous conditions, for example *Aneura pinguis* (actually a liverwort), *Campylium stellatum*, *Ctenidium molluscum*, *Drepanocladus cossonii/revolvens* (= *Scorpidium cossonii* and *S. revolvens*), *Fissidens adianthoides* and *Scorpidium scorpioides*. *Calliergonella cuspidata* is also often found. Substrates vary from deep fen peats to thin, sometimes rocky, flushed soils.

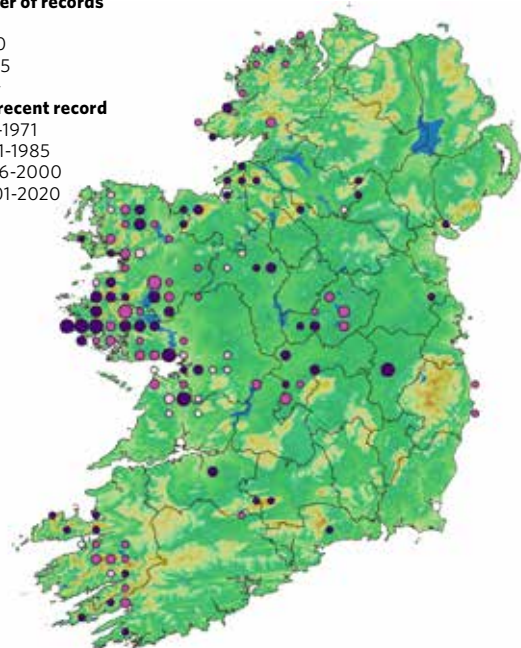
1. *Schoenus nigricans* quite common to dominant .....2  
*Schoenus nigricans* absent or if present then not so common.....3
2. *Potamogeton polygonifolius* present and/or *Scorpidium scorpioides* common to dominant and/or *Drosera rotundifolia* present..... **FE1A**  
Vegetation not as above ..... **FE1B**
3. *Juncus subnodulosus* very common ..... **FE1D**  
*Juncus subnodulosus* absent or if present then not very common (Small *Carex* species prevalent)..... **FE1C**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



## FE2 *Menyanthes trifoliata* – *Potentilla palustris* group

This group encompasses rather acidic mires (including quaking mires), flushes and soakways. The main vascular species include small- to medium-sized sedges (*Carex diandra*, *Carex rostrata*, *Carex lasiocarpa*, *Carex limosa*, *Eriophorum angustifolium*), *Equisetum fluviatile*, *Galium palustre*, *Menyanthes trifoliata*, *Mentha aquatica*, *Potamogeton polygonifolius* and *Potentilla palustris* (= *Comarum palustre*).

Bryophyte cover ranges considerably from low to dominance by *Calliergonella cuspidata* or *Sphagnum* spp.

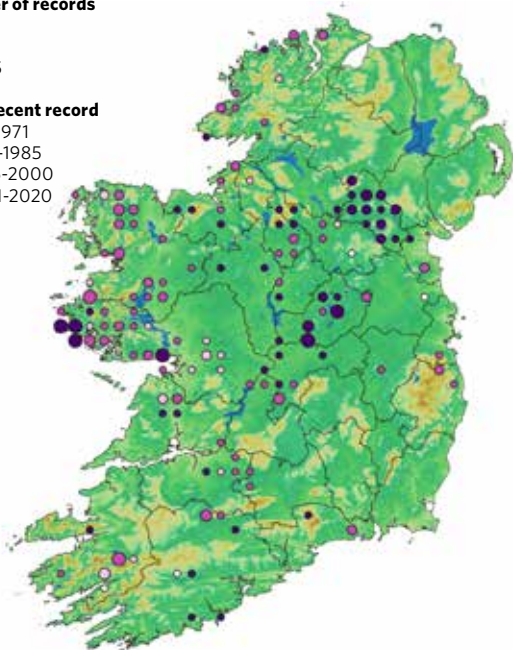
1. *Calliergonella cuspidata* quite common to dominant ..... **FE2F**  
*Calliergonella cuspidata* absent or if present then not so common ..... 2
2. *Sphagnum recurvum* agg. quite common to dominant ..... **FE2E**  
*Sphagnum recurvum* agg. absent or if present then not so common ..... 3
3. *Vaccinium oxycoccos* present ..... **FE2C**  
*Vaccinium oxycoccos* absent ..... 4
4. *Carex limosa* present ..... **FE2B**  
*Carex limosa* absent ..... 5
5. *Carex rostrata* abundant to dominant ..... **FE2D**  
*Carex rostrata* absent or if present then not abundant ..... 6
6. *Ranunculus flammula* present ..... **FE2B**  
*Ranunculus flammula* absent (*Equisetum fluviatile* usually present) ..... **FE2A**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



## FE3 *Agrostis stolonifera* – *Carex nigra* group

This group represents circumneutral communities of fens, flushes, dune slacks and turlough basins. The main graminoid species are *Agrostis stolonifera*, *Carex nigra* and *Eleocharis palustris*, although *Carex panicea*, *Carex viridula* (= *C. flava* group) and *Juncus articulatus* are also often found.

The forbaceous component includes *Galium palustre*, *Hydrocotyle vulgaris*, *Mentha aquatica*, *Potentilla anserina*, *Ranunculus flammula* and *Ranunculus repens*. The primary bryophyte species is *Calliergonella cuspidata*, with 'brown mosses' such as *Campylium stellatum* and *Drepanocladus cossonii/revolvens* (= *Scorpidium cossonii* and *S. revolvens*) being rather rare.

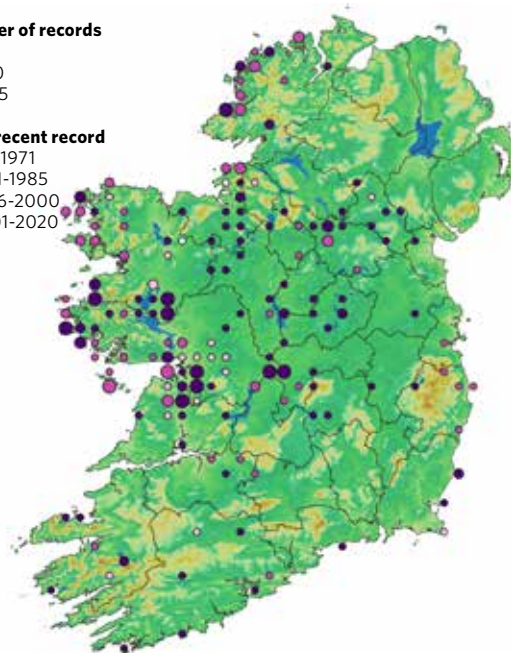
1. *Eleocharis palustris* very common ..... **FE3C**  
*Eleocharis palustris* absent or if present then not very common ..... 2
2. *Potentilla anserina* common ..... **FE3B**  
*Potentilla anserina* absent or if present then uncommon ..... 3
3. *Calliergonella cuspidata* abundant to dominant ..... **FE3D**  
*Calliergonella cuspidata* absent or if present then not abundant ..... 4
4. *Rorippa nasturtium-aquaticum* agg. (= *Nasturtium* spp.) common to dominant ..... **FE3C**  
*Rorippa nasturtium-aquaticum* agg. (= *Nasturtium* spp.) absent or if present then uncommon ..... **FE3A**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



## FE4 *Philonotis fontana* – *Palustriella commutata* group

This group consists of communities of circumneutral to strongly basic springheads, upwellings, seepage points and stony rills. Precipitation of calcium carbonate can lead to the deposition of tufa and the creation of petrifying springs. These assemblages can be found within a range of other habitats including upland heaths and grasslands, woodlands, fens and coastal cliffs. They are often bryophyte-rich with the usual species including *Aneura pinguis*, *Brachythecium rivulare*, *Bryum pseudotriquetrum*, *Calliergonella cuspidata*, *Dicranella palustris* (= *Dichodontium palustre*), *Fissidens adianthoides*, *Palustriella commutata*, *Philonotis fontana* and *Scapania undulata*. The main herbs are *Agrostis stolonifera*, *Anthoxanthum odoratum*, *Carex panicea*, *Carex viridula* (= *C. flava* group), *Chrysosplenium oppositifolium*, *Festuca rubra*, *Galium palustre* and *Holcus lanatus*.

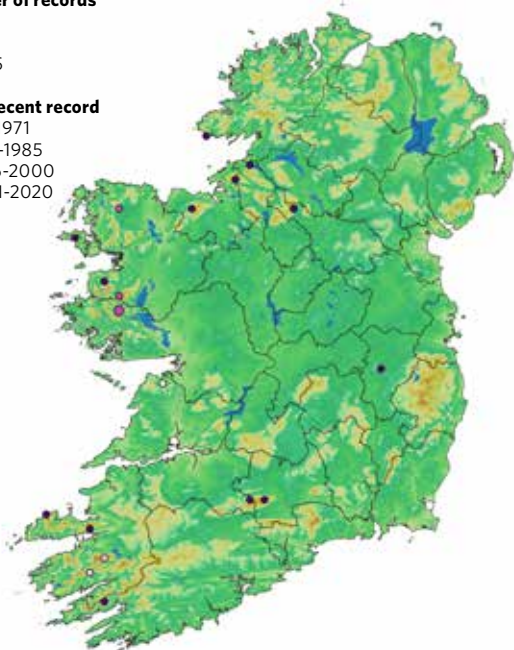
1. *Palustriella commutata* very common ..... **FE4B**  
*Palustriella commutata* absent or if present  
not very common ..... **FE4A**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



# Freshwater habitats

**F**reshwater habitats include streams, rivers, lakes, reservoirs, canals and ditches. Nutrient conditions generally vary from oligotrophic to mesotrophic to eutrophic, but also included here are some assemblages from dystrophic pools (peaty, acidic waters, low in nutrients) and brackish (slightly saline) waters. Within freshwater habitats, communities differ according to the growth form of the main aquatic species, being either submersed, floating-leaf/free-floating or emergent. The freshwater habitats division is split into three groups that broadly reflect these growth forms and trophic status. See Figure 18 in Part III, p. 125, for an example of how freshwater communities occur in the context of lowland rivers.



## FW1 *Littorella uniflora* – *Eriocaulon aquaticum* group

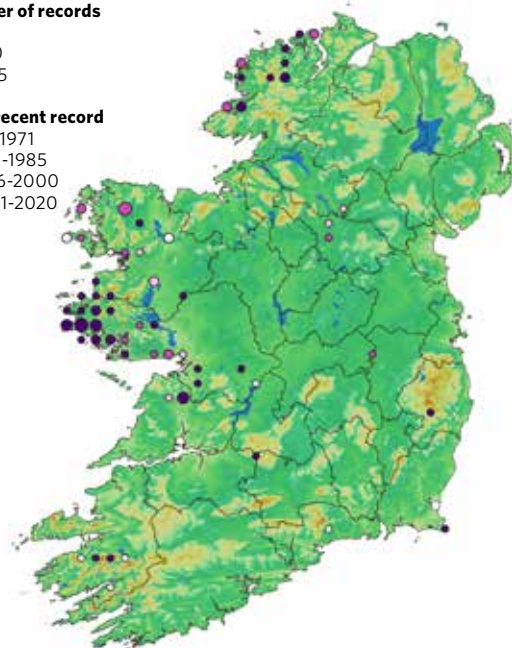
This group primarily consists of submersed and shoreline communities of oligotrophic and mesotrophic lakes. In such situations, the substrate is often acidic and stony. It also includes related vegetation from shallow rivers, and, within bogland, the margins of peaty dystrophic pools, erosion channels and drainage ditches. The main species are *Eriocaulon aquaticum*, *Juncus bulbosus*, *Littorella uniflora*, *Lobelia dortmanna*, *Najas flexilis* and *Ranunculus flammula*. Records come predominantly from the far west of Ireland.

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



1. *Eriocaulon aquaticum* common to dominant..... **FW1B**  
*Eriocaulon* absent or if present then uncommon..... 2
2. *Littorella uniflora* scarce to dominant ..... **FW1A**  
*Littorella uniflora* absent or if present then  
very scarce..... 3
3. *Najas flexilis* present ..... **FW1D**  
*Najas flexilis* absent (*Juncus bulbosus*  
usually present) ..... **FW1C**

## FW2 *Ranunculus penicillatus* – *Fontinalis antipyretica* group

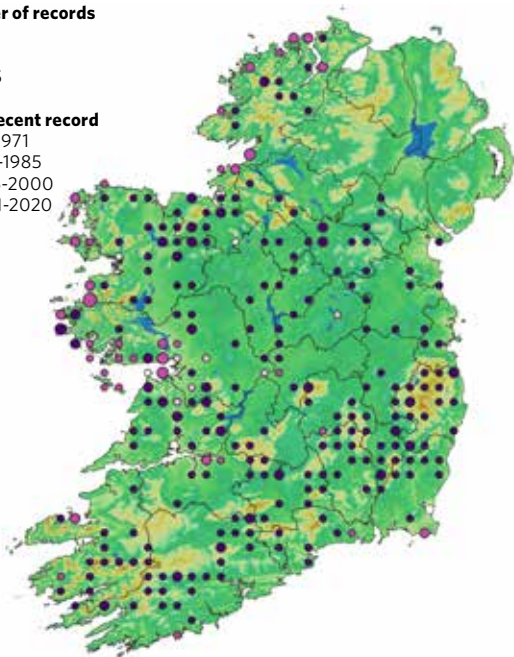
This variable group consists of a range of aquatic communities from streams, rivers, lakes and lagoons. These communities are variously characterized by aquatic or hydrophilous bryophytes (e.g., *Chiloscyphus polyanthos*, *Fontinalis antipyretica*, *Rhynchostegium riparioides*), pondweeds (e.g., *Potamogeton pectinatus* = *Stuckenia pectinata*, *Potamogeton natans*, *Potamogeton filiformis* = *Stuckenia filiformis*, *Zannichellia palustris*), water-lilies (*Nuphar lutea*, *Nymphaea alba*), water-crowfoots (*Ranunculus penicillatus*, *Ranunculus peltatus*) or emergent herbs (e.g., *Apium nodiflorum*, *Rorippa nasturtium-aquaticum* agg. = *Nasturtium* spp.). Conditions tend to be mesotrophic to eutrophic.

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



1. *Rhynchostegium riparioides* scarce to abundant .... **FW2B**  
*Rhynchostegium riparioides* absent or if present then very scarce .....2
2. *Potamogeton pectinatus* (= *Stuckenia pectinata*) scarce to abundant ..... **FW2F**  
*Potamogeton pectinatus* (= *Stuckenia pectinata*) absent or if present then very scarce .....3
3. *Apium nodiflorum* present but very scarce (*Potamogeton* spp. often present) ..... **FW2D**  
*Apium nodiflorum* scarce to abundant (*Rorippa nasturtium-aquaticum* agg. = *Nasturtium* spp. usually present) ..... **FW2E**  
*Apium nodiflorum* absent .....4

4. *Ranunculus penicillatus* present .....5  
*Ranunculus penicillatus* absent .....6
5. *Fontinalis antipyretica* scarce to abundant .....7  
*Fontinalis antipyretica* absent or if present then very scarce .....8
6. *Fontinalis antipyretica* present ..... **FW2A**  
*Fontinalis antipyretica* absent .....9
7. *Ranunculus penicillatus* scarce to abundant ..... **FW2E**  
*Ranunculus penicillatus* very scarce ..... **FW2A**
8. *Callitriche stagnalis* present ..... **FW2D**  
*Callitriche stagnalis* absent ..... **FW2C**
9. *Nymphaea alba* very common to dominant ..... **FW2I**  
*Nymphaea alba* absent or if present then not very common .....10
10. *Potamogeton natans* common to dominant ..... **FW2G**  
*Potamogeton natans* absent or if present then uncommon .....11
11. *Nuphar lutea* quite common to dominant ..... **FW2J**  
*Nuphar lutea* absent or if present then not so common .....12
12. *Zannichellia palustris* common to dominant ..... **FW2K**  
*Zannichellia palustris* absent or if present then uncommon (*Potamogeton filiformis* = *Stuckenia filiformis* usually present) ..... **FW2H**



## FW3 *Phragmites australis* – *Cladium mariscus* group

This large group brings together various types of swamp and hydrophilous tall-herb communities, found along the margins of lakes, lagoons, pools, canals, estuaries and slow-moving rivers, and also in ditches, flushes, wet corners of fields and fen systems. A wide range of trophic conditions is encompassed. Monodominance by tall, emergent plants is common and species richness is often low. Such plants include grasses (*Phragmites australis*, *Glyceria maxima*), sedges (*Bolboschoenus maritimus*, *Carex rostrata*, *Carex elata*, *Carex paniculata*, *Cladium mariscus*, *Schoenoplectus lacustris*, *Schoenoplectus tabernaemontani*), horsetails (*Equisetum fluviatile*) and other herbaceous species (*Filipendula ulmaria*, *Iris pseudacorus*, *Sparganium erectum*).

- |                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>1.</b> <i>Cladium mariscus</i> very common to dominant ..... <b>FW3H</b><br/><i>Cladium mariscus</i> absent or if present then not very common.....2</p> <p><b>2.</b> <i>Filipendula ulmaria</i> scarce to dominant.....3<br/><i>Filipendula ulmaria</i> absent or if present then very scarce.....4</p> | <p><b>3.</b> <i>Iris pseudacorus</i> abundant to dominant ..... <b>FW3N</b><br/><i>Iris pseudacorus</i> absent or if present then not abundant..... <b>FW3F</b></p> <p><b>4.</b> <i>Phragmites australis</i> abundant to dominant..... <b>FW3E</b><br/><i>Phragmites australis</i> absent or if present then not abundant.....5</p> <p><b>5.</b> <i>Carex rostrata</i> very common to dominant ..... <b>FW3C</b><br/><i>Carex rostrata</i> absent or if present then not very common .....6</p> <p><b>6.</b> <i>Schoenoplectus lacustris</i> very common to dominant ..... <b>FW3D</b><br/><i>Schoenoplectus lacustris</i> absent or if present then not very common.....7</p> <p><b>7.</b> <i>Schoenoplectus tabernaemontani</i> very common to dominant..... <b>FW3I</b><br/><i>Schoenoplectus tabernaemontani</i> absent or if present then not very common .....8</p> <p><b>8.</b> <i>Iris pseudacorus</i> abundant to dominant ..... <b>FW3N</b><br/><i>Iris pseudacorus</i> absent or if present then not abundant .....9</p> <p><b>9.</b> <i>Carex elata</i> abundant to dominant ..... <b>FW3J</b><br/><i>Carex elata</i> absent or if present then not abundant.....10</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



10. *Equisetum fluviatile* scarce to dominant ..... 11  
*Equisetum fluviatile* absent or if present then very scarce ..... 12
11. *Carex paniculata* abundant to dominant ..... **FW3K**  
*Carex paniculata* absent or if present then not abundant (*Equisetum fluviatile* usually the main species) ..... **FW3G**
12. *Phragmites australis* present ..... **FW3B**  
*Phragmites australis* absent ..... 13
13. *Typha latifolia* abundant to dominant ..... **FW3M**  
*Typha latifolia* absent or if present then not abundant ..... 14

14. *Glyceria maxima* very abundant to dominant ..... **FW3L**  
*Glyceria maxima* absent or if present then not very abundant (*Sparganium erectum* and *Schoenoplectus lacustris* usually present) ..... **FW3A**

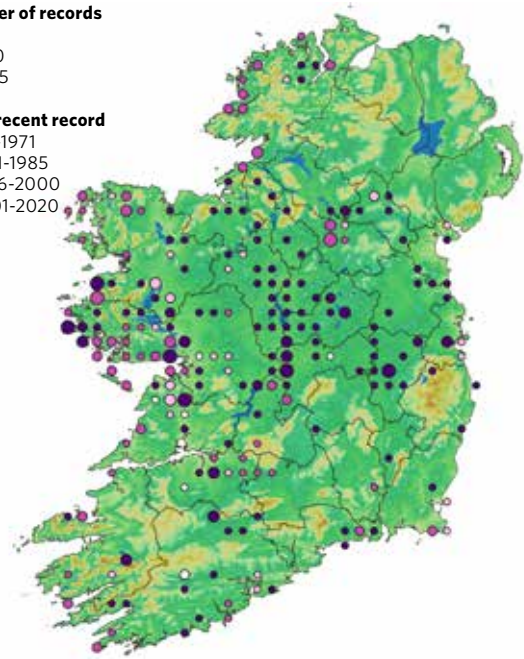


**Number of records**

- 1-3
- 4-10
- 11-25
- 26+

**Most recent record**

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



# Grasslands

**G**raslands are the most abundant habitat type in the country, accounting for over half of the total land cover. These communities are typically maintained by grazing or mowing, or a combination of the two. The vast majority of grassland in Ireland is agriculturally improved, meaning that it has been drained, reseeded and fertilized, and exhibits relatively little variation. Semi-natural or unimproved grassland, on the other hand, includes a wide range of communities reflecting a diversity of conditions. The main species in grasslands are grasses and rushes but forb cover and richness can be high in semi-natural swards. In addition to grasslands, included here are some communities from marshes. The grasslands division is split into four groups broadly along gradients from acid to basic and wet to dry.

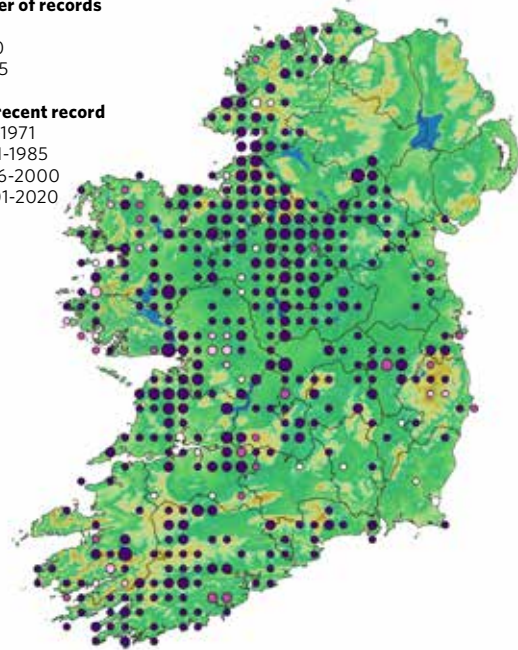
## GL1 *Juncus acutiflorus* – *Molinia caerulea* group

This group comprises wet, lowland semi-natural grassland and marsh communities of mildly acidic to circumneutral and oligotrophic to mesotrophic soils, including rough pasturage and flood meadows of lakes and rivers. The main graminoid species are *Agrostis stolonifera*, *Anthoxanthum odoratum*, *Carex flacca*, *Carex nigra*, *Carex panicea*, *Festuca rubra*, *Holcus lanatus*, *Juncus acutiflorus* and *Molinia caerulea*. The forbs found here include *Cardamine pratensis*, *Galium palustre*, *Filipendula ulmaria*, *Plantago lanceolata*, *Potentilla erecta*, *Prunella vulgaris*, *Ranunculus acris*, *Ranunculus flammula*, *Ranunculus repens*, *Succisa pratensis*, *Trifolium pratense* and *Trifolium repens*. The most common bryophyte is *Calliergonella cuspidata*. Soils are usually gleys or basin peats.

1. *Molinia caerulea* abundant to dominant .....2  
*Molinia caerulea* absent or if present then abundant .....3
2. *Trifolium pratense* present ..... **GL1C**  
*Trifolium pratense* absent..... **GL1D**
3. *Succisa pratensis* common to dominant .....4  
*Succisa pratensis* absent or if present then uncommon 5
4. *Ranunculus repens* scarce to dominant .....6  
*Ranunculus repens* absent or if present then very scarce..... **GL1C**

5. *Rhytidiadelphus squarrosus* common to dominant... **GL1E**  
*Rhytidiadelphus squarrosus* absent or if present then uncommon..... 7
6. *Molinia caerulea* quite common to very common... **GL1C**  
*Molinia caerulea* absent or if present then not so common ..... **GL1E**
7. *Juncus acutiflorus* common to dominant .....8  
*Juncus acutiflorus* absent or if present then uncommon..... **GL1B**
8. *Calliergonella cuspidata* quite common to dominant .....9  
*Calliergonella cuspidata* absent or if present then not so common..... **GL1A**
9. *Filipendula ulmaria* common to dominant ..... **GL1B**  
*Filipendula ulmaria* absent or if present then uncommon..... **GL1E**

**Number of records**  
 ● 1-3  
 ● 4-10  
 ● 11-25  
 ● 26+  
**Most recent record**  
 ○ pre-1971  
 ○ 1971-1985  
 ○ 1986-2000  
 ● 2001-2020



## GL2 *Agrostis stolonifera* – *Ranunculus repens* group

This group mainly collates communities of wet, mesotrophic pastures and marshes from the lowlands, but also included are some upland rushy flushes. Assemblages are usually semi-natural in nature, but sometimes somewhat improved. The main graminoids are *Agrostis stolonifera*, *Holcus lanatus*, *Juncus effusus* and *Lolium perenne*. Less often found are *Anthoxanthum odoratum* and *Poa trivialis*. The typical forbs are *Cardamine pratensis*, *Cerastium fontanum*, *Galium palustre*, *Filipendula ulmaria*, *Potentilla anserina*, *Ranunculus repens*, *Rumex acetosa* and *Trifolium repens*. Any bryophyte cover is usually provided by *Brachythecium rutabulum*. Soils are gleys, mineral soils or basin peats.

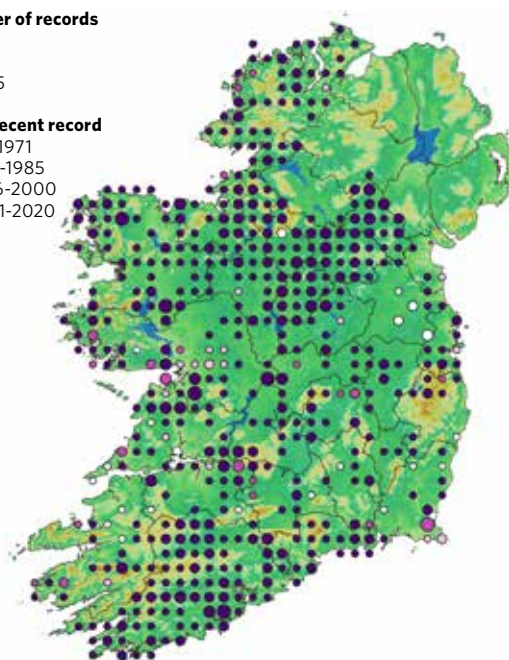
1. *Juncus effusus* very abundant to dominant .....2  
*Juncus effusus* scarce to abundant .....3  
*Juncus effusus* absent or if present then very scarce .....4
2. *Ranunculus repens* common to dominant and  
*Trifolium repens* present ..... **GL2B**  
*Ranunculus repens* absent or if present then  
uncommon and/or *Trifolium repens* absent ..... **GL2D**
3. *Holcus lanatus* common to dominant .....5  
*Holcus lanatus* absent or if present then uncommon .....6
4. *Holcus lanatus* present .....7  
*Holcus lanatus* absent (*Agrostis stolonifera*  
usually abundant) ..... **GL2A**
5. *Lolium perenne* very common to dominant ..... **GL2C**  
*Lolium perenne* absent or if present then not very  
common ..... **GL2B**
6. *Juncus effusus* abundant ..... **GL2D**  
*Juncus effusus* not abundant ..... **GL2A**
7. *Lolium perenne* common to dominant ..... **GL2C**  
*Lolium perenne* absent or if present then uncommon ...8
8. *Anthoxanthum odoratum* common to dominant ..... **GL2B**  
*Anthoxanthum odoratum* absent or if present then  
uncommon .....9
9. *Holcus lanatus* very common to dominant ..... **GL2C**  
*Holcus lanatus* not very common (*Agrostis*  
*stolonifera* usually abundant) ..... **GL2A**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



GL2

## GL3 *Cynosurus cristatus* – *Plantago lanceolata* group

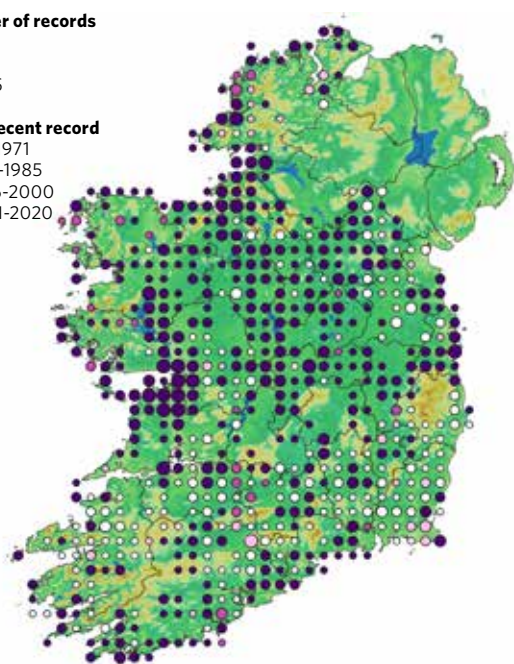
This group consists of communities representing relatively dry, calcareous or mesotrophic swards from lowland pastures, meadows, silage fields, verges, amenity grassland and coastal grassland. Assemblages vary from potentially natural to semi-natural to strongly improved in nature. Unimproved swards can be highly diverse. The main graminoid species are *Agrostis capillaris*, *Agrostis stolonifera*, *Anthoxanthum odoratum*, *Arrhenatherum elatius*, *Briza media*, *Carex flacca*, *Cynosurus cristatus*, *Dactylis glomerata*, *Festuca rubra*, *Lolium perenne*, *Luzula campestris* and *Poa trivialis*. Forbs include *Bellis perennis*, *Centaurea nigra*, *Cerastium fontanum*, *Euphrasia officinalis* agg., *Galium verum*, *Hypochaeris radicata*, *Linum catharticum*, *Lotus corniculatus*, *Plantago lanceolata*, *Prunella vulgaris*, *Ranunculus acris*, *Rhinanthus minor*, *Succisa pratensis*, *Trifolium pratense* and *Trifolium repens*. Soils are usually well-drained mineral types and, less often, gleys.

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



1. *Lolium perenne* very common to dominant..... **GL3B**  
*Lolium perenne* absent or if present then not very common .....2
2. *Succisa pratensis* scarce to dominant.....3  
*Succisa pratensis* absent or if present then very scarce.....4

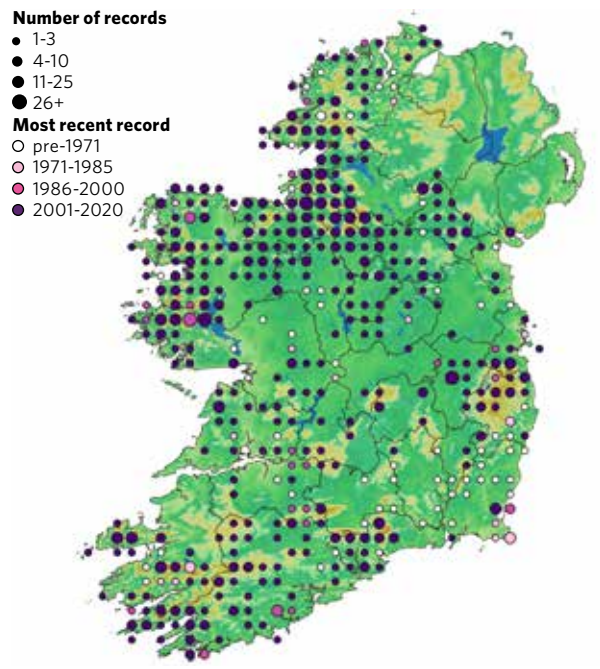
3. *Rumex acetosa* present ..... **GL3D**  
*Rumex acetosa* absent ..... **GL3A**
4. *Cynosurus cristatus* very common to dominant..... **GL3D**  
*Cynosurus cristatus* absent or if present then not very common.....5
5. *Dactylis glomerata* common to dominant..... **GL3C**  
*Dactylis glomerata* absent or if present then uncommon.....6
6. *Plantago maritima* present ..... **GL3F**  
*Plantago maritima* absent.....7
7. *Plantago lanceolata* abundant to dominant..... **GL3E**  
*Plantago lanceolata* absent or if present then not abundant .....8
8. *Agrostis capillaris* common to dominant..... **GL3D**  
*Agrostis capillaris* absent or if present then uncommon.....9
9. *Pilosella officinarum* present ..... **GL3A**  
*Pilosella officinarum* absent.....10
10. *Poa trivialis* very common to dominant ..... **GL3B**  
*Poa trivialis* absent or if present then not very common .....11
11. *Anthoxanthum odoratum* very common to dominant ..... **GL3E**  
*Anthoxanthum odoratum* absent or if present then not very common.....12
12. *Arrhenatherum elatius* very abundant to dominant ..... **GL3G**  
*Arrhenatherum elatius* absent or if present then not very abundant .....13
13. *Dactylis glomerata* present..... **GL3C**  
*Dactylis glomerata* absent (*Festuca rubra* usually abundant)..... **GL3F**





### GL4 *Nardus stricta* – *Galium saxatile* group

This group brings together dry or humid, acidic and low fertility grasslands chiefly from rough pasturage in the uplands and upland margins. Swards range from unimproved to semi-improved. The main graminoids are *Agrostis canina/vinealis*, *Agrostis capillaris*, *Anthoxanthum odoratum*, *Festuca* spp., *Holcus lanatus*, *Juncus acutiflorus*, *Luzula multiflora* and *Nardus stricta*. The forb component includes *Cerastium fontanum*, *Galium saxatile*, *Plantago lanceolata*, *Potentilla erecta*, *Rumex acetosa* and *Trifolium repens*. There can be good cover of bryophytes from *Hylocomium splendens*, *Rhytidiadelphus squarrosus*, *Scleropodium purum* (= *Pseudoscleropodium purum*) and *Thuidium tamariscinum*. Soils are often thin and rather peaty.



1. *Hylocomium splendens* present ..... 2  
*Hylocomium splendens* absent ..... 3
2. *Festuca rubra* present ..... 4  
*Festuca rubra* absent ..... 5
3. *Agrostis capillaris* quite common to dominant ..... **GL4A**  
*Agrostis capillaris* absent or if present then not so common ..... **GL4D**
4. *Agrostis canina/vinealis* common to dominant ..... **GL4D**  
*Agrostis canina/vinealis* absent or if present then uncommon ..... **GL4C**
5. *Juncus acutiflorus* present ..... **GL4D**  
*Juncus acutiflorus* absent ..... **GL4B**



# Heaths

**H**eaths cover large areas of the Irish uplands, favouring poor, acidic, often peaty soils. Smaller extents can be found around the coastline. The vegetation is characterized by the typical presence of ericaceous dwarf shrubs, although sedges and grasses can also be abundant. As well as heaths proper, this division also includes related assemblages of bogs, moss heaths and poor flushes. The heaths division comprises four groups, representing differences in altitude, wetness and acidity. See Figure 17 in Part III, p. 125, for an example of how heath communities fit into the upland landscape.

## HE1 *Dryas octopetala* – *Sesleria caerulea* group

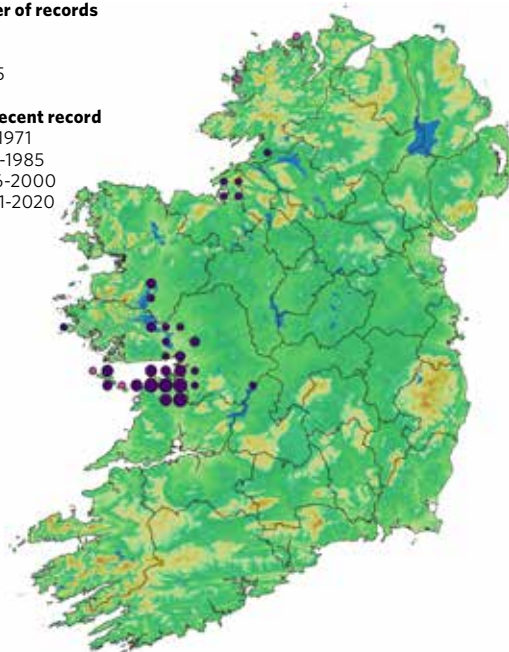
This group represents open calcareous heaths. These are often found in association with limestone pavement and calcareous grassland and have a restricted distribution within Ireland. Dwarf shrub cover in these heaths is provided by *Calluna vulgaris* and/or low-growing mats of *Dryas octopetala*. *Calluna*, a calcifuge, is able to establish because high rainfall in these areas leads to leaching and acidification of thin patches of organic soils over the limestone. These shrubs are accompanied by a range of species characteristic of calcareous grassland. The main graminoids are *Sesleria caerulea*, *Carex flacca*, *Briza media* and *Festuca ovina* and there is typically a good diversity of colourful forbs including *Succisa pratensis*, *Thymus polytrichus* (= *T. drucei*), *Campanula rotundifolia*, *Linum catharticum*, *Lotus corniculatus*, *Viola riviniana/reichenbachiana*, *Hypericum pulchrum* and *Geranium sanguineum*. The bryophyte layer is composed mainly of *Scleropodium purum* (= *Pseudoscleropodium purum*) and *Breutelia chrysocoma*. The group comprises only a single community (**HE1A**) with characteristics of the group.

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



## HE2 *Erica cinerea* – *Calluna vulgaris* group

This group encompasses submontane and lowland dry heath communities including coastal heaths. It also includes drier types of wet heath, those in which ericaceous plant cover is reasonably high. *Calluna vulgaris* is usually the dominant species. *Erica cinerea* is very frequent, more so than *Erica tetralix* or *Vaccinium myrtillus* which may both also be encountered here. *Ulex gallii* can be abundant in coastal communities. The main herbaceous species are *Agrostis capillaris*, *Molinia caerulea*, *Trichophorum cespitosum/germanicum* and *Potentilla erecta*. The bryophyte layer is composed chiefly of robust pleurocarps: *Hypnum jutlandicum*, *Hylocomium splendens*, *Rhytidiadelphus loreus* and *Pleurozium schreberi*. Soils are typically acidic and infertile.

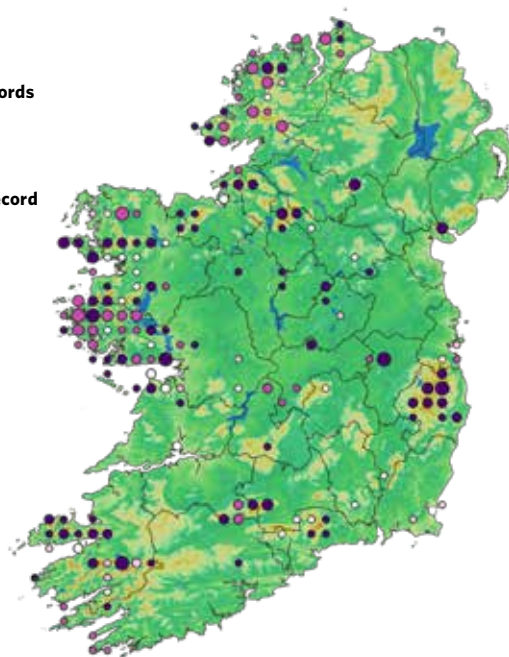


### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



1. *Molinia caerulea* very common to abundant .....2  
*Molinia caerulea* absent or if present then not very common .....3
2. *Calluna vulgaris* very abundant to dominant ..... **HE2D**  
*Calluna vulgaris* scarce to abundant .....4
3. *Calluna vulgaris* dominant ..... **HE2B**  
*Calluna vulgaris* not dominant .....5
4. *Ulex gallii* very common to dominant ..... **HE2A**  
*Ulex gallii* absent or if present not very common  
(*Trichophorum cespitosum/germanicum* usually common) ..... **HE2E**
5. *Ulex gallii* very common to dominant ..... **HE2A**  
*Ulex gallii* absent or if present not very common .....6
6. *Trichophorum cespitosum/germanicum* present ..... **HE2E**  
*Trichophorum cespitosum/germanicum* absent (*Agrostis capillaris* and *Anthoxanthum odoratum* usually common) ..... **HE2C**



## HE3 *Vaccinium myrtillus* – *Racomitrium lanuginosum* group

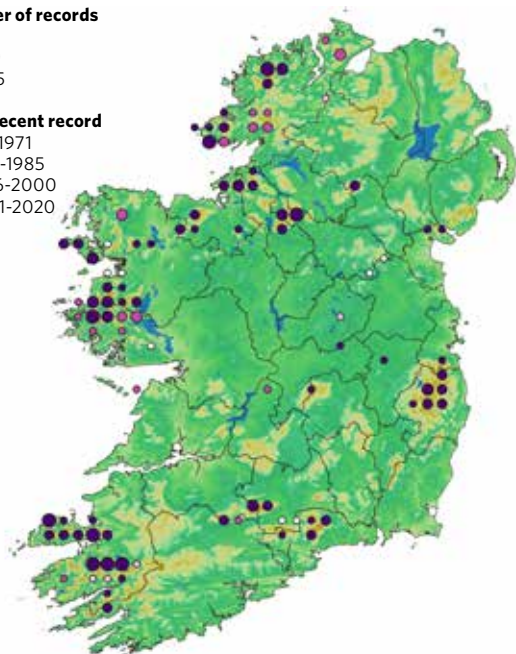
This rather variable group unites several vegetation communities of the montane zone (which in Ireland is generally land above 400 m), and includes montane dwarf shrub heaths, moss heaths and bogs. The main dwarf shrub species are *Calluna vulgaris*, *Vaccinium myrtillus* and, less frequently found, *Erica cinerea*. Grass species include *Agrostis capillaris*, *Deschampsia flexuosa* (= *Avenella flexuosa*), *Festuca vivipara* and *Nardus stricta*. Other herbaceous plants to be found here include *Eriophorum vaginatum*, *Galium saxatile*, *Juncus squarrosus* and *Potentilla erecta*. The bryophyte layer is often abundant with *Hylocomium splendens*, *Racomitrium lanuginosum* and *Rhytidiadelphus loreus* being some of the chief species. The vegetation is often rich in liverworts and lichens (*Cladonia* spp.). Substrates are infertile and acidic and include both shallow soils with a high cover of exposed rock and deep peats.

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



1. *Eriophorum vaginatum* common to dominant ..... **HE3F**  
*Eriophorum vaginatum* absent or if present then uncommon.....2
2. *Racomitrium lanuginosum* present .....3  
*Racomitrium lanuginosum* absent.....4
3. *Calluna vulgaris* common to dominant.....5  
*Calluna vulgaris* absent or if present then uncommon.....6

4. *Sphagnum capillifolium* (= *S. capillifolium*/*rubellum*) very common to dominant..... **HE3B**  
*Sphagnum capillifolium* (= *S. capillifolium*/*rubellum*) absent or if present then not very common ..... **HE3A**
5. *Sphagnum capillifolium* (= *S. capillifolium*/*rubellum*) present .....7  
*Sphagnum capillifolium* (= *S. capillifolium*/*rubellum*) absent.....8
6. *Nardus stricta* scarce to dominant..... **HE3C**  
*Nardus stricta* absent or if present then very scarce..... **HE3E**
7. *Juncus squarrosus* very common to dominant ..... **HE3G**  
*Juncus squarrosus* absent or if present then not very common ..... **HE3B**
8. *Nardus stricta* common to dominant ..... **HE3C**  
*Nardus stricta* absent or if present then uncommon..... **HE3D**



## HE4 *Molinia caerulea* – *Polygala serpyllifolia* group

This group brings together wet heaths and related poor flushes of the submontane and lowland zones, and also includes similar vegetation from bogs. The main species throughout is usually *Molinia caerulea*, which can have striking dominance. Dwarf shrubs, in the guise of *Calluna vulgaris*, *Erica tetralix* and, sometimes, *Myrica gale*, tend to have a subordinate role. The main herbaceous companions are *Carex panicea*, *Nardus stricta*, *Narthecium ossifragum*, *Polygala serpyllifolia*, *Potentilla erecta*, *Schoenus nigricans* and *Trichophorum cespitosum/germanicum*. The bryophyte layer tends to be not so well developed, with the chief components being *Hypnum jutlandicum*, *Racomitrium lanuginosum*, *Pleurozia purpurea* and *Sphagnum* spp. Substrates are wet and infertile peaty soils.

1. *Schoenus nigricans* common to dominant ..... **HE4C**  
*Schoenus nigricans* absent or if present then uncommon.....2
2. *Nardus stricta* very common to dominant..... **HE4B**  
*Nardus stricta* absent or if present then not very common .....3

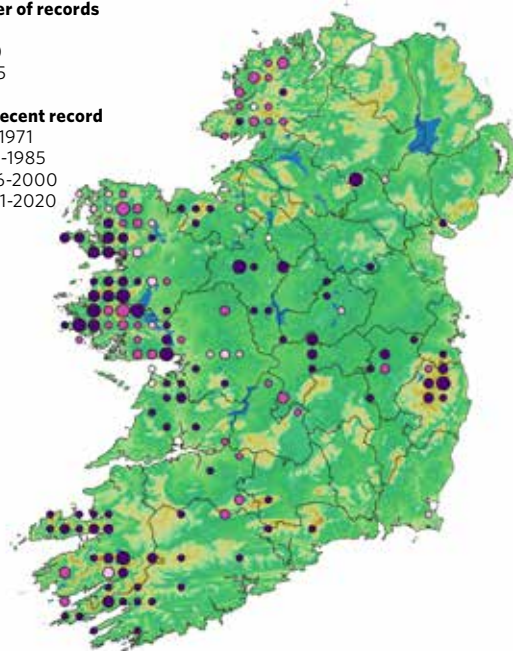
3. *Calluna vulgaris* very common to abundant ..... **HE4E**  
*Calluna vulgaris* absent or if present then not very common .....4
4. *Myrica gale* common to dominant ..... **HE4F**  
*Myrica gale* absent or if present then uncommon.....5
5. *Molinia caerulea* very abundant to dominant..... **HE4D**  
*Molinia caerulea* not very abundant (*Trichophorum cespitosum/germanicum* usually common)..... **HE4A**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



HE4

# Invasive plant communities

**I**nvasive plants are non-native species that have naturalised after being introduced accidentally or purposely. They tend to exhibit vigorous growth in the Irish climate and reproduce rapidly, outcompeting native species and transforming habitats by their dominance. This division gathers assemblages of such species that do not fit comfortably elsewhere in the classification into one place for the sake of practicality; there is no implied floristic similarity. Note that cordgrass (*Spartina*) stands are dealt with under the saltmarsh (**SM**) division and non-native conifers stands are dealt with under the woodlands and forests (**WL**) division. There is a single group with characteristics of the division.

## IN1 Invasive plants group

Currently, this group consists of heaths and woodland infested by *Rhododendron ponticum* and wet grassland, disturbed roadsides and quarries invaded by *Gunnera tinctoria*. Both species are undoubtedly more widespread than mapped records indicate. Stands of other non-native species could be accommodated within this group, but data are currently lacking.

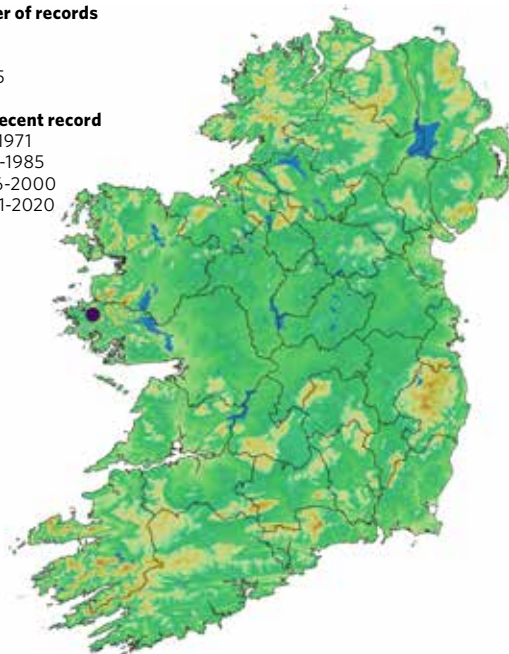
1. *Gunnera tinctoria* very common to absent ..... **IN1B**  
*Gunnera tinctoria* absent or if present then not very common (*Rhododendron ponticum* abundant to dominant) ..... **IN1A**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



# Rocky habitats

**R**ocky habitats are characterized by the presence of exposed bedrock, loose rocks or rock fragments, combined with low vegetation cover and skeletal soils. They can be either natural (e.g., cliff faces, scree) or man-made (e.g., walls, mine spoil) in nature and occur in upland, lowland and coastal landscapes. The main species tend to be forbs, ferns and bryophytes. The rocky habitats division is split into four groups representing differences in the acid-base nature of the rocks, heavy metal concentrations and proximity to the coast. See Figure 17 in Part III, p. 125, for an example of how some rocky habitat communities fit into the upland landscape and Figure 16 in Part III, p. 124, for an example of how they fit into a karst limestone landscape.

## RH1 *Asplenium ruta-muraria* – *Geranium robertianum* group

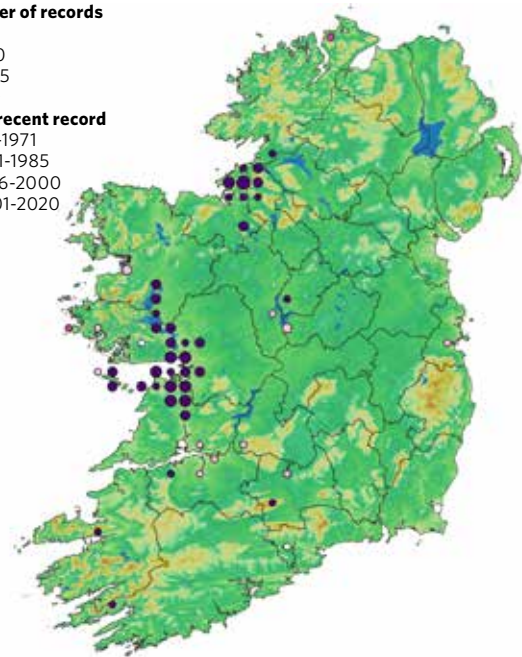
In this group are gathered sparsely vegetated communities of dry, calcareous rocky habitats, including limestone pavement, calcareous cliff faces, calcareous scree and stone or brick walls with lime mortar. The main species include the calcicolous herbs *Campanula rotundifolia*, *Geranium robertianum*, *Sesleria caerulea*, *Parietaria judaica*, *Teucrium scorodonia*, *Thymus polytrichus* (= *T. drucei*) and the non-native *Mycelis muralis*. Ferns are a frequent feature, including *Asplenium ruta-muraria*, *Asplenium trichomanes*, *Ceterach officinarum* (= *Asplenium ceterach*), *Cystopteris fragilis* and *Phyllitis scolopendrium* (= *Asplenium scolopendrium*). Saxicolous bryophytes found here include *Breutelia chrysocoma*, *Ctenidium molluscum*, *Fissidens dubius*, *Neckera crispa*, *Tortella tortuosa* and, on walls, *Tortula muralis*. Communities of man-made habitats are undoubtedly more widespread than current mapped records indicate.

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



1. *Parietaria judaica* present ..... **RH1D**
2. *Parietaria judaica* absent ..... 2
3. *Teucrium scorodonia* present ..... 3
4. *Teucrium scorodonia* absent ..... 4
5. *Sesleria caerulea* present ..... **RH1A**
6. *Sesleria caerulea* absent ..... **RH1B**
7. *Asplenium ruta-muraria* present and *Ctenidium molluscum* absent ..... **RH1C**
8. *Ctenidium molluscum* present and/or *Asplenium ruta-muraria* absent ..... **RH1A**



## RH2 *Saxifraga spathularis* – *Racomitrium lanuginosum* group

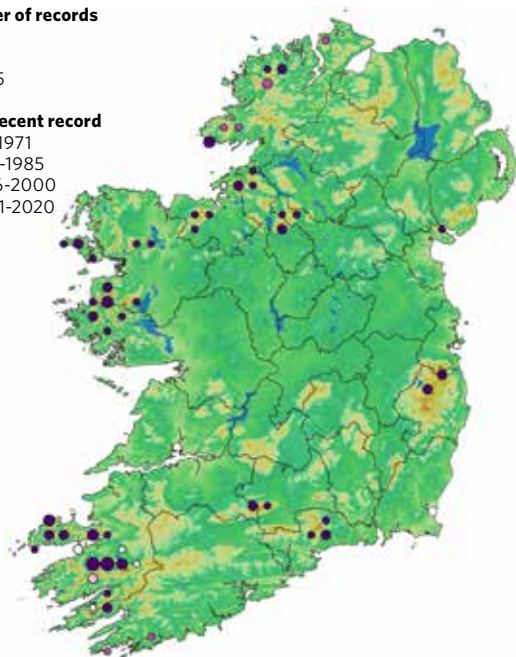
This group is formed of a range of communities from sparsely vegetated siliceous rock and gravel habitats, including crevices, overhangs and wet ledges on upland cliff faces, scree slopes, walls and fellfield-esque mountain tops. In sheltered locales, ferns such as *Blechnum spicant*, *Dryopteris dilatata* and *Hymenophyllum wilsonii* may grow. The other main vascular species include *Agrostis capillaris*, *Aira* spp., *Festuca vivipara*, *Galium saxatile*, *Vaccinium myrtillus* and *Saxifraga spathularis*. Bryophytes can be relatively abundant in these open communities and typical species include *Breutelia chrysocoma*, *Diplophyllum albicans*, *Isothecium myosuroides*, *Racomitrium fasciculare*, *Racomitrium lanuginosum* and *Scapania gracilis*. Communities of man-made habitats are undoubtedly more widespread than current mapped records indicate.

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



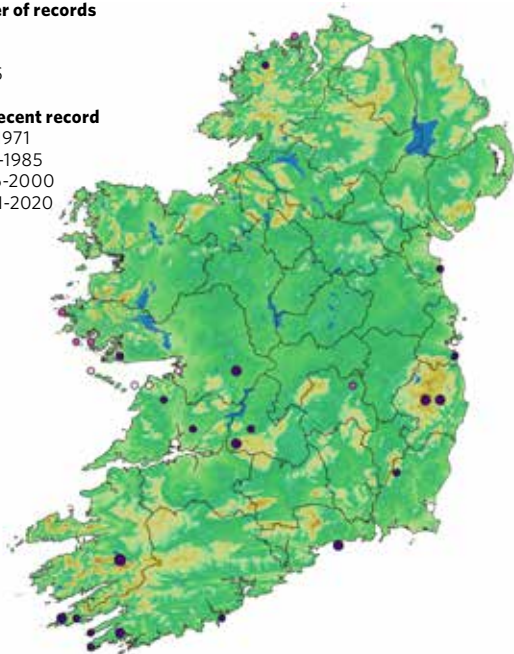
1. *Racomitrium fasciculare* present .....RH2B  
*Racomitrium fasciculare* absent .....2
2. *Viola riviniana/reichenbachiana* present (*Breutelia chrysocoma* usually present).....RH2D  
*Viola riviniana/reichenbachiana* absent .....3
3. *Racomitrium lanuginosum* common to abundant ...RH2C  
*Racomitrium lanuginosum* absent or if present then uncommon.....4
4. *Isothecium myosuroides* present .....RH2A  
*Isothecium myosuroides* absent .....5
5. *Aira praecox* scarce to abundant.....RH2E  
*Aira praecox* absent or if present very scarce .....6
6. *Dryopteris dilatata* present .....RH2A  
*Dryopteris dilatata* absent (*Festuca vivipara* usually present, as may be arctic-alpines *Salix herbacea* and *Carex bigelowii*).....RH2F



### RH3 *Cephaloziella nicholsonii* – *Silene uniflora* group

This group collates rather poorly defined vegetation from metalliferous spoil associated with old mine workings where the ground contains high concentrations of zinc, lead or copper. Also, included here is related coastal vegetation from shingle banks and cliffs. The main vascular species are *Agrostis capillaris*, *Armeria maritima*, *Rumex acetosa* and *Silene uniflora*. The specialist bryophyte flora includes *Cephaloziella nicholsonii*, *Cephaloziella stellulifera*, *Dicranella varia* (= *D. howei/varia*), *Ditrichum cornubicum* and *Pohlia andalusica*.

- Number of records**
- 1-3
  - 4-10
  - 11-25
  - 26+
- Most recent record**
- pre-1971
  - 1971-1985
  - 1986-2000
  - 2001-2020



1. *Silene uniflora* scarce to abundant.....**RH3B**  
*Silene uniflora* absent or if present then very scarce  
(*Agrostis capillaris* usually present) ..... **RH3A**



### RH4 *Asplenium marinum* – *Plantago coronopus* group

This group represents vegetation of rocky coastal cliffs, smaller outcrops of sea-sprayed rocks, soft cliffs and trampled ground within saltmarshes or sand dunes. The main species are *Armeria maritima*, *Asplenium marinum*, *Festuca rubra* and *Plantago coronopus*. Maritime specialists encountered less often here include *Crithmum maritimum*, *Sagina maritima*, *Silene uniflora* and *Spergularia rupicola*. This type of vegetation has received little attention and the group could be expanded with more data.

- Number of records**
- 1-3
  - 4-10
  - 11-25
  - 26+
- Most recent record**
- pre-1971
  - 1971-1985
  - 1986-2000
  - 2001-2020



1. *Asplenium marinum* present .....**RH4A**  
*Asplenium marinum* absent (*Armeria maritima* and  
*Plantago coronopus* usually present)..... **RH4B**



# Scrub and wayside

**S**crub and wayside communities are found across the country alongside paths, roads and railways, around woodland margins, in abandoned fields, ungrazed hillsides and forming field boundaries. The main species tend to be thorny, woody species, bracken and nitrogen-loving (nitrophilous) herbs. There is a single group with characteristics of the division.

## SC1 *Rubus fruticosus* agg. – *Galium aparine* group

This diverse group includes thorny scrub, upland willow scrub and hedgerows, and also bracken, bramble and nettle communities. The main species are *Galium aparine*, *Crataegus monogyna*, *Prunus spinosa*, *Pteridium aquilinum*, *Rubus fruticosus* agg., *Salix aurita*, *Ulex europaeus* and *Urtica dioica*. This type of vegetation has received little attention (in part due to the discomfort of surveying it) and is undoubtedly more widespread than current mapped records indicate.

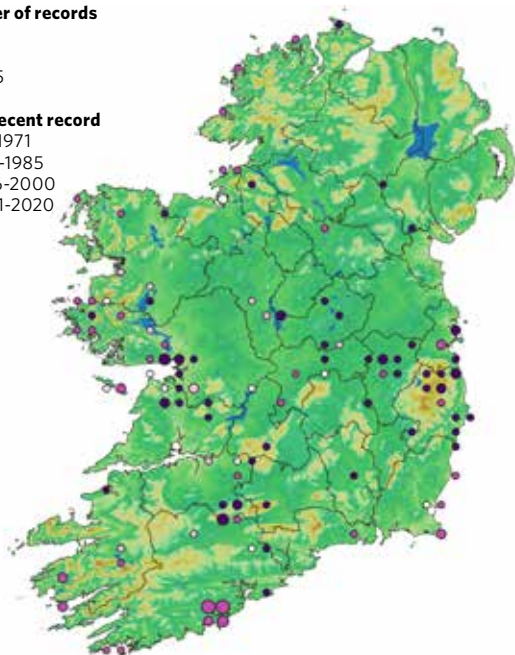
1. *Salix aurita* abundant to dominant (*Luzula sylvatica* usually present) ..... **SC1G**  
*Salix aurita* absent or if present then not abundant ..... 2

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



2. *Ulex europaeus* abundant to dominant ..... **SC1D**  
*Ulex europaeus* absent or if present then not abundant ..... 3
3. *Pteridium aquilinum* abundant to dominant ..... **SC1C**  
*Pteridium aquilinum* absent or if present then not abundant ..... 4
4. *Crataegus monogyna* common to dominant ..... 5  
*Crataegus monogyna* absent or if present then uncommon ..... 6
5. *Prunus spinosa* very common to dominant ..... **SC1A**  
*Prunus spinosa* absent or if present then not very common ..... **SC1B**
6. *Rubus fruticosus* agg. scarce to dominant ..... 7  
*Rubus fruticosus* agg. absent or if present then very scarce (*Galium aparine* and/or *Urtica dioica* usually present) ..... **SC1F**
7. *Prunus spinosa* abundant to dominant ..... **SC1A**  
*Prunus spinosa* absent or if present then not very common ..... 8
8. *Galium aparine* common to dominant ..... **SC1F**  
*Galium aparine* absent or if present then uncommon (*Rubus fruticosus* agg. usually abundant) ..... **SC1E**



# Saltmarsh

**S**altmarshes occur around the Irish coastline in sheltered bays and estuaries and also fringing lagoons. They support a number of salt-tolerant plants (halophytes) that are seldom found in other habitats. Their vegetation is typically zoned, from the lowest part of the marsh, which is the most frequently inundated by tides, up to the highest part of the marsh, which is only inundated during storm tides. The saltmarsh division comprises seven groups, ordered to represent a general progression up the saltmarsh gradient. See Figure 14 in Part III, p. 123, for an example of saltmarsh zonation.

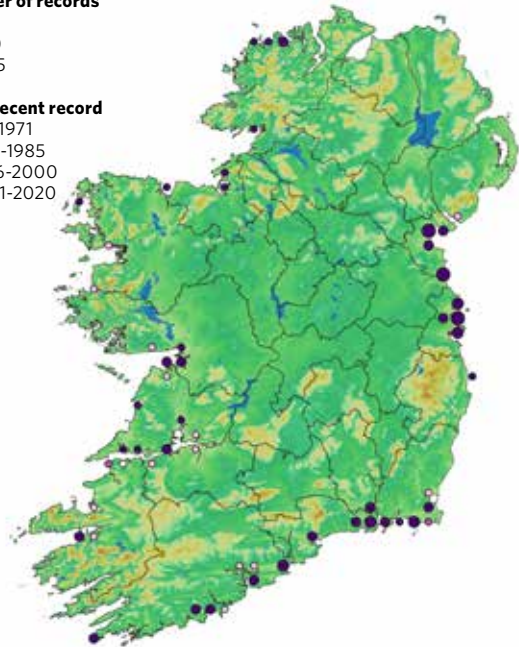
## SM1 *Salicornia* agg. – *Spartina* agg. group

This group consists of herbaceous pioneer communities usually found at the seaward edge of coastal saltmarshes where they are regularly inundated, but occasionally they occur further up the shore. The main taxa are *Salicornia* agg. (mostly *Salicornia europaea*), *Spartina* agg. (almost always the non-native *Spartina anglica*) and *Suaeda maritima*. Other plants likely to be encountered include *Aster tripolium* (= *Tripolium pannonicum*), *Atriplex portulacoides*, *Limonium humile*, *Puccinellia maritima* and *Spergularia media*, but these are seldom abundant. Substrates include sand, mud, shingle and both sand-gravel and sand-shingle mixtures.

1. *Spartina* agg. abundant to dominant ..... **SM1B**  
*Spartina* agg. absent or if present then not abundant...2
2. *Suaeda maritima* quite common to abundant ..... **SM1C**  
*Suaeda maritima* absent or if present then not so common (*Salicornia* agg. is the main plant) ..... **SM1A**

**Number of records**  
● 1-3  
● 4-10  
● 11-25  
● 26+

**Most recent record**  
○ pre-1971  
○ 1971-1985  
○ 1986-2000  
● 2001-2020



SM1

## SM2 *Puccinellia maritima* – *Spergularia media* group

This group comprises the communities of the lower part of saltmarshes that occur just above the pioneer zone.

The main species are *Puccinellia maritima* and *Atriplex portulacoides*, giving the group a grassy or shrubby physiognomy. Other species found here include *Aster tripolium* (= *Tripolium pannonicum*), *Limonium humile*, *Plantago maritima*, *Salicornia* agg. and *Spergularia media*.

Substrates tend to be consolidated sediments.

1. *Atriplex portulacoides* abundant to dominant ..... **SM2B**  
*Atriplex portulacoides* absent or if present then not abundant .....2
2. *Puccinellia maritima* dominant ..... **SM2D**  
*Puccinellia maritima* absent or if present then not dominant .....3
3. *Plantago maritima* scarce to abundant ..... **SM2A**  
*Plantago maritima* absent or if present then very scarce .....4
4. *Limonium humile* and/or *Salicornia* agg. scarce to abundant ..... **SM2C**  
*Limonium humile* and *Salicornia* agg. both absent or very scarce .....5

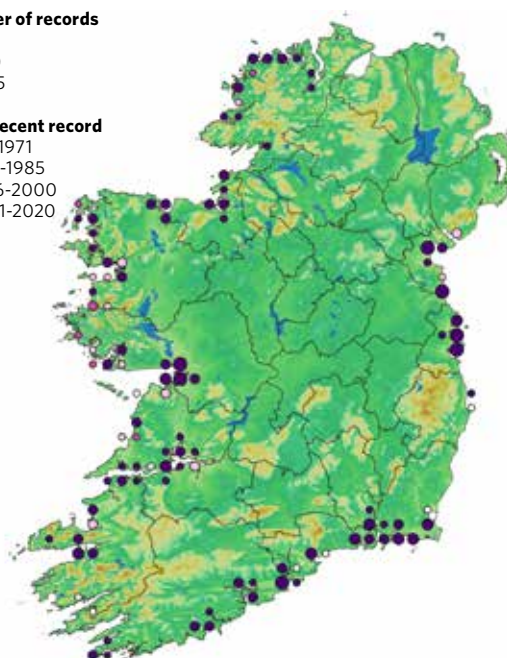
5. *Armeria maritima* common to abundant ..... **SM2A**  
*Armeria maritima* absent or if present then uncommon (*Puccinellia maritima* usually abundant) ..... **SM2D**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



SM2



SM3

### SM3 *Plantago maritima* – *Armeria maritima* group

This group represents communities of the middle zone of coastal saltmarshes. *Plantago maritima* and *Armeria maritima* tend to be dominant species, so it has a typically forbaceous appearance. Other species include *Aster tripolium* (= *Tripolium pannonicum*), *Glaux maritima* (= *Lysimachia maritima*), *Limonium humile*, *Puccinellia maritima* and *Triglochin maritimum* (= *T. maritima*).

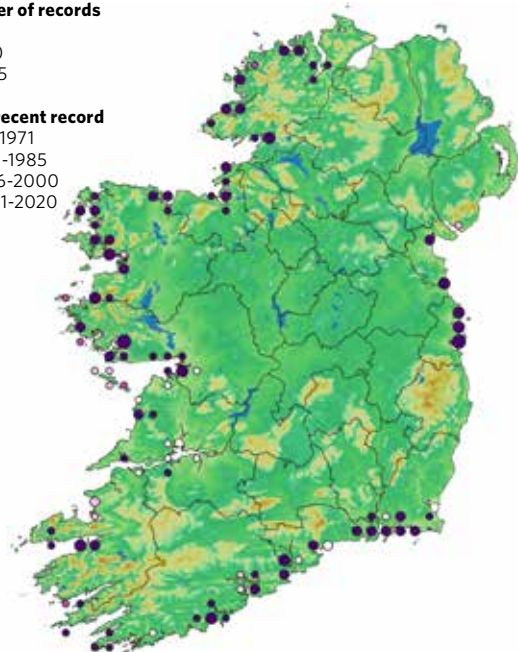
- 1. *Puccinellia maritima* scarce to abundant..... **SM3B**  
*Puccinellia maritima* absent or very scarce (*Plantago maritima* usually abundant)..... **SM3A**

**Number of records**

- 1-3
- 4-10
- 11-25
- 26+

**Most recent record**

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



## SM4 *Festuca rubra* – *Seriphidium maritimum* group

This group consists mainly of grassy communities of the upper saltmarsh characterized by an abundance of *Festuca rubra*. Other species likely to be observed are *Agrostis stolonifera*, *Armeria maritima*, *Aster tripolium* (= *Tripolium pannonicum*), *Glaux maritima* (= *Lysimachia maritima*), *Juncus gerardii*, *Plantago maritima* and *Triglochin maritimum* (= *T. maritima*). *Seriphidium maritimum* (= *Artemisia maritima*) is uncommon, but is more frequently found in this group than elsewhere on saltmarsh. Some species-poor *Festuca rubra*/*Agrostis stolonifera* swards from inland locales and lacking in typical grassland indicators have been classified here.

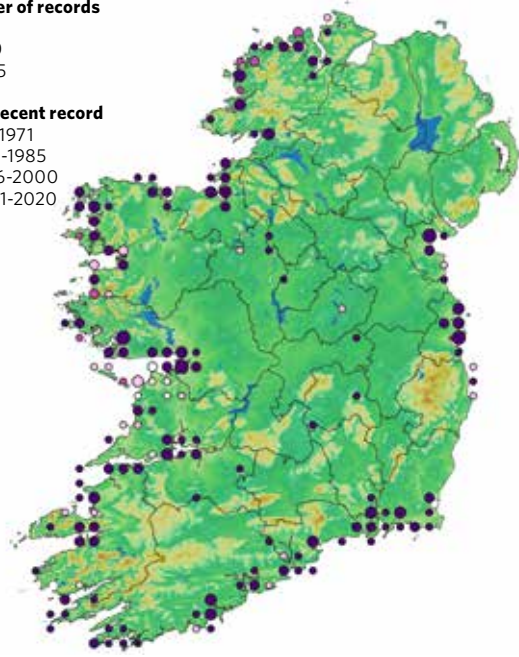
1. *Juncus gerardii* very common to abundant ..... **SM4B**  
*Juncus gerardii* absent or if present then not very common ..... 2
2. *Agrostis stolonifera* quite common to abundant... **SM4A**  
*Agrostis stolonifera* absent or if present then not so common ..... 3
3. *Plantago maritima* very common or abundant and/or  
*Armeria maritima* scarce to abundant ..... **SM4C**  
Vegetation not as above (*Festuca rubra* usually strong dominant) ..... **SM4D**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



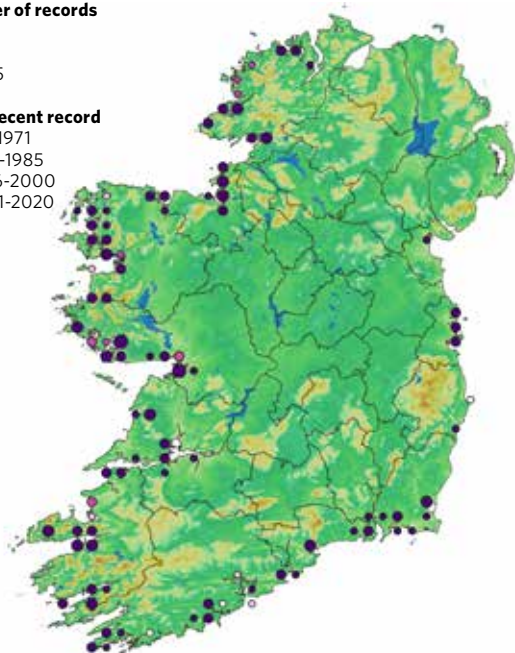
SM4

## SM5 *Juncus maritimus* – *Oenanthe lachenalii* group

This group encompasses tall, rushy communities of the upper saltmarsh. *Juncus maritimus* is usually dominant or co-dominant. The most common other species are *Agrostis stolonifera*, *Armeria maritima*, *Aster tripolium* (= *Tripolium pannonicum*), *Festuca rubra*, *Glaux maritima* (= *Lysimachia maritima*), *Leontodon autumnalis* (= *Scorzoneroides autumnalis*) and *Plantago maritima*. *Oenanthe lachenalii* is uncommon, but is more frequently found in this group than elsewhere on saltmarsh.

- Festuca rubra* very common to abundant ..... **SM5A**  
*Festuca rubra* absent or if present then not very common ..... **SM5B**

**Number of records**  
 ● 1-3  
 ● 4-10  
 ● 11-25  
 ● 26+  
**Most recent record**  
 ○ pre-1971  
 ○ 1971-1985  
 ○ 1986-2000  
 ● 2001-2020

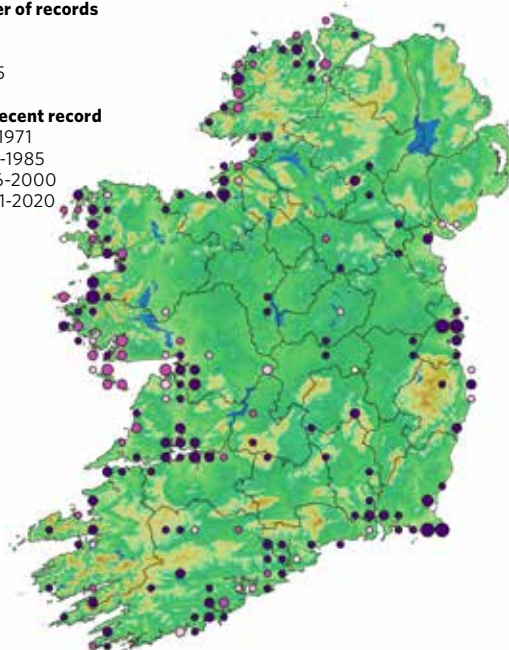


SM5

## SM6 *Agrostis stolonifera* – *Juncus gerardii* group

This is a variable group but it brings together swamp and grassland communities of the upper parts of saltmarshes that are poorly accommodated elsewhere along with some species-poor inundation swards from freshwater locales inland. The main species are *Agrostis stolonifera*, *Bolboschoenus maritimus*, *Glaux maritima* (= *Lysimachia maritima*), *Juncus gerardii* and *Potentilla anserina*. Less frequently found are *Aster tripolium* (= *Tripolium pannonicum*), *Festuca rubra*, *Leontodon autumnalis* (= *Scorzoneroides autumnalis*) and *Triglochin maritimum* (= *T. maritima*).

**Number of records**  
 ● 1-3  
 ● 4-10  
 ● 11-25  
 ● 26+  
**Most recent record**  
 ○ pre-1971  
 ○ 1971-1985  
 ○ 1986-2000  
 ● 2001-2020



- Juncus gerardii* very common to abundant ..... **SM6D**  
*Juncus gerardii* absent or if present then not very common ..... 2
- Potentilla anserina* very common to abundant ..... **SM6C**  
*Potentilla anserina* absent or if present then not very common ..... 3
- Bolboschoenus maritimus* abundant to dominant ..... **SM6A**  
*Bolboschoenus maritimus* absent or if present then not abundant (*Agrostis stolonifera* usually strong dominant) ..... **SM6B**



SM6

## SM7 *Elytrigia repens* – *Elytrigia atherica* group

This group encompasses tall, coarse couch grass swards. They may occur at the very tops of saltmarshes (along driftlines and at the base of levees) or around lagoons and along creeks. Similar swards may also occur inland, on abandoned farmland, on uncut verges or in disused gardens. The main species are *Elytrigia repens* (= *Elymus repens*) and, along the south and east coast, *Elytrigia atherica* (= *Elymus athericus*). Other grass species that occur here are *Agrostis stolonifera*, *Festuca rubra* and *Holcus lanatus*. *Atriplex prostrata* can be found amongst driftline swards.

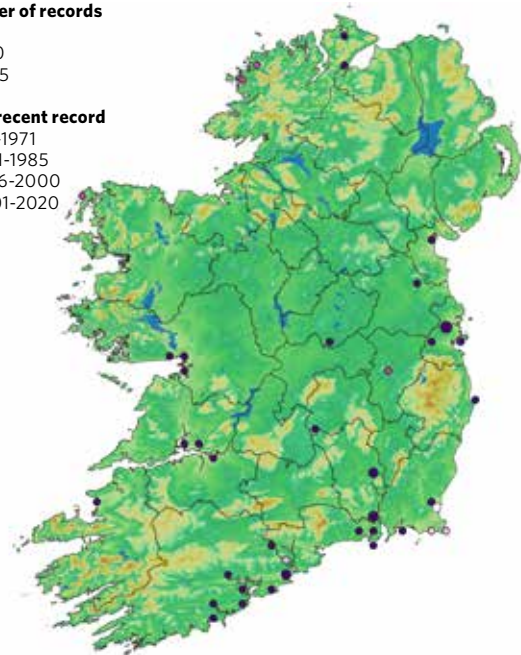
1. *Elytrigia repens* (= *Elymus repens*) abundant to dominant ..... **SM7A**  
*Elytrigia repens* absent or if present then not abundant (*Elytrigia atherica* = *Elymus athericus* abundant to dominant) ..... **SM7B**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



# Strandline and shingle

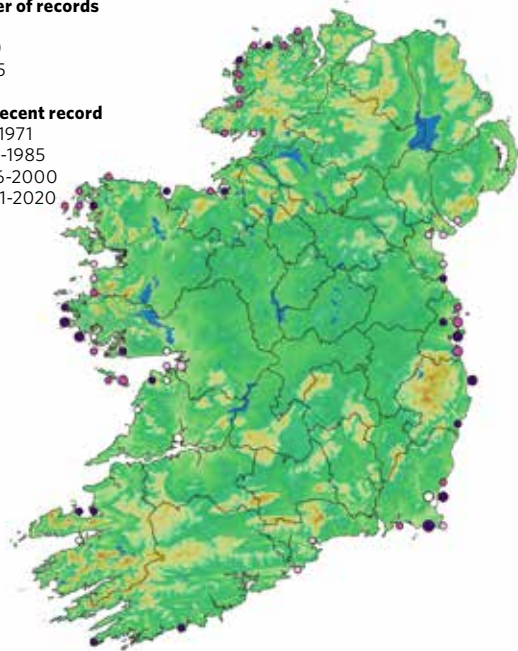
**S**trandline and shingle communities are found around the Irish coastline where there are sandy or stony beaches, or saltmarshes. They are typically open communities, characterized by the presence of sand-loving (psammophilic) and salt-tolerant (halophilic) plants. There is a single group with characteristics of the division.

## ST1 *Atriplex prostrata* – *Honckenya peploides* group

This group brings together communities found in a narrow, linear zone along the high tide mark on sandy and shingly beaches and similar vegetation that also occurs at the landward margin of saltmarshes and on shingle banks. Where there are dune systems, strandline vegetation occurs below the embryonic dunes. The main species encountered are *Atriplex prostrata*, *Beta vulgaris*, *Cakile maritima*, *Elytrigia juncea* (= *Elymus junceiformis*), *Eryngium maritimum*, *Honckenya peploides*, *Rumex crispus*, *Salsola kali* and *Tripleurospermum maritimum*.

1. *Honckenya peploides* common to dominant.....**ST1C**  
*Honckenya peploides* absent or if present then uncommon.....2
2. *Atriplex prostrata* common to dominant.....**ST1A**  
*Atriplex prostrata* absent or if present then uncommon (*Cakile maritima* usually present).....**ST1B**

- Number of records**
- 1-3
  - 4-10
  - 11-25
  - 26+
- Most recent record**
- pre-1971
  - 1971-1985
  - 1986-2000
  - 2001-2020



# Saline water habitats

**S**aline water habitats occur around the coastline in estuaries, sheltered bays and lagoons. They are characterized by the presence of aquatic vascular halophytes, usually accompanied by macroalgal species. There is a single group with characteristics of the division.

## SW1 *Ruppia maritima/cirrhosa* – *Zostera marina* group

This group represents floristically simple vegetation of the subtidal or lower intertidal zone of lagoons and sheltered coastal waters. The main vascular taxa are *Ruppia maritima/cirrhosa* (= *R. maritima/spiralis*) and *Zostera marina*. Intertidal *Zostera noltii* (= *Z. noltei*) beds probably also belong in this group but there are currently little data available.

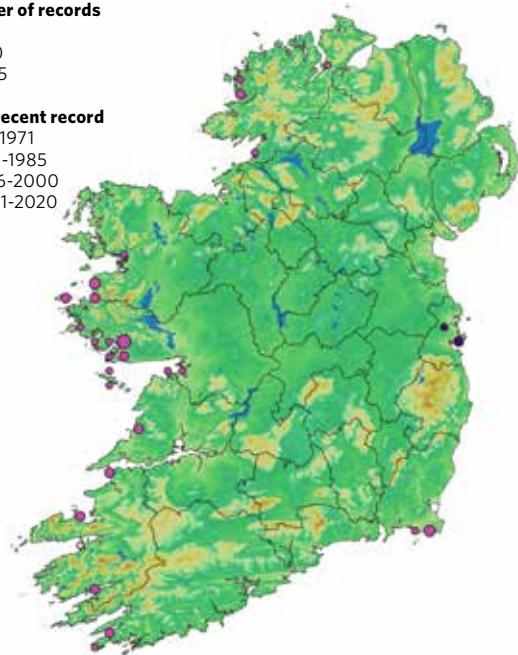
1. *Ruppia maritima/cirrhosa* (= *R. maritima/spiralis*) scarce to dominant ..... **SW1A**  
*Ruppia maritima/cirrhosa* (= *R. maritima/spiralis*) absent or if present then very scarce (*Zostera marina* present) ..... **SW1B**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



SW1

# Communities of weeds and other annuals

Annual communities can be found across Ireland in a variety of different habitats where either disturbance (usually caused by human activity) or periodic but sustained inundation prevents more competitive, perennial plants from dominating. Fast-growing ruderal species are able to prosper in these open communities. In tillage fields and gardens, growers regard such species as weeds and modern practices have inevitably caused a decline in the occurrence and diversity of segetal assemblages. This division is split into two groups chiefly on the basis of wetness.

## WE1 *Poa annua* – *Stellaria media* group

This group consists of annual weed communities from relatively dry, disturbed locations including arable fields, flower beds, market and kitchen gardens, well-worn pathways across fields, amenity grassland and trampled gateways. The main species are mostly small forbs and include *Anagallis arvensis* (= *Lysimachia arvensis*), *Bellis perennis*, *Capsella bursa-pastoris*, *Cerastium fontanum*, *Lamium purpureum*, *Persicaria maculosa*, *Plantago major*, *Polygonum aviculare*, *Ranunculus repens*, *Senecio vulgaris*, *Sonchus oleraceus*, *Stellaria media*, *Taraxacum officinale* agg. and *Veronica persica*. Grass species found here include *Poa annua*, *Holcus lanatus*, *Lolium perenne* and *Lolium temulentum*. Segetal assemblages can contain archaeophytes such as *Centaurea cyanus* and *Agrostemma githago* which were once common sights of arable fields, but are now very rare due to changes in farming. Communities in this group have been vastly under-recorded and are far more widespread than current mapped records suggest.

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



1. *Stellaria media* very common to dominant ..... **WE1A**  
*Stellaria media* absent or if present then not very common ..... 2
2. *Lolium perenne* common to dominant ..... 3  
*Lolium perenne* absent or if present then uncommon ... 4
3. *Poa annua* scarce to dominant ..... **WE1E**  
*Poa annua* absent or if present then very scarce (*Anagallis arvensis* = *Lysimachia arvensis* usually present) ..... **WE1D**
4. *Veronica persica* present ..... **WE1C**  
*Veronica persica* absent ..... 5
5. *Persicaria maculosa* scarce to dominant ..... **WE1F**  
*Persicaria maculosa* absent or if present then very scarce (*Cerastium fontanum* and *Ranunculus repens* usually present) ..... **WE1B**

## WE2 *Juncus bufonius* – *Limosella aquatica* group

This group consists of inundation communities that are characterized by the presence of annual species. They have been recorded from the banks of turloughs, reservoirs, rivers and estuarine channels that are periodically inundated and from the flood zones of lagoons and brackish coastal lakes, the margin of dune slacks and from wet areas within machair. At inland locations they have been noted on inundated paths in woodlands and peatlands and may also occur in wet arable fields. The main species are *Agrostis stolonifera*, *Gnaphalium uliginosum*, *Juncus bufonius*, *Limosella aquatica*, *Persicaria maculosa* and *Triglochin palustre* (= *T. palustris*).

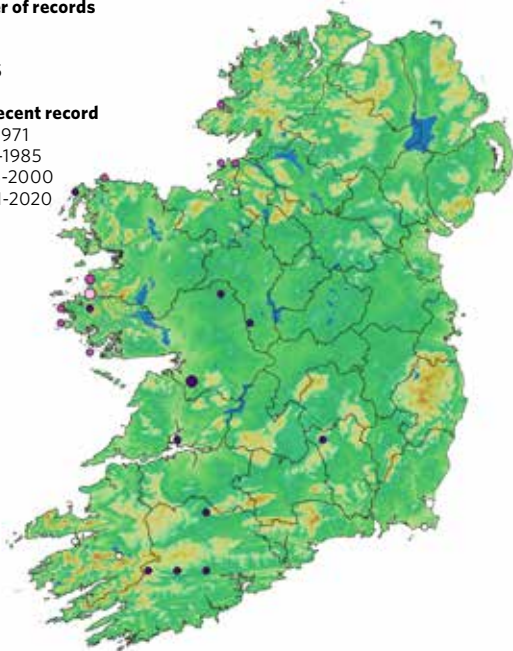
1. *Persicaria maculosa* present..... **WE2A**  
*Persicaria maculosa* absent..... **WE2B**

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



# Woodlands and forests

About 11% of Ireland is wooded, a proportion that is small compared with that of many other European countries, but still equates to a sizeable area of habitat. The large majority of this wooded area, however, which is distributed across the country, comprises commercial forestry plantations of non-native conifers. Woodland composed primarily of broadleaf species covers a much smaller extent and is highly fragmented. Some of this, referred to as native (or semi-natural) woodland, is dominated by native species whilst some is dominated by non-native broadleaves. Woodlands are usually stratified, with canopy, understorey and field layers. The field layer is chiefly composed of herbs, ferns and woody shrubs. The woodlands and forests division comprises five groups, of which four deal with native and modified broadleaf woodland and native yew-woods, and are divided broadly along gradients from acid to basic and wet to dry. A fifth group deals with conifer plantations.

## WL1 *Quercus petraea* – *Luzula sylvatica* group

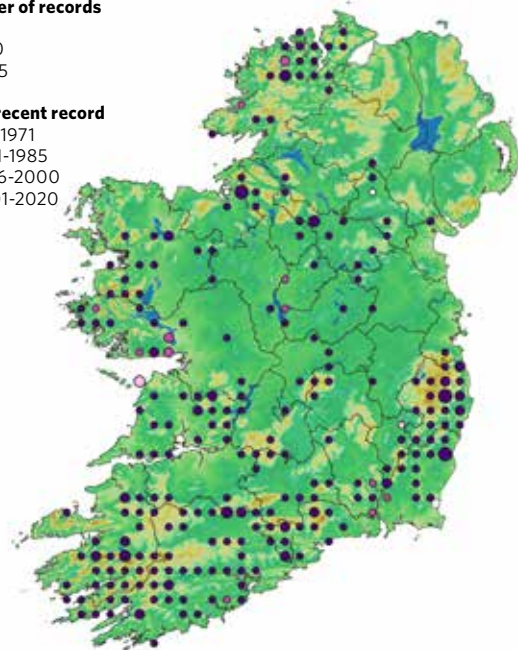
This group collates woodland communities found on dry or humid, acidic soils, often in upland regions, but seldom at high altitude. The main canopy species in high forest are *Quercus* spp.—usually *Quercus petraea* but sometimes *Quercus robur* or *Quercus × rosacea*—*Betula pubescens* and *Sorbus aucuparia*. In the understorey are found *Ilex aquifolium* and *Corylus avellana*. Occasionally *Corylus* itself forms a low canopy. In the field layer can be found *Blechnum spicant*, *Dryopteris dilatata*, *Hedera helix* (= *H. helix/hibernica*), *Lonicera periclymenum*, *Luzula sylvatica*, *Oxalis acetosella*, *Rubus fruticosus* agg. and *Vaccinium myrtillus*. Bryophytes here include *Dicranum scoparium*, *Dicranum majus*, *Isoetecium myosuroides*, *Kindbergia praelonga*, *Mnium hornum*, *Polytrichum formosum*, *Pseudotaxiphyllum elegans*, *Rhytidiadelphus loreus* and *Thuidium tamariscinum*. Substrates are acidic, nutrient-poor podzols and well-drained mineral soils.

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



1. *Corylus avellana* abundant to dominant..... **WL1C**  
*Corylus avellana* absent or if present then not abundant .....2
2. *Rhytidiadelphus loreus* and/or *Dicranum majus* present...  
**WL1D**  
*Rhytidiadelphus loreus* and *Dicranum majus* absent.....3
3. *Quercus petraea* common to dominant..... **WL1B**  
*Quercus petraea* absent or if present then uncommon..... **WL1A**



## WL2 *Fraxinus excelsior* – *Hedera helix* group

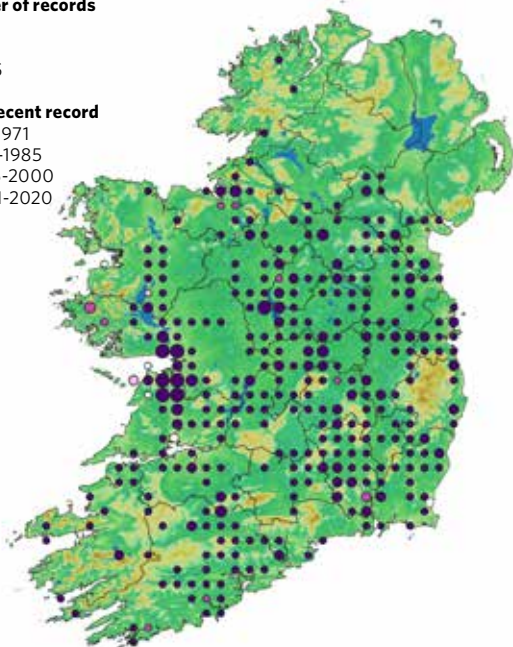
This group contains communities of base-rich, relatively dry woodlands found throughout the lowlands of Ireland, including non-native broadleaf stands. The main canopy species are *Acer pseudoplatanus*, *Fagus sylvatica*, *Fraxinus excelsior*, *Quercus robur* and, in scrub-woodland, *Corylus avellana*. In the understorey of high forest can be found *Corylus avellana*, *Crataegus monogyna* and *Ilex aquifolium*. Typical species of the field layer include *Arum maculatum*, *Circaea lutetiana*, *Dryopteris affinis*, *Dryopteris dilatata*, *Fragaria vesca*, *Geranium robertianum*, *Geum urbanum*, *Hedera helix* (= *H. helix/hibernica*), *Lonicera periclymenum*, *Rubus fruticosus* agg., *Polystichum setiferum*, *Potentilla sterilis* and *Viola riviniana/reichenbachiana*. The bryophyte layer consists mostly of *Eurhynchium striatum*, *Hypnum cupressiforme*, *Isoetes myosuroides*, *Neckera complanata*, *Plagiomnium undulatum*, *Rhytidiadelphus triquetrus* (= *Hylocomiadelphus triquetrus*), *Thamnobryum alopecurum* and *Thuidium tamariscinum*. These stands grow on well-drained mineral soils, sometimes in association with outcropping limestone.

### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



1. *Taxus baccata* abundant to dominant ..... **WL2F**  
*Taxus baccata* absent or if present then not abundant .2
2. *Corylus avellana* very abundant to dominant ..... **WL2E**  
*Corylus avellana* absent or if present then not very abundant .....3
3. *Quercus robur* abundant to dominant ..... **WL2A**  
*Quercus robur* absent or if present then not abundant .4
4. *Fagus sylvatica* abundant to dominant ..... **WL2D**  
*Fagus sylvatica* absent or if present then not abundant .....5
5. *Hedera helix* (= *H. helix/hibernica*) abundant (*Acer pseudoplatanus* frequent in canopy) ..... **WL2C**  
*Hedera helix* (= *H. helix/hibernica*) absent or if present then not abundant ..... **WL2B**



## WL3 *Alnus glutinosa* – *Filipendula ulmaria* group

This group encompasses stands from base-rich wet woodlands along rivers, streams and lake margins, on flushed hillsides and on degraded bogs. The main canopy species are *Alnus glutinosa*, *Fraxinus excelsior* and *Salix cinerea*. *Betula pubescens* is fairly frequent as are *Crataegus monogyna* and *Ilex aquifolium* in the understorey. Common field layer plants include *Angelica sylvestris*, *Carex remota*, *Filipendula ulmaria*, *Galium palustre* and *Ranunculus repens*. In the bryophyte layer can be found *Brachythecium rutabulum*, *Calliergonella cuspidata*, *Kindbergia praelonga* and *Hypnum cupressiforme*. Soils are usually gleys and basin peats, including fen peats.

1. *Fraxinus excelsior* abundant to dominant.....2  
*Fraxinus excelsior* absent or if present then not abundant .....3
2. *Thuidium tamariscinum* scarce to abundant (*Betula pubescens* and *Salix cinerea* typically present)..... **WL3A**  
*Thuidium tamariscinum* absent or if present then very scarce (*Betula pubescens* and *Salix cinerea* often absent)..... **WL3C**
3. *Alnus glutinosa* very abundant to dominant..... **WL3B**  
*Alnus glutinosa* absent or if present then not very abundant .....4
4. *Calliergonella cuspidata* quite common to abundant ..... **WL3E**  
*Calliergonella cuspidata* absent or if present then not so common.....5
5. *Rubus fruticosus* agg. scarce to abundant..... **WL3D**  
*Rubus fruticosus* agg. very scarce or absent (*Phalaris arundinacea* usually frequent) ..... **WL3F**

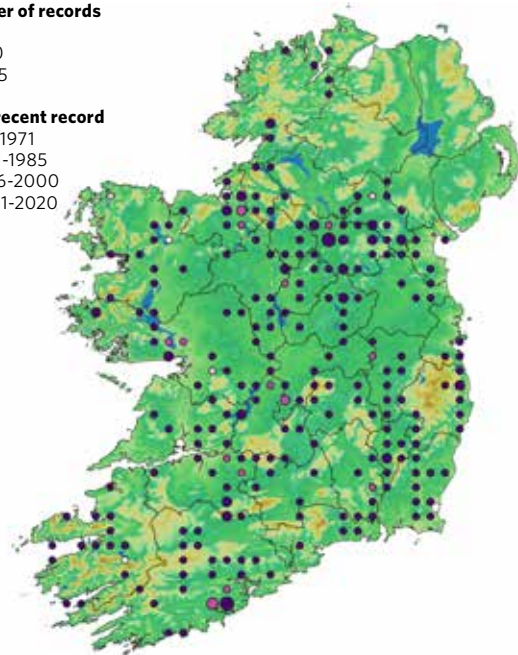


### Number of records

- 1-3
- 4-10
- 11-25
- 26+

### Most recent record

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



## WL4 *Betula pubescens* – *Molinia caerulea* group

This group comprises birch stands that are often successional to other woodland types. They are particularly prevalent on degraded raised bogs in the midlands but also occur as part of upland woodlands, and, rarely, on intact raised bog. *Betula pubescens* dominates, accompanied most often by *Ilex aquifolium*, *Salix cinerea* and *Sorbus aucuparia*. The more common plants in the field layer include *Rubus fruticosus* agg., *Dryopteris dilatata*, *Molinia caerulea*, *Oxalis acetosella*, *Potentilla erecta* and *Pteridium aquilinum*. Bryophytes include *Thuidium tamariscinum*, *Kindbergia praelonga*, *Scleropodium purum* (= *Pseudoscleropodium purum*) and, less often, *Sphagnum* spp. Substrates are typically deep or degraded basin peats, podzols or peaty gleys, but stands can occur on well-drained acidic mineral soils.

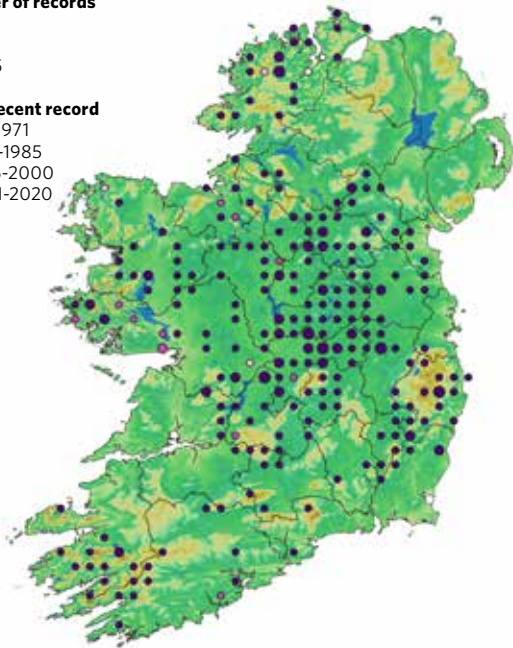


**Number of records**

- 1-3
- 4-10
- 11-25
- 26+

**Most recent record**

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



1. *Agrostis capillaris* scarce to abundant ..... **WL4B**  
*Agrostis capillaris* absent or if present then very scarce.....2
2. *Sphagnum palustre* scarce to abundant..... **WL4C**  
*Sphagnum palustre* absent or if present then very scarce .....3
3. *Vaccinium myrtillus* present ..... **WL4A**  
*Vaccinium myrtillus* absent.....4
4. *Molinia caerulea* present.....5  
*Molinia caerulea* absent .....6
5. *Salix cinerea* abundant and/or *Filipendula ulmaria* present..... **WL4E**  
*Salix cinerea* if present then not abundant and *Filipendula ulmaria* absent..... **WL4F**
6. *Ilex aquifolium* abundant..... **WL4A**  
*Ilex aquifolium* absent or if present then not abundant ..... **WL4D**

(= *H. helix/hibernica*) and *Rubus fruticosus* agg. There may be some suppressed growth of *Ilex aquifolium* or *Sorbus aucuparia*. A typical woodland suite of bryophytes occurs, including *Brachythecium rutabulum*, *Hypnum jutlandicum*, *Kindbergia praelonga*, *Lophocolea bidentata*, *Plagiothecium undulatum*, *Polytrichum formosum*, *Rhytidiadelphus loreus*, *Rhytidiadelphus squarrosus* and *Thuidium tamariscinum*. Stands dominated by other non-native conifers, such as *Pinus contorta* and *Picea abies*, may also belong within group **WL5**, but data from such stands are currently lacking. Vast swathes of Ireland are covered by *Picea sitchensis* forests, evidently not indicated by the current map of records.

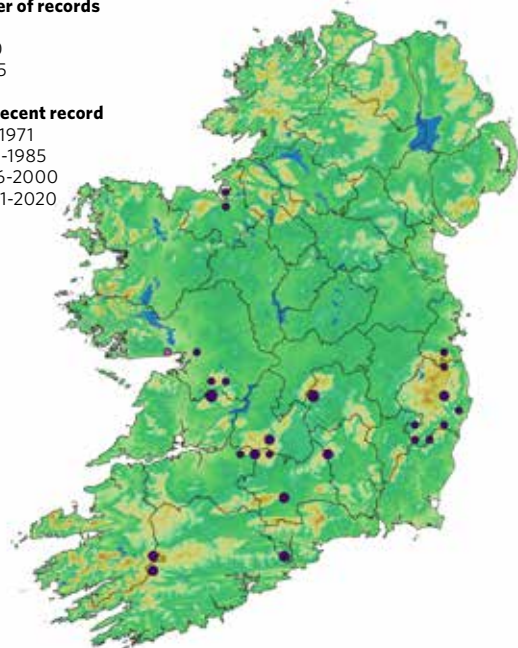
1. *Larix kaempferi* abundant to dominant..... **WL5B**  
*Larix kaempferi* absent or if present then not abundant ..... **WL5A**

**Number of records**

- 1-3
- 4-10
- 11-25
- 26+

**Most recent record**

- pre-1971
- 1971-1985
- 1986-2000
- 2001-2020



## WL5 *Picea sitchensis* – *Larix kaempferi* group

This group comprises commercial forestry plantations composed of non-native conifers. Presently, the group covers stands dominated by *Picea sitchensis* or *Larix kaempferi*. These are generally even-aged and without much diversity in structure. The abundance of the field and bryophyte layers is dependent on the openness of the canopy, itself determined by thinning practices. Both lower layers are typically sparse with the main vascular plants being *Agrostis* spp., *Dryopteris dilatata*, *Hedera helix*



WL5

## Part III

# List of communities

Below is a comprehensive list of IVC communities and sub-communities, structured by divisions (in bold) and groups (underlined).

### **Bogs (BG)**

- BG1 *Rhynchospora alba* – *Sphagnum cuspidatum* group  
BG1A *Sphagnum cuspidatum* –  
*Sphagnum subsecundum* agg. hollow  
BG1Ai *Sphagnum cuspidatum* sub-community  
BG1Aii *Sphagnum subsecundum* agg. –  
*Schoenus nigricans* sub-community  
BG1B *Rhynchospora alba* – *Narthecium ossifragum* bog  
BG1Bi *Sphagnum subsecundum* agg. –  
*Potamogeton polygonifolius* sub-community  
BG1Bii *Calluna vulgaris* – *Campylopus*  
*atrovirens* sub-community  
BG1C *Schoenus nigricans* – *Eriophorum*  
*angustifolium* bog  
BG1D *Eriophorum angustifolium* –  
*Campylopus introflexus* bog  
BG2 *Erica tetralix* – *Sphagnum capillifolium* group  
BG2A *Eriophorum vaginatum* – *Vaccinium oxycoccos* bog  
BG2Ai *Menyanthes trifoliata* – *Carex*  
*rostrata* sub-community  
BG2Aii *Andromeda polifolia* – *Sphagnum*  
*magellanicum* sub-community  
BG2B *Erica tetralix* – *Andromeda polifolia* bog  
BG2C *Erica tetralix* – *Molinia caerulea* –  
*Cladonia portentosa* peatland  
BG2D *Erica tetralix* – *Schoenus nigricans* bog  
BG2E *Calluna vulgaris* – *Eriophorum* spp. bog  
BG2F *Trichophorum cespitosum/germanicum*  
– *Eriophorum angustifolium* peatland

### **Dunelands (DU)**

- DU1 *Elytrigia juncea* – *Ammophila arenaria* group  
DU1A *Elytrigia juncea* duneland  
DU1B *Ammophila arenaria* duneland  
DU2 *Festuca rubra* – *Galium verum* group  
DU2A *Ammophila arenaria* – *Festuca rubra* duneland  
DU2B *Festuca rubra* – *Syntrichia ruraliformis* duneland  
DU2C *Festuca rubra* – *Plantago lanceolata*  
– *Carex arenaria* duneland  
DU2D *Festuca rubra* – *Thymus polytrichus* duneland

### DU3 *Agrostis stolonifera* – *Carex arenaria* group

- DU3A *Salix repens* – *Lotus corniculatus* duneland  
DU3B *Agrostis stolonifera* – *Calliergonella*  
*cuspidata* – *Carex arenaria* grassland  
DU3C *Agrostis stolonifera* – *Festuca rubra*  
– *Carex arenaria* duneland  
DU3D *Festuca rubra* – *Bellis perennis* grassland  
DU3E *Succisa pratensis* – *Epipactis palustris* duneland

### **Fens, mires and springs (FE)**

- FE1 *Schoenus nigricans* – *Campylium stellatum* group  
FE1A *Schoenus nigricans* – *Campylium stellatum* fen  
FE1B *Schoenus nigricans* – *Succisa pratensis* fen  
FE1C *Carex panicea* – *Carex viridula* fen  
FE1D *Juncus subnodulosus* – *Mentha aquatica* fen  
FE2 *Menyanthes trifoliata* – *Potentilla palustris* group  
FE2A *Equisetum fluviatile* – *Menyanthes trifoliata* mire  
FE2B *Carex limosa* – *Menyanthes trifoliata* mire  
FE2C *Carex lasiocarpa* – *Menyanthes trifoliata* mire  
FE2D *Carex rostrata* – *Menyanthes trifoliata* mire  
FE2E *Menyanthes trifoliata* – *Sphagnum*  
*recurvum* agg. mire  
FE2Ei *Carex nigra* – *Polytrichum*  
*commune* sub-community  
FE2Eii *Menyanthes trifoliata* – *Carex*  
*rostrata* sub-community  
FE2F *Menyanthes trifoliata* –  
*Calliergonella cuspidata* mire  
FE3 *Agrostis stolonifera* – *Carex nigra* group  
FE3A *Carex nigra* – *Ranunculus flammula* fen  
FE3B *Carex nigra* – *Potentilla anserina* fen  
FE3C *Eleocharis palustris* – *Agrostis stolonifera* fen  
FE3D *Carex nigra* – *Calliergonella cuspidata* fen  
FE4 *Philonotis fontana* – *Palustriella commutata* group  
FE4A *Philonotis fontana* – *Chrysosplenium*  
*oppositifolium* spring  
FE4B *Palustriella commutata* –  
*Bryum pseudotriquetrum* spring

## Freshwater habitats (FW)

### FW1 *Littorella uniflora* – *Eriocaulon aquaticum* group

FW1A *Littorella uniflora* – *Ranunculus*

*flammula* aquatic community

FW1B *Eriocaulon aquaticum* – *Lobelia*

*dortmanna* aquatic community

FW1C *Juncus bulbosus* aquatic community

FW1Ci *Potamogeton natans* – *Mentha*

*aquatica* sub-community

FW1Cii *Juncus effusus* – *Polytrichum*

*commune* sub-community

FW1D *Najas flexilis* aquatic community

### FW2 *Ranunculus penicillatus* – *Fontinalis antipyretica* group

FW2A *Fontinalis antipyretica* – *Myriophyllum*

*alterniflorum* aquatic community

FW2B *Rhynchosygium riparioides* – *Chiloscyphus*

*polyanthos* aquatic community

FW2C *Ranunculus penicillatus* – *Fontinalis*

*antipyretica* aquatic community

FW2D *Apium nodiflorum* – *Ranunculus*

*penicillatus* aquatic community

FW2E *Apium nodiflorum* – *Rorippa nasturtium-*

*aquaticum* agg. aquatic community

FW2F *Potamogeton pectinatus* – *Myriophyllum*

*spicatum* aquatic community

FW2G *Potamogeton natans* – *Equisetum*

*fluviatile* aquatic community

FW2H *Potamogeton filiformis* – *Myriophyllum*

*alterniflorum* aquatic community

FW2I *Nymphaea alba* aquatic community

FW2J *Nuphar lutea* aquatic community

FW2K *Zannichellia palustris* aquatic community

### FW3 *Phragmites australis* – *Cladium mariscus* group

FW3A *Schoenoplectus lacustris* – *Sparganium*

*erectum* swamp

FW3B *Phragmites australis* – *Agrostis stolonifera* swamp

FW3C *Carex rostrata* swamp

FW3Ci *Phragmites australis* – *Equisetum*

*fluviatile* sub-community

FW3Cii *Sphagnum subsecundum* agg. –

*Potamogeton polygonifolius* sub-community

FW3D *Schoenoplectus lacustris* swamp

FW3E *Phragmites australis* – *Equisetum fluviatile* swamp

FW3F *Filipendula ulmaria* – *Valeriana*

*officinalis* tall-herb swamp

FW3G *Equisetum fluviatile* – *Eleocharis palustris* swamp

FW3H *Cladium mariscus* – *Phragmites australis* swamp

FW3I *Schoenoplectus tabernaemontani* swamp

FW3J *Carex elata* swamp

FW3K *Carex paniculata* swamp

FW3L *Glyceria maxima* swamp

FW3M *Typha latifolia* swamp

FW3N *Iris pseudacorus* beds

## Grasslands (GL)

### GL1 *Juncus acutiflorus* – *Molinia caerulea* group

GL1A *Juncus acutiflorus* – *Holcus lanatus* grassland

GL1B *Agrostis stolonifera* – *Filipendula ulmaria*

marsh-grassland

GL1C *Molinia caerulea* – *Succisa pratensis* grassland

GL1D *Molinia caerulea* – *Potentilla erecta* –

*Agrostis stolonifera* grassland

GL1Di *Filipendula ulmaria* – *Hydrocotyle*

*vulgaris* sub-community

GL1Dii *Holcus lanatus* – *Anthoxanthum*

*odoratum* sub-community

GL1E *Juncus acutiflorus* – *Rhytidiadelphus*

*squarrosus* grassland

### GL2 *Agrostis stolonifera* – *Ranunculus repens* group

GL2A *Agrostis stolonifera* – *Ranunculus repens*

marsh-grassland

GL2B *Juncus effusus* – *Holcus lanatus* grassland

GL2C *Holcus lanatus* – *Lolium perenne* grassland

GL2D *Juncus effusus* – *Rumex acetosa* grassland

GL2Di typical sub-community

GL2Dii *Polytrichum commune* –

*Sphagnum* spp. sub-community

### GL3 *Cynosurus cristatus* – *Plantago lanceolata* group

GL3A *Briza media* – *Thymus polytrichus* grassland

GL3Ai *Sesleria caerulea* – *Tortella*

*tortuosa* sub-community

GL3Aii *Cynosurus cristatus* – *Rhytidiadelphus*

*squarrosus* sub-community

GL3B *Lolium perenne* – *Trifolium repens* grassland

GL3Bi *Cynosurus cristatus* – *Festuca*

*rubra* sub-community

GL3Bii *Poa annua* – *Plantago major* sub-community

GL3Biii *Lolium perenne* sub-community

GL3C *Festuca rubra* – *Plantago lanceolata* grassland

GL3D *Cynosurus cristatus* – *Trifolium pratense* grassland

GL3E *Festuca rubra* – *Rhinanthus minor* grassland

GL3F *Festuca rubra* – *Lotus corniculatus* grassland  
 GL3Fi *Plantago maritima* – *Plantago coronopus* sub-community  
 GL3Fii *Festuca rubra* – *Poa pratensis/humilis* sub-community  
 GL3G *Arrhenatherum elatius* – *Dactylis glomerata* grassland  
 GL4 *Nardus stricta* – *Galium saxatile* group  
 GL4A *Agrostis capillaris* – *Trifolium repens* grassland  
 GL4B *Nardus stricta* – *Potentilla erecta* grassland  
 GL4Bi *Festuca ovina* – *Luzula campestris* sub-community  
 GL4Bii *Calluna vulgaris* – *Rhytidadelphus loreus* sub-community  
 GL4C *Agrostis capillaris* – *Potentilla erecta* grassland  
 GL4D *Agrostis canina/vinealis* – *Rhytidadelphus squarrosus* grassland

## Heaths (HE)

HE1 *Dryas octopetala* – *Sesleria caerulea* group  
 HE1A *Dryas octopetala* – *Sesleria caerulea* heath  
 HE2 *Erica cinerea* – *Calluna vulgaris* group  
 HE2A *Ulex gallii* – *Erica cinerea* heath  
 HE2Ai *Daboecia cantabrica* – *Hypochaeris radicata* sub-community  
 HE2Aii *Calluna vulgaris* – *Hypnum jutlandicum* sub-community  
 HE2B *Calluna vulgaris* – *Hypnum jutlandicum* heath  
 HE2C *Calluna vulgaris* – *Agrostis capillaris* heath  
 HE2Ci *Daboecia cantabrica* – *Lotus corniculatus* sub-community  
 HE2Cii *Carex binervis* – *Rhytidadelphus loreus* sub-community  
 HE2D *Calluna vulgaris* – *Molinia caerulea* – *Erica cinerea* heath  
 HE2E *Calluna vulgaris* – *Trichophorum cespitosum/germanicum* heath  
 HE3 *Vaccinium myrtillus* – *Racomitrium lanuginosum* group  
 HE3A *Calluna vulgaris* – *Hylocomium splendens* heath  
 HE3B *Calluna vulgaris* – *Scapania gracilis* heath  
 HE3C *Calluna vulgaris* – *Nardus stricta* heath  
 HE3D *Calluna vulgaris* – *Racomitrium lanuginosum* heath  
 HE3Di *Arctostaphylos uva-ursi* – *Juniperus communis* sub-community  
 HE3Dii typical sub-community

HE3E *Racomitrium lanuginosum* – *Festuca vivipara* heath  
 HE3Ei *Hymenophyllum wilsonii* – *Bazzania tricrenata* sub-community  
 HE3Eii typical sub-community  
 HE3F *Calluna vulgaris* – *Eriophorum vaginatum* bog  
 HE3Fi *Juncus squarrosus* – *Luzula sylvatica* sub-community  
 HE3Fii typical sub-community  
 HE3G *Juncus squarrosus* – *Rhytidadelphus loreus* heath  
 HE4 *Molinia caerulea* – *Polygala serpyllifolia* group  
 HE4A *Molinia caerulea* – *Trichophorum cespitosum/germanicum* peatland  
 HE4B *Molinia caerulea* – *Nardus stricta* heath  
 HE4Bi *Juncus bulbosus* – *Carex echinata* sub-community  
 HE4Bii *Nardus stricta* – *Agrostis canina/vinealis* sub-community  
 HE4C *Molinia caerulea* – *Schoenus nigricans* – *Calluna vulgaris* peatland  
 HE4Ci *Myrica gale* – *Sphagnum papillosum* sub-community  
 HE4Cii *Racomitrium lanuginosum* – *Pleurozia purpurea* sub-community  
 HE4D *Molinia caerulea* – *Potentilla erecta* – *Erica tetralix* heath  
 HE4E *Molinia caerulea* – *Calluna vulgaris* – *Erica tetralix* heath  
 HE4F *Molinia caerulea* – *Myrica gale* flush

## Invasive plant communities (IN)

IN1 Invasive plants group  
 IN1A *Rhododendron ponticum* invasive community  
 IN1B *Gunnera tinctoria* invasive community

## Rocky habitats (RH)

RH1 *Asplenium ruta-muraria* – *Geranium robertianum* group  
 RH1A *Asplenium trichomanes* – *Ctenidium molluscum* crevice community  
 RH1Ai *Sesleria caerulea* – *Carex flacca* sub-community  
 RH1Aii *Tortella tortuosa* – *Asplenium trichomanes* sub-community  
 RH1B *Teucrium scorodonia* – *Mycelis muralis* pavement community

RH1C *Asplenium ruta-muraria* – *Cymbalaria muralis*  
wall community

RH1D *Parietaria judaica* – *Tortula muralis*  
wall community

RH2 *Saxifraga spathularis* – *Racomitrium lanuginosum* group

RH2A *Hymenophyllum wilsonii* – *Isoetes*  
*myosuroides* crevice community

RH2Ai *Saxifraga spathularis* – *Festuca*  
*vivipara* sub-community

RH2Aii *Dryopteris dilatata* – *Polypodium*  
*vulgare* sub-community

RH2B *Racomitrium fasciculare* – *Festuca*  
*vivipara* scree community

RH2C *Racomitrium lanuginosum* – *Hypnum*  
*jutlandicum* scree community

RH2D *Angelica sylvestris* – *Breutelia*  
*chrysocoma* ledge community

RH2Di *Festuca rubra* – *Diplophyllum*  
*albicans* sub-community

RH2Dii *Campanula rotundifolia* – *Selaginella*  
*selaginoides* sub-community

RH2E *Aira caryophyllea* – *Polytrichum*  
*juniperinum* wall community

RH2F *Festuca vivipara* – *Oligotrichum*  
*hercynicum* fellfield

RH3 *Cephaloziella nicholsonii* – *Silene uniflora* group

RH3A *Cephaloziella stellulifera* – *Dicranella*  
*varia* mine-spoil community

RH3B *Silene uniflora* – *Euphrasia officinalis* agg.  
rock community

RH4 *Asplenium marinum* – *Plantago coronopus* group

RH4A *Asplenium marinum* crevice community

RH4B *Plantago coronopus* – *Armeria maritima* coastal  
rock community

## Scrub and wayside (SC)

SC1 *Rubus fruticosus* agg. – *Galium aparine* group

SC1A *Prunus spinosa* – *Crataegus monogyna* scrub

SC1B *Crataegus monogyna* –  
*Rubus fruticosus* agg. scrub

SC1C *Pteridium aquilinum* – *Rubus fruticosus* agg. scrub

SC1D *Ulex europaeus* – *Rubus fruticosus* agg. scrub

SC1E *Rubus fruticosus* agg. – *Holcus*  
*lanatus* wayside community

SC1F *Galium aparine* – *Urtica*  
*dioica* wayside community

SC1G *Salix aurita* – *Luzula sylvatica* scrub

## Saltmarsh (SM)

SM1 *Salicornia* agg. – *Spartina* agg. group

SM1A *Salicornia* agg. saltmarsh

SM1B *Spartina* agg. saltmarsh

SM1C *Suaeda maritima* saltmarsh

SM2 *Puccinellia maritima* – *Spergularia media* group

SM2A *Puccinellia maritima* – *Glaux maritima* saltmarsh

SM2B *Atriplex portulacoides* – *Puccinellia*  
*maritima* saltmarsh

SM2C *Puccinellia maritima* – *Limonium*  
*humile* saltmarsh

SM2D *Puccinellia maritima* – *Aster tripolium* saltmarsh

SM3 *Plantago maritima* – *Armeria maritima* group

SM3A *Plantago maritima* – *Armeria maritima* saltmarsh

SM3B *Plantago maritima* – *Puccinellia*  
*maritima* saltmarsh

SM4 *Festuca rubra* – *Seriphidium maritimum* group

SM4A *Festuca rubra* – *Agrostis stolonifera* saltmarsh

SM4B *Festuca rubra* – *Juncus gerardii* saltmarsh

SM4Bi typical sub-community

SM4Bii *Blysmus rufus* sub-community

SM4C *Festuca rubra* – *Armeria maritima* saltmarsh

SM4D *Festuca rubra* – *Plantago maritima* saltmarsh

SM5 *Juncus maritimus* – *Oenanthe lachenalii* group

SM5A *Juncus maritimus* – *Festuca rubra* saltmarsh

SM5B *Juncus maritimus* – *Plantago maritima* saltmarsh

SM6 *Agrostis stolonifera* – *Juncus gerardii* group

SM6A *Bolboschoenus maritimus* – *Agrostis*  
*stolonifera* saltmarsh-swamp

SM6B *Agrostis stolonifera* – *Triglochin*  
*maritimum* grassland

SM6Bi *Glaux maritima* – *Aster*  
*tripolium* sub-community

SM6Bii *Holcus lanatus* – *Anthoxanthum*  
*odoratum* sub-community

SM6C *Agrostis stolonifera* – *Potentilla*  
*anserina* grassland

SM6Ci *Juncus gerardii* sub-community

SM6Cii *Rumex crispus* – *Galium*  
*palustre* sub-community

SM6D *Agrostis stolonifera* – *Juncus gerardii* saltmarsh

SM6Di typical sub-community

SM6Dii *Blysmus rufus* sub-community

SM7 *Elytrigia repens* – *Elytrigia atherica* group

SM7A *Elytrigia repens* coarse grassland

SM7Ai *Atriplex prostrata* sub-community

SM7Aii *Holcus lanatus* – *Potentilla*  
*anserina* sub-community

SM7B *Elytrigia atherica* saltmarsh

## Strandline and shingle (ST)

### ST1 *Atriplex prostrata* – *Honckenya peploides* group

- ST1A *Atriplex prostrata* – *Tripleurospermum maritimum* strandline community
- ST1B *Cakile maritima* – *Salsola kali* strandline community
- ST1C *Honckenya peploides* – *Eryngium maritimum* strandline community

## Saline water habitats (SW)

### SW1 *Ruppia maritima/cirrhosa* – *Zostera marina* group

- SW1A *Ruppia maritima/cirrhosa* saline community
- SW1B *Zostera marina* saline community

## Communities of weeds and other annuals (WE)

### WE1 *Poa annua* – *Stellaria media* group

- WE1A *Stellaria media* – *Senecio vulgaris* weed community
- WE1B *Cerastium fontanum* – *Ranunculus repens* weed community
- WE1C *Veronica persica* – *Lamium purpureum* weed community
- WE1D *Lolium perenne* – *Anagallis arvensis* weed community
- WE1E *Poa annua* – *Plantago major* weed community
- WE1F *Persicaria maculosa* – *Polygonum aviculare* weed community

### WE2 *Juncus bufonius* – *Limosella aquatica* group

- WE2A *Persicaria maculosa* – *Limosella aquatica* inundation community
- WE2B *Juncus bufonius* – *Triglochin palustre* inundation community

## Woodlands and forests (WL)

### WL1 *Quercus petraea* – *Luzula sylvatica* group

- WL1A *Quercus robur* – *Luzula sylvatica* woodland
  - WL1Ai *Quercus robur* sub-community
  - WL1Aii *Quercus* × *rosacea* sub-community
- WL1B *Quercus petraea* – *Luzula sylvatica* woodland
- WL1C *Quercus petraea* – *Corylus avellana* woodland
  - WL1Ci *Quercus petraea* sub-community
  - WL1Cii *Corylus avellana* sub-community
- WL1D *Quercus petraea* – *Vaccinium myrtillus* woodland
  - WL1Di *Agrostis* spp. – *Galium saxatile* sub-community
  - WL1Dii *Ilex aquifolium* – *Hedera helix* sub-community

### WL3 *Fraxinus excelsior* – *Hedera helix* group

- WL2A *Quercus robur* – *Circaea lutetiana* woodland
- WL2B *Fraxinus excelsior* – *Geum urbanum* woodland
- WL2C *Fraxinus excelsior* – *Acer pseudoplatanus* woodland
- WL2D *Fagus sylvatica* – *Hedera helix* woodland
- WL2E *Corylus avellana* – *Potentilla sterilis* woodland
  - WL2Ei *Ctenidium molluscum* – *Epipactis helleborine* sub-community
  - WL2Eii *Fraxinus excelsior* – *Ilex aquifolium* sub-community
- WL2F *Taxus baccata* – *Ilex aquifolium* woodland
- WL3 *Alnus glutinosa* – *Filipendula ulmaria* group
  - WL3A *Fraxinus excelsior* – *Galium palustre* woodland
  - WL3B *Alnus glutinosa* – *Ranunculus repens* woodland
  - WL3C *Fraxinus excelsior* – *Iris pseudacorus* woodland
  - WL3D *Salix cinerea* – *Urtica dioica* woodland
    - WL3Di *Salix fragilis* – *Calystegia sepium* sub-community
    - WL3Dii *Crataegus monogyna* – *Dryopteris dilatata* sub-community
  - WL3E *Salix cinerea* – *Galium palustre* woodland
  - WL3F *Salix cinerea* – *Phalaris arundinacea* woodland
- WL4 *Betula pubescens* – *Molinia caerulea* group
  - WL4A *Betula pubescens* – *Vaccinium myrtillus* woodland
  - WL4B *Betula pubescens* – *Agrostis capillaris* woodland
    - WL4Bi *Ilex aquifolium* – *Plagiochila spinulosa* sub-community
    - WL4Bii *Rubus fruticosus* agg. – *Salix cinerea* sub-community
  - WL4C *Betula pubescens* – *Sphagnum palustre* woodland
    - WL4Ci *Calluna vulgaris* – *Eriophorum vaginatum* sub-community
    - WL4Cii *Rubus fruticosus* agg. – *Potentilla erecta* sub-community
  - WL4D *Betula pubescens* – *Rubus fruticosus* agg. woodland
  - WL4E *Betula pubescens* – *Salix cinerea* woodland
  - WL4F *Betula pubescens* – *Pteridium aquilinum* woodland
- WL5 *Picea sitchensis* – *Larix kaempferi* group
  - WL5A *Picea sitchensis* forest
  - WL5B *Larix kaempferi* forest

# Index of species

Species are ordered alphabetically with the codes of the communities in whose synoptic tables they are listed. Bold type indicates that the species is a constant (frequency IV or V) for that community. Absence of a particular community beside a species does not imply that the species never occurs in that community, only that it is not within the forty most frequent species.

*Acer pseudoplatanus* WL2A, WL2B, **WL2C**, WL2D, WL3C, WL3D

*Achillea millefolium* DU2C, **GL3A**, GL3B, GL3C, GL3D, GL3E, GL4A, GL4C, ST1B, ST1C, WE1B, WE1E, WE1F

*Adiantum capillus-veneris* RH4A

*Aegopodium podagraria* SC1F

*Agrostis canina/vinealis* FE2E, FW1C, GL1A, GL1E, GL2D, GL4B, GL4C, **GL4D**, HE2A, HE2B, HE2C, HE2D, HE2E, HE3A, HE3B, HE3C, HE3D, HE3E, HE3G, HE4B, HE4D, RH2F, SC1C, WL1D, **WL4B**, WL4C, WL4E, WL5A, **WL5B**

*Agrostis capillaris* FE2E, **FE4A**, GL1A, GL1D, GL1E, GL2B, GL2C, GL2D, GL3A, **GL3B**, GL3C, **GL3D**, **GL3E**, GL3F, GL3G, **GL4A**, **GL4B**, **GL4C**, GL4D, HE2A, HE2B, **HE2C**, HE2E, HE3A, HE3B, **HE3C**, HE3D, **HE3E**, HE3G, HE4B, HE4D, IN1B, RH2A, **RH2B**, RH2C, RH2D, RH2E, **RH2F**, **RH3A**, SC1C, **SC1G**, SM4C, WE1B, WL1D, **WL4B**, WL4F, WL5A, **WL5B**

*Agrostis stolonifera* BG1A, BG1D, DU1A, DU2A, DU2C, DU3A, **DU3B**, **DU3C**, **DU3D**, **DU3E**, FE1B, FE1D, FE2A, FE2B, FE2C, FE2D, FE2E, **FE2F**, **FE3A**, **FE3B**, **FE3C**, **FE3D**, FE4A, FE4B, FW1A, FW1B, FW1C, FW2D, FW2E, FW2G, **FW3B**, FW3C, FW3E, FW3F, FW3G, FW3H, FW3I, FW3J, FW3L, **FW3N**, **GL1A**, **GL1B**, GL1C, **GL1D**, GL1E, **GL2A**, **GL2B**, **GL2C**, **GL2D**,

GL3B, **GL3C**, GL3E, GL3F, GL3G, GL4A, GL4D, HE4D, **IN1B**, RH4A, RH4B, SC1A, **SC1B**, SC1C, SC1D, SC1E, SC1F, SC1G, SM1B, SM2A, SM2B, SM2D, SM3A, SM3B, **SM4A**, **SM4B**, SM4C, SM4D, **SM5A**, **SM5B**, SM6A, **SM6B**, **SM6C**, **SM6D**, WE2B, **SM7A**, SM7B, ST1A, ST1C, SW1A, WE1A, WE1B, WE1C, WE1D, WE1E, WE1F, **WE2A**, WL2A, WL3B, WL3C, WL3D, WL3E, WL3F, WL4E, WL4F, WL5A

*Aira caryophyllea* **RH2E**

*Aira praecox* **RH2E**

*Ajuga reptans* WL3A, WL3B

*Alisma plantago-aquatica* FW2C, FW2G, FW2J, FW3A, FW3C, FW3D, FW3G, WE2A

*Alnus glutinosa* FW3L, IN1B, SC1E, WL1A, **WL3A**, **WL3B**, **WL3C**, WL3D, **WL3F**, WL4D

*Alopecurus geniculatus* GL2C, SM1A, SM6B

*Alopecurus pratensis* FW3N, GL2B, GL2C, GL3E, GL3G, GL4A

*Amblystegium serpens* RH4B

*Ammophila arenaria* DU1A, **DU1B**, **DU2A**, DU2B, DU2C, DU2D, DU3A, DU3E, SM2B, ST1A, ST1B, ST1C

*Amphidium mougeotii* RH2A

*Anagallis arvensis* DU1B, SC1F, WE1C, **WE1D**, WE1F

*Anagallis tenella* DU3D, FE1A, FE1B, **FE1C**, FE2B, FE3A, FE3D, FE4B, FW1A,

FW1B, FW3I, GL3F, HE4F, SM3A

*Anastrepta orcadensis* HE3G

*Andraea rothii* RH2C

*Andraea rupestris* RH2F

*Andromeda polifolia* BG2A, **BG2B**

*Aneura pinguis* FE1A, FE1C, FE2C, FE4B, FW1C, RH2D

*Angelica sylvestris* FE1B, FE1D, **FE2C**, FE2D, FE2F, FW2A, FW2C, FW3F, FW3H, FW3J, FW3K, RH2D, SC1G, WL3B, WL3C, **WL3D**, **WL3E**, WL3F, WL4E

*Antennaria dioica* HE1A

*Anthoxanthum odoratum* **DU3E**, FE1C, FE1D, FE2D, FE2E, FE2F, **FE4A**, FW3F, FW3N, **GL1A**, GL1B, **GL1C**, GL1D, **GL1E**, **GL2B**, GL2C, GL2D, **GL3A**, GL3B, **GL3C**, **GL3D**, **GL3E**, GL3F, GL3G, **GL4A**, **GL4B**, **GL4C**, **GL4D**, HE1A, HE2A, HE2B, **HE2C**, HE3A, HE3E, HE3G, HE4D, HE4F, IN1B, RH1A, RH2B, RH2D, RH2F, SC1C, SC1E, SM6B, WL1D, **WL4B**, WL4C, WL4E, WL4F, WL5A, WL5B

*Anthriscus sylvestris* SC1F

*Anthyllis vulneraria* DU1B, DU2A, DU2B, DU2D, GL3F, SM3A, ST1C

*Apium graveolens* SM1B, SM2D, SM6D

*Apium inundatum* FE3B, FE3C, FW1A, FW1B, FW1D, FW2G

*Apium nodiflorum* DU3C, FE2A, FE3C, FE3D, FW2A, FW2B, FW2C, **FW2D**, **FW2E**, FW2F, FW2G, **FW3A**, FW3E,

FW3G, FW3N, WE2B

*Arctostaphylos uva-ursi* HE2E, HE3D

*Arenaria serpyllifolia* DU2B, DU2D,  
WE1D

*Armeria maritima* GL3F, HE3E, RH2F,  
RH3A, RH3B, RH4A, **RH4B**, SM1A,  
SM1B, SM1C, **SM2A**, SM2B, SM2C,  
SM2D, **SM3A**, **SM3B**, SM4A, SM4B,  
**SM4C**, SM4D, SM5A, SM5B, SM6B,  
SM6D

*Arrhenatherum elatius* DU2A, FW3F,  
GL3C, **GL3G**, SC1A, **SC1B**, SC1C,  
SC1D, SC1E, SC1F, SM4A, SM7A

*Artemisia vulgaris* SC1F

*Arum maculatum* WL2A, WL2B,  
WL2C, WL2D, WL2E

*Asperula cynanchica* HE1A

*Asplenium adiantum-nigrum* RH3A

*Asplenium marinum* **RH4A**

*Asplenium ruta-muraria* RH1A, **RH1B**,  
**RH1C**, RH4A

*Asplenium trichomanes* RH1A, RH1B,  
RH1C

*Aster tripolium* RH4A, SM1A, SM1B,  
SM1C, **SM2A**, SM2B, **SM2C**, **SM2D**,  
**SM3A**, **SM3B**, SM4A, SM4B, SM4C,  
SM4D, SM5A, SM5B, SM6A, SM6B,  
SM6C, SM6D, SM7A, SM7B, ST1A

*Athyrium filix-femina* SC1G, WL1B,  
**WL1C**, WL2A, WL2B, **WL3A**, WL3B,  
WL3C, WL3D, WL3E, WL4D, WL4E,  
WL5A

*Atrichum undulatum* IN1B, WL1C,  
WL2A, WL5A

*Atriplex glabriuscula* ST1B

*Atriplex laciniata* DU1A, SM2A, SM2C,  
SM2D, SM5B, ST1A, ST1B, ST1C

*Atriplex littoralis* SM3B

*Atriplex patula* SM2C, WE1C, WE1D,  
WE1F

*Atriplex portulacoides* SM1A, SM1B,  
SM1C, SM2A, **SM2B**, SM2C, SM2D,  
SM3A, SM3B, SM4B, SM4C, SM4D,  
SM5A, SM5B, SM7B

*Atriplex prostrata* DU1A, DU1B, SM1A,  
SM1B, SM1C, SM2A, SM2B, SM2C,  
SM2D, SM3A, SM3B, SM4A, SM4B,  
SM4C, SM4D, SM5A, SM5B, SM6A,  
SM6B, SM6C, SM6D, WE2B, SM7A,  
SM7B, **ST1A**, ST1B, ST1C, WE2A

*Aulacomnium palustre* **BG2A**, BG2B,  
FE2C, FE2E, FW1C, WL4C

*Baldellia ranunculoides* FE2A, FW1A,  
FW1B, FW2G, FW2I, FW3B, FW3D,  
FW3G, FW3I, FW3J

*Barbula convoluta* RH4A

*Bazzania tricrenata* HE3B, HE3E

*Bellis perennis* DU2A, DU2B, DU2C,  
**DU2D**, DU3A, DU3B, DU3C, **DU3D**,  
FE1C, FE3D, GL2C, GL3A, **GL3B**,  
**GL3D**, GL3F, WE1A, WE1B, **WE1D**,  
WE1E

*Berula erecta* FE2A, FW2D, FW2G,  
FW3A, FW3D, FW3E, FW3G, FW3I,  
FW3L

*Beta vulgaris* DU1A, SM2B, SM3B,  
SM4D, SM5A, SM7A, ST1A, ST1B,  
ST1C

*Betula pubescens* BG2A, IN1A, IN1B,  
RH3A, SC1G, WL1A, WL1B, WL1C,  
**WL1D**, **WL3A**, WL3C, **WL3E**, WL3F,  
**WL4A**, **WL4B**, **WL4C**, **WL4D**, **WL4E**,  
**WL4F**

*Blechnum spicant* HE2B, HE2C, HE2D,  
HE2E, HE3A, HE3B, HE4D, IN1A,  
IN1B, RH2A, RH2D, **SC1G**, WL1A,  
WL1B, **WL1C**, **WL1D**, WL3A, WL3B,  
WL4A, **WL4B**, WL4C, WL4D, WL4E,  
WL4F, WL5A, WL5B

*Blindia acuta* RH2D

*Blysmus rufus* SM3A, SM4B, SM5B,  
SM6D

*Bolboschoenus maritimus* **FW3B**,  
FW3E, FW3I, SM1A, SM1B, SM2A,  
SM2D, SM3A, SM4A, SM4B, SM5B,  
**SM6A**, SM6B, SM6C, SM6D, WE2B,  
SM7A, SW1A

*Brachypodium sylvaticum* RH1B, SC1B,  
WL2E, WL2F

*Brachythecium albicans* DU2C

*Brachythecium plumosum* FW2B,  
FW2E

*Brachythecium rivulare* **FE4A**, FW2B,  
FW2E

*Brachythecium rutabulum* DU2A,  
DU2B, DU3B, DU3C, FE1D, FW2B,  
FW2E, FW3E, FW3I, FW3N, GL1A,  
GL1E, GL2B, GL2C, GL2D, GL3B,  
GL3C, GL3D, GL3E, GL4A, SM6A,  
WL2A, WL2B, WL2C, WL2D, WL3B,  
WL3C, WL3D, WL3E, **WL3F**, WL4A,  
WL4D, WL4E, WL4F, WL5A

*Brassica nigra* ST1C

*Brassica rapa* WE1A

*Breutelia chrysocoma* BG1C, BG2C,  
BG2E, HE1A, HE2B, HE2C, HE2D,  
HE2E, **HE3B**, HE3C, HE3D, HE4B,  
HE4C, HE4E, HE4F, RH1A, **RH2B**,  
**RH2D**

*Briza media* **DU3E**, FE1B, GL1C, **GL3A**,  
GL3C, HE1A

*Bromus hordeaceus* WE1D

*Bryum caespiticium* RH1D

*Bryum dichotomum* RH3A

*Bryum pallescens* RH3A

*Bryum pseudotriquetrum* FE1C, FE2C,  
FE2F, FE4A, **FE4B**, FW3J

*Buddleja davidii* RH1D

*Cakile maritima* DU1A, DU1B, SM1C,  
ST1A, **ST1B**, ST1C

*Calliargon cordifolium* WL3E

*Calliargon giganteum* FE1D, FE2A,

FE2B, FE2C, FE2D, FE2F, FE3A, FE3B, FW2G, FW2I, FW3J

*Calliergon stramineum* FE2E

*Calliergonella cuspidata* DU2C, DU2D, DU3A, **DU3B, DU3D**, FE1B, FE1C, FE1D, FE2B, FE2C, FE2D, **FE2F**, FE3A, FE3B, FE3C, **FE3D, FE4A**, FE4B, FW3C, FW3E, FW3F, FW3H, FW3J, FW3K, FW3N, GL1A, **GL1B, GL1C**, GL1D, **GL1E**, GL2A, GL2B, GL2C, GL2D, GL3A, GL3B, GL3C, GL3D, GL3E, GL3F, GL4A, GL4C, GL4D, HE4F, **IN1B**, WL3A, WL3C, **WL3E, WL3F, WL4E**

*Callitriche hamulata* FW1D

*Callitriche hermaphroditica* FW1D, FW2D, FW2F, FW3A

*Callitriche obtusangula* FW2E

*Callitriche palustris* WE2A

*Callitriche platycarpa* FW2E

*Callitriche stagnalis* FW2A, **FW2D**, FW2E, FW2F, FW3A, FW3D, SM6A, WE2A

*Calluna vulgaris* BG1A, BG1B, **BG1C**, BG1D, **BG2A, BG2B, BG2C, BG2D, BG2E, BG2F**, FW1C, GL3F, GL4B, GL4C, HE1A, **HE2A, HE2B, HE2C, HE2D, HE2E, HE3A, HE3B, HE3C, HE3D**, HE3E, **HE3F, HE3G, HE4A, HE4B, HE4C**, HE4D, **HE4E**, HE4F, IN1B, RH2A, RH2B, RH2C, RH2D, RH2F, RH3A, SC1C, WL4C, WL4F, WL5B

*Caltha palustris* FE1D, FE2A, FE2C, FE2D, FE2F, FE3A, FE3B, FE3C, FE3D, FW2A, FW2C, FW2E, FW2F, FW3B, FW3C, FW3E, FW3G, FW3J, FW3K, GL1B, GL2A, WL3F

*Calypogeia arguta* RH2A

*Calypogeia fissa* BG2A, BG2C, BG2E, HE3F, HE4C, HE4D, HE4E

*Calypogeia muelleriana* BG2A, BG2B,

BG2E, BG2F, HE3A, HE3B, HE3F, HE3G, IN1A, SC1G, WL5A, WL5B

*Calypogeia sphagnicola* BG2A

*Calystegia sepium* FW3E, FW3F, GL3G, SC1B, SC1E, SC1F, SM7A

*Calystegia soldanella* DU1A, DU1B, ST1C

*Campanula rotundifolia* DU2C, DU2D, GL3A, **HE1A**, RH1A, RH2D

*Campylium stellatum* **FE1A, FE1B**, FE1C, FE1D, FE2B, FE2C, FE2F, FE3A, FE4B, HE4F

*Campylopus atrovirens* BG1B, BG1C, BG1D, BG2B, BG2D, BG2F, HE3C, HE4A, HE4B, HE4C, RH2C, RH2F

*Campylopus flexuosus* BG1B, BG1C, BG1D, BG2D, BG2F, GL4B, HE2B, HE2E, HE3A, HE3B, HE3C, HE3D, HE3E, HE3G, HE4A, HE4C, HE4E, RH2A, RH2C, RH2F, WL5A

*Campylopus introflexus* BG1C, BG1D, BG2B, BG2E, BG2F, **FW1C**, HE2B, HE2E, HE4A, WL4F

*Capsella bursa-pastoris* SC1F, WE1A, **WE1C**, WE1E, WE1F

*Cardamine flexuosa* SC1G, SM6A, WL3D

*Cardamine hirsuta* WE1B

*Cardamine pratensis* DU3B, FE1D, FE2A, FE2B, FE2C, FE2D, FE2F, FE3A, FE3B, FE3C, FE3D, FE4A, FE4B, FW3B, FW3C, FW3E, FW3H, FW3I, FW3J, FW3K, FW3N, GL1A, **GL1B**, GL1D, GL1E, GL2A, GL2B, GL2C, GL2D, SM6A, WL3C, WL3D, WL3E

*Carex acutiformis* FW3N

*Carex appropinquata* FE2C

*Carex arenaria* DU1A, DU1B, DU2A, DU2B, DU2C, DU2D, DU3A, DU3B, **DU3C**, DU3D, SM2B, SM6C, ST1C

*Carex bigelowii* HE3E, HE3G, RH2F

*Carex binervis* GL4B, GL4C, HE2A, HE2B, HE2C, HE2D, HE2E, HE3A, HE3C, HE3D, HE3E

*Carex caryophyllea* GL3A, HE1A

*Carex diandra* FE2A, FE2B, **FE2F**

*Carex dioica* FE1A, FE1C

*Carex distans* RH4A, SM2A, SM3B, SM4A, SM4B, SM4C, SM5A, SM5B, SM6D

*Carex disticha* FE2F, FE3C, FW3F, FW3H, FW3L, GL1B, GL2A

*Carex echinata* BG1A, BG1D, FE1A, FE1C, FE2B, FE2E, FE4A, FW3C, GL1C, GL1E, GL4D, HE4A, HE4B, HE4C, HE4D, HE4E, HE4F

*Carex elata* FW3H, **FW3J**, WL3F

*Carex extensa* FW3I, SM2A, SM2D, SM3A, SM3B, SM4A, SM4B, SM4C, SM4D, SM5A, SM5B, SM6D

*Carex flacca* DU2C, DU2D, **DU3A**, DU3B, DU3C, **DU3D**, FE1B, FE1D, FE3A, FE4B, GL1A, GL1B, **GL1C**, GL1D, GL1E, GL2A, **GL3A**, GL3C, GL3D, GL3E, GL3F, GL4C, GL4D, **HE1A**, HE2A, RH1A, RH1B, SM4B, SM5A

*Carex hirta* FE3B, FW3N, GL2A, GL2B

*Carex hostiana* FE1B, FE1C, FE3A, GL1D, HE4F

*Carex lasiocarpa* FE1A, FE1D, FE2A, FE2B, **FE2C**, FE2F, FW2G, FW3E, FW3F, FW3H, FW3J, HE4F

*Carex leporina* GL1A, GL1E, GL2B, GL2D, GL4A, GL4D

*Carex limosa* BG1A, BG1B, FE1A, **FE2B**, FE2C, FE2E, FW2J

*Carex nigra* DU3A, **DU3B**, DU3D, **DU3E**, FE1C, FE1D, FE2A, FE2B, FE2D, FE2E, FE2F, **FE3A, FE3B**, FE3C, **FE3D**, FE4B, FW1A, FW1B, FW2G, FW2I, FW3B, FW3C, FW3E, FW3F, FW3G, FW3K, GL1A, **GL1B**, GL1C, GL1D, GL1E,

GL2A, GL2B, GL2D, GL3F, GL4C,  
GL4D, HE4F, SM4A, SM6B, SM6C

*Carex otrubae* **DU3E**, SM5A, SM5B

*Carex panicea* BG1A, BG1C, BG1D,  
BG2B, BG2C, BG2D, BG2E, BG2F,  
DU3B, DU3D, FE1A, **FE1B**, **FE1C**, FE1D,  
FE2B, FE2C, FE2E, FE2F, **FE3A**, FE3B,  
FE3D, **FE4B**, FW1A, FW3F, FW3J,  
GL1A, GL1B, **GL1C**, **GL1D**, GL1E, GL2A,  
GL3A, GL3F, GL4B, GL4C, GL4D,  
HE2A, HE2C, HE2D, HE2E, HE3C,  
HE3D, HE4A, **HE4B**, HE4C, HE4D,  
HE4E, HE4F

*Carex paniculata* **FW3K**

*Carex pilulifera* GL4B, HE2A, HE2C,  
HE3C, RH2B, RH2F

*Carex pulicaris* FE1B, FE1C, GL1C, GL1D,  
GL4C, HE1A, HE4F, RH1A, RH2D

*Carex remota* **WL3A**, WL3B, **WL3C**,  
WL3D, WL3F

*Carex rostrata* BG1A, BG2A, FE2A,  
FE2B, FE2C, **FE2D**, FE2E, FE2F, FE3D,  
FW1B, FW2G, FW2I, FW2J, FW3B,  
**FW3C**, FW3E, FW3G, FW3H, FW3J,  
FW3K, FW3M, SM6B, SW1A

*Carex sylvatica* WL2B, WL2D, WL2E

*Carex vesicaria* FW3G, WL3F

*Carex viridula* BG1D, FE1A, FE1B, **FE1C**,  
FE1D, FE2B, FE2C, FE2F, **FE3A**, FE3B,  
FE4A, **FE4B**, FW1A, FW1B, FW3C,  
FW3H, FW3I, FW3J, FW3M, GL1C,  
GL3F, HE3C, HE4B, RH2D, RH2F,  
SM3A, SM4B, SM4C

*Carlina vulgaris* HE1A, RH1B

*Catabrosa aquatica* WE2B

*Catapodium marinum* DU2B, DU3C,  
RH4B

*Catapodium rigidum* DU2B

*Centaurea nigra* FE1B, GL1C, GL1D,  
**GL3A**, GL3B, **GL3C**, **GL3D**, GL3E,  
GL4A, SC1E

*Centaureum erythraea* DU2D

*Centaureum pulchellum* SM6C

*Centranthus ruber* RH1C, RH1D

*Cephalozia bicuspidata* BG1A, BG1B,  
BG2C, BG2D, BG2F, FW1C, HE3B,  
HE3F, HE4A, HE4C, RH2F

*Cephalozia connivens* BG2A, BG2D

*Cephaloziella nicholsonii* RH3A

*Cephaloziella stellulifera* RH3A, RH3B

*Cerastium diffusum* DU1A, DU1B,  
DU2A, DU2B, DU2C, DU2D, DU3C,  
RH3B, RH4B, SM4C, SM4D

*Cerastium fontanum* DU2A, DU2B,  
DU2C, DU2D, DU3C, DU3D, FE4A,  
GL1A, GL1C, GL1E, GL2A, GL2B,  
GL2C, GL2D, **GL3B**, **GL3C**, **GL3D**,  
**GL3E**, GL3F, GL3G, **GL4A**, GL4C,  
RH2E, RH3A, RH4B, SC1E, SM3A,  
SM4A, SM4C, SM4D, SM6C, WE1A,  
**WE1B**, WE1C, **WE1D**, WE1E, WE1F

*Cerastium glomeratum* DU2C

*Ceratodon purpureus* DU2B, RH2E,  
RH3A, SM4C

*Ceterach officinarum* RH1B, RH1C

*Chamerion angustifolium* RH1C

*Chenopodium album* SC1F, SM7A,  
WE1A, WE1C, WE1D, WE1F

*Chenopodium rubrum* SM2D, WE2A

*Chiloscyphus polyanthos* FE4A, FW2A,  
FW2B, FW2C, FW2E

*Chrysanthemum segetum* WE1F

*Chrysosplenium oppositifolium* **FE4A**,  
FE4B, SC1G, WL2B, WL3A, WL3B,  
WL3C, WL3D

*Cicuta virosa* FW3G, FW3M

*Cinclidium stygium* FE2C

*Cinclidotus fontinaloides* FW2A, FW2B

*Circaea lutetiana* WL1C, WL2A, WL2B,  
WL2C, WL2D, WL2E, **WL3A**, WL3B,  
WL3C, WL3D, WL4D

*Cirsium arvense* DU1A, DU1B, DU2A,  
FW3N, GL2C, GL3B, GL3D, GL3G,  
GL4A, SC1A, SC1B, SC1E, SC1F,  
SM4A, SM7A, WE1A, WE1B, WE1C,  
WE1D, WE1E, WE1F, WE2A

*Cirsium dissectum* FE1B, FE1D, FE3A,  
FE4B, GL1C, GL1D, HE4F

*Cirsium palustre* GL1A, GL1C, GL1D,  
GL1E, GL2B, GL2D, GL3D, GL4A,  
GL4B, GL4C, GL4D

*Cirsium vulgare* DU1A, DU1B, DU3C,  
SC1A, WE1A, WE1B, WE1E, WE1F

*Cladium mariscus* FE1A, FW1B, FW2I,  
FW2J, **FW3H**

*Cladonia arbuscula* HE3B, HE3D, HE3F,  
HE3G

*Cladonia coccifera* BG1C, BG2B

*Cladonia crispata* BG2B

*Cladonia fimbriata* RH2E

*Cladonia floerkeana* BG2B

*Cladonia furcata* BG2B, HE3D

*Cladonia portentosa* BG1B, BG1C,  
BG2A, **BG2B**, **BG2C**, **BG2D**, BG2E,  
BG2F, DU3E, FW1C, HE2A, HE2B,  
HE2D, HE2E, HE3A, HE3B, HE3C,  
HE3D, HE3F, HE3G, HE4A, HE4B,  
HE4C, HE4E, RH2C

*Cladonia pyxidata* RH4B

*Cladonia rangiformis* RH4B

*Cladonia subcervicornis* HE3D, HE3E,  
RH2C, RH2F

*Cladonia uncialis* BG1B, BG1C, BG2B,  
BG2C, **BG2D**, BG2E, BG2F, HE2E,  
HE3B, HE3C, **HE3D**, HE3E, HE3F,  
HE3G, HE4A, HE4B, HE4C, RH2C

*Cladopodiella fluitans* BG1B, BG2D

*Climacium dendroides* WL3E, WL3F

*Cochlearia anglica* SM1B, SM2A,  
SM2B, SM2C, SM2D, SM3A, SM3B,  
SM4A, SM4B, SM4C, SM4D, SM5A,  
SM5B, SM7B

*Cochlearia danica* RH3B, SM4C

*Cochlearia officinalis* agg. RH3B, RH4B, SM1B, SM1C, SM2A, SM2B, SM2C, SM2D, SM3A, SM3B, SM4A, SM4B, SM4C, SM4D, SM5A, SM5B, SM6A, SM6B, SM6D, SM7B, ST1A

*Collema undulatum* RH1C

*Cololejeunea calcarea* RH1C

*Conocephalum conicum* FW2B, FW2E

*Convolvulus arvensis* SM7A

*Corylus avellana* IN1A, RH1B, WL1A, WL1B, **WL1C**, WL2A, WL2B, **WL2C**, WL2D, **WL2E**, WL2F, **WL3A**, WL4A, **WL4B**

*Crambe maritima* RH3B

*Crataegus monogyna* RH1B, **SC1A**, **SC1B**, SC1C, SC1D, SC1G, WL1C, WL2A, **WL2B**, **WL2C**, WL2D, **WL2E**, WL3A, WL3B, **WL3C**, WL3D, WL3E, WL3F, WL4D, WL4E, WL4F

*Cratoneuron filicinum* FE4B, FW2B

*Crepis capillaris* DU2A, DU2B, RH1C, SC1E

*Crepis paludosa* FW3K

*Crepis vesicaria* DU1B, WE1D

*Crithmum maritimum* RH3B, RH4B, ST1C

*Crocsmia × crocosmiiflora* FW2A, FW2C, IN1B

*Ctenidium molluscum* DU3D, FE1B, GL3A, HE1A, **RH1A**, RH1B, RH2D, **WL2E**

*Cymbalaria muralis* RH1C

*Cynosurus cristatus* DU2C, DU3A, DU3D, DU3E, GL1A, GL1C, **GL1E**, GL2B, GL2C, **GL3A**, **GL3B**, **GL3C**, **GL3D**, **GL3E**, GL4A, GL4C

*Cyperus eragrostis* WE2A

*Cystopteris fragilis* RH1A, RH1C

*Cytisus scoparius* SC1D

*Daboecia cantabrica* HE2A, HE2B, HE2C

*Dactylis glomerata* DU2A, DU2C, FW3F, GL2C, GL3A, **GL3B**, **GL3C**, GL3D, GL3E, GL3F, GL3G, GL4A, RH4A, SC1A, **SC1B**, SC1C, SC1D, **SC1E**, SC1F, SM4A, SM4D, SM6B, SM7A, WE1B, WE1D, WE1E

*Dactylorhiza incarnata* FE1B

*Dactylorhiza maculata* SC1D

*Dactylorhiza purpurella* DU3E

*Dactylorhiza traunsteineri* FE2C

*Danthonia decumbens* DU3A, DU3D, DU3E, GL3A, GL3F, GL4B, GL4C, GL4D, HE2A, HE2C, HE2E, HE3C, HE4B, RH2E

*Daucus carota* DU1A, DU1B, DU2A, GL3C, ST1A, WE1D

*Drepanocladus cossonii/revolvens* FE1A, FE1B, FE1C, FE1D, FE2C, FE3A, FE4B

*Deschampsia cespitosa* FW3F, GL2A, GL2D, SC1A, WL3A, WL3E

*Deschampsia flexuosa* BG1D, HE2B, HE2C, HE2D, HE2E, **HE3A**, **HE3B**, HE3C, **HE3D**, HE3E, HE3F, HE3G, RH2B, RH2C, RH2F, WL1D, WL5B

*Dichodontium pellucidum* FW2B, RH3A

*Dicranella heteromalla* HE3D, HE3E, RH2F, WL5B

*Dicranella palustris* FE4A

*Dicranella varia* RH3A, RH3B

*Dicranum majus* IN1A, **WL1D**, WL4B

*Dicranum scoparium* BG2A, BG2B, BG2C, BG2E, GL4B, HE1A, HE2A, HE2B, HE2C, HE2D, HE2E, HE3A, **HE3B**, HE3C, HE3D, HE3E, HE3F, HE3G, HE4A, HE4E, IN1A, RH2A, RH2B, RH2C, RH2D, RH2E, SC1C, WL1A, WL1B, **WL1D**, WL4A, **WL4B**, WL4C, WL4F, WL5A, WL5B

*Didymodon fallax* RH4B

*Didymodon insulanus* FW2B

*Didymodon rigidulus* RH1C, RH1D

*Didymodon tophaceus* RH3A

*Didymodon vinealis* RH1C

*Digitalis purpurea* SC1B, WL5A

*Diplophyllum albicans* BG1C, BG2C, BG2D, BG2E, BG2F, HE2B, HE2C, HE2D, HE2E, HE3A, **HE3B**, HE3C, HE3D, **HE3E**, HE3F, HE3G, HE4A, HE4C, HE4D, HE4E, IN1A, **RH2A**, RH2B, **RH2C**, RH2D, **RH2F**, RH3A, WL1D, WL4B

*Ditrichum cornubicum* RH3A

*Ditrichum gracile* DU2D, RH1A

*Drepanocladus aduncus* DU3B, FE3B, FW2G, SM4B

*Drosera anglica* BG1A, BG1B, BG1C, BG1D, BG2B, BG2D, FE1A

*Drosera intermedia* BG1A, **BG1B**, BG1C, BG1D, BG2D, FE1A

*Drosera rotundifolia* BG1A, **BG1B**, BG1C, BG1D, BG2A, **BG2B**, BG2C, **BG2D**, BG2E, BG2F, FE1A, FE1C, FE2C, FE2E, HE4A, HE4B, HE4C, HE4E, HE4F

*Dryas octopetala* **HE1A**

*Dryopteris aemula* WL1A, WL1B, WL1D, WL4B

*Dryopteris affinis* IN1B, SC1G, WL1A, WL1B, **WL1C**, WL2A, WL2B, WL2C, WL2D, WL4D, WL5A, WL5B

*Dryopteris carthusiana* BG2A, FW1C, IN1A, WL4C, WL4F

*Dryopteris dilatata* RH2A, RH2B, RH2C, SC1A, SC1B, **SC1G**, **WL1A**, **WL1B**, **WL1C**, WL1D, **WL2A**, **WL2B**, WL2C, WL2D, **WL3A**, **WL3B**, WL3C, WL3D, **WL4A**, WL4B, WL4C, **WL4D**, **WL4E**, **WL4F**, WL5A, **WL5B**

*Dryopteris filix-mas* IN1A, SC1A, SC1B, SC1D, WL2A, WL2C, WL2D, WL2E

*Elatine hexandra* FW1D, WE2A

*Eleocharis acicularis* FW1A, WE2A

*Eleocharis multicaulis* BG1A, BG1B, BG1C, FE1A, FE1C, FE2B, FE2E, FW1A, FW1B, FW2I, FW3C, FW3H, FW3J, HE4B, HE4F

*Eleocharis palustris* DU3B, FE2A, FE2D, FE3A, FE3B, **FE3C**, FE3D, FW1A, FW1B, FW2F, FW2G, FW3B, FW3C, FW3D, FW3G, FW3I, FW3M, FW3N, SM6A, SM6B, SM6C, WE2B, SW1A, WE2A

*Eleocharis quinqueflora* FE1C, SM4B

*Eleocharis uniglumis* FW3I, SM4B, SM6B, SM6C, SM6D, WE2B

*Eloдея canadensis* FW1D, FW2A, FW2C, FW2D, FW2E, FW2F, FW2H, FW2I, FW2J, FW2K, FW3A, FW3G, FW3M

*Elytrigia atherica* SM7A, **SM7B**

*Elytrigia juncea* **DU1A**, DU1B, DU2A, DU2B, DU2C, DU3C, RH4B, SM1C, SM2A, SM2B, SM2C, SM2D, ST1A, ST1B, **ST1C**

*Elytrigia repens* GL2C, GL3G, RH3B, SC1A, SC1E, SC1F, SM1A, SM1B, SM2A, SM2B, SM2C, SM2D, SM3A, SM3B, SM4A, SM4B, SM4C, SM4D, SM5A, SM6A, SM6B, SM6C, **SM7A**, SM7B, ST1A, ST1C, WE1A, WE1B, WE1C, WE1D, WE1F

*Empetrum nigrum* BG2A, BG2E, HE3A, HE3B, HE3D, HE3F, HE3G

*Encalypta streptocarpa* RH1B

*Epilichen scabrosus* WE2B

*Epilobium brunnescens* FE4A, FE4B, RH1A, RH1C, RH2A, RH2B, RH2D, RH3A

*Epilobium hirsutum* FW2A, FW2C, FW2D, FW2E, FW3A, FW3E, FW3F, FW3L, IN1B, SM6A

*Epilobium montanum* IN1B, RH1C, WE1E

*Epilobium obscurum* GL1A, GL2B, GL2D, WE2A

*Epilobium palustre* FE1D, FE2A, FE2B, FE2C, FE2D, FE2F, FE3C, FE3D, FW2I, FW3E, FW3H, FW3K, GL1A, GL1B, GL2D

*Epilobium parviflorum* FE3C, FE3D, SM6A

*Epipactis helleborine* RH3B, WL2E

*Epipactis palustris* **DU3E**

*Equisetum × litorale* FE3C

*Equisetum arvense* DU3E, FW2B, FW3N, IN1B, RH3B

*Equisetum fluviatile* BG1D, FE1D, **FE2A**, FE2B, **FE2C**, **FE2D**, **FE2F**, FE3A, FE3C, FE3D, FW1B, FW2D, FW2F, FW2G, FW2I, FW2J, FW3B, FW3C, FW3D, FW3E, FW3F, **FW3G**, FW3H, FW3I, FW3J, FW3K, FW3L, FW3M, FW3N, GL1B, GL2D, WL3E, WL3F

*Equisetum palustre* FE1D, FE2F, FE3B, FW2C, FW3K, FW3L, FW3N, GL1B, WE2A

*Erica cinerea* BG1C, BG1D, BG2C, BG2F, **HE2A**, **HE2B**, **HE2C**, **HE2D**, **HE2E**, HE3A, **HE3B**, **HE3C**, **HE3D**, HE3F, HE3G, HE4A, HE4B, HE4C, HE4D, HE4E, RH2C, RH2E

*Erica erigena* HE4F

*Erica tetralix* BG1A, **BG1B**, **BG1C**, BG1D, **BG2A**, **BG2B**, **BG2C**, **BG2D**, **BG2E**, **BG2F**, FE1A, FE1C, HE2A, HE2B, **HE2D**, HE2E, HE3A, HE3F, **HE4A**, **HE4B**, **HE4C**, HE4D, **HE4E**, **HE4F**, WL4C

*Eriocaulon aquaticum* FE2B, FW1A, **FW1B**, FW3D, FW3H

*Eriophorum angustifolium* **BG1A**, **BG1B**, **BG1C**, **BG1D**, **BG2A**, **BG2B**, **BG2C**, **BG2D**, **BG2E**, **BG2F**, **FE1A**, FE1C, FE2A, FE2B, FE2D, FE2E, FE2F, FE3A, FW1C, FW3C, FW3M, HE2B, HE2D, HE2E, HE3A, HE3C, **HE3F**, HE3G, HE4A, HE4B, HE4C, HE4D, HE4E, HE4F, WE2B

*Eriophorum gracile* FE2B

*Eriophorum latifolium* FE1A

*Eriophorum vaginatum* BG1A, BG1B, BG1C, BG1D, **BG2A**, **BG2B**, BG2C, BG2D, **BG2E**, BG2F, FE2E, HE2B, HE2D, HE3A, **HE3F**, HE3G, HE4A, HE4C, HE4D, HE4E, HE4F, WL4C

*Erophila verna* DU2B

*Eryngium maritimum* DU1A, DU1B, ST1C

*Eucladium verticillatum* RH4A

*Eupatorium cannabinum* FE1D, RH4A

*Euphorbia helioscopia* WE1A, WE1C, WE1F

*Euphorbia paralias* DU1A, DU1B, DU2A, RH3B, ST1C

*Euphorbia peplus* WE1A, WE1C, WE1D

*Euphorbia portlandica* DU1B

*Euphrasia officinalis* agg. DU2C, DU2D, DU3A, DU3D, DU3E, FE1B, **GL3A**, GL3C, GL3D, GL3E, GL3F, GL4B, GL4C, HE1A, RH1A, RH1B, RH2D, RH3B

*Eurhynchium hians* FW2B

*Eurhynchium striatum* IN1A, SC1A, WL1A, WL1B, **WL1C**, WL2A, **WL2B**, **WL2C**, **WL2D**, **WL2E**, WL2F, **WL3A**, WL3B, WL3D, WL4A, **WL4D**, WL4E, WL4F, WL5B

*Fagus sylvatica* WL1A, WL1B, WL2A, WL2C, **WL2D**, WL2F, WL4A, WL4D

*Fallopia convolvulus* WE1A, WE1C, WE1D, WE1F

*Fallopia japonica* FW2A, FW2C

*Festuca arundinacea* FW3F, GL1B, GL2A

*Festuca ovina* FE2E, FE4A, GL3A, GL4B, HE1A, HE2B, HE2C, RH1A, RH2C, RH3B, RH4A, RH4B, SC1D, SM3A

*Festuca pratensis* GL1B

*Festuca rubra* DU1A, DU1B, **DU2A**, **DU2B**, **DU2C**, **DU2D**, **DU3A**, DU3B, **DU3C**, **DU3D**, **DU3E**, FE1B, FE4A, **FE4B**, FW3F, FW3N, GL1A, GL1B, **GL1C**, GL1D, GL1E, GL2A, GL2B, GL2C, GL2D, **GL3A**, GL3B, **GL3C**, **GL3D**, **GL3E**, **GL3F**, GL3G, GL4A, GL4B, **GL4C**, GL4D, HE2A, RH1A, RH2B, RH2D, **RH2E**, RH3A, RH3B, RH4A, **RH4B**, SC1C, SC1E, SC1F, SM1B, SM2A, SM2B, SM2C, SM2D, SM3A, SM3B, **SM4A**, **SM4B**, **SM4C**, **SM4D**, **SM5A**, SM5B, SM6A, SM6B, SM6C, SM6D, SM7A, SM7B, ST1A, ST1C

*Festuca vivipara* FE4A, GL4B, HE2A, HE2C, HE3B, HE3C, HE3D, **HE3E**, HE4D, RH1C, RH2A, **RH2B**, RH2C, **RH2D**, **RH2F**, SM2C

*Filipendula ulmaria* DU3B, DU3E, FE1B, FE1D, **FE2C**, FE2D, FE2F, FE3A, FE3B, FE3D, FW2A, FW2C, FW2E, FW3E, **FW3F**, FW3H, FW3J, FW3K, FW3L, FW3N, GL1A, **GL1B**, GL1C, GL1D, GL1E, GL2A, GL2B, GL2D, GL3E, GL3G, IN1B, SC1A, SC1B, SC1D, SM4A, **WL3A**, **WL3B**, **WL3C**, **WL3D**, **WL3E**, **WL3F**, WL4E

*Fissidens adianthoides* FE1A, FE1B, FE1C, FE4B, RH1C

*Fissidens bryoides* SC1G

*Fissidens crassipes* FW2E

*Fissidens dubius* RH1A, **RH1B**, RH1C, RH4A, WL2F

*Fissidens incurvus* RH4A

*Fissidens taxifolius* FW2B, IN1A, WL2D, WL2E

*Fontinalis antipyretica* FE3B, FW1A, FW1D, **FW2A**, FW2B, **FW2C**, **FW2D**, **FW2E**, FW2F, FW3A, FW3D

*Fontinalis squamosa* FW2A, FW2B, FW2C

*Fragaria vesca* **WL2E**

*Fraxinus excelsior* GL2C, GL3B, GL3D, GL4A, IN1B, RH1B, SC1A, SC1B, WL1B, **WL1C**, **WL2A**, **WL2B**, **WL2C**, **WL2D**, WL2E, **WL2F**, **WL3A**, WL3B, **WL3C**, **WL3D**, WL3E, **WL3F**, WL4D, **WL4E**

*Frullania dilatata* WL1A, WL1B, WL1C, WL2A, WL2B, WL2C, WL2D, WL3A, WL3B, WL3C, WL3D, WL3E, WL4A, WL4D, WL4E, WL4F

*Frullania tamarisci* HE2A, HE2C, HE2E, HE3D, RH2A, RH2D, WL1A, WL1B, **WL1D**, WL4B

*Fumaria bastardii* WE1A, WE1C, WE1F

*Fumaria officinalis* WE1A, WE1C, WE1F

*Galeopsis tetrahit* WE1A, WE1F

*Galium aparine* GL3G, RH3B, **SC1A**, **SC1B**, SC1D, SC1E, **SC1F**, ST1A, ST1C, WE1A, WE1C, WL3B, WL3D

*Galium boreale* FE1B

*Galium palustre* DU3B, FE1D, FE2A, FE2B, FE2C, **FE2D**, FE2E, **FE2F**, FE3A, **FE3B**, FE3C, **FE3D**, **FE4A**, FE4B, FW1A, FW3B, FW3E, FW3F, FW3G, FW3H, FW3I, FW3J, FW3K, FW3L, FW3N, GL1A, **GL1B**, GL1C, GL1D, GL1E, **GL2A**, GL2B, GL2D, HE4D, SM2A, SM6C, WE2A, **WL3A**, WL3B,

WL3C, WL3D, **WL3E**, **WL3F**, **WL4E**

*Galium saxatile* **GL4B**, **GL4C**, GL4D, HE2A, HE2B, HE2C, HE3A, HE3B, HE3C, HE3D, **HE3E**, HE3F, HE3G, HE4D, RH2A, **RH2B**, RH2C, RH2D, RH2E, **RH2F**, SC1C, WL1D, WL4B, WL5A, WL5B

*Galium uliginosum* FW3K

*Galium verum* DU1A, DU1B, **DU2A**, **DU2B**, **DU2C**, **DU2D**, DU3A, DU3E, **GL3A**, GL3C, HE1A, SM4D, ST1C

*Geranium dissectum* IN1B

*Geranium molle* WE1B, WE1D, WE1E, WE1F

*Geranium robertianum* IN1B, RH1A, **RH1B**, RH1C, RH4A, SC1A, SC1B, SC1F, WL1C, WL2A, WL2B, WL2C, WL2D, WL2E, **WL3A**, WL3B, WL3C, WL3D, WL4D, WL4E

*Geranium sanguineum* HE1A, RH1B

*Geum urbanum* SC1A, WL1C, WL2A, **WL2B**, WL2C, WL2D, **WL2E**, **WL3A**, WL3B, WL3C, WL3D

*Glaucium flavum* ST1C

*Glaux maritima* DU1A, DU3B, DU3C, FW3B, FW3I, RH3B, RH4B, SM1A, SM1B, SM1C, SM2A, SM2B, SM2C, SM2D, SM3A, SM3B, SM4A, **SM4B**, **SM4C**, SM4D, **SM5A**, **SM5B**, SM6A, SM6B, SM6C, **SM6D**, WE2B, SM7A, SM7B, ST1A, ST1C

*Glechoma hederacea* SC1F

*Glyceria fluitans* FE3C, FW2E, FW2G, FW2J, GL2B, GL2D

*Glyceria maxima* FW2D, **FW3L**

*Glyceria notata* FW2D, FW2F, FW3A

*Gnaphalium uliginosum* FE3B, WE1E, **WE2A**

*Groenlandia densa* FW2K

*Gunnera tinctoria* **IN1B**

*Gymnocolea inflata* BG1A, BG1B

*Gymnomitrium crenulatum* RH2C

*Hedera helix* IN1A, **IN1B**, RH1B, **SC1A**, **SC1B**, SC1C, SC1D, SC1E, SC1F, SC1G, **WL1A**, **WL1B**, **WL1C**, WL1D, **WL2A**, **WL2B**, **WL2C**, **WL2D**, **WL2E**, **WL2F**, **WL3A**, **WL3B**, **WL3C**, **WL3D**, **WL3E**, WL3F, **WL4A**, WL4B, WL4C, **WL4D**, **WL4E**, **WL4F**, **WL5A**, WL5B

*Helictotrichon pubescens* DU3E, GL3A

*Hennediella heimii* RH4B

*Heracleum sphondylium* DU2A, GL3C, GL3E, GL3G, SC1A, SC1B, SC1E, SC1F, WL2C

*Herbertus aduncus* HE3B, HE3D, HE3E, RH2B, RH2C

*Heterocladium heteropterum* RH2A

*Hieracium* agg. FE4A

*Hippuris vulgaris* FE2A, FE3C, FW2D, FW2F, FW2G, FW2I, FW2J, FW3A, FW3B, FW3C, FW3E, FW3G, FW3I, FW3M

*Holcus lanatus* BG1D, DU1B, DU2A, DU2C, DU2D, DU3A, DU3B, DU3D, **DU3E**, FE1D, FE2D, FE2E, FE2F, FE3D, **FE4A**, FE4B, FW1C, FW3F, **FW3K**, FW3N, **GL1A**, GL1B, **GL1C**, GL1D, **GL1E**, GL2A, **GL2B**, **GL2C**, **GL2D**, GL3A, **GL3B**, **GL3C**, **GL3D**, **GL3E**, GL3F, **GL3G**, **GL4A**, GL4B, **GL4C**, **GL4D**, HE2A, HE4D, IN1B, RH1C, **SC1B**, SC1C, SC1D, **SC1E**, SC1F, SC1G, SM4A, SM4D, SM5A, SM6B, SM6C, SM7A, WE1A, **WE1B**, WE1D, WE1E, WE1F, WL4B, WL4C, WL4E, WL5A, WL5B

*Homalothecium lutescens* DU2A, DU2B, DU2C, DU2D, DU3A, DU3C, RH4A, RH4B

*Homalothecium sericeum* RH1C, RH1D, RH4A

*Honckenya peploides* DU1A, DU1B, ST1A, ST1B, **ST1C**

*Hookeria lucens* IN1A, SC1G, WL1B, WL1C, WL3A

*Hordeum murinum* WE1E

*Huperzia selago* HE3C, HE3D, HE3E, RH2B, RH2C, RH2F

*Hyacinthoides non-scripta* SC1D, WL1A, WL1B, WL1C, WL2A, WL2B, WL2C, WL2D

*Hydrilla verticillata* FW1D

*Hydrocotyle vulgaris* BG1A, DU3A, **DU3B**, **DU3D**, DU3E, FE1B, FE1C, FE1D, FE2A, **FE2B**, FE2C, FE2D, FE2E, FE2F, **FE3A**, FE3B, FE3C, **FE3D**, FE4B, FW1A, FW1B, FW2G, FW2J, FW3B, FW3C, FW3E, FW3G, FW3H, FW3I, FW3J, FW3K, FW3N, GL1B, GL1D, GL2A, SM6A, SM6B

*Hygrohypnum luridum* FW2B

*Hygrohypnum ochraceum* FW2B

*Hylocomium brevirostre* **WL2E**, WL2F

*Hylocomium splendens* BG2A, BG2C, BG2E, BG2F, DU3A, DU3E, FE2C, GL3A, **GL4B**, **GL4C**, GL4D, HE1A, HE2A, HE2B, **HE2C**, **HE2D**, HE2E, **HE3A**, **HE3B**, HE3C, HE3D, **HE3E**, **HE3F**, **HE3G**, HE4A, HE4B, HE4C, HE4D, HE4E, HE4F, IN1A, RH1A, RH2A, **RH2B**, RH2C, **RH2D**, RH2E, RH2F, RH3A, **WL4B**, WL4C, WL5A, WL5B

*Hymenophyllum wilsonii* HE3E, RH2A, RH2B, RH2C

*Hyocodium armoricum* FW2B

*Hypericum elodes* FE1C, FE2B, FE2D, FW3C

*Hypericum humifusum* WE2B

*Hypericum pulchrum* **HE1A**, HE2A, HE2C, RH2D

*Hypnum andoi* WL1A, WL1B, WL1C,

WL1D, WL2A, WL3E, WL4A, WL4B, WL4C, WL4D, WL4E, WL4F, WL5A

*Hypnum cupressiforme* DU2D, GL3F, GL4B, HE2A, HE2C, HE2D, IN1A, RH2B, WL1A, WL1B, WL1C, WL1D, WL2A, WL2B, WL2C, WL2D, **WL3A**, WL3B, WL3C, WL3D, **WL3E**, WL3F, WL4A, WL4B, WL4C, **WL4D**, WL4E, WL4F

*Hypnum jutlandicum* BG1B, BG1C, BG1D, BG2A, **BG2B**, **BG2C**, **BG2D**, **BG2E**, BG2F, FW1C, GL4B, HE2A, **HE2B**, HE2C, HE2D, **HE2E**, HE3A, **HE3B**, **HE3C**, **HE3D**, **HE3E**, **HE3F**, **HE3G**, HE4A, **HE4B**, HE4C, HE4D, **HE4E**, HE4F, IN1A, RH2A, RH2B, **RH2C**, RH2D, RH2F, SC1C, WL1D, WL4A, WL4B, **WL4C**, WL4D, WL4E, WL4F, WL5A, **WL5B**

*Hypnum lacunosum* RH1A, RH2E

*Hypnum resupinatum* WL1A, WL1B, WL2A, WL2C, WL4D, WL4F

*Hypochaeris radicata* BG1D, DU1A, DU1B, DU2A, **DU2B**, DU2C, DU2D, DU3A, DU3C, DU3E, FW1C, GL1E, **GL3A**, GL3B, GL3C, **GL3D**, GL3E, GL3F, GL4A, GL4C, GL4D, HE1A, HE2A, RH1A, RH1B, RH2E, RH4B, SC1C, SC1E, SM4C, SM4D, ST1C

*Ilex aquifolium* IN1A, SC1B, SC1D, **WL1A**, **WL1B**, **WL1C**, **WL1D**, WL2A, WL2B, WL2C, WL2D, **WL2F**, **WL3A**, **WL4A**, **WL4B**, WL4D, WL4E, WL4F, WL5A, WL5B

*Impatiens glandulifera* FW2A, FW2C

*Iris pseudacorus* FE2A, FE2D, FE2F, FE3C, FE3D, FW2C, FW2D, FW2E, FW2F, FW2G, FW3A, FW3B, FW3D, FW3E, FW3F, FW3G, FW3I, FW3J, FW3L, **FW3N**, SM6A, WL3B, WL3C, **WL3F**

*Isoetes lacustris* FW1D

*Isolepis cernua* WE2B

*Isolepis fluitans* FE2B, FW1A, FW1B, FW2G, FW2I

*Isolepis setacea* WE2B

*Isoethecium alopecuroides* IN1A, WL1B, WL2A, WL2B, WL2D, WL2F

*Isoethecium myosuroides* IN1A, **RH2A**, RH2C, **WL1A, WL1B, WL1C, WL1D**, WL2A, WL2B, WL2C, WL2D, **WL2F, WL3A**, WL3B, WL3C, WL3D, WL3E, WL3F, WL4A, **WL4B**, WL4C, WL4D

*Jasione montana* RH2B, RH2D

*Juncus* × *surrejanus* FE3B, GL2A

*Juncus acutiflorus* FE1D, FE2D, FE2E, FE4B, FW1A, FW1B, FW3C, FW3K, **GL1A**, GL1B, **GL1C**, GL1D, **GL1E**, GL2B, GL2D, **GL4D**, HE4D, HE4F, SM6B

*Juncus acutus* SM2A, SM2B, SM6C

*Juncus articulatus* DU3B, DU3C, DU3D, FE1C, FE2A, FE2B, FE2D, FE2F, FE3A, FE3B, FE3C, **FE3D**, FE4A, FE4B, FW1A, FW1B, FW1C, FW2A, FW2E, FW2G, FW3B, FW3C, FW3I, FW3J, GL2A, SM4A, SM4B, SM5A, SM6A, SM6B, SM6C, SM6D, WE2B, WE2A

*Juncus bufonius* DU3C, RH2E, RH3A, SM2A, SM2D, SM4B, SM5B, SM6B, SM6C, SM6D, **WE2B**, SW1A, WE1B, WE1E, **WE2A**

*Juncus bulbosus* BG1A, BG1B, BG1C, BG1D, FE1A, **FE1C**, FE2A, FE2B, FE2E, FE4A, FE4B, FW1A, **FW1B, FW1C**, FW2A, FW2G, FW2I, FW3B, FW3C, FW3D, FW3E, FW3J, HE4A, HE4B, RH2B, RH2E, RH2F, WE2B

*Juncus conglomeratus* GL1A, GL1C, GL1D, GL4D

*Juncus effusus* BG1D, FE2D, FE2E, FE3D, FE4A, FW1C, FW2A, FW2C, FW3B, FW3F, FW3K, FW3N, GL1A, GL1B, GL1D, **GL1E**, GL2A, **GL2B**, GL2C, **GL2D**, GL4A, GL4C, GL4D,

HE4D, HE4F, IN1B, SC1D, SC1E, SC1G, WL3A, WL3B, WL3D, WL3E, WL4C, WL4E, WL4F

*Juncus gerardii* FW3I, RH4B, SM1A, SM2A, SM2B, SM2C, SM2D, SM3A, SM3B, SM4A, **SM4B**, SM4C, SM4D, SM5A, SM5B, SM6A, SM6B, SM6C, **SM6D**, WE2B, SM7A, SM7B

*Juncus inflexus* GL1B

*Juncus maritimus* DU3E, SM1A, SM2A, SM2B, SM2C, SM2D, SM3A, SM3B, SM4A, SM4B, SM4C, SM4D, **SM5A, SM5B**, SM6A, SM6B, SM6D, SM7B

*Juncus squarrosus* BG1D, BG2E, BG2F, GL4B, HE2B, HE2D, HE2E, HE3A, HE3C, HE3D, HE3E, HE3F, **HE3G**, HE4A, HE4B, HE4E, RH2F

*Juncus subnodulosus* FE1A, FE1B, **FE1D**, FE2A, FE2F, FW1B, FW2I, FW3F, FW3H, FW3J

*Jungermannia gracillima* RH3A

*Juniperus communis* HE2E, HE3D

*Kindbergia praelonga* FW1C, FW2B, FW3E, FW3F, FW3H, FW3K, GL1A, GL1D, GL2B, GL2C, GL2D, GL3B, GL3D, GL3E, GL3F, GL4A, HE2B, HE4D, HE4F, IN1A, RH2A, RH4A, SC1C, **SC1G**, SM4A, SM4B, SM5A, SM7A, **WL1A, WL1B, WL1C**, WL1D, **WL2A, WL2B, WL2C, WL2D, WL2E, WL2F, WL3A, WL3B, WL3C, WL3D, WL3E**, WL3F, **WL4A**, WL4B, WL4C, **WL4D, WL4E, WL4F, WL5A, WL5B**

*Koeleria macrantha* DU2D, GL3A, GL3F, HE1A

*Kurzia pauciflora* BG1B, BG1C, BG2C, BG2D, BG2F, HE4A, HE4C

*Kurzia trichoclados* HE3B

*Lamium hybridum* WE1C

*Lamium purpureum* WE1A, **WE1C**

*Lapsana communis* SC1F, WE1A, WE1C

*Larix kaempferi* SM7A, **WL5B**

*Lathyrus palustris* FW3J

*Lathyrus pratensis* FW3F, FW3N, GL1A, GL1B, GL1C, GL2B, GL2D, GL3C, GL3E, GL3G, SC1A, SC1B, SC1D, SC1E, SM7A

*Lejeunea lamacerina* FW2B

*Lejeunea patens* RH2A

*Lemna minor* FE2A, FE2D, FE3C, FW2C, FW2D, FW2E, FW2F, FW2G, FW2I, FW2J, FW3A, FW3B, FW3C, FW3D, FW3E, FW3G, FW3I, FW3L, FW3M

*Lemna trisulca* FE2A, FE2D, FW2A, FW2C, FW2D, FW2E, FW2F, FW2G, FW3A, FW3C, FW3D, FW3G, FW3H, FW3M

*Leontodon autumnalis* DU1B, DU2A, DU2B, DU2C, DU3A, DU3B, DU3C, DU3D, FE1B, FE3A, FE3B, FE3D, FE4B, FW1A, GL1B, GL1C, GL1D, GL1E, GL2A, GL2C, GL3B, GL3C, **GL3D**, GL3E, GL3F, GL4A, RH4A, RH4B, SM2D, SM3A, SM4A, SM4B, SM4C, SM4D, SM5A, SM5B, SM6B, SM6C, SM6D, WE1E

*Leontodon saxatilis* DU1A, DU1B, DU2A, DU2B, DU2C, DU2D, DU3A, DU3B, DU3C, DU3D, GL3D, RH2E, RH3B, RH4A, RH4B, SM2A, SM3A, SM4B, SM5B, SM6D

*Leptodictyum riparium* FE2A, FW2A, FW2B, FW2C, FW2D, FW2E, FW2F, FW3A, FW3G

*Leucanthemum vulgare* GL3A, GL3C, GL3D, GL3E, WE1B, WE1D

*Leucobryum glaucum* BG1C, BG2B, BG2C, BG2D, HE2D, HE2E, HE4A, HE4C, HE4E, IN1A

*Leymus arenarius* DU1A, DU1B, ST1B, ST1C

*Limonium binervosum* agg. DU1A,

SM1A, SM2A, SM2B, SM2C, SM3B

*Limonium humile* SM1A, SM1B, SM1C, SM2A, SM2B, **SM2C**, SM2D, SM3A, SM3B, SM4B, SM4C, SM4D, SM5A, SM5B, SM6D

*Limosella aquatica* **WE2A**

*Linum catharticum* DU2D, DU3A, DU3B, DU3C, DU3D, DU3E, FE1B, **GL3A, HE1A**, RH1A, RH1B, RH2E

*Littorella uniflora* **FW1A**, FW1B, FW2H, FW3C, WE2A

*Lobelia dortmanna* FW1A, **FW1B**

*Lolium multiflorum* GL2C, GL3B, WE1E

*Lolium perenne* DU2C, DU3C, GL2A, GL2B, **GL2C, GL3B**, GL3C, **GL3D**, GL3E, GL3G, GL4A, SM6B, ST1C, WE1A, WE1B, **WE1D, WE1E**

*Lolium temulentum* **WE1D**

*Lonicera periclymenum* RH1B, SC1A, SC1B, SC1C, SC1D, **SC1G, WL1A, WL1B, WL1C**, WL1D, **WL2A, WL2B, WL2C, WL2D, WL2E, WL3A, WL3B, WL3C, WL3E, WL4A, WL4B, WL4D, WL4E, WL4F**

*Lophocolea bidentata* BG2A, FE2E, FW1C, FW3K, GL1C, GL1E, GL2D, GL4B, GL4D, HE2B, HE2C, HE2D, HE3A, HE3F, HE3G, HE4D, **SC1G, WL1A, WL1B, WL1D, WL2B, WL2D, WL2E, WL3B, WL3C, WL3D, WL3E, WL4A, WL4C, WL4D, WL4E, WL4F, WL5A, WL5B**

*Lophozia ventricosa* BG2E, HE3A, HE3B, HE3D, HE3E, HE3F, HE3G, RH2A, RH2C, RH2F, RH3A

*Lotus corniculatus* DU1A, DU1B, DU2A, **DU2B, DU2C, DU2D, DU3A**, DU3B, DU3C, **DU3D, DU3E**, FE1B, FE3B, GL1C, GL1D, GL2A, **GL3A**, GL3C, GL3D, GL3E, **GL3F**, GL3G, GL4A, GL4C, **HE1A**, HE2A, HE2C, RH1B, RH3B, RH4B, SM3A, SM4A, SM4C,

SM4D, SM5A, SM6C, ST1C, WE1D

*Lotus pedunculatus* FE2D, FW3K, GL1A, GL1D, GL1E, GL2B, GL2D, GL4A, GL4D, IN1B, SC1A, SC1B, SC1C, SC1D, SC1E

*Lunularia cruciata* FW2E

*Luzula campestris* DU2A, DU2B, DU2C, **DU2D**, DU3A, DU3D, GL3B, **GL3D**, GL3E, GL4A, GL4B, GL4C, RH2E, SC1D

*Luzula multiflora* BG2A, GL1D, GL4B, GL4C, **GL4D**, HE2C, HE4D, WL5A, WL5B

*Luzula sylvatica* FE4A, HE3A, HE3E, HE3F, HE3G, RH2B, **SC1G, WL1A, WL1B, WL1C, WL1D**, WL4A

*Lychnis flos-cuculi* FE2C, FE2F, FW3L, GL1B, GL1E

*Lycopus europaeus* FW3E, FW3H, FW3J, WL3F

*Lysimachia nemorum* FE4A, SC1G, WL3A

*Lysimachia vulgaris* FE3B, FW3F, FW3H, FW3J, WL3F

*Lythrum portula* WE2A

*Lythrum salicaria* FE1D, FE2A, FE2B, FE2F, FE3A, FE3B, FE3D, FW1A, FW1B, FW2C, FW3B, FW3E, FW3F, FW3G, FW3H, FW3I, FW3J, IN1B, SC1E, SM5A, SM5B, WE2B, WE2A, WL3E, **WL3F**

*Marchantia polymorpha* FW2A, FW2B

*Marsipella emarginata* RH2A, RH2B

*Matricaria discoidea* SC1F, WE1A, WE1C, WE1E, WE1F

*Medicago lupulina* WE1D

*Mentha aquatica* DU3B, FE1B, **FE1D**, FE2A, FE2B, FE2C, FE2D, **FE2F, FE3A**, FE3B, FE3C, **FE3D**, FW1A, FW1B, FW1C, FW2A, FW2B, FW2C, FW2D, FW2E, FW2F, FW2G, FW3A, FW3B,

FW3C, FW3D, FW3E, FW3F, FW3G, FW3H, FW3I, FW3J, FW3K, FW3L, FW3N, GL1A, GL1B, GL1C, GL1D, GL2A, SC1E, SM6A, SM6C, SW1A, WE2A, WL3B, WL3D, WL3E, **WL3F**

*Mentha arvensis* FE3B

*Menyanthes trifoliata* BG1A, BG1B, BG2A, BG2B, **FE1A, FE1D, FE2A, FE2B, FE2C, FE2D**, FE2E, **FE2F**, FE3A, FE3C, FE3D, FW1A, FW1B, FW1C, FW2F, FW2G, FW2I, FW2J, FW3B, FW3C, FW3D, FW3E, FW3G, FW3H, FW3J, FW3K, FW3L, FW3M, HE4F, SW1A

*Mercurialis annua* WE1A

*Metzgeria furcata* WL1A, WL1B, WL1C, WL2A, WL2B, WL2C, WL2D, WL2E, **WL2F**, WL3A, WL3B, WL3D, WL4A, WL4D

*Mnium hornum* FW2B, IN1A, RH2A, SC1C, SC1G, WL1A, WL1B, WL1C, **WL1D**, WL2A, WL2F, WL3B, WL4A, **WL4B**, WL4F, WL5A, WL5B

*Molinia caerulea* BG1A, **BG1B, BG1C**, BG1D, BG2A, BG2B, **BG2C, BG2D**, BG2E, **BG2F, FE1A, FE1B, FE1C**, FE1D, FE2B, FE2D, FE2E, FE2F, FE3A, FE4B, FW1A, FW1B, FW1C, FW3C, FW3F, FW3H, FW3K, GL1A, GL1B, **GL1C, GL1D**, GL4B, GL4D, **HE2A**, HE2B, HE2C, **HE2D, HE2E**, HE3A, HE3B, HE3C, HE3F, **HE4A, HE4B, HE4C, HE4D, HE4E, HE4F**, IN1A, IN1B, SC1C, SM5A, SM5B, WE2B, WL3E, WL4A, **WL4C, WL4E, WL4F**, WL5B

*Montia fontana* FE4A, WE2B

*Mycelis muralis* **RH1B**, RH4A

*Mylia anomala* BG2A, BG2C, BG2D

*Mylia taylorii* BG2F, HE3B

*Myosotis arvensis* WE1A, WE1B, WE1C, WE1F

*Myosotis laxa* FE2D, FE3C, FE3D,

FW3B, FW3I, SM6A

*Myosotis scorpioides* FE3B, FW2A, FW2C, FW2D, FW2E, FW2F, FW3A, GL2A, WL3F

*Myrica gale* BG1A, BG1B, BG2A, BG2B, BG2C, BG2D, FE1A, FE1C, FE2B, FW1B, FW3H, HE4C, HE4D, HE4E, **HE4F**, WL4C

*Myriophyllum alterniflorum* FW1A, FW1B, FW1C, FW1D, FW2A, FW2B, FW2C, FW2G, FW2H, FW2I, FW3D

*Myriophyllum spicatum* FW2A, FW2D, FW2F, FW2G, FW2H, FW2K, FW3A, FW3G, FW3I, SW1A

*Myriophyllum verticillatum* WE2A

*Najas flexilis* **FW1D**

*Nardia scalaris* RH2F

*Nardus stricta* BG1C, BG1D, BG2F, FE1C, FE4A, **GL4B**, GL4C, GL4D, HE2A, HE2B, HE2C, HE2D, HE2E, **HE3C**, HE3D, HE3E, HE3G, HE4A, **HE4B**, RH2B, RH2F

*Narthecium ossifragum* BG1A, **BG1B**, **BG1C**, BG1D, BG2A, **BG2B**, BG2C, **BG2D**, BG2E, **BG2F**, FE1A, FE1C, FW3C, HE2E, HE3C, **HE4A**, **HE4B**, HE4C, HE4E, HE4F

*Neckera complanata* WL1A, WL1B, WL1C, WL2A, WL2B, WL2C, WL2D, WL2E, WL2F, WL3C, WL3E, WL4A, WL4D

*Neckera crispa* **RH1A**, RH1B, WL2F

*Nuphar lutea* FW2G, FW2I, **FW2J**, FW3A, FW3D

*Nymphaea alba* FW1B, FW2G, **FW2I**, FW2J, FW3A, FW3C, FW3H

*Odontites vernus* SM6C, WE1D

*Odontoschisma denudatum* BG2B

*Odontoschisma sphagni* BG1A, BG1B, BG1C, BG2A, **BG2B**, **BG2C**, **BG2D**, BG2E, BG2F, HE2D, HE2E, HE3B, HE3F, HE4A, HE4C, HE4E

*Oenanthe aquatica* FW2D, FW2F, FW2J, FW3A

*Oenanthe crocata* FW2B, FW2C, FW2D, FW2E, WL3B

*Oenanthe fluviatilis* FW2C, FW2F

*Oenanthe lachenalii* FW3B, FW3I, SM2C, SM4A, SM4B, SM5A, SM5B, SM6C, SM6D

*Oligotrichum hercynicum* RH2B, RH2F

*Ononis repens* DU1B, DU2A, DU3E, ST1C

*Ophioglossum vulgatum* DU3B, DU3E

*Orchis morio* SC1D

*Orobanche rapum-genistae* SC1D

*Osmunda regalis* FW1C

*Otanthus maritimus* ST1C

*Oxalis acetosella* RH2A, RH2B, SC1G, **WL1A**, WL1B, **WL1C**, **WL1D**, WL2A, WL2B, WL2E, WL2F, **WL3A**, WL4A, **WL4B**, WL4D, WL5B

*Palustriella commutata* **FE4B**

*Papaver dubium* WE1A, WE1C

*Papaver rhoeas* WE1C

*Parapholis strigosa* SM2A, SM2D, SM3A, SM4B, SM4C, SM6A

*Parietaria judaica* RH1C, **RH1D**

*Parnassia palustris* DU3B, DU3D, FE1B

*Pedicularis palustris* FE1C, FE1D, FE2B, FE2F, FE3A, FW3I

*Pedicularis sylvatica* BG2C, BG2D, GL4D, HE2A, HE4A, HE4C

*Pellia endiviifolia* FE4B, FW2B, FW2E

*Pellia epiphylla* FE4B, FW2B, IN1B, RH2A, RH2B, RH2D, SC1G, WL3A, WL3B, WL5A

*Pellia neesiana* FW1C

*Peltigera canina* DU2B, DU2D, RH2E

*Peltigera polydactylon* FW1C

*Persicaria amphibia* FE2A, FE3B, FE3C,

FW1A, FW2F, FW2G, FW3A, FW3D, FW3G

*Persicaria hydropiper* FW2E, WE2A

*Persicaria maculosa* FW2A, FW3L, FW3N, SC1F, SM6B, WE1A, WE1B, WE1C, WE1E, **WE1F**, **WE2A**

*Phalaris arundinacea* FE3B, FW2A, FW2B, FW2C, FW2D, FW2E, FW2F, FW3A, FW3D, FW3F, FW3J, FW3L, FW3M, FW3N, GL3G, SW1A, WL3C, WL3E, **WL3F**

*Philonotis calcarea* FE4B

*Philonotis fontana* **FE4A**, FE4B

*Phleum arenarium* DU1B, DU2B

*Phleum pratense* FW3F, GL2C, GL3B, GL3E

*Phragmites australis* BG1A, FE1A, FE1B, FE1D, FE2A, **FE2B**, FE2D, FE2F, FE3D, FW1A, FW1B, FW2F, FW2G, **FW2I**, FW2J, FW3A, **FW3B**, FW3C, FW3D, **FW3E**, FW3F, FW3G, **FW3H**, FW3I, **FW3J**, FW3K, FW3M, GL3G, HE4F, SM1A, SM2C, SM2D, SM5A, SM5B, SM6A, SM6D, SM7B, SW1A, WL3F

*Phyllitis scolopendrium* RH1B, RH1C, RH4A, SC1A, SC1B, WL2C, WL2D, WL2E, WL2F

*Picea sitchensis* SM6B, SM7A, **WL5A**

*Pilosella officinarum* DU2B, DU2D, **GL3A**, HE1A, RH1A, RH1B, RH3A

*Pinguicula lusitanica* FE1A

*Pinguicula vulgaris* FE1A, FE1B, FE1C, FE4B

*Pinus sylvestris* WL4C

*Plagiochila asplenioides* **WL2E**

*Plagiochila porelloides* WL2F

*Plagiochila punctata* RH2A

*Plagiochila spinulosa* RH2A, RH2C, WL2F

*Plagiomnium affine* WL2F

*Plagiomnium rostratum* FE2F, FW2B

*Plagiomnium undulatum* FW1C, FW2B, GL3C, GL3D, GL3E, GL4C, IN1A, RH1A, SC1G, WL1C, WL2B, WL2C, WL2D, **WL2E**, WL2F, **WL3A**, WL3B, WL3C, WL3D, WL3E, WL4E, WL5A

*Plagiothecium denticulatum* IN1A, RH2E

*Plagiothecium succulentum* RH2A, SC1G

*Plagiothecium undulatum* BG2E, HE2B, HE2C, HE2D, HE3A, HE3B, HE3C, HE3E, HE3F, HE3G, HE4E, IN1A, **WL1D**, WL4B, WL5A, WL5B

*Plantago coronopus* DU1A, DU2B, DU2C, DU3C, DU3D, FW3B, GL3F, RH2E, RH3A, RH3B, **RH4B**, SM2A, SM2C, SM2D, SM3A, SM3B, SM4A, SM4B, SM4C, SM4D, SM5A, SM5B, SM6B, SM6C, SM6D, WE2B, ST1A

*Plantago lanceolata* DU1A, DU1B, DU2A, DU2B, **DU2C**, **DU2D**, DU3A, DU3B, DU3C, **DU3D**, DU3E, FE3A, FW3B, FW3K, GL1A, GL1B, **GL1C**, GL1D, GL1E, GL2A, GL2B, GL2C, **GL3A**, **GL3B**, **GL3C**, **GL3D**, **GL3E**, **GL3F**, GL3G, GL4A, **GL4C**, GL4D, HE1A, HE2A, HE2C, IN1B, RH2D, RH2E, RH3B, RH4B, SC1B, SC1D, SC1E, SM3B, SM4A, SM4D, SM5A, SM6A, SM6C, SM7A, ST1C, WE1B, **WE1D**, WE1E, WE1F

*Plantago major* FE3B, GL2A, GL2C, GL3B, SC1B, SM2A, SM2D, SM6C, SM6D, WE1B, **WE1E**, WE1F, WE2A

*Plantago maritima* DU1A, DU3C, DU3D, GL3F, HE1A, RH1B, RH3B, RH4A, RH4B, SM1A, SM1B, SM1C, **SM2A**, SM2B, SM2C, SM2D, **SM3A**, **SM3B**, SM4A, **SM4B**, **SM4C**, SM4D, SM5A, **SM5B**, SM6A, SM6B, SM6D, SM7A, ST1A, ST1C

*Pleurochaete squarrosa* RH3B

*Pleurozia purpurea* BG1B, BG1C, BG2B,

BG2C, **BG2D**, BG2E, BG2F, HE2E, HE3B, HE3C, HE3D, HE3E, HE4A, HE4B, HE4C, HE4E, RH2B, RH2C

*Pleurozium schreberi* BG2A, BG2C, BG2E, BG2F, GL4B, HE2A, HE2B, HE2C, HE2D, HE2E, HE3A, **HE3B**, HE3D, HE3E, HE3F, HE3G, HE4E, SC1C, WL4C

*Poa annua* DU1A, DU3C, DU3E, GL2C, GL3B, RH2E, RH3A, SM6C, WE2B, **WE1A**, **WE1B**, **WE1C**, **WE1E**, WE1F, WE2A

*Poa palustris* SM2D

*Poa pratensis/humilis* DU1A, DU1B, DU2A, DU2B, **DU2C**, DU2D, DU3A, DU3B, DU3C, DU3D, FE4A, FW3F, GL1A, GL1B, GL2A, GL2B, GL2D, GL3B, GL3C, GL3F, GL3G, GL4A, GL4D, HE3E, IN1B, RH1C, RH1D, RH2E, SC1C, SM4A, SM4D, SM5A, SM6B, SM6C, SM6D, SM7A, WE1B

*Poa trivialis* FW3F, FW3N, GL1A, GL1B, GL1E, GL2A, GL2B, GL2C, GL2D, **GL3B**, GL3D, GL3E, GL3G, GL4A, RH1C, SC1D, SC1F, SM7A, WE1E, WL2E, WL3D, WL5A, WL5B

*Pogonatum aloides* RH3A

*Pogonatum urnigerum* RH2B, RH2F

*Pohlia andalusica* RH3A

*Pohlia annotina* RH3A

*Pohlia melanodon* FW2E

*Pohlia nutans* RH3A, RH3B

*Pohlia wahlenbergii* RH3A

*Polygala serpyllifolia* BG1B, BG1C, BG2C, BG2D, BG2E, BG2F, GL4B, HE2A, HE2D, HE2E, HE3C, HE4A, HE4B, HE4C, HE4D, HE4E, HE4F

*Polygala vulgaris* DU2D, DU3A, DU3E, FE1B, GL3A, HE1A, SC1D, WL1A

*Polygonum aviculare* FE3B, SC1F, SM6C, SM7A, WE1A, WE1C, WE1D,

WE1E, **WE1F**, WE2A

*Polypodium vulgare* IN1A, RH1C, RH2A, WL1A, WL1B, WL1C, WL1D, WL3C, WL3F, WL4A

*Polystichum setiferum* SC1A, SC1B, WL2A, WL2B, WL2C, WL2D, WL2E, WL2F

*Polytrichum alpinum* HE3E, RH2A, RH2C, RH2F

*Polytrichum commune* BG1D, BG2A, BG2E, FE2E, FW1C, GL2D, GL4B, GL4D, HE2B, HE2C, HE2D, HE3A, HE3E, HE3F, HE3G, HE4B, HE4D, **RH2B**, SC1G, WL4A, **WL4C**, WL4E, WL4F, WL5A

*Polytrichum formosum* BG2A, GL4B, HE2D, HE3A, IN1A, RH2A, RH2C, RH2F, SC1G, WL1A, WL1B, WL1C, **WL1D**, WL4A, **WL4B**, WL4D, WL4F, WL5A, **WL5B**

*Polytrichum juniperinum* **RH2E**

*Polytrichum piliferum* RH2E, RH2F

*Polytrichum strictum* BG2A

*Potamogeton × nitens* FW2F

*Potamogeton berchtoldii* FE3C, FW1D, FW2A, FW2F, FW2J, FW2K, FW3B, FW3G

*Potamogeton coloratus* FE2A, FW1A, FW2F, FW2I, FW2J, FW3I, FW3J

*Potamogeton crispus* FW2A, FW2C, FW2D, FW2E, FW2F, FW2K, FW3A

*Potamogeton filiformis* **FW2H**

*Potamogeton gramineus* FW1A, FW1C, FW2D, FW2I, FW3A, FW3D, FW3J

*Potamogeton lucens* FW1A, FW2D, FW2J, FW3A, FW3D

*Potamogeton natans* FE2A, FE3C, FW1A, FW1B, FW1C, FW2D, FW2F, **FW2G**, FW2I, FW2J, FW3A, FW3C, FW3D, FW3E, FW3G, FW3I, FW3J, FW3M

*Potamogeton obtusifolius* FW1D

*Potamogeton pectinatus* FW2A, FW2C, FW2D, **FW2F**, FW2G, FW2J, FW3A, FW3D, FW3G, FW3I, SW1A

*Potamogeton perfoliatus* FW1D, FW2A, FW2F, FW2H, FW3A, FW3D

*Potamogeton polygonifolius* BG1A, BG1B, FE1A, FE1C, FE2A, **FE2B**, FE2D, FW1B, FW1C, FW3C, FW3E

*Potamogeton pusillus* FW1D, FW2D, FW3A, FW3D

*Potentilla anserina* DU1A, DU3A, **DU3B**, DU3C, DU3D, DU3E, FE3A, **FE3B**, FE3C, FE3D, FW3G, FW3J, FW3N, GL1A, GL1B, GL1D, **GL2A**, GL2B, GL2C, GL2D, GL3B, GL3C, GL3D, GL3G, RH3B, SC1B, SC1C, SC1D, SC1E, SC1F, SM4A, SM4B, SM4D, SM5A, SM6A, SM6B, **SM6C**, SM6D, WE2B, SM7A, SM7B, ST1A, ST1C, WE1E, WE1F, WE2A

*Potentilla erecta* BG1A, BG1B, BG1C, BG1D, **BG2C**, **BG2D**, BG2E, **BG2F**, FE1A, **FE1B**, FE1C, FE1D, FE2E, FW1A, FW1C, FW3F, FW3K, GL1A, **GL1C**, **GL1D**, GL1E, GL2A, GL2D, **GL3A**, GL3F, GL3G, GL4A, **GL4B**, **GL4C**, **GL4D**, **HE1A**, **HE2A**, **HE2B**, **HE2C**, **HE2D**, **HE2E**, HE3A, **HE3B**, **HE3C**, **HE3D**, HE3E, HE3F, **HE3G**, **HE4A**, **HE4B**, **HE4C**, **HE4D**, **HE4E**, **HE4F**, IN1A, IN1B, RH1A, RH1B, RH2D, RH2F, SC1C, SC1D, SC1G, WL1D, **WL4B**, WL4C, **WL4E**, WL4F, WL5A, WL5B

*Potentilla palustris* FE1D, FE2A, FE2B, **FE2C**, FE2D, FE2E, **FE2F**, FE3A, FE3D, FW1A, FW1B, FW2G, FW2I, FW2J, FW3B, FW3C, FW3D, FW3E, FW3F, FW3G, FW3H, FW3J, **FW3K**, GL1B, GL2D, WL3E, WL3F

*Potentilla reptans* FE3B, GL3G, SC1B, SC1E, SM6C, WE1D

*Potentilla sterilis* WL1C, **WL2E**, WL2F

*Primula vulgaris* RH2D, SC1A, WL2B, WL2C, WL2D, WL2E

*Prunella vulgaris* DU2C, DU2D, DU3A, DU3B, DU3C, **DU3D**, DU3E, FE1B, FE1C, FE3A, FE4B, **GL1C**, GL1D, **GL1E**, GL2A, GL2C, **GL3A**, GL3B, GL3C, **GL3D**, GL3E, GL3F, GL4A, GL4B, GL4C, GL4D, IN1B, RH2E, WE1B, WE1E

*Prunus laurocerasus* WL2F

*Prunus spinosa* GL3B, RH1B, RH4A, **SC1A**, SC1D, **WL2E**, WL2F

*Pseudotaxiphyllum elegans* IN1A, RH2A, RH2C, WL1A, WL1B, WL1D, WL4B, WL5B

*Psora lurida* RH4B

*Pteridium aquilinum* HE3A, RH1B, SC1A, SC1B, **SC1C**, **SC1D**, SC1E, SC1G, WL1A, WL1B, WL1D, WL4A, WL4D, **WL4F**, WL5B

*Ptilidium ciliare* HE3G

*Puccinellia distans* SM1A, SM2A, SM2C, SM3B, SM6A

*Puccinellia fasciculata* SM1A, SM2D

*Puccinellia maritima* RH3B, SM1A, SM1B, SM1C, **SM2A**, **SM2B**, **SM2C**, **SM2D**, SM3A, **SM3B**, SM4A, SM4B, SM4C, SM4D, SM5A, SM5B, SM6A, SM6B, SM6D, ST1A

*Pyrola rotundifolia* FE2C

*Quercus × rosacea* IN1A, WL1A

*Quercus petraea* **WL1B**, WL1C, **WL1D**, WL2F, WL4A, WL4B

*Quercus robur* **WL1A**, **WL2A**, WL2B, WL2C, WL2D, WL2F, WL3C, WL4A, WL4D

*Racomitrium aciculare* FW2B

*Racomitrium canescens* RH2E

*Racomitrium fasciculare* **RH2B**, RH2C

*Racomitrium heterostichum* RH2C, RH2F

*Racomitrium lanuginosum* BG1B, BG1C, BG1D, BG2B, BG2C, **BG2D**, BG2E, **BG2F**, GL4B, HE2B, HE2D, HE2E, HE3A, **HE3B**, **HE3C**, **HE3D**, **HE3E**, HE3F, **HE3G**, **HE4A**, **HE4B**, HE4C, HE4E, RH2A, **RH2B**, **RH2C**, RH2D, **RH2F**

*Radula complanata* SC1A, WL1A, WL2B, WL2C, WL2D, WL3E, WL3F, WL4D, WL4F

*Ramalina siliquosa* RH4B

*Ranunculus acris* DU3B, DU3D, FE3A, FE3D, FW3B, FW3K, FW3N, GL1A, GL1B, **GL1C**, GL1D, **GL1E**, GL2A, GL2B, GL2C, GL2D, GL3B, GL3C, GL3D, **GL3E**, GL4A, GL4C, GL4D, SC1F, WE1B

*Ranunculus aquatilis* FW1A, FW2D, FW3G

*Ranunculus bulbosus* DU2A, DU2B, DU2C, DU2D, DU3A, DU3C, DU3D, **DU3E**, FW3K, GL3C, GL3D

*Ranunculus circinatus* WE2A

*Ranunculus ficaria* FE4A

*Ranunculus flammula* DU3B, FE1B, **FE1C**, FE1D, **FE2B**, FE2D, FE2E, FE2F, **FE3A**, FE3B, FE3C, **FE3D**, FE4B, FW1A, FW1B, FW1C, FW2G, FW3B, FW3C, FW3D, FW3G, FW3H, FW3I, FW3J, FW3K, GL1A, GL1B, GL1C, GL1D, **GL1E**, GL2A, GL2B, GL2D, GL4D, SM6B, WE2B, SW1A

*Ranunculus lingua* FE2D, FW3E, FW3G

*Ranunculus peltatus* FW2C, FW2D, FW3D

*Ranunculus penicillatus* FW2A, FW2B, **FW2C**, **FW2D**, FW2E, FW2F, FW3A

*Ranunculus repens* DU3A, DU3B, DU3C, DU3D, FE3A, **FE3B**, FE3C,

FE3D, FW3F, FW3J, FW3K, FW3L, FW3N, GL1A, **GL1B**, GL1C, GL1D, **GL1E**, **GL2A**, **GL2B**, **GL2C**, GL2D, **GL3B**, GL3C, GL3D, GL3E, GL3G, GL4A, GL4C, GL4D, IN1B, RH3A, SC1A, SC1B, SC1C, SC1E, SC1F, SC1G, SM6C, SM7A, WE1A, **WE1B**, **WE1C**, WE1D, WE1E, **WE1F**, WE2A, **WL3A**, **WL3B**, WL3C, WL3D, WL3E, WL3F

*Ranunculus sceleratus* SM2A, SM2D, SM6A, SM6D, ST1A

*Ranunculus trichophyllus* FE3C, FW1A, FW2F, FW2H, FW3D

*Raphanus raphanistrum* ST1A

*Rhinanthus minor* DU2B, DU3A, DU3B, DU3E, **GL3E**, SM4D

*Rhizomnium punctatum* FE4A, FW2B, SC1G, WL3F

*Rhododendron ponticum* **IN1A**, WL4A

*Rhynchospora alba* BG1A, **BG1B**, **BG1C**, BG1D, **BG2B**, BG2C, **BG2D**, FE1A, HE4A, HE4B, HE4C

*Rhynchospora fusca* BG1A, BG1D

*Rhynchoستيgiella tenella* RH1C, RH1D

*Rhynchoستيgium riparioides* FW2A, **FW2B**, FW2C, FW2D, FW2E, FW3A

*Rhytidadelphus loreus* BG2C, BG2E, BG2F, FE2E, GL4B, HE2B, HE2C, **HE2D**, HE2E, **HE3A**, **HE3B**, HE3C, **HE3D**, **HE3E**, **HE3F**, **HE3G**, HE4B, HE4D, HE4E, IN1A, RH2A, RH2B, RH2C, RH2D, RH2F, WL1A, **WL1D**, WL4A, **WL4B**, WL5A, **WL5B**

*Rhytidadelphus squarrosus* DU2A, DU2B, DU2C, DU2D, DU3A, DU3B, DU3C, DU3D, FE1C, FE2D, FE2E, FE4A, FW1C, GL1A, **GL1C**, GL1D, **GL1E**, GL2B, GL2D, GL3A, GL3C, GL3D, GL3E, GL3F, **GL4A**, **GL4B**, **GL4C**, **GL4D**, HE1A, HE2A, HE2B, HE2C, HE2D, HE3A, HE3B, HE3C, HE3D, HE3E, HE3F, HE3G, HE4B, HE4D, HE4E, HE4F, RH1A, RH2C,

RH2D, RH2E, RH3A, SC1C, WL3E, WL4C, WL5A, **WL5B**

*Rhytidadelphus triquetrus* DU3A, HE1A, RH1A, WL1C, WL1D, WL2A, WL2B, WL2D, **WL2E**, WL2F, WL4A, WL4B, WL4D, WL5B

*Riccardia multifida* BG1A, FE1A, FE4B

*Riccia cavernosa* WE2A

*Rorippa amphibia* FW2A, FW2D, FW3L

*Rorippa islandica* WE2A

*Rorippa nasturtium-aquaticum* agg. FE2A, FE3C, FE3D, FW2A, FW2B, FW2C, FW2D, **FW2E**, FW2F, FW3A, FW3C, FW3D, FW3N, WE2B, WE2A

*Rorippa palustris* FE3C, WE2A

*Rosa canina* SC1A

*Rosa spinosissima* HE1A, RH1A, RH1B, RH3B

*Rubus fruticosus* agg. FW3E, FW3F, FW3K, GL3G, IN1A, **IN1B**, RH1B, **SC1A**, **SC1B**, SC1C, **SC1D**, **SC1E**, SC1F, **SC1G**, **WL1A**, **WL1B**, **WL1C**, WL1D, **WL2A**, **WL2B**, **WL2C**, **WL2D**, **WL2E**, WL2F, **WL3A**, **WL3B**, **WL3C**, **WL3D**, **WL3E**, WL3F, **WL4A**, WL4B, WL4C, **WL4D**, **WL4E**, **WL4F**, WL5A, **WL5B**

*Rubus idaeus* WL4D, WL4F

*Rumex acetosa* DU1B, DU2A, DU2B, DU2C, DU2D, FE2E, FE3B, FE4A, FW3F, FW3K, FW3N, GL1A, GL1B, GL1D, GL1E, GL2A, **GL2B**, GL2C, GL2D, GL3B, GL3C, **GL3D**, **GL3E**, GL3F, GL3G, **GL4A**, GL4C, GL4D, RH3A, RH3B, RH4A, SC1B, SC1C, SC1D, SC1E, SM2A, SM4A, SM4D, SM6B, SM6C, WE2B, SM7A, WE1B, WL5A

*Rumex acetosella* FW1C, RH2E, RH3A, RH3B, WE2B, WE1B

*Rumex conglomeratus* FW3B, FW3N, SC1A, SC1B, SC1E

*Rumex crispus* DU1A, DU1B, DU3C, FE3B, FE3C, FE3D, GL2A, GL2C, GL3B, GL3G, IN1B, SC1F, SM1C, SM4A, SM4D, SM5A, SM6A, SM6B, SM6C, SM6D, WE2B, SM7A, SM7B, ST1A, ST1C, WE1A, WE1B, WE1C, WE1D, WE1E, WE1F, WE2A

*Rumex hydrolapathum* FW2C, FW3A, FW3D, FW3G, SM6A

*Rumex obtusifolius* GL2C, GL3B, GL3G, SC1B, SC1C, SC1E, SC1F, SM7A, ST1A, WE1A, WE1B, WE1C, WE1E, WE1F

*Rumex sanguineus* SC1F, WL3C, WL3D

*Ruppia maritima/cirrhusa* FW2F, FW2K, FW3I, **SW1A**, SW1B

*Saccogyna viticulosa* HE3B, HE3F, HE3G, IN1A, RH2A, WL4B

*Sagina maritima* RH4B

*Sagina nodosa* DU3C, DU3D, FE3D, RH4B, WE2B

*Sagina procumbens* FE3D, FE4A, FW1C, FW3B, GL3F, RH1C, **RH2E**, RH3A, WE2B, WE1B, WE1E

*Sagittaria sagittifolia* FW3A

*Salicornia* agg. **SM1A**, SM1B, **SM1C**, SM2A, SM2B, **SM2C**, SM2D, SM3A, SM3B, SM4C, SM4D, SM5B, SM6A, SM6D, ST1A, SW1A

*Salix × multinervis* WL4E, WL4F

*Salix aurita* FE2C, SC1D, **SC1G**

*Salix caprea* SC1E

*Salix cinerea* BG1D, FE2D, FE2F, FW3B, FW3H, IN1B, SC1E, WE2A, **WL3A**, WL3B, WL3C, **WL3D**, **WL3E**, **WL3F**, WL4A, WL4C, **WL4D**, **WL4E**, WL4F

*Salix herbacea* RH2F

*Salix repens* **DU3A**, DU3B, DU3D, FE2C

*Salsola kali* DU1A, DU1B, ST1A, ST1B, ST1C

*Sambucus nigra* WL2C

*Samolus valerandi* FE3A, FE3D, FW1A, FW3B, FW3I, SM2D, SM4B, SM5A, SM5B, SM6A, SM6B, SM6D, WE2B

*Sanicula europaea* WL1C, WL2D, WL2E

*Sarcocornia perennis* SM1B, SM2A, SM2C, SM2D, SM3B

*Saxifraga aizoides* RH1A

*Saxifraga spathularis* HE3E, **RH2A**, RH2B, RH2C, RH2D, RH2F

*Saxifraga stellaris* FE4A

*Scapania aspera* RH1A, RH1B

*Scapania gracilis* BG2E, BG2F, HE2B, HE2D, HE2E, HE3A, **HE3B**, HE3C, HE3D, HE3E, HE3F, **HE3G**, RH2A, RH2B, **RH2C**, WL1D, WL4B

*Scapania undulata* **FE4A**, FW2A, FW2B, FW2C

*Schistidium crassipilum* RH3B

*Schistidium rivulare* FW2B

*Schoenoplectus lacustris* FE2A, FW1A, FW1B, FW1C, FW2A, FW2C, FW2D, FW2E, FW2F, FW2G, FW2I, FW2J, **FW3A**, FW3C, **FW3D**, FW3E, FW3G, FW3J, FW3M, WE2B

*Schoenoplectus triquetus* SM6A

*Schoenus nigricans* BG1A, **BG1B**, **BG1C**, BG1D, BG2C, **BG2D**, **FE1A**, **FE1B**, FE1C, FE1D, FE2C, FW3B, FW3H, FW3I, HE4A, HE4B, **HE4C**, HE4E, HE4F, SM5A, SM5B

*Scleropodium purum* DU2A, DU2D, DU3A, DU3B, DU3E, FE1D, GL1C, GL1D, GL1E, **GL3A**, GL3D, GL4A, GL4B, **GL4C**, **GL4D**, **HE1A**, HE2A, HE2B, HE2C, HE2D, HE3A, HE4D, HE4F, RH1A, RH2D, RH2E, RH3A, SC1C, WL4A, **WL4B**, WL4C, WL4D, WL4E, **WL4F**, WL5A, **WL5B**

*Scopelophila cataractae* RH3A

*Scorpidium scorpioides* BG1A, **FE1A**,

FE1B, FE1C, FE1D, FE2A, FE2B, FE2C, FE3A, FW1A, FW1B, FW2I, FW3D, FW3H, FW3I, FW3J

*Scrophularia auriculata* IN1B

*Sedum acre* DU1A, DU2B, DU2C, DU3C, RH3B, ST1C

*Sedum anglicum* **RH2E**, RH3A, RH3B

*Selaginella selaginoides* DU3D, FE1A, FE1B

*Senecio aquaticus* FE3A, FE3B, FE3C, FE3D, FW3B, FW3K, FW3N, GL1A, GL1B, GL1E, GL2A, GL2B, GL2D, SM4A, SM5A, SM6A, SM6D, WL3F

*Senecio jacobaea* DU1A, DU1B, DU2A, DU2B, DU2C, DU2D, DU3A, DU3C, DU3E, FW3K, GL2C, GL3B, GL3C, GL3D, GL4A, IN1B, RH1A, RH1B, RH1C, SC1D, SC1E, SC1F, ST1A, ST1C, WE1B, WE1E

*Senecio vulgaris* DU1A, DU1B, RH4B, SM6C, SM7B, ST1A, ST1C, **WE1A**, WE1B, **WE1C**, WE1D, WE1E, WE1F

*Seriphidium maritimum* SM2A, SM2D, SM4A, SM4C, SM4D, ST1A

*Sesleria caerulea* FE1B, GL3A, **HE1A**, **RH1A**, **RH1B**

*Sherardia arvensis* WE1D

*Silene uniflora* RH3A, **RH3B**, RH4A, RH4B, SM2B, SM4C, ST1A, ST1C

*Sinapis arvensis* WE1A, WE1C, WE1D, WE1F

*Sisymbrium officinale* WE1C, WE1E

*Sium latifolium* FW3J

*Solanum dulcamara* FW2E, ST1A

*Solanum tuberosum* WE1D

*Solidago virgaurea* HE1A, RH1B, RH2F

*Sonchus arvensis* DU1A, DU1B, RH3B, SM4A, SM7A, ST1A, WE1C, WE1F

*Sonchus asper* RH4A, SM7B, WE1A, WE1B, WE1C, WE1D, WE1E

*Sonchus oleraceus* DU1A, DU1B, RH1C, RH1D, ST1A, WE1A, WE1B, **WE1C**, WE1D, WE1E, WE2A

*Sorbus aria* agg. WL2F

*Sorbus aucuparia* IN1A, SC1G, **WL1A**, WL1B, WL1C, **WL1D**, WL2F, **WL4A**, **WL4B**, WL4D, WL4F, WL5B

*Sparganium angustifolium* FW1B, FW1D, FW3D

*Sparganium emersum* FW2A, FW2C, FW2D, FW2E, FW2J, FW3A, FW3D

*Sparganium erectum* FE2A, FE2D, FE3C, FW2A, FW2B, FW2C, FW2D, FW2E, FW2F, FW2G, FW2J, **FW3A**, FW3B, FW3C, FW3D, FW3E, FW3G, FW3H, FW3L, FW3N

*Sparganium natans* FW1B, FW2G, FW2I, FW3B

*Spartina* agg. FW3D, SM1A, **SM1B**, SM1C, SM2A, SM2B, SM2C, SM2D, SM3A, SM3B, SM4B, SM4C, SM4D, SM5A, SM5B, SM6D, ST1A

*Spergula arvensis* WE1F

*Spergularia marina* SM1A, SM1B, SM1C, SM2A, SM2B, SM2C, SM2D, SM3A, SM3B, SM4B, SM4C, SM5B, SM6A, SM6D, WE2B, ST1A, SW1A

*Spergularia media* SM1A, SM1B, SM1C, SM2A, SM2B, **SM2C**, SM2D, SM3A, SM3B, SM4B, SM4C, SM4D, SM5B, SM6D, ST1A

*Spergularia rupicola* RH4B

*Sphagnum austinii* BG2B

*Sphagnum beothuk/fusum* BG2B

*Sphagnum capillifolium* BG1A, BG1B, BG1C, BG1D, **BG2A**, **BG2B**, **BG2C**, **BG2D**, **BG2E**, BG2F, HE2B, HE2D, HE2E, HE3A, **HE3B**, HE3C, HE3D, **HE3F**, **HE3G**, HE4A, HE4B, HE4C, HE4D, HE4E, HE4F, WL4C

*Sphagnum compactum* BG1C, BG2F, HE4A, HE4B, HE4C

- Sphagnum contortum* FE1A, FE2C
- Sphagnum cuspidatum* **BG1A**, BG1B, BG1C, BG1D, BG2A, BG2B, BG2D, BG2E, BG2F, FE2E, FW1B, FW1C, FW3C, HE4B, HE4C
- Sphagnum fimbriatum* WL4C
- Sphagnum magellanicum* BG1A, BG1B, BG2A, BG2B, BG2D
- Sphagnum palustre* BG1A, BG1B, BG1C, BG2A, BG2C, BG2D, BG2E, BG2F, FE2E, HE4B, HE4C, HE4D, HE4E, HE4F, RH2B, **WL4C**, WL4E
- Sphagnum papillosum* BG1A, **BG1B**, BG1C, BG1D, BG2A, **BG2B**, BG2C, **BG2D**, BG2E, BG2F, FW1C, HE3F, HE4A, HE4B, HE4C, HE4D, HE4E, HE4F
- Sphagnum quinquefarium* WL1D
- Sphagnum recurvum* agg. BG1A, **BG2A**, BG2E, **FE2E**, WL4C
- Sphagnum squarrosum* FE2E, FW1C, FW3D, WL4C
- Sphagnum subnitens* BG1B, BG1C, BG1D, BG2A, BG2B, BG2C, BG2D, BG2E, BG2F, FE2C, HE2D, HE3A, HE3B, HE3C, HE3F, HE4A, HE4C, HE4D, HE4E, HE4F, IN1A
- Sphagnum subsecundum* agg. **BG1A**, BG1B, BG1D, BG2C, BG2D, BG2F, FE1A, FE1C, FE2B, FE2E, FW1B, FW1C, FW2I, FW3C, HE4B, HE4C, HE4D, HE4F, RH2B, RH2D
- Sphagnum tenellum* BG1B, BG1C, BG1D, **BG2B**, BG2C, **BG2D**, BG2E, BG2F, HE3C, HE3F, HE4A, HE4C, HE4E
- Schoenoplectus tabernaemontani* FW2F, FW2I, FW3B, FW3E, **FW3I**, FW3M, SM5B, SM6A, SM6B, WE2B, SW1A
- Stachys palustris* FW2C, GL3G, SC1A, SC1D, SC1E, SM7A, WE1F
- Stachys sylvatica* SC1A, SC1B, SC1D, SC1F
- Stellaria graminea* GL2B, GL3E, GL3G, GL4A
- Stellaria holostea* SC1D, SC1G
- Stellaria media* RH1C, SC1F, WE2B, **WE1A**, WE1B, **WE1C**, WE1E, **WE1F**
- Stellaria palustris* FW3L
- Stellaria uliginosa* FE4A, GL2B, GL2D, WE2B
- Stereocaulon evolutum* RH2C
- Stereocaulon vesuvianum* RH2C
- Suaeda maritima* SM1A, SM1B, **SM1C**, SM2A, SM2B, SM2C, SM2D, SM3A, SM3B, SM4C, SM4D, SM5B, ST1A, ST1C
- Succisa pratensis* BG2C, DU3D, **DU3E**, FE1A, **FE1B**, FE1C, FE1D, FE2B, **FE2C**, FE2D, FE2E, FE2F, FE3A, FE4B, FW3E, FW3H, FW3K, GL1B, **GL1C**, **GL1D**, GL1E, **GL3A**, GL3F, GL4C, GL4D, **HE1A**, HE2A, HE2C, HE2D, HE2E, HE4A, HE4D, HE4E, HE4F, IN1B, RH1A, RH1B, RH2D, RH3B, SC1D, WL4E
- Syntrichia ruraliformis* DU2A, **DU2B**, DU2C, DU2D
- Taraxacum officinale* agg. DU1A, DU1B, DU2A, DU2B, DU2C, DU2D, DU3A, DU3B, DU3C, DU3D, DU3E, FE4A, FE4B, GL1C, GL2A, GL2B, GL2C, GL3B, GL3C, GL3D, GL3E, GL3F, GL3G, GL4A, IN1B, RH1A, RH1B, RH1C, RH1D, RH4B, SC1B, SC1C, SC1E, SC1F, SM4B, SM4C, SM4D, SM5B, SM6C, ST1A, ST1C, WE1A, WE1B, WE1C, **WE1D**, **WE1E**
- Taxus baccata* **WL2F**
- Teucrium scorodonia* HE1A, RH1A, **RH1B**, SC1A, SC1B, SC1C, SC1D
- Thamnobryum alopecurum* FW2B, IN1A, RH1C, SC1G, WL2A, **WL2B**, **WL2C**, WL2D, **WL2E**, **WL2F**, **WL3C**, WL3D
- Thuidium abietinum* RH2E
- Thuidium tamariscinum* FE4A, FE4B, GL1C, **GL4B**, GL4C, GL4D, HE2A, HE2B, **HE2C**, HE2D, HE3A, HE3B, HE3E, HE3F, HE4B, HE4D, HE4E, **IN1A**, RH1A, RH2A, RH2C, RH2D, SC1C, **SC1G**, **WL1A**, **WL1B**, **WL1C**, **WL1D**, WL2A, **WL2B**, WL2C, WL2D, **WL2E**, **WL2F**, **WL3A**, WL3B, WL3C, WL3D, WL3E, **WL4A**, **WL4B**, **WL4C**, **WL4D**, **WL4E**, **WL4F**, **WL5A**, **WL5B**
- Thymus polytrichus* DU2A, DU2B, DU2C, **DU2D**, DU3A, **GL3A**, GL3F, **HE1A**, HE2A, **RH1A**, RH1B, RH2D, RH2F, RH4B, SM3A
- Timmia norvegica* RH2E
- Torilis japonica* SC1F
- Tortella flavovirens* RH3B, RH4A, RH4B, SM4C
- Tortella nitida* RH3B, RH4B
- Tortella tortuosa* HE1A, **RH1A**, **RH1B**, RH1C, RH4A, WL2E, WL2F
- Tortula muralis* RH1C, RH1D
- Trichophorum cespitosum/germanicum* BG1B, BG1C, BG1D, **BG2B**, **BG2C**, **BG2D**, **BG2E**, **BG2F**, HE2A, HE2B, HE2D, **HE2E**, HE3C, HE3D, HE3F, HE3G, **HE4A**, **HE4B**, HE4C, HE4E
- Trichostomum brachydontium* RH1A, RH3B, RH4A, RH4B
- Trichostomum tenuirostre* RH2A, RH2D
- Trifolium arvense* DU2B
- Trifolium campestre* RH2E
- Trifolium dubium* DU3C, RH2E, WE1D, WE1E
- Trifolium fragiferum* SM6C
- Trifolium pratense* DU2C, DU3A, DU3B, DU3D, DU3E, FW3N, **GL1C**, GL1E, GL2B, GL2C, **GL3A**, GL3B, **GL3C**, **GL3D**, **GL3E**, GL3F, GL4A, GL4C, WE1D

*Trifolium repens* DU1B, DU2A, DU2B, **DU2C, DU2D, DU3A, DU3B, DU3C, DU3D**, DU3E, FE3A, FE3B, FE3D, FE4A, FE4B, FW3N, GL1A, **GL1B, GL1C**, GL1D, **GL1E, GL2A, GL2B, GL2C**, GL2D, **GL3A, GL3B, GL3C, GL3D, GL3E, GL3F**, GL3G, **GL4A, GL4B, GL4C**, GL4D, IN1B, RH4B, SC1C, SC1E, SM3A, SM4A, SM4B, SM4C, SM4D, SM5A, SM5B, SM6B, SM6C, SM6D, SM7A, WE1A, **WE1B**, WE1C, WE1D, WE1E, WE1F

*Trifolium striatum* SM3A

*Triglochin maritimum* FW3I, SM1A, SM1B, SM2A, SM2B, SM2C, SM2D, **SM3A**, SM3B, SM4A, **SM4B**, SM4C, SM4D, SM5A, SM5B, SM6A, SM6B, SM6D, WE2B, SM7A, SM7B, ST1A

*Triglochin palustre* FE3A, FE3C, FE3D, FW3I, SM3A, SM6B, SM6D, WE2B

*Tripleurospermum inodorum* SC1F

*Tripleurospermum maritimum* DU1A, DU1B, DU3C, RH3B, RH4B, SM1C, SM2A, SM3A, SM4A, SM4C, SM6C, SM6D, SM7B, **ST1A**, ST1C

*Tritomaria quinqueidentata* HE3G, RH2B, RH2D

*Tussilago farfara* DU1A, DU1B, DU2A, SM3A, WE2B, ST1A, WE1E

*Typha latifolia* FE2A, FE2D, FE2F, FW2G, FW2I, FW2J, FW3B, FW3C, FW3D, FW3E, FW3G, FW3H, FW3I, FW3K, **FW3M**, FW3N, SM6A, SW1A, WE2A

*Ulex europaeus* IN1A, IN1B, SC1A, SC1B, SC1C, **SC1D**, SC1E, WL2F, WL4F

*Ulex gallii* **HE2A**, HE2C, HE2E, HE4E, RH2E

*Ulotia bruchii/crispa* SC1A, WL1B, WL1C, WL2A, WL2F, WL3A, WL3B, WL3D, **WL3E**, WL3F, WL4A, WL4C, WL4D, **WL4E**, WL4F, WL5B

*Urtica dioica* FW2A, FW2C, FW3L, FW3N, GL2C, GL3G, RH1C, SC1A, **SC1B**, SC1C, SC1D, SC1E, **SC1F**, SM7A, WE1A, WE1B, WE1C, WE1F, WL2C, WL3B, WL3C, WL3D, WL3F

*Urtica urens* WE1A, WE1C

*Utricularia australis/vulgaris* FE2A, FE3C, FW1B, FW2F, FW2G, FW2I, FW3D, FW3E, FW3G, FW3I

*Utricularia intermedia* FE1A, FE2B, FW1B, FW2I, FW2J, FW3H

*Utricularia minor* BG1A, FE1A, FW2G, FW3C, FW3H

*Vaccinium myrtillus* BG2A, BG2E, GL4B, HE2B, HE2D, **HE3A, HE3B, HE3C, HE3D, HE3E, HE3F, HE3G**, RH2A, RH2B, RH2C, RH2F, SC1C, **SC1G**, WL1A, WL1B, **WL1D, WL4A, WL4B, WL4C, WL5A, WL5B**

*Vaccinium oxycoccos* BG1A, **BG2A, BG2B, FE2C**, FE2E, WL4C

*Valeriana officinalis* FE1D, FE2C, FW3E, FW3F, FW3H, FW3K, FW3L, SC1D, WL3E, WL3F

*Veronica anagallis-aquatica* FE3C, FW2D, FW2E, FW2F, FW3A

*Veronica arvensis* WE1D

*Veronica beccabunga* FE3C, FW2A, FW2C, FW2D, FW2E, FW3A, FW3N

*Veronica catenata* FE3C

*Veronica chamaedrys* DU2A, FW3N, GL3C, GL3G, SC1A, SC1B, SC1C, SC1F, WE1B, WL2B, WL2C, WL2E

*Veronica filiformis* WE1B

*Veronica hederifolia* WE1C

*Veronica montana* SM7A, WL2B, WL2C, WL2F, WL3A

*Veronica persica* SM7A, WE1A, **WE1C**, WE1D, WE1F

*Veronica scutellata* FE2D, WE2A

*Veronica serpyllifolia* FE3B, GL2C, GL3B, WE2B, WE1B, WE1E

*Viburnum opulus* WL3F

*Vicia cracca* DU3B, FW3F, FW3G, GL1B, GL3E, GL3G

*Vicia sativa* DU3E, GL3G, SM7A

*Vicia sepium* GL3G, SC1A, SC1F, SM7A, WL2E

*Viola arvensis* WE1F

*Viola palustris* FE2E, FW3K, SM2D

*Viola tricolor* DU2B

*Vulpia bromoides* **RH2E**

*Viola riviniana/reichenbachiana* DU2A, DU2D, DU3A, FE4B, GL3A, GL3F, GL4B, GL4C, **HE1A**, HE2A, HE2C, RH1A, RH1B, RH2B, **RH2D**, RH4B, SC1A, SC1B, SC1C, SC1E, **WL1C, WL2A, WL2B, WL2C, WL2D, WL2E, WL2F, WL3A, WL3C, WL3D, WL3E, WL4B, WL4D, WL4E**

*Warnstorfia fluitans* BG1A, FW3C

*Weissia controversa* RH3A, RH3B

*Zannichellia palustris* FW1D, FW2D, FW2F, **FW2K**, SW1A

*Zostera angustifolia* SM1B, SW1A

*Zostera marina* SW1A, **SW1B**

# National Vegetation Database datasets

Dataset code	Dataset description	Plots
EPA 001	McGarrigle, M., 2010. EPA's Irish national river macrophyte and associated environmental data collected as part of the macrophyte intercalibration exercise in the Central and Baltic GIG under the Water Framework Directive. Unpublished data from the Environmental Protection Agency.	279
INDEP 001	Ivimey-Cook, R.B., Proctor, M.C.F., 1966. The plant communities of the Burren, Co. Clare. Proceedings of the Royal Irish Academy 64B, 211-299.	429
INDEP 002	Murray, A., 2003. A study of the flora of Malahide saltmarsh during the construction of the northern motorway. Unpublished report for Fingal County Council.	51
INDEP 003	Kirby, N., O'Connell, M., 1982. Shannawoneen Wood, Co. Galway, Ireland: the woodland and saxicolous communities and the epiphytic flora. Journal of Life Sciences of the Royal Dublin Society 4, 73-96.	13
INDEP 004	Horsfield, D. Hobbes, A., Averis, B., Kinnes, L., 1991. The vegetation of Connemara in relation to plant communities of Great Britain. CSD Report No. 1253. Nature Conservancy Council, Peterborough.	63
INDEP 005	Bleasdale, A., 1998. An assessment of the scientific interest of the dune system at White Strand, Doonbeg, Co. Clare. Unpublished report for The Heritage Council.	36
INDEP 006	Parr, S., O'Donovan, G., Ward S., Finn, J. A., 2009. Vegetation analyses of upland Burren grasslands of conservation interest. Biology and Environment: Proceedings of the Royal Irish Academy 109B, 11-33.	400
INDEP 007	Moran, J., 2007. Unpublished relevés from The Burren, Co. Clare of winterages as part of the BurrenLIFE Project.	50
INDEP 008	Bleasdale, A., Wolfe-Murphy, S.A., 1998. Moboy Bog, Co. Tyrone. Environmental Impact Statement: flora and fauna. Unpublished report for Allathan Associates, Hallhill, Turriff, Aberdeenshire.	21 <sup>a</sup>
INDEP 009	Bleasdale, A., Conaghan, J., 1999. The vegetation and management of Barleycove Dunes, Co. Cork. Unpublished report for Cork County Council.	31
INDEP 010	Crushell, P., 2008. Soak systems of an Irish raised bog: a multidisciplinary study of their origin, ecology, conservation and restoration. Ph.D thesis. Wageningen University, The Netherlands.	172
INDEP 011	Foss, P., Crushell, P., 2007. Monaghan Fen Survey. Report and accompanying GIS datasets prepared for Monaghan County Council and the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland.	54
INDEP 012	Foss, P., Crushell, P., 2008. Monaghan Fen Survey II. Report and accompanying GIS datasets prepared for Monaghan County Council and the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland.	16
INDEP 013	Crushell, P., O'Callaghan, R. J., 2008. A survey of Red Grouse ( <i>Lagopus lagopus</i> ) habitat in Ireland 2007-2008: an assessment of habitat condition and land-use impacts. Unpublished Report for BirdWatch Ireland and the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland.	400 <sup>b</sup>
INDEP 014	Bleasdale, A., Conaghan, J., 1998. Survey of Turloughmore, Inis Mor, Co. Galway. Independent survey for a private company.	16

Dataset code	Dataset description	Plots
INDEP 015	Fojt, W., 1988. Mires Research Group Field Excursion 1988, Ireland. Independent survey for the Nature Conservancy Council, UK.	40
INDEP 016	Bleasdale, A., 1995. A vegetation description of selected sites at the Teagasc Hill Farm, Erriff River. Unpublished independent survey.	21
INDEP 017	Bleasdale, A., Conaghan, J., 1997. An assessment of the scientific interest of woodland and associated habitats at Rindoon, Co. Roscommon. Unpublished report for The Heritage Council.	13
INDEP 018	Conaghan, J., 1999. The vegetation, ecology and conservation of the Lough Oughter lake system, Co. Cavan. Unpublished report by Enviroscope Environmental Consultancy, Galway.	203
INDEP 019	Conaghan, J., 2000. An assessment of the conservation value of blanket bog landscape to the west of Galway City. Unpublished report by Enviroscope Environmental Consultancy, Galway.	207
INDEP 020	Wolfe-Murphy, S. A., Murphy, C., 2002. Ecological survey of the Slieve Beagh/Eshbrack Bog area, County Monaghan. Unpublished report for The Truagh Development Association.	153
INDEP 021	Lynn, D., 2000-2005. Unpublished turlough relevés collected for a post-doctorate position, funded by the EPA.	12
INDEP 022	Botanical Society of the British Isles, 1974. Relevés from an unpublished survey vegetation survey of Lough Carra, Co. Mayo.	101
INDEP 023	O'Donovan, G., 2006. A survey of lowland grasslands of conservation interest in Sligo. Unpublished report for The Heritage Council.	176
INDEP 024	Ní Lamhna, É., 1982. The vegetation of saltmarshes and sand-dunes at Malahide Island, County Dublin. <i>Journal of Life Sciences of the Royal Dublin Society</i> 3, 111-129.	147
INDEP 025	Wilmanns, O., Brun-Hool, J., 1982. Plant communities of human settlements in Ireland. 1. Vegetation of walls. <i>Journal of Life Sciences of the Royal Dublin Society</i> 3, 79-90.	42
INDEP 026	Brun-Hool, J., Wilmanns, O., 1982. Plant communities of human settlements in Ireland. 2. Gardens, parks and roads. <i>Journal of Life Sciences of the Royal Dublin Society</i> 3, 91-103.	58
INDEP 027	Doyle, G. J., 1982. <i>Minuartio-Thlaspietum alpestris</i> ( <i>Violotea calaminariae</i> ) in Ireland. <i>Journal of Life Sciences of the Royal Dublin Society</i> 3, 143-146.	14
INDEP 028	Boorman, L.A., 1966. Experimental studies in the genus <i>Limonium</i> . Ph.D. thesis. University of Oxford.	89
INDEP 029	Wilmanns, O., Brun-Hool, J., 1982. Irish mantel and saum vegetation. <i>Journal of Life Sciences of the Royal Dublin Society</i> 3, 165-174.	16
INDEP 030	Lynch, R., 2005. The vegetation of the Ballyhoura Mountains, Co. Limerick (woodland relevés). Unpublished report for The Heritage Council.	78
INDEP 031	Lynch, R., 2005. The vegetation of the Ballyhoura Mountains, Co. Limerick (upland relevés). Unpublished report for The Heritage Council.	65
INDEP 032	Roden, C., 1999. A survey of coastal lakes in Counties Galway, Mayo, Sligo and Donegal. Unpublished report for The Heritage Council.	64
INDEP 033	NSSHARE, 2009. River vegetation data collated for NSSHARE project as described in: Methods Manual. 1. River Macrophytes. Report for the NSSHARE project.	420 <sup>a</sup>
INDEP 034	Kelly-Quinn, M., Bradley, C., Dodkins, I., Harrington, T.J., Ni Chathain, B., O'Connor, M., Rippey, B., Trigg, D., 2005. Water Framework Directive – Characterisation of reference conditions and testing of typology of rivers (2002-W-LS-7). Final Report. Environmental Protection Agency, Wexford.	100
IPCC 001	O'Connell, C., Foss, P., 1999. A survey of cutover and cutaway bog habitats of the Irish midlands. Unpublished report for the Irish Peatland Conservation Council.	31
IPCC 002	Poutsma, J., 1999. Fenor Bog: vegetation survey and management plan. Unpublished report for the Irish Peatland Conservation Council.	26

Dataset code	Dataset description	Plots
IPCC 003	van der Borch, E., 2000. Cumberagh River Bog: vegetation and wildlife survey 2000. Unpublished report for the Irish Peatland Conservation Council.	58
IPCC 004	Coumans, C., 2005. A hydrological and vegetative research on Lodge Bog, Ireland. Unpublished report for the Irish Peatland Conservation Council.	76
IPCC 005	Aukema, R., Scherrenburg, M., 1998. Clochar na gCon Bog survey and sustainable development plan. Unpublished report for the Irish Peatland Conservation Council.	30
NIEA 001	Northern Ireland Environmental Agency, 2007-2012. River macrophyte survey data for the Water Framework Directive's water quality classification system using the LEAFPACS method.	637 <sup>a</sup>
NPWS 001	McGough, H.N., 1984. A report on the grasslands and closely related vegetation of the Burren region in the west of Ireland. Unpublished report for the National Parks and Wildlife Service.	81
NPWS 002	Curtis, T.G.F., McGough, H.N., 1981. A survey of the wetlands of the Fergus catchment and adjoining areas. Unpublished report for the National Parks and Wildlife Service.	45
NPWS 003	Irish Rare Flora Survey: protected flora, 1991-1993. Unpublished report for the National Parks and Wildlife Service.	110
NPWS 004	Irish Rare Flora Survey: threatened flora, 1991-1996. Unpublished report for the National Parks and Wildlife Service.	38
NPWS 005	Irish Rare Flora Survey: scarce species, 1985-1996. Unpublished report for the National Parks and Wildlife Service.	58
NPWS 006	Crawford, I., Bleasdale, A., Conaghan, J., 1996. Biomar Survey of Irish Machair Sites. Vol. 2: plant communities. Irish Wildlife Manuals No. 4. Dúchas, The Heritage Service, Dublin.	1450
NPWS 007	Ó Críodáin, C., 1988. Parvocaricetea in Ireland. Ph.D. thesis. University College Dublin.	284
NPWS 008	Bleasdale, A., 1988. Unpublished relevés from Inis Mór and Derrynane.	50
NPWS 009	Brock, T., Frigge, P., van der Ster, H., 1978. A vegetation study of the pools and surrounding wetlands in the Dooaghtry area, Co. Mayo. Unpublished report for the National Parks and Wildlife Service from the Laboratory of Geobotany, Catholic University Nijmegen.	366
NPWS 010	Beckers, A., Brock, T., Klerkx, J., 1976. A vegetation study of some parts of Dooaghtry, Co. Mayo, Republic of Ireland. Unpublished report for the National Parks and Wildlife Service from the Laboratory of Geobotany, Catholic University Nijmegen.	339
NPWS 011	Lockhart, N., 1982. A survey of the wetland vegetation of the Dunkellin and Lavelly River catchments. Unpublished relevés for the National Parks and Wildlife Service.	107
NPWS 012	Lockhart, N., Moore, J.J., O'Connell, M., 1975-1980. Survey of wetlands (fens) from Finn/Lackey, Co. Monaghan, Blackwater and Pollardstown Fen. Unpublished report for the National Parks and Wildlife Service.	53
NPWS 013	O'Sullivan, A. et al., 1974. Survey of wetlands of Lough Carra. Unpublished report for the National Parks and Wildlife Service.	70
NPWS 014	Ryan et al., 1975-1978. Survey of wetlands in counties Galway, Clare, Wexford, Sligo, Roscommon, Limerick, Donegal, Westmeath and Cavan. Unpublished report for the National Parks and Wildlife Service.	120
NPWS 015	Tobin, G., 2005. Botanical survey of Garriskill, Co. Westmeath, Ardgullion Bog, Co. Longford, Bellanagare Bog, Co. Roscommon and Kilbarry Bog, Co. Roscommon. Unpublished report for the National Parks and Wildlife Service.	461
NPWS 016	Dwyer, R., Wann, J., 2005. Surveys of Glen Lough, Fisherstown Bog, Killyconny Bog and Ballinderry and Ballynagrenia Bogs. Unpublished reports for the National Parks and Wildlife Service.	66
NPWS 017	Farrell, C. A., 2004. Mayo National Park Exclosure Study. Unpublished report for the National Parks and Wildlife Service.	102

Dataset code	Dataset description	Plots
NPWS 018	Smith G. F., 2007. North Midlands botanical surveys: Annagh Lough Wood, Co. Cavan and St John's Wood, Co. Roscommon. Unpublished report for the National Parks and Wildlife Service.	60
NPWS 019	Natura Environmental Consultants, 2007. Botanical surveys 2006: North Midlands cSACs. Unpublished report for the National Parks and Wildlife Service.	53
NPWS 020	Conaghan, J., 1998. A study of the vegetation and ecohydrology of Sharavogue Bog, Co. Offaly, with particular reference to the lagg zone. Unpublished report to the National Parks and Wildlife Service.	141
NPWS 021	Conaghan, J., 1998. A study of the vegetation and ecohydrology of Clonfinane Bog, Co. Tipperary. Unpublished report for the National Parks and Wildlife Service.	62
NPWS 022	Loftus, M., Scott, L., 1996. A monitoring programme, towards the development of nature conservation management policy in Laragh West, County Wicklow. Unpublished report for the National Parks and Wildlife Service.	15
NPWS 023	Hatch, P., 1996. A survey of the vegetation of Irish coastal lagoons: summer 1996. Unpublished report for the National Parks and Wildlife Service.	282
NPWS 024	Weekes, L., 1990. A vegetation survey of Glenveagh National Park and the An Taisce property, Co. Donegal. Unpublished report for the National Parks and Wildlife Service.	132
NPWS 025	Heuff, H., 1984. Vegetation of Irish lakes Part II. Unpublished report for the National Parks and Wildlife Service.	152 <sup>b</sup>
NPWS 026	Neefjes, M., 1989. The vegetation of Clara Bog in relation to the hydrology and water chemistry. Unpublished report for the National Parks and Wildlife Service.	58
NPWS 027	Bleasdale, A., Conaghan, J., 1996. Monitoring techniques in quantifying vegetation change in grazing trials in Glenveagh National Park. Unpublished report for the National Parks and Wildlife Service.	7
NPWS 028	Patton, L. Boyle, G., O'Connell, T., 1989. An ecological survey of Pollardstown Fen. Unpublished report for the National Parks and Wildlife Service.	43
NPWS 029	Bleasdale, A., Conaghan, J., 1996. A study of woodland exclosures in Glenveagh National Park, Co. Donegal. Unpublished report for the National Parks and Wildlife Service.	46
NPWS 030	Heuff, H., 1987. The vegetation of Irish rivers. Unpublished report for the National Parks and Wildlife Service.	183 <sup>b</sup>
NPWS 031	Bleasdale, A., Conaghan, J., 1998. A baseline vegetation survey of Derrynane National Historic Park. Unpublished report for the National Parks and Wildlife Service.	34
NPWS 032	Bleasdale, A., 1994. The arable weed flora of the rye crop on the Aran Islands, Co. Galway. Unpublished report for the National Parks and Wildlife Service.	122
NPWS 033	Bleasdale, A., Conaghan, J., 1996. A botanical assessment of Lurgabrack Dunes, Dunfanaghy, Co. Donegal. Unpublished report for the National Parks and Wildlife Service.	26
NPWS 034	Constable, T., Cassells, D., 2002. Vegetation studies in Ballyteige, County Clare. Unpublished report for the National Parks and Wildlife Service.	25
NPWS 035	Dunne, F., 2000. Blanket bog, heath and upland grassland exclosures, baseline surveys and monitoring methodologies. Unpublished report for Dúchas - The Heritage Service.	54
NPWS 036	Lockhart, N. D., 1992. A report on the wetland vegetation of the Mulkear River catchment, Counties Limerick and Tipperary. Unpublished report for the National Parks and Wildlife Service.	113
NPWS 037	O'Donovan, G., 2007. Vegetation and habitat survey of Wicklow Uplands cSAC. Unpublished report for the National Parks and Wildlife Service.	118
NPWS 038	Webb, A., 2002. An investigation into the plausibility of aging a burnt area in upland heath and blanket bog. B.Sc. thesis. University College Cork.	67

Dataset code	Dataset description	Plots
NPWS 039	Conaghan, J., Fuller, J., 2005. A survey of rare and threatened vascular plants in County Roscommon. Unpublished report for the National Parks and Wildlife Service.	18
NPWS 040	Conaghan, J., Fuller, J., 2005. A survey of rare and threatened vascular plants in County Sligo. Unpublished report for the National Parks and Wildlife Service.	13
NPWS 041	Conaghan, J., 1998. A survey of protected, threatened and scarce plant species in County Donegal. Unpublished report for the National Parks and Wildlife Service.	25
NPWS 042	Heery, S., 1983. A vegetation study of the Little Brosna floodplain grasslands. Report to the National Association of Regional Game Councils of Ireland and The Royal Irish Academy, Dublin.	122
NPWS 043	Borggreve, C., de Groot, C., 1996. Vegetation of the Shannon callows at Bullock Island, Ireland. Graduate thesis. Wageningen Agricultural University, The Netherlands.	133
NPWS 044	Roden, C., 2004. The distribution of <i>Najas flexilis</i> in Ireland 2002-2004. Unpublished report for the National Parks and Wildlife Service.	35
NPWS 045	Curtis, T., Wilson, F., 2008. Field survey of rare, threatened and scarce vascular plants in County Wicklow. Unpublished report for the National Parks and Wildlife Service.	33
NPWS 046	van Groenendael, J.M., Hochstenbach, S.M.H., van Mansfeld, M.J.M., Roozen, M.J.M., Westhoff, V., 1982. The influence of the sea on the vegetation of lakes in southwest Connemara. <i>Journal of Life Sciences of the Royal Dublin Society</i> 3, 221-242.	505
NPWS 047	Martin, J., 2006. Survey of rare/threatened and scarce vascular plants in Counties Cavan, Louth, Meath, Monaghan and Westmeath. Unpublished report for the National Parks and Wildlife Service.	35
NPWS 048	Roden, C. M., Conaghan, J., Fuller, J., Reynolds, S., 2006. A survey of rare/threatened and scarce vascular plants in County Clare. Unpublished report for the National Parks and Wildlife Service.	21
NPWS 049	Conaghan, J., Roden, C., Fuller, J., 2006. A survey of rare and scarce vascular plants in County Galway. Unpublished report for the National Parks and Wildlife Service.	67
NPWS 050	Reynolds, S., Conaghan, J., Fuller, J., 2006. A survey of rare and scarce vascular plants in County Limerick. Unpublished report for the National Parks and Wildlife Service.	14
NPWS 051	Conaghan, J., Fuller, J., 2005. A survey of rare and threatened vascular plants in County Leitrim. Unpublished report for the National Parks and Wildlife Service.	14
NPWS 052	Martin, J.R., Perrin, P.M., Delaney, A., O'Neill, F. H., McNutt, K.E., Devaney, F.M., 2007-2009. Irish semi-natural grasslands survey. Unpublished reports for the National Parks and Wildlife Service.	2143 <sup>c</sup>
NPWS 053	Conaghan, J., Fuller, J., 2005. A survey of rare and threatened vascular plants in County Longford. Unpublished report for the National Parks and Wildlife Service.	4
NPWS 054	Roden, C., 2002. Relevés from a survey of Lady's Island Lake, Co. Wexford. Unpublished relevés recorded for the National Parks and Wildlife Service.	115
NPWS 055	Roden, C., 1998. Survey of Irish coastal lagoons 1998, Volume III: flora and vegetation. Unpublished report for the National Parks and Wildlife Service.	226
NPWS 056	Perrin, P.M., Martin, J.R., Barron, S.J., O'Neill, F.H., McNutt, K.E., Delaney, A.M., 2008. National Survey of Native Woodlands 2003-2008. Unpublished report for the National Parks and Wildlife Service.	1667
NPWS 057	Bourke, D., Hochstrasser, T., Nolan, S., Schulte, R., 2007. Historical Grassland Turboveg Database Project: 2067 relevés recorded by Austin O'Sullivan 1962-1982. Unpublished report for the National Parks and Wildlife Service.	2940

Dataset code	Dataset description	Plots
NPWS 058	<p>Geurts, M, Meijer, Y., Giesen, T., 2008. Additional Dutch datasets of Irish vegetation relevés added to the National Vegetation Database. Unpublished report for the National Parks and Wildlife Service.</p> <ul style="list-style-type: none"> <li>▪ Braun-Blanquet, J., Tuxen, R., 1952. Irische Pflanzengesellschaften, in: Ludi, W. (Ed.), Die Pflanzenwelt Irlands. Ergebnisse der 9. Internationalen Pflanzengeographischen Exkursion durch Irland 1949, Veröffentlichungen des Geobotanischen Institutes Rubel in Zurich, pp. 214-415.</li> <li>▪ van Ravensberg, M., van der Wijngaart, R., 2000. Syntaxonomy and synecology of two turloughs Roo West and Roo East in west Ireland. Department of Nature Conservation and Plant Ecology, Wageningen University.</li> <li>▪ Coumans, C., 2005. A hydrological and vegetative research on Lodge Bog Ireland. Department of Plant Ecology and Evolutionary Biology, Utrecht University.</li> <li>▪ Hine, H., Ransijn, M., 1997. Kilcolman Wildfowl Refuge, nutrient dynamics, vegetation composition and the amount of eutrophication. Department of Plant Ecology and Evolutionary Biology, Utrecht University.</li> <li>▪ van Holsteijn, C., Soons, M., 1998. Sheheree Bog, dehydration, acidification and eutrophication and the vegetation N/P-ratio as a tool to monitor eutrophication. Landscape Ecology, Faculty of Biology, Utrecht University.</li> <li>▪ Verheggen, E., Kamp, A., Verhees, E., Ligtenberg, H., Kassenberg, J., 2006. The Aillebrack machair and Gurteen-Dog's Bay machair. Comparison, threats, protection and future, in: Eindrapport Ierland Excursie 2006. Department. of Aquatic Ecology, Radboud University, Nijmegen, Netherlands, pp 73-90.</li> </ul>	743
NPWS 059	Holyoak, D., 2008. Bryophytes and metallophyte vegetation on metalliferous mine-waste in Ireland. Unpublished report to the National Parks and Wildlife Service.	83
NPWS 060	Kelleher, C., 2011. Floating river vegetation (EU Habitat Code 3260) – a review of the habitat description and its distribution in Ireland. Unpublished report of the National Parks and Wildlife Service.	16
NPWS 061	Wilson, S., Fernández, F., 2013. National survey of limestone pavement and associated habitats in Ireland. Irish Wildlife Manuals No. 73. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.	358
NPWS 062	O'Neill, F.H., Martin, J.R., Devaney, F.M., Perrin, P.M., 2013. The Irish semi-natural grasslands survey 2007-2012. Irish Wildlife Manuals No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.	4633
NUIG 001	Regan, E., 2005. An investigation of the plant, carabid and staphylinid communities of turloughs in southeast Galway/north Clare, Ireland. Ph.D. thesis. National University of Ireland, Galway.	90
NUIG 002	Lockhart, N., 1991. Phytosociological and ecological studies of lowland blanket bog flushes in west Galway and north Mayo. Ph.D. thesis. National University of Ireland, Galway.	168
NUIG 003	Conaghan, J., 1995. Ecological studies of two rare bog cottons, <i>Eriophorum gracile</i> Koch ex Roth and <i>Eriophorum latifolium</i> Hoppe. Ph.D. thesis. National University of Ireland, Galway.	118
NUIG 004	Bleasdale, A., 1995. The vegetation and ecology of the Connemara Uplands, with particular reference to sheep grazing. Ph.D. thesis. National University of Ireland, Galway.	646
NUIG 005	Mooney, E., 1991. A phytosociological and palaeoecological study of the wetlands of the Lower Corrib Basin, Co. Galway, Ireland. Ph.D. thesis. National University of Ireland, Galway.	258
NUIG 006	Moran, J., 2005. Skealaghan Turlough, Co. Mayo: implications of grazing and flooding regimes for plant and carabid beetle communities with reference to turlough farming systems in the region. Ph.D. thesis. National University of Ireland, Galway.	189

Dataset code	Dataset description	Plots
NUIG 007	Regan, E., 2000. An assessment of short duration trampling on blanket bog vegetation in Connemara National Park and an appraisal of visitor attitudes to trampling in Connemara. B.Sc. thesis. National University of Ireland, Galway.	36
NUIG 008	Sullivan, C., 2005. The distribution and impact of <i>Rhododendron ponticum</i> in Connemara National Park. B.Sc. thesis. National University of Ireland, Galway.	42
NUIG 009	MacGowran, B., 1985. Phytosociological and ecological studies on turloughs in the west of Ireland. Ph.D. thesis. National University of Ireland, Galway.	227
NUIG 010	Kirby, N. E., 1981. An ecological and phytosociological study of <i>Corylus avellana</i> L. in the Burren, western Ireland. Ph.D. thesis. National University of Ireland, Galway.	227
NUIG 011	O'Connor, M. J., 1992. The ecology and land use of the salt marshes of Tawin Island, Galway Bay. B.Sc. thesis. National University of Ireland, Galway.	54
NUIG 012	Carty, H., 2006. Assessment of the impact of path construction on the vegetation of Diamond Hill in Connemara National Park. B.Sc. thesis. National University of Ireland, Galway.	218
NUIG 013	Keane, S., 1990. Vegetation and land use studies in the eastern area of the Burren, Co. Clare. M.Sc. thesis. National University of Ireland, Galway.	100
NUIG 014	Scully, A. C., 1989. Ecological studies of the aquatic species, <i>Eriocaulon aquaticum</i> (Hill) Druce and <i>Lobelia dortmanna</i> L. M.Sc. thesis. National University of Ireland, Galway.	64
NUIG 015	O'Connor, M., 2000. A study of the phytosociology, vegetation distribution and ecology of the Roundstone bog complex, Connemara, Co. Galway. Ph.D. thesis. National University of Ireland, Galway.	374
NUIG 016	O'Connor, Á., 1996. Investigations of small-scale patterns and vegetation of the Roundstone lowland blanket bog complex, County Galway. B.Sc. thesis. National University College, Galway.	160
NUIG 017	Ní Bhriain, B., Sheehy Skeffington, M., Gormally, M., 2002. Conservation implications of land use practices on the plant and carabid beetle communities of two turloughs in Co. Galway, Ireland. <i>Biological Conservation</i> 105, 81-92.	40
NUIG 018	Poole, A., Gormally, M., Sheehy Skeffington, M., 2003. The flora and carabid beetle fauna of a mature and regenerating semi-natural oak woodland in south-east Ireland. <i>Forest Ecology and Management</i> 177, 207-220.	35
NUIG 019	Lambe, E., 1971. A phytosociological and ecological analysis of Irish weed communities. Ph.D. thesis. National University of Ireland, Galway.	320
NUIG 020	van der Sleesen, A., 2000. Galway's woodlands: inventory, social context and prospects for the future. Ph.D. thesis. National University of Ireland, Galway.	70
NUIG 021	Gabbett, M., 1998. An ecological study of woodlands in north-west Connemara. B.Sc. thesis. National University of Ireland, Galway.	43
NUIG 022	Hall, K., 2007. The spread and distribution of <i>Gunnera tinctoria</i> in and around Connemara National Park. B.Sc. thesis. National University of Ireland, Galway.	90
NUIG 023	van Doorslaer, L., 1990. The ecology of <i>Erica mackaiana</i> Bab. with reference to its conservation in Connemara (Ireland). Ph.D. thesis. National University College, Galway.	57
NUIG 024	Mullen, K., 1999. An investigation of the flora and terrestrial invertebrate fauna of forest road edges within a conifer plantation in Connemara, Co. Galway. B.Sc. thesis. National University of Ireland, Galway.	47
NUIG 025	Fahy, O., Gormally, M., 1998. A comparison of plant and carabid beetle communities in an Irish oak woodland with a nearby conifer plantation and clearfelled site. <i>Forest Ecology and Management</i> 110, 263-273.	30
NUIG 026	Brennan, C., 1999. The effects of different mowing regimes on species composition of amenity grasslands at two sites in Leinster. B.Sc. thesis. National University of Ireland, Galway.	65

Dataset code	Dataset description	Plots
NUIG 027	Murphy, A., 1987. A vegetation survey of a west coast saltmarsh at Oranmore, Co. Galway, Ireland. B.Sc. thesis. National University of Ireland, Galway.	44
NUIG 028	Springer, S., 1999. The vegetation and ecology of some lagoonal salt marshes in Connemara. B.Sc. thesis. National University of Ireland, Galway.	71
NUIG 029	Tiernan, D., 2000. A study of the riverine vegetation of the River Liffey between Islandbridge and Chapelizod with respect to wildlife conservation and visitor use. B.Sc. thesis. National University of Ireland, Galway.	32
NUIG 030	Monaghan, F., 1990. The deciduous woodlands at Lough Gill: an ecological study. B.Sc. thesis. National University of Ireland, Galway.	53
NUIG 031	Conaghan, J. P., 1989. A study of the phytosociology and ecology of <i>Daboecia cantabrica</i> in Connemara. B.Sc. thesis. National University of Ireland, Galway.	43
NUIG 032	Ryder, E., 2004. A vegetation study of Merlin Park woodland, Co. Galway in relation to management objectives. B.Sc. thesis, National University of Ireland, Galway.	30
NUIG 033	Ní Bhriain, B., 1999. A study of a turlough in the Burren, Co. Clare in its agricultural context. B.Sc. thesis. National University of Ireland, Galway.	79
NUIG 034	Lawlor, S., 2004. A vegetation study of Menlo Woodland Galway, with a view to future management. B.Sc. thesis. National University of Ireland, Galway.	35
NUIG 035	Kelly, J., 2010. A study of the vegetation on a salt marsh in Corranroo Bay, Kinvara, Co. Galway. B.Sc. thesis, National University of Ireland, Galway.	62
NUIG 036	Murphy, S., 2010. A study of the vegetation and management of Shrule Turlough, Co. Mayo. B.Sc. thesis. National University of Ireland, Galway.	74
NUIG 037	Fahy, O., 2003. An investigation of the plant and terrestrial invertebrate communities of conifer plantations and broadleaf woodlands in Connemara, County Galway. Ph.D. thesis. National University of Ireland, Galway.	188 <sup>d</sup>
NUIG 038	Delaney, E., 2002. The vegetation and ecology of the salt marsh sites in Sáilín and Lough Rusheen, Galway Bay. B.Sc. thesis. National University of Ireland, Galway.	83
NUU 001	Kirkpatrick, A.H., 1988. A vegetation survey of heath and moorland in Northern Ireland and Donegal. Ph.D. thesis. New University of Ulster.	298
TCD 001	Martin, J.R., 2000. A species-based approach to the conservation of Irish threatened vascular plant species using complimentary <i>in situ</i> and <i>ex situ</i> methods. Ph.D. thesis. Trinity College Dublin.	49
TCD 002	Telford, M., 1977. Glenveagh National Park: the past and present vegetation. Ph.D. thesis. Trinity College Dublin.	203
TCD 003	French, L., 2005. Ground flora communities in Ireland's plantation forests: their diversity, structure and composition. Ph.D. thesis. Trinity College Dublin.	212
TCD 004	Smith, G.F., Gittings, T., Wilson, M., Oxbrough, A., Iremonger, S., O'Donoghue, S., McKee, A.-M., O'Halloran, J., Kelly, D.L., Pithon, J., O'Sullivan, A., Neville, P., Mitchell, F.J.G., Giller, P., O'Donnell, V., Kelly, T., 2006. Biodiversity assessment of afforestation sites. BIOFOREST project 3.1.1. Final report. Department of Botany, Trinity College Dublin, Department of Zoology, Ecology and Plant Science, University College Cork and Coastal and Marine Resources Centre, University College Cork.	210
TCD 005	Smith, G., Gittings, T., Wilson, M., French, L., Oxbrough, A., O'Donoghue, S., Pithon, J., O'Donnell, V., McKee, A.-M., Iremonger, S., O'Halloran, J., Kelly, J., Mitchell, F., Giller, P., Kelly, T., 2005. Assessment of biodiversity at different stages of the forest cycle. BIOFOREST project 3.1.2. Final report. Department of Botany, Trinity College Dublin, Department of Zoology, Ecology and Plant Science, University College Cork and Coastal and Marine Resources Centre, University College Cork.	198

Dataset code	Dataset description	Plots
TCD 006	Kingston, N., 1996. The ecology and distribution of the gametophyte generation of the Killarney Fern ( <i>Trichomanes speciosum</i> Wild.) in Ireland. B.A. (mod.) thesis. Trinity College Dublin.	23
TCD 007	MhicDaeid, E.C., 1976. A phytosociological and ecological study of the vegetation of peatlands and heaths in the Killarney Valley. Ph.D. thesis. Trinity College Dublin.	423
TCD 008	Long, M., 2008. Grazing effects on plant and mollusc diversity in woodland and grassland Habitats. Ph.D. thesis. Trinity College Dublin.	120
TCD 009	Byrne, C., 1996. Semi-natural grassland communities in eastern Ireland: classification, conservation and management. Ph.D. thesis. Trinity College Dublin.	91
UCD 001	Wymer, E., 1984. The phytosociology of Irish salt marsh vegetation. M.Sc. thesis. University College Dublin.	191
UCD 002	UCD, 1972. Saltmarsh vegetation from the coastal vegetation survey. Unpublished relevés carried out by various recorders at University College Dublin.	376
UCD 003	Ní Annracháin, O., 1972. Unpublished relevés from North Bull Island. University College Dublin.	206
UCD 004	UCD, 1966-1983. Sand dune survey. Unpublished relevés. University College Dublin.	18
UCD 004a	UCD, 1966-1983. Sand dune survey. Unpublished relevés. University College Dublin.	21
UCD 005	UCD, 1970's. Saltmarsh student survey (cross referenced by J.J. Moore). University College Dublin.	25
UCD 005a	UCD, 1970's. Saltmarsh student survey (cross referenced by J.J. Moore). University College Dublin.	15
UCD 006	Caffrey, J., 1990. The classification, ecology and dynamics of aquatic plant communities in some Irish rivers. Ph.D. thesis. University College Dublin.	235
UCD 007	MacGowan F. L., 2000. The influence of anthropogenic activity on the vegetation of Atlantic blanket bog in the west of Ireland. Ph.D. thesis. University College Dublin.	427
UCD 008	O'Connell, M., 1977. The phytosociology and ecology of Scragh Bog. Ph.D. thesis. University College Dublin.	194
UCD 009	Farrell, C., 2001. An ecological study of intact and industrial cutaway Atlantic blanket bog at Bellacorick, northwest Mayo. Ph.D. thesis. University College Dublin.	425
UCD 010	Foss, P., 1986. The distribution, phytosociology, autoecology and post-glacial history of <i>Erica erigena</i> R. Ross in Ireland. Ph.D. thesis. University College Dublin.	66
UCD 011	Fox, H., Cullen, M., Little, D.J., Ryan, D., Ciaurriz, P., Dwyer, R., Boyle, G.M., 2001. Vegetation monitoring and botanical survey of Brackloon Wood, Westport, Co. Mayo. Forest Ecosystem Research Group, Report No. 31. Department of Environmental Resource Management, University College Dublin.	126 <sup>d</sup>
UCD 012	Gaynor, K., 2007. Flora and vegetation of Irish sand dune systems. Ph.D. thesis. University College Dublin.	529
UCD 013	McKee, A.-M., 2000. A phytosociological study and detailed vegetation map of the heathlands of the western Twelve Ben Mountains Connemara, Ireland. Ph.D. thesis. University College Dublin.	270
UCD 014	Dunford, B., 2001. The impact of agricultural practices on the natural heritage of the Burren uplands, Co. Clare. Ph.D. thesis. University College Dublin.	1116
UCD 015	Hanrahan, J., 1997. The effects of grazing on vegetation, regeneration and soils of an oak woodland in Glendalough, County Wicklow. M.Sc. thesis. University College Dublin.	64
UCD 016	Irvine, K. M., 2004. The comparative ecology of <i>Puccinellia fasciculata</i> , <i>P. distans</i> and <i>P. maritima</i> . M.Sc. thesis. University College Dublin.	50

Dataset code	Dataset description	Plots
UCD 017	Burke, F., 2001. The role of satellite imagery for the production of a broad category habitat map of Wicklow Mountains National Park SAC. M.Sc. thesis. University College Dublin.	90
UCD 018	O'Connell, C., 1988. A comparative palynological study of contemporary and subfossil pine and birch woodlands on raised bogs. Ph.D. thesis. University College Dublin.	28
UCD 019	Cross, J.R., 1973. The ecology and control of <i>Rhododendron ponticum</i> (L.) with special reference to the Killarney National Park. Ph.D. thesis. Trinity College Dublin.	48 <sup>d</sup>
UCD 020	Doyle, G.J., 1983. Phytosociology and primary production of native and reclaimed bog ecosystems at Glenamoy, Co. Mayo, western Ireland. Ph.D. thesis. University College Dublin.	29
UCD 021	Browne, A., 1998. Vegetation-environment interactions in the vicinity of a pharmaceutical plant near Kinsale, Co. Cork. Ph.D. thesis. University College Dublin.	445
UL 001	Deegan, B., 2002. Ecology of Triangular Clubrush ( <i>Schoenoplectus triqueter</i> ) in the Shannon Estuary. M.Sc. thesis. University of Limerick.	23

- a Dataset excluded as all data are from Northern Ireland
- b Dataset excluded as it contains incomplete species lists
- c Dataset excluded as it is superseded by NPWS O62
- d Dataset excluded as it contains woodland plots in which only ground flora has been recorded

## External datasets

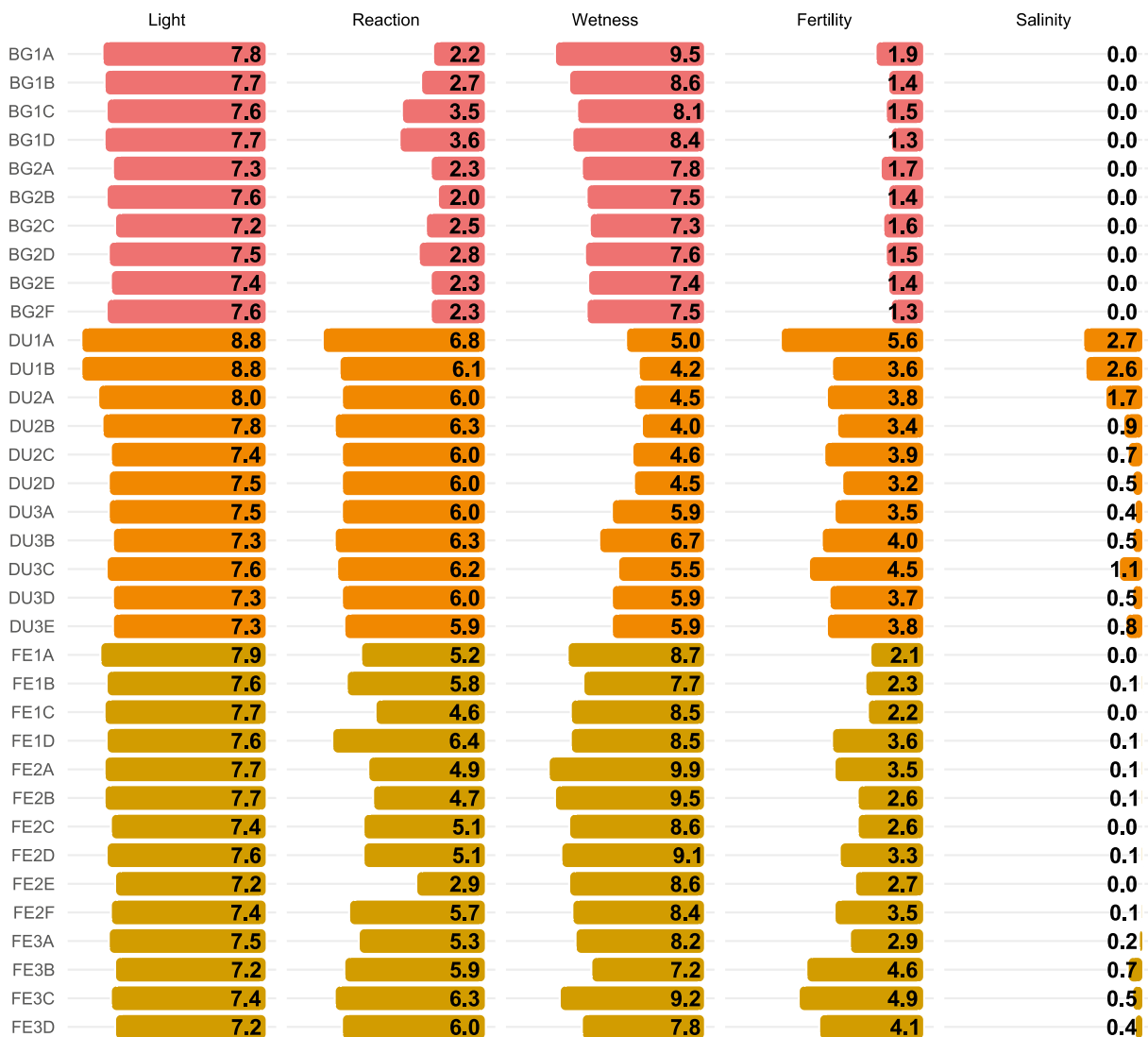
Dataset code	Dataset description	Plots
EXT 001	Perrin, P.M., Barron, S.J., Roche, J.R., O'Hanrahan, B., 2014. Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. Irish Wildlife Manuals No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.	1233
EXT 002	Weekes, L., 2016. The development of an aquatic vegetation classification system and monitoring protocol for Irish rivers to support biodiversity reporting requirements and conservation planning. Ph.D. thesis. University College Dublin.	140
EXT 003	Galway County Council, 2013-2014. Unpublished plot data recorded for the Galway City Transport Project.	339
EXT 004	Long, M.P., Brophy, J.T., 2019. Monitoring of sites and habitat for three Annex II species of whorl snail ( <i>Vertigo</i> ). Irish Wildlife Manuals No. 104. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.	242
EXT 005a	Regan, S., Conaghan, J., 2016. Eco-hydrological investigation of Tory Hill Fen SAC, Co. Limerick. Unpublished report for the Office of Public Works.	35
EXT 005b	Regan, S., Conaghan, J., 2017. Eco-hydrological investigation of Ballymore Fen SAC, Co. Westmeath. Unpublished report for the Office of Public Works.	29

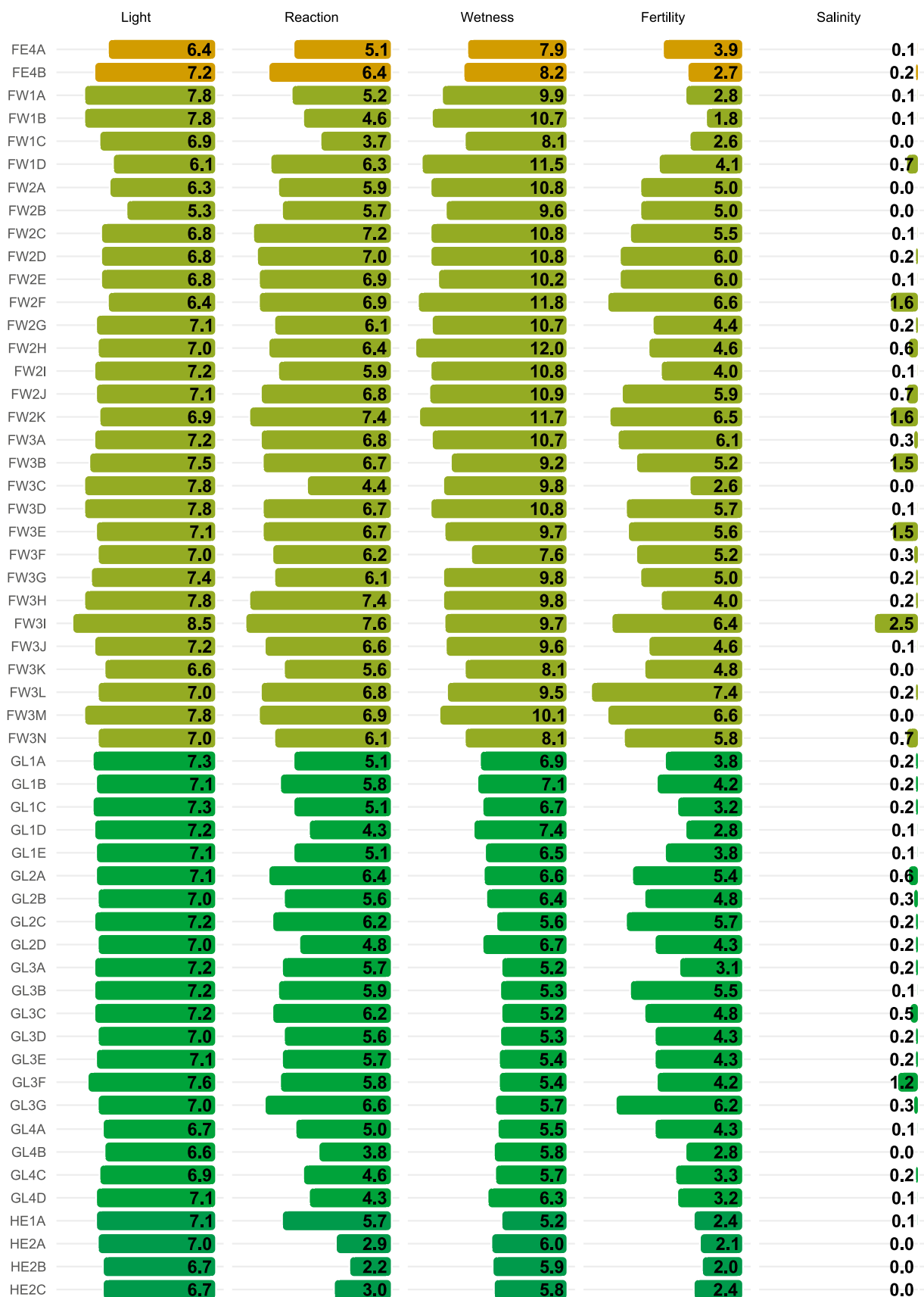
<b>Dataset code</b>	<b>Dataset description</b>	<b>Plots</b>
EXT 006	Conaghan, J., Fuller, J., 2018. A survey of the vegetation of the Habitats Directive Annex I habitat Rivers with muddy banks with <i>Chenopodium rubri</i> p.p. and <i>Bidenton</i> p.p. vegetation (3270), in Ireland. Unpublished report for the National Parks and Wildlife Service.	30
EXT 007	O'Neill, F.H., Martin, J.R., 2018. The Irish Juniper Monitoring Survey 2017. Irish Wildlife Manuals No. 101. National Parks and Wildlife Service, Department of Culture Heritage and the Gaeltacht, Dublin.	21
EXT 008	Barron, S.J., Delaney, A., Perrin, P.M., Martin, J.R., O'Neill, F.H., 2011. National survey and assessment of the conservation status of Irish sea cliffs. Irish Wildlife Manuals No. 53. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.	52
EXT 009	Delaney, A., Devaney, F.M., Martin, J.R., Barron, S.J., 2013. Monitoring survey of Annex I sand dune habitats in Ireland. Irish Wildlife Manuals No. 75. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.	124
EXT 010	Devaney, F.M., 2007. The alder marsh: ecohydrology and restoration prospects of a desiccating dune slack. Ph.D. thesis. University College Dublin.	75
EXT 011	Delaney, A., 2017. Biological communities and environmental controls in a seasonal wetland habitat. Ph.D. thesis. Trinity College Dublin.	128
EXT 012	Perrin, P.M., Waldren, S., Penk, M.R., O'Neill, F.H., 2020. Saltmarsh Function and Human Impacts in Relation to Ecological Status (SAMFHIREs) (2015-W-MS-19) (EPA Research Report No. 313). Environmental Protection Agency, Wexford. (Data from chapter 7).	85
EXT 013	Hodd, R.L., 2007. A study of the vegetation of the scree slopes of the Macgillycuddy's Reeks, Co. Kerry. B.Sc. thesis. National University of Ireland, Galway.	104
EXT 014	Hodd, R.L., 2012. A study of the oceanic montane vegetation and bryophyte communities of western Ireland and their potential response to climate change. Ph.D. thesis. National University of Ireland, Galway.	326
EXT 015	Crowley, W., Smith, G.F., 2017. Unpublished plots from the LIFE Raised Bog Restoration Project.	27
EXT 016	Perrin, P.M., Waldren, S., Penk, M.R., O'Neill, F.H., 2020. Saltmarsh Function and Human Impacts in Relation to Ecological Status (SAMFHIREs) (2015-W-MS-19) (EPA Research Report No. 313). Environmental Protection Agency, Wexford. (Data from chapter 2).	246
EXT 017	McCorry, M., 2007. Saltmarsh Monitoring Project 2006. Unpublished report for the National Parks and Wildlife Service.	361
EXT 018a	McCorry, M., Ryle, T., 2009. Saltmarsh Monitoring Project 2007-2008. Unpublished report for the National Parks and Wildlife Service (Habitat 1310).	92
EXT 018b	McCorry, M., Ryle, T., 2009. Saltmarsh Monitoring Project 2007-2008. Unpublished report for the National Parks and Wildlife Service (Habitat 1330).	918
EXT 018c	McCorry, M., Ryle, T., 2009. Saltmarsh Monitoring Project 2007-2008. Unpublished report for the National Parks and Wildlife Service (Habitat 1410).	412
EXT 018d	McCorry, M., Ryle, T., 2009. Saltmarsh Monitoring Project 2007-2008. Unpublished report for the National Parks and Wildlife Service (Habitat 1420).	10

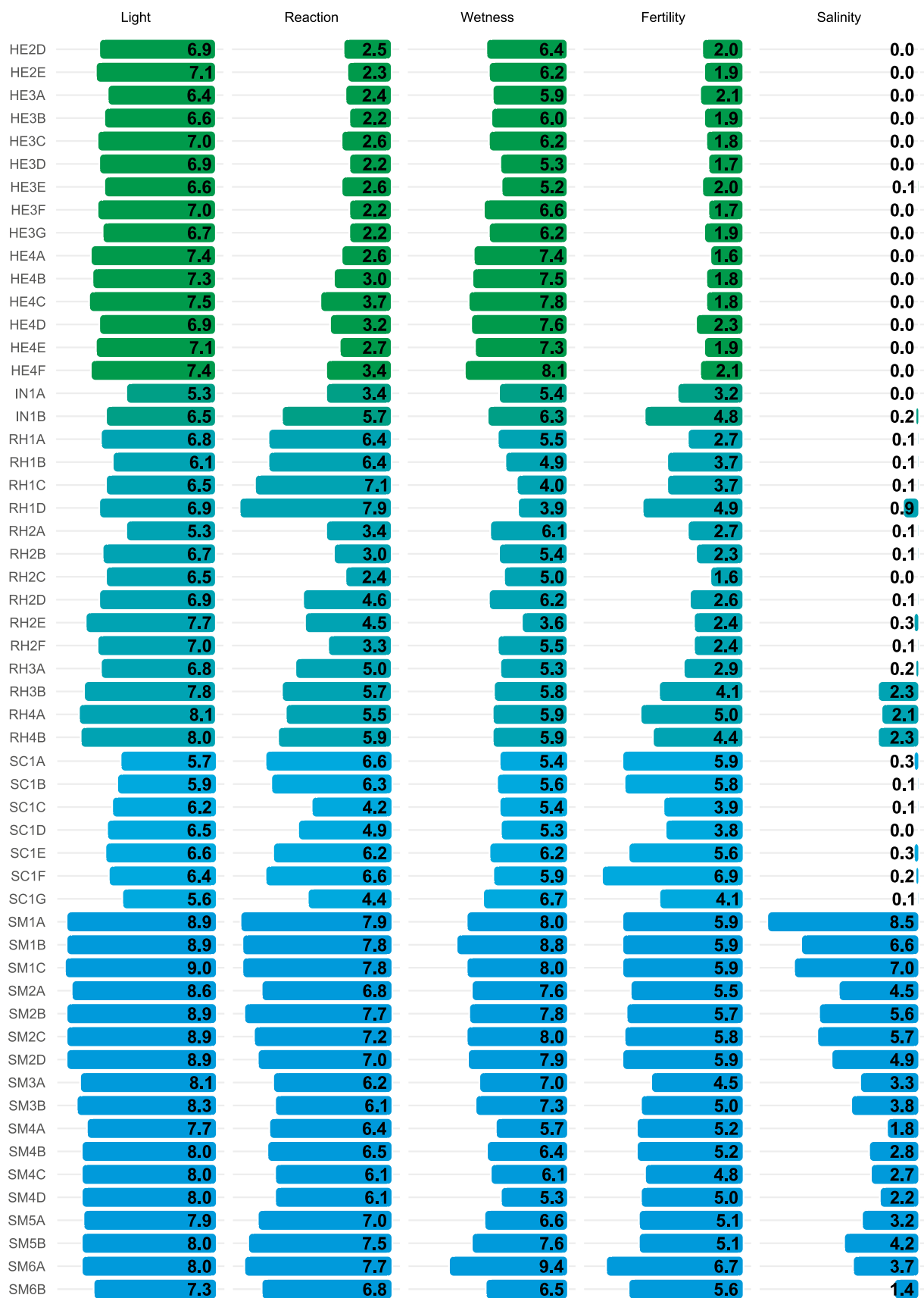
# Ellenberg indicator values by community

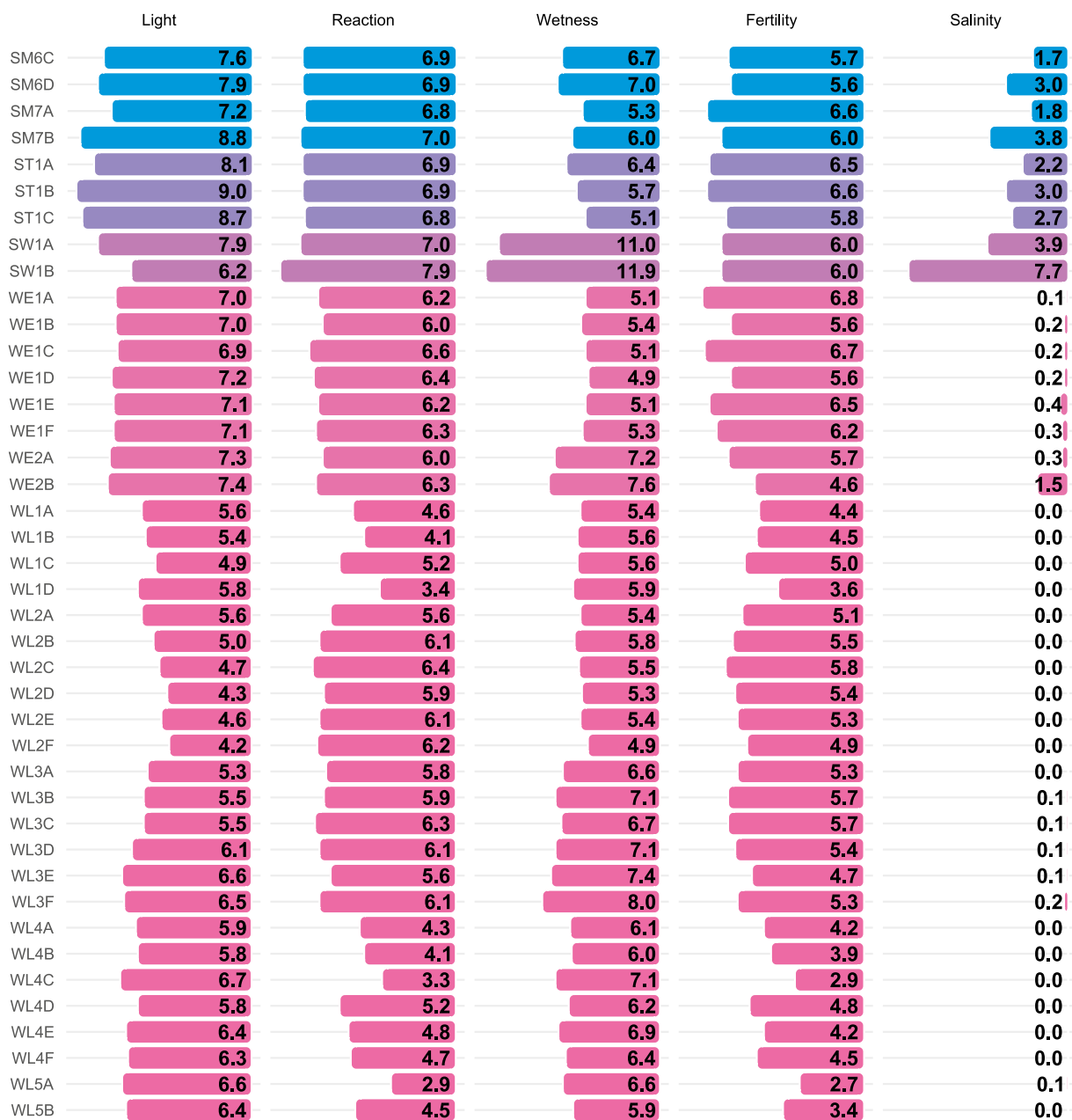
**E**llenberg indicator values provide a proxy measure of environmental parameters by indicating the typical conditions in which species grow. Species indicator values for Light range from 0 (deep shade) to 9 (full light) and for Reaction they range from 0 (very acidic) to 9 (basic). For Wetness they range from 0 (very dry) to 12 (submerged) and for Fertility they range from 0 (very infertile) to 9 (enriched). Finally, for Salinity they range from 0 (salt intolerant) to 9 (strongly salt tolerant).

Communities are here listed alphabetically and colour-coded by division. Values shown are the means for each parameter for each community. These means are based on plot-level data that were calculated by taking the abundance-weighted mean of the indicator values for the species present.





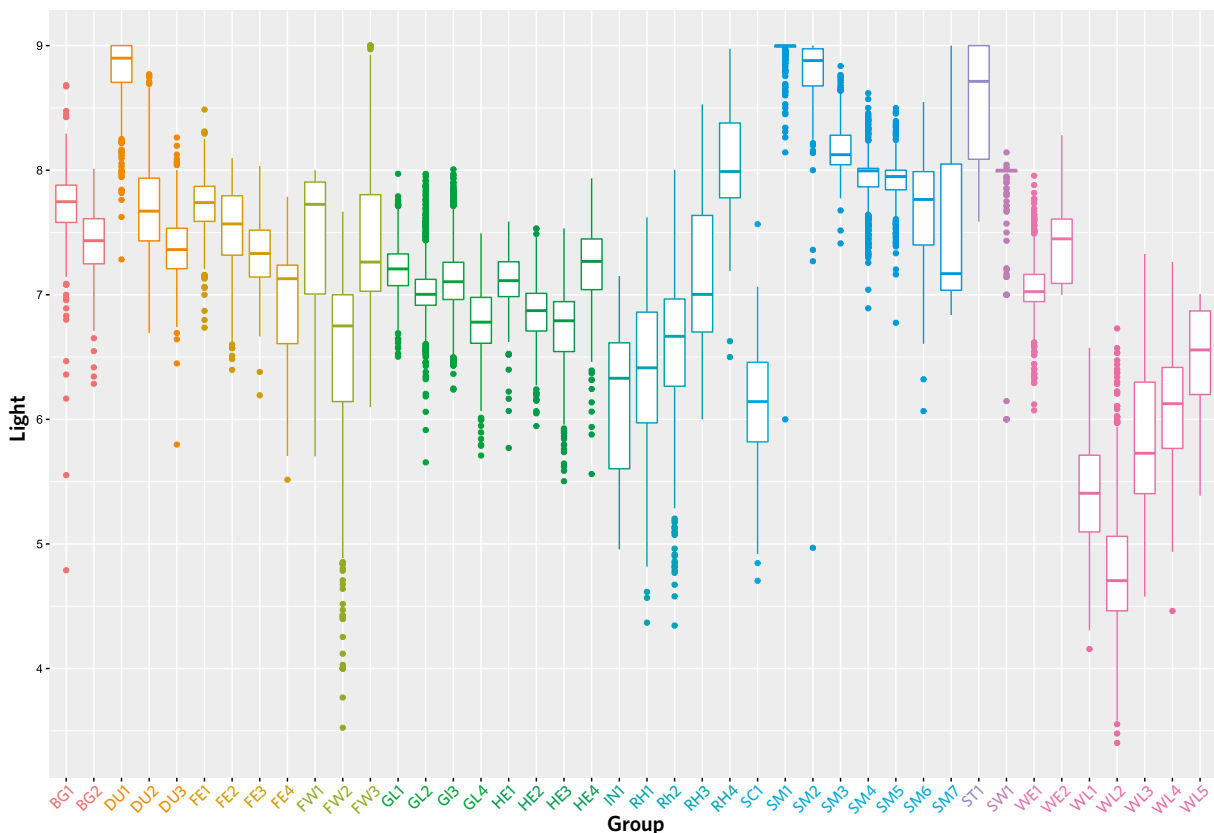


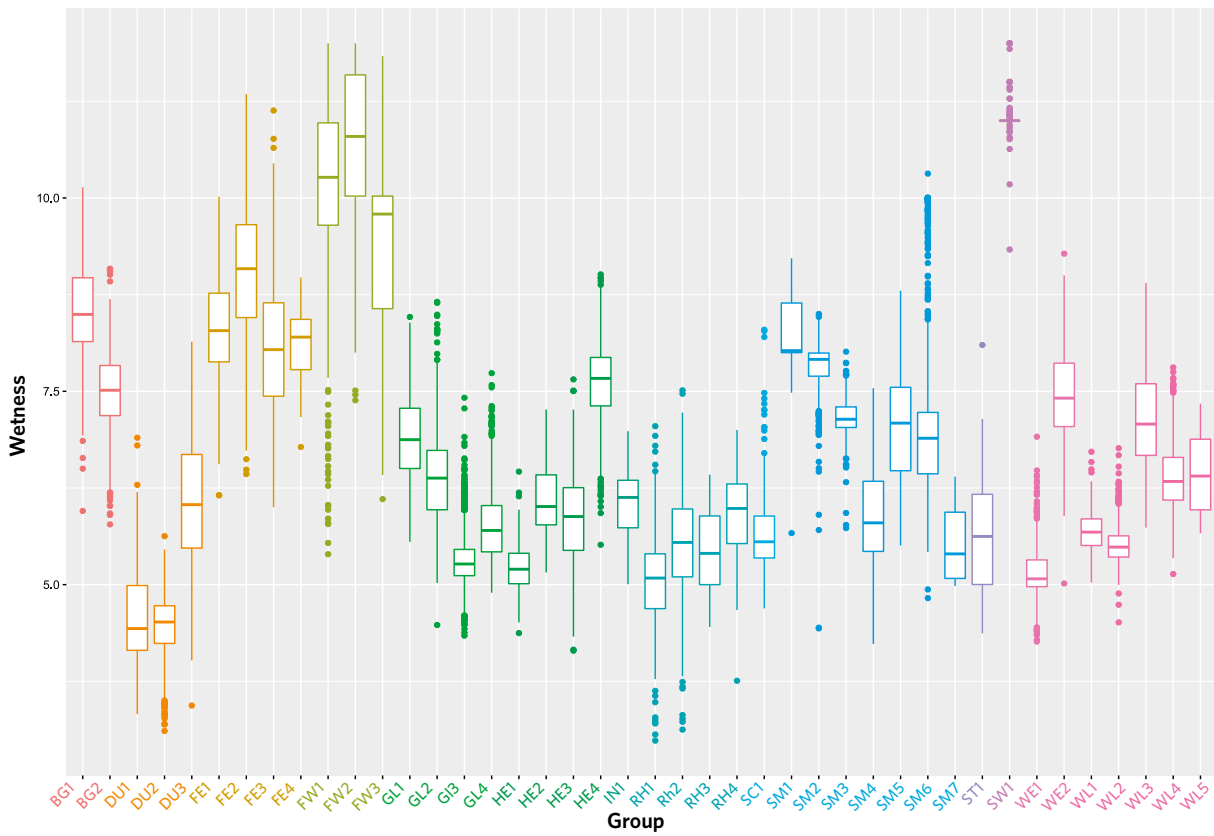
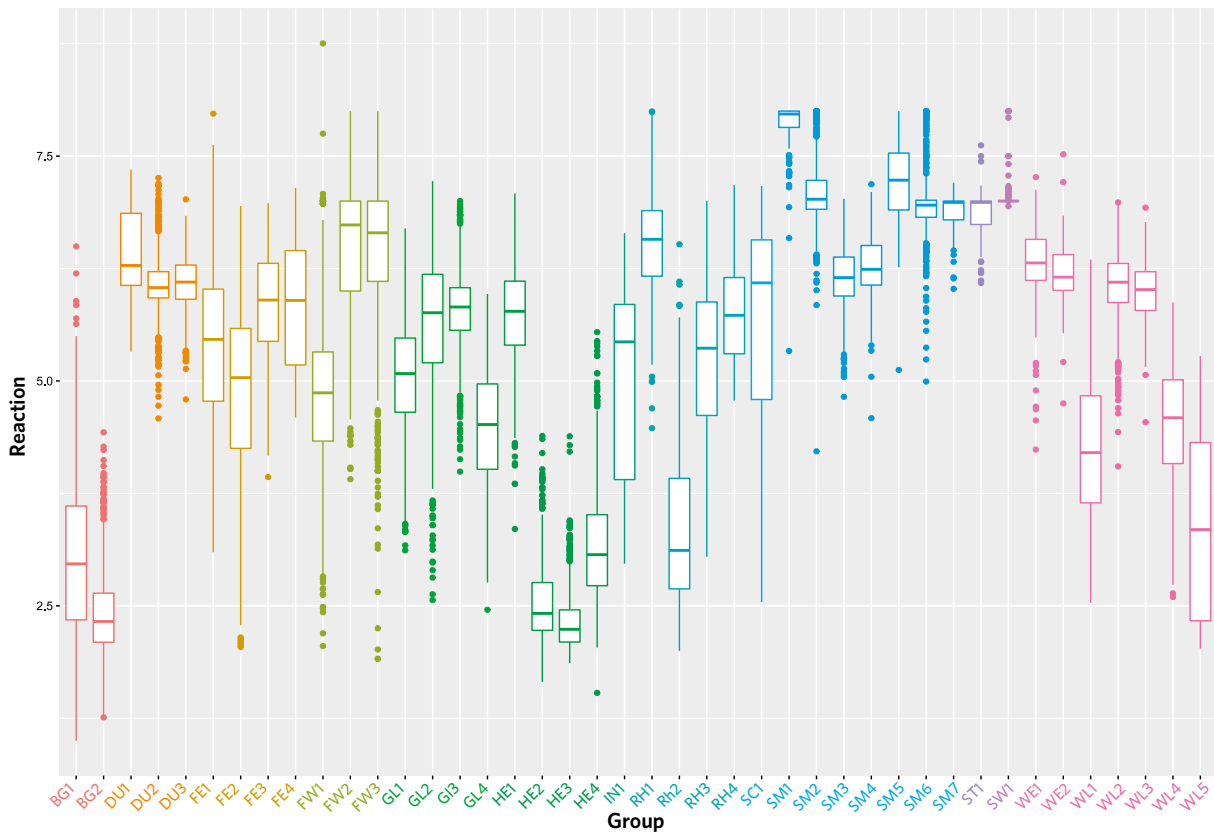


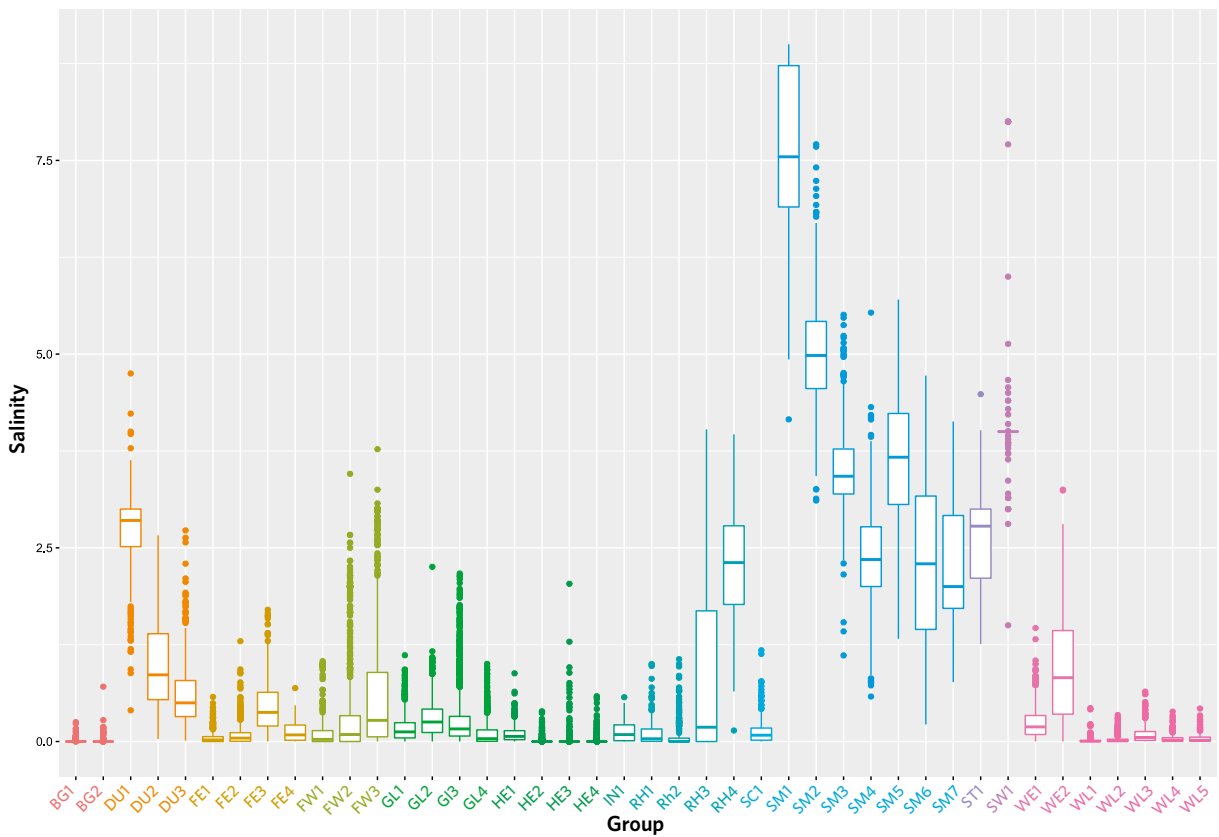
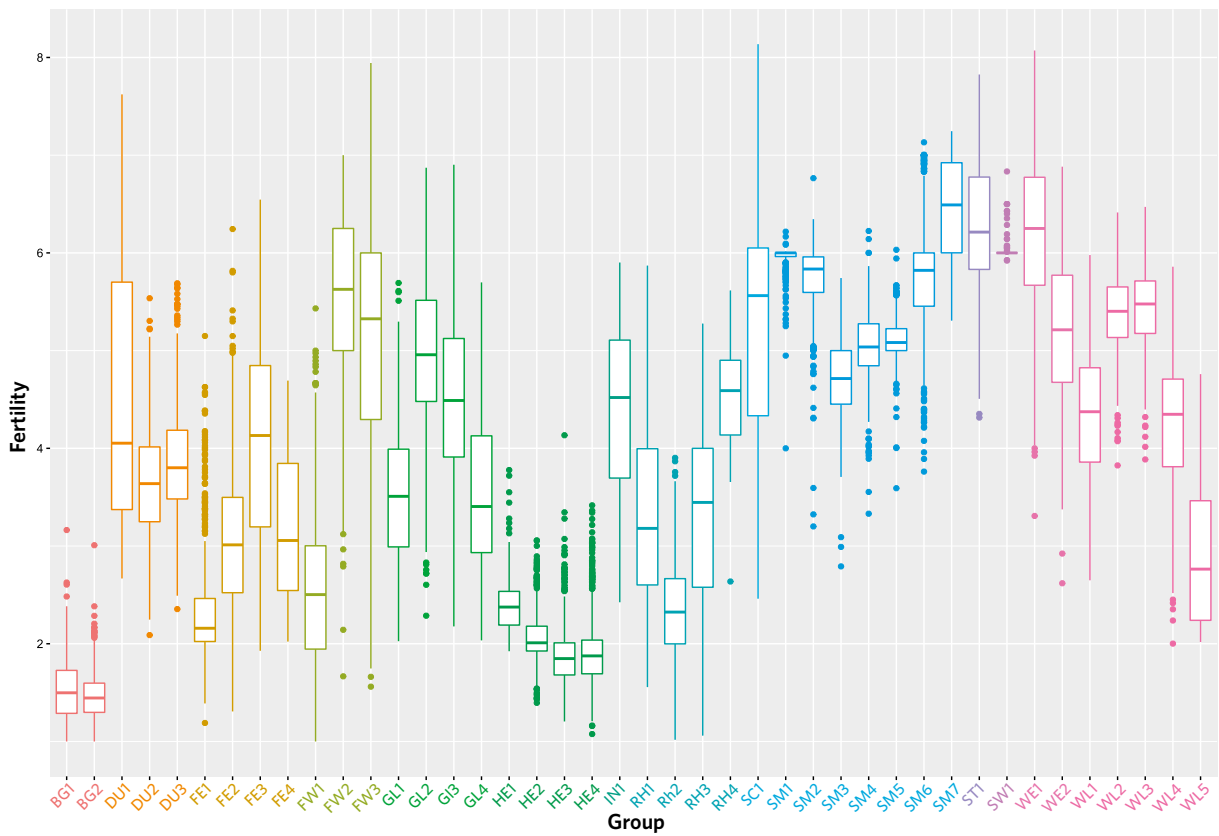
# Ellenberg indicator values by group

**E**llenberg indicator values provide a proxy measure of environmental parameters by indicating the typical conditions in which species grow. Species indicator values for Light range from 0 (deep shade) to 9 (full light) and for Reaction they range from 0 (very acidic) to 9 (basic). For Wetness they range from 0 (very dry) to 12 (submerged) and for Fertility they range from 0 (very infertile) to 9 (enriched). Finally, for Salinity they range from 0 (salt intolerant) to 9 (strongly salt tolerant).

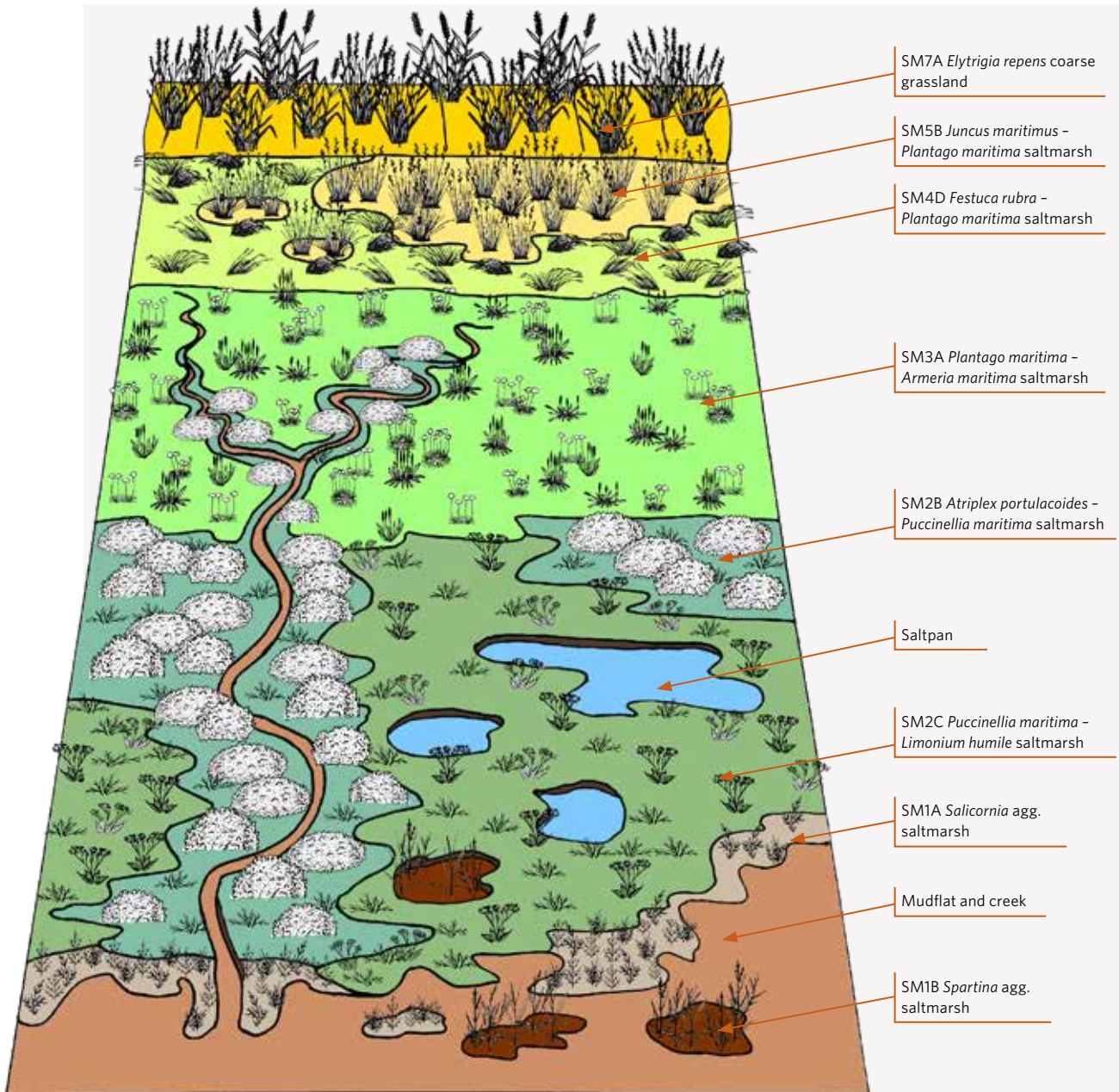
Below are presented box-and-whisker plots for each parameter in turn at the group level with groups colour-coded by division. The thick horizontal line indicates the median. The upper and lower sides of the box (the hinges) correspond to the first and third quartiles. The upper whisker extends from the hinge to the largest value no further than  $1.5 \times \text{IQR}$  from the hinge (where IQR is the inter-quartile range, or distance between the first and third quartiles). The lower whisker extends from the hinge to the smallest value at most  $1.5 \times \text{IQR}$  from the hinge. Data beyond the end of the whiskers are plotted as individual points. These statistics are based on plot-level data that were calculated by taking the abundance-weighted mean of the indicator values for the species present.



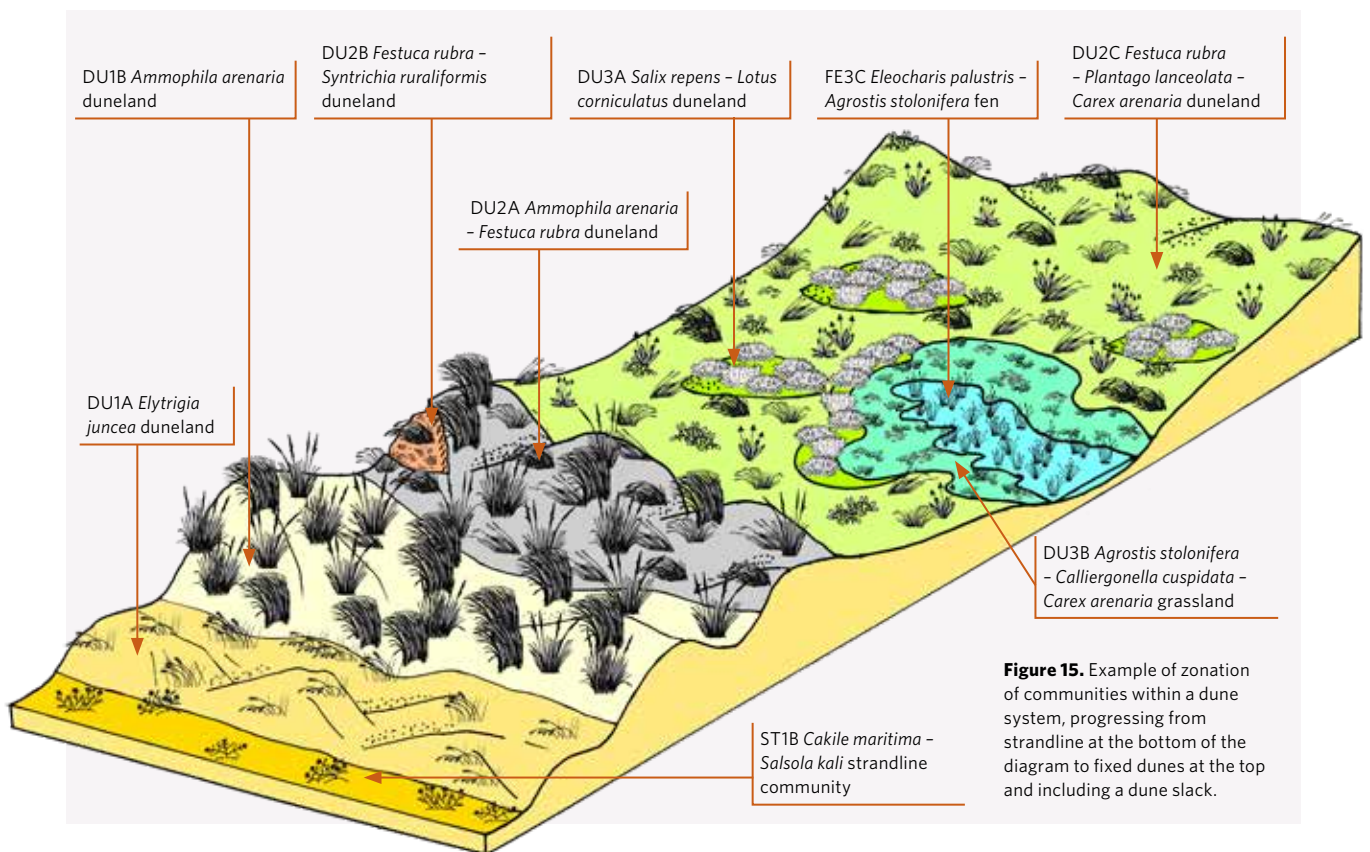




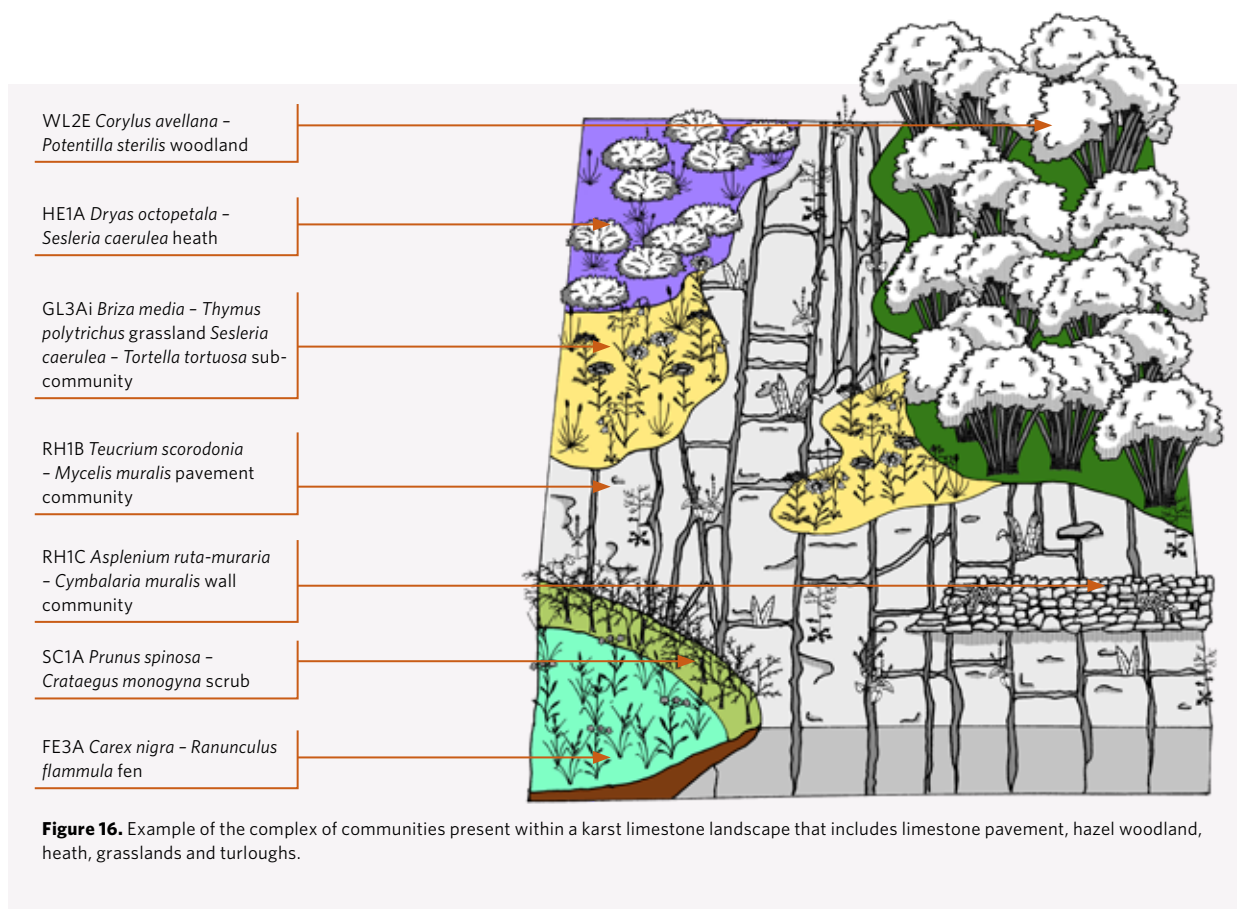
# Habitat diagrams



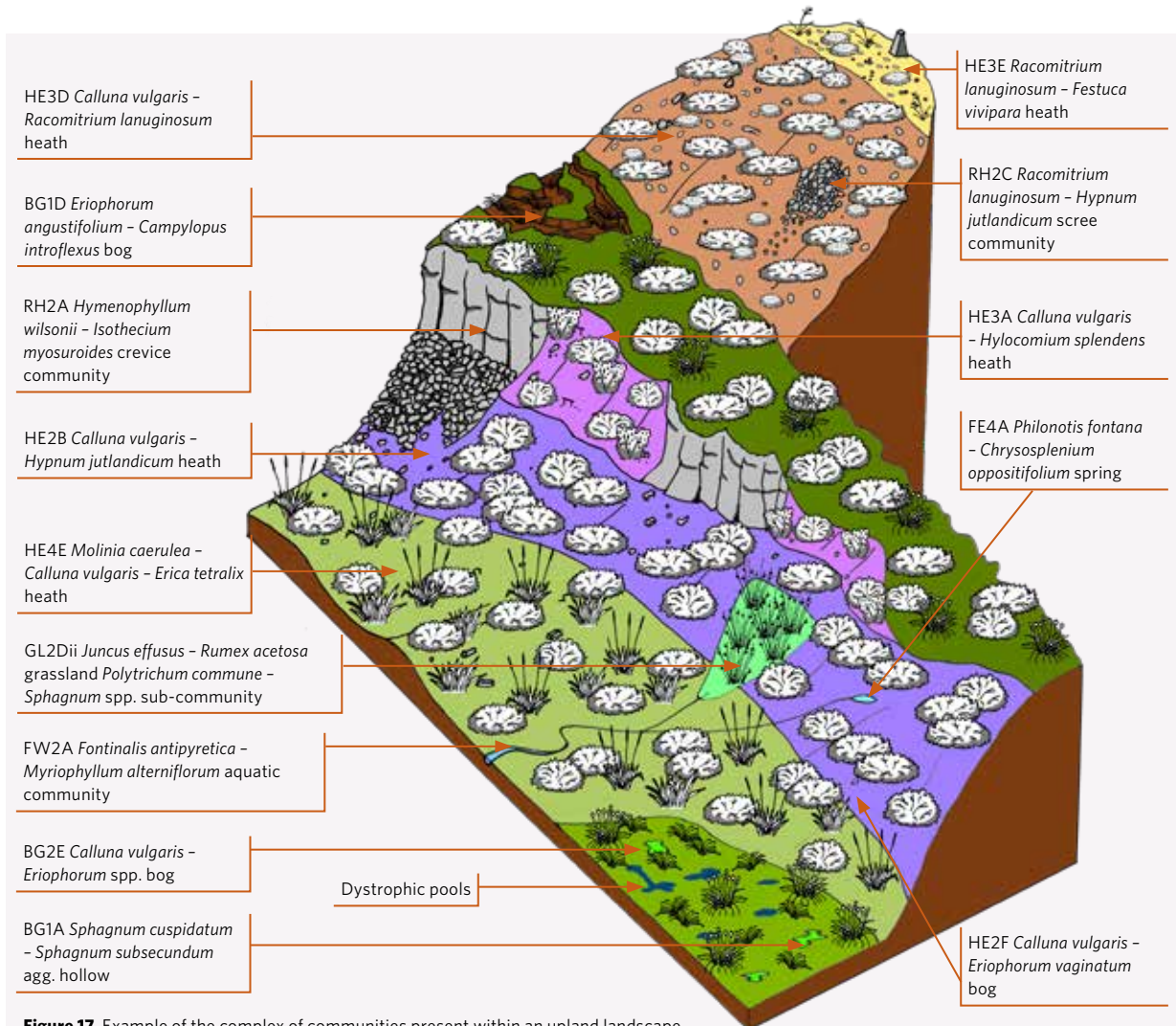
**Figure 14.** Example of zonation of communities within a saltmarsh, progressing from mudflats at the bottom of the diagram to an embankment at the top.



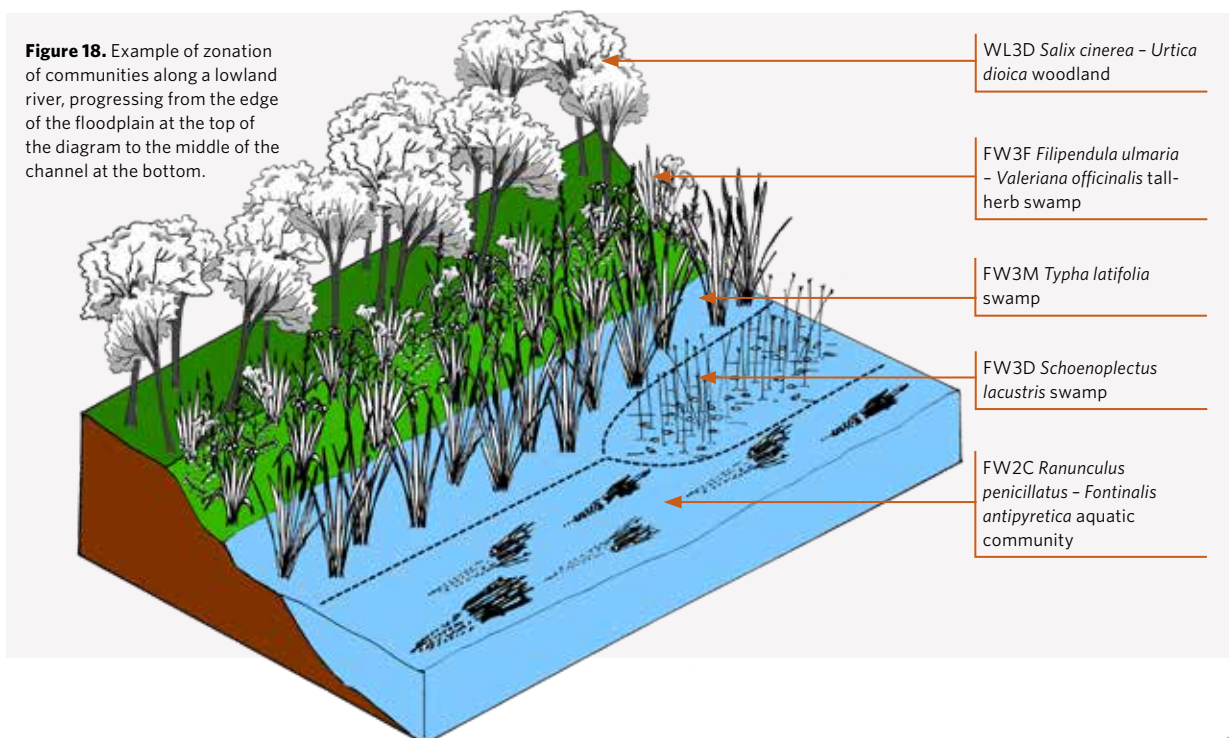
**Figure 15.** Example of zonation of communities within a dune system, progressing from strandline at the bottom of the diagram to fixed dunes at the top and including a dune slack.



**Figure 16.** Example of the complex of communities present within a karst limestone landscape that includes limestone pavement, hazel woodland, heath, grasslands and turloughs.



**Figure 17.** Example of the complex of communities present within an upland landscape that includes cliffs, scree slopes, eroding bog, flushes and springs. It is greatly simplified, as in reality a wider variety of communities would occur in intimate mosaics.



**Figure 18.** Example of zonation of communities along a lowland river, progressing from the edge of the floodplain at the top of the diagram to the middle of the channel at the bottom.

# Phytosociological conspectus

**I**n this section, the communities of the IVC are cast into the hierarchy of the Braun-Blanquet phytosociological approach as revised by Mucina et al. (2016); a website based on this publication can be found here: <https://floraveg.eu/vegetation/>. In doing so, this section mimics the final pages of Rodwell (2000) and provides an update of the vegetation catalogue presented by White and Doyle (1982). Three levels of the phytosociological hierarchy are considered: class, order and alliance. Unlike White and Doyle (1982), no analysis at the association level is attempted here. The main entries in this conspectus take the following format:

## Broad vegetation category

### Class (suffix -etea)

Order (suffix -etalia)

Alliance (suffix -ion)

*Alliance verbal diagnosis (description)*

**IVC** community

The codes used here for phytosociological syntaxa differ from those originally used in Mucina et al. (2016); both sets of codes are used on the website mentioned above. To assist with the placement of communities, use was made of an amended version of the EuroVegChecklist Expert System (EES); for details on this analysis see Box 4 and for the full results see Table 7 at the end of this section.



## Box 4:

# Analysis based on the EuroVegChecklist Expert System

The EES is a numerical analysis based on Mucina et al. (2016) that can assign individual plots to phytosociological classes based on the presence and abundance of diagnostic species from a predetermined, curated list. It is implemented within JUICE v7.1 (Institute of Botany and Zoology, Masaryk University, Brno), a software application designed for phytosociological analysis, although to improve transparency of the procedure the present analysis was conducted using a similar approach in R.

A substantial number of nomenclatural changes had to be implemented to our Irish dataset to match the species nomenclature used by the EES list. Even after these amendments, over 500 taxa in the IVC dataset were not listed as indicators in the EES and therefore went unused. A substantial proportion of these were bryophytes and lichens. Furthermore, the EES requires identification to subspecies level for a large number of its diagnostic taxa (including some of our common species such as *Agrostis stolonifera* and *Rumex acetosa*) and our data did not meet this requirement. A species was thus regarded as being diagnostic for all classes linked to any subspecies listed for that species that are known to occur in Ireland. In most of these instances, only a single subspecies occurs here (e.g., *Crepis vesicaria* ssp. *taraxacifolia*), but sometimes two or more occur (e.g., *Plantago major* ssp. *major* and ssp. *intermedia*) and so the diagnostic power of the analysis was somewhat reduced.

We chose to use the square root of species cover to decrease the importance of dominants. In addition, as some species were diagnostic for more than one class, a weighting option was also used to down-weight such species. For example, species diagnostic of two classes had a weighting of a half and those diagnostic of three classes had a weighting of one third. All plots with at least one diagnostic species present were analysed. For each plot, a score for each phytosociological class was calculated using the following equation, where  $n$  is the number of diagnostic species for that class present,  $c$  is the cover of the  $i$ -th species and  $w$  is the weighting of the  $i$ -th species.

$$\sum_{i=1}^n (\sqrt{c_i} \times w_i)$$

Plots were then assigned to the class with the highest calculated score. If only one class had the highest score, a full 'point' was attached that plot. If two, three or four classes shared the highest score, then the plot was assigned to each of those classes but only a half, a third or a quarter point was attached to it respectively. Assignment of plots to phytosociological classes was then cross-tabulated with assignment to IVC community and the number of 'points' was totalled for each combination. For each IVC community, the number of points credited to each class was then expressed as the percentage of the total number of points for that community.

Whilst the results of the analysis broadly made sense, there were several instances where classes appeared to have been 'misidentified', or at least where the habitat types and geographical ranges stated by Mucina et al. (2016) were at odds with the Irish data. For instance, many plots from non-wooded communities (usually heath or wetland) were assigned to forested classes; this is a recognised problem for the EES (Mucina et al., 2016). Therefore, in the following conspectus the results were used as a guide in the placement of IVC communities within classes rather than adhered to slavishly. Communities were then subjectively placed within constituent orders and alliances. Most communities are listed only once, but some appear to genuinely have affinities for more than one alliance. Where this occurs, the code for the other alliance or alliances is given each time. Superscript lower-case letters will frequently be found after an IVC community and indicate that the reader should refer to the matching explanatory note at the end of the conspectus.

Two final points to note. Firstly, classes identified by the EES analysis but within which no IVC communities were ultimately placed are presently within the conspectus thusly:

## Broad vegetation category

### Class (suffix -etea)

*Class verbal diagnosis (description)*

Minor affinities

Secondly, communities dominated by non-native plants from the **IN1** and **WL5** groups are not included in the conspectus.

## A. Vegetation of the arctic zone

### AB *Carici rupestris-Kobresietea bellardii* Ohba 1974

AB01 *Thymo arcticae-Kobresietalia bellardii* Ohba 1974

AB01A *Kobresio-Dryadion Nordhagen* 1943

*Graminoid and dwarf-scrub heath vegetation of Scotland, Scandinavia, Iceland and the Arctic Ocean islands*

**HE1A** *Dryas octopetala* – *Sesleria caerulea* heath (DA01A)<sup>a</sup>

### AC *Loiseleurio procumbentis-Vaccinietea*

#### Egglar ex Schubert 1960

AC01 *Rhododendro ferruginei-Vaccinietalia*

Br.-Bl. in Br.-Bl. et Jenny 1926

AC01A *Loiseleurio procumbentis-Vaccinion*

Br.-Bl. in Br.-Bl. et Jenny 1926

*Relic alpine silicicolous dwarf heath in wind-exposed habitats of the nemoral mountain ranges of Europe*

**HE3C** *Calluna vulgaris* – *Nardus stricta* heath<sup>b</sup>

**HE3D** *Calluna vulgaris* – *Racomitrium lanuginosum* heath<sup>b</sup>

**HE3E** *Racomitrium lanuginosum* – *Festuca vivipara* heath<sup>b</sup>

### AE *Saxifrago cernuae-Cochlearietea groenlandicae*

#### Mucina et Daniëls in Mucina et al. 2016

*Vegetation of open grassy tundra disturbed by zoo-anthropogenic activities and cryoturbation in Svalbard and Greenland*

Minor affinities

## B. Vegetation of the boreal zone

### BA *Vaccinio-Piceetea Br.-Bl. in Br.-Bl. et al. 1939*

*Holarctic coniferous and boreo-subarctic birch forests on oligotrophic and leached soils in the boreal zone and at high-altitudes of mountains in the nemoral zone of Eurasia*

Minor affinities

### BC *Brachypodio pinnati-Betuletea*

#### pendulae Ermakov et al. 1991

*Hemiboreal pine and birch-pine herb-rich open forests on fertile soils of the Southern Urals and Southern Siberia, and relict birch-poplar forests of Europe*

Minor affinities

## C. Vegetation of the nemoral forest zone

### CA *Carpino-Fagetea sylvaticae* Jakucs ex Passarge 1968

CA02 *Fagetalia sylvaticae* Pawłowski 1928

CA02B *Fagion sylvaticae* Luquet 1926

*Partly refugial post-glacial basiphilous beech and mixed fir-beech forests of the temperate Europe*

**WL2D** *Fagus sylvatica* – *Hedera helix* woodland

**WL2F** *Taxus baccata* – *Ilex aquifolium* woodland

CA03 *Carpinetalia betuli* P. Fukarek 1968

CA03A Carpinion betuli Issler 1931  
*Oak-hornbeam forests on deep nutrient-rich soils of the cool-temperate Europe and the British Isles*

**WL2A** *Quercus robur* – *Circaea lutetiana* woodland

**WL2B** *Fraxinus excelsior* – *Geum urbanum* woodland

**WL2C** *Fraxinus excelsior* – *Acer pseudoplatanus* woodland

### **CC Quercetea robori-petraeae Br.-**

#### **Bl. et Tx. ex Oberd. 1957**

CC01 Quercetalia roboris Tx. 1931

CC01A Hymenophyllo-Quercion petraeae Pallas 2000

*Hyperoceanic humid acidophilous oak forests on nutrient-poor soils of Ireland*

**WL1B** *Quercus petraea* – *Luzula sylvatica* woodland (CC01B) <sup>c</sup>

**WL1D** *Quercus petraea* – *Vaccinium myrtillus* woodland (CC01B) <sup>c</sup>

CC01B Quercion roboris Malcuit 1929

*Temperate atlantic and subatlantic acidophilous oak forests on nutrient-poor soils of Western Europe*

**WL1A** *Quercus robur* – *Luzula sylvatica* woodland <sup>c</sup>

**WL1B** *Quercus petraea* – *Luzula sylvatica* woodland (CC01A) <sup>c</sup>

**WL1C** *Quercus petraea* – *Corylus avellana* woodland <sup>c</sup>

**WL1D** *Quercus petraea* – *Vaccinium myrtillus* woodland (CC01A) <sup>c</sup>

CC02 Lonicero periclymeni-Betuletalia pubescentis

Willner et Mucina in Willner et al. 2016

CC02B Lonicero periclymeni-Betulion pubescentis Géhu 2006

*Atlantic birch forests on nutrient-poor soils of the North Sea seaboard and northwestern France*

**WL4A** *Betula pubescens* – *Vaccinium myrtillus* woodland <sup>d</sup>

**WL4B** *Betula pubescens* – *Agrostis capillaris* woodland <sup>d</sup>

**WL4D** *Betula pubescens* – *Rubus fruticosus* agg. woodland <sup>d</sup>

**WL4F** *Betula pubescens* – *Pteridium aquilinum* woodland <sup>d</sup>

### **CD Crataego-Prunetea Tx. 1962 nom. conserv. propos.**

CD01 Prunetalia spinosae Tx. 1952

CD01D Urtico-Crataegion Passarge et G. Hofmann 1968

*Mesophilous hedges and scrub on mesotrophic base-rich soils of northwestern Europe*

**SC1A** *Prunus spinosa* – *Crataegus monogyna* scrub

**SC1B** *Crataegus monogyna* – *Rubus fruticosus* agg. scrub <sup>e</sup>

CD01E Astantio-Corylion avellanae Passarge 1978

*Hazel scrub on nutrient-rich soils in the submontane and montane belts of Western, Central and southeastern Europe*

**WL2E** *Corylus avellana* – *Potentilla sterilis* woodland <sup>f</sup>

CD01F Pruno-Rubion radulae Weber 1974

*Bramble scrub on neutral and base-rich soils of Western and Central Europe*

**SC1E** *Rubus fruticosus* agg. – *Holcus lanatus* wayside community <sup>e</sup>

### **CE Lonicero-Rubetea plicati Haveman, Schaminée et Stortelder in Stortelder et al. 1999**

CE01 Rubetalia plicati Weber in Pott 1995

CE01A Lonicero-Rubion silvatici Tx. et Neumann ex Wittig 1977

*Acidophilous bramble scrub, hedges and scrub of forest clearings on dry sandy nutrient-poor minerotrophic soils of northwestern Europe*

**SC1C** *Pteridium aquilinum* – *Rubus fruticosus* agg. scrub <sup>g</sup>

### **CG Salicetea arenariae Weber 1999**

CG01 Salicetalia arenariae Preising et Weber 1997

CG01A Salicion arenariae Tx. ex Passarge in Scamoni 1963

*Willow and sea buckthorn low scrub on dunes of the oceanic regions of Western Europe*

**DU3A** *Salix repens* – *Lotus corniculatus* duneland <sup>h</sup>

### **CH Calluno-Ulicetea Br.-Bl. et Tx. ex Klika et Hadač 1944**

CH01 Ulicetalia nani Quantin 1935

CH01B Ulicion Malcuit 1929

*Gorse heath of the oceanic regions of Western Europe*

**HE2A** *Ulex gallii* – *Erica cinerea* heath

CH02 Vaccinio myrtilli-Genistetalia pilosae Schubert ex Passarge 1964  
CH02B Calluno-Genistion pilosae P. Duvigneaud 1945  
*Low-altitude heath of the atlantic and subcontinental regions of temperate Europe*

**HE2B** *Calluna vulgaris* – *Hypnum jutlandicum* heath <sup>i</sup>

**HE2C** *Calluna vulgaris* – *Agrostis capillaris* heath (CI01B)

**HE2D** *Calluna vulgaris* – *Molinia caerulea* – *Erica cinerea* heath (PB01A) <sup>i</sup>

**HE2E** *Calluna vulgaris* – *Trichophorum cespitosum/germanicum* heath (PB01A) <sup>i</sup>

CH02D Genisto pilosae-Vaccinion Br.-Bl. 1926  
*Montane-subalpine dwarf heath on siliceous substrates of the nemoral mountain ranges of Western and Central Europe*

**HE3A** *Calluna vulgaris* – *Hylocomium splendens* heath <sup>j</sup>

**HE3B** *Calluna vulgaris* – *Scapania gracilis* heath <sup>j</sup>

#### **CI Nardetea strictae Rivas Goday et Borja Carbonell in Rivas Goday et Mayor López 1966 nom. conserv. propos.**

CI01 Nardetalia strictae Preising 1950  
CI01B Violion caninae Schwickerath 1944  
*Meso-subxerophytic oligotrophic pastures in the lowland to submontane belts of Western and Central Europe*

**GL4B** *Nardus stricta* – *Potentilla erecta* grassland

**GL4C** *Agrostis capillaris* – *Potentilla erecta* grassland (CM01C)

**HE2C** *Calluna vulgaris* – *Agrostis capillaris* heath (CH02B)

**RH2D** *Angelica sylvestris* – *Breutelia chrysocoma* ledge community (CS01A, CT01B) <sup>k</sup>

CI01C Nardo-Juncion squarrosi (Oberd. 1957) Passarge 1964  
*Hygrophilous oligotrophic meadows on peaty soils of the subatlantic regions of Western and Central Europe*

**HE3G** *Juncus squarrosus* – *Rhytidiadelphus loreus* heath (PB01B)

**HE4B** *Molinia caerulea* – *Nardus stricta* heath (PB01A) <sup>l</sup>

#### **CJ Koelerio-Coryneporetea canescentis**

##### **Klika in Klika et Novák 1941**

*Dry grasslands on sandy soils and on rocky outcrops of the temperate to boreal zones of Europe, the North Atlantic islands and Greenland*

Minor affinities

##### **CK Sedo-Scleranthetea Br.-Bl. 1955**

CK02 Sedo-Scleranthetalia Br.-Bl. 1955

CK02C Sedion anglici Br.-Bl. in Br.-Bl. et Tx. 1952

*Pioneer vegetation on acidic shallow soils on siliceous rocky outcrops of the atlantic regions of Europe*

**RH2E** *Aira caryophylla* – *Polytrichum juniperinum* wall community <sup>m</sup>

##### **CL Trifolio-Geranietea sanguinei T. Müller 1962**

*Thermophilous forest fringe and tall-herb vegetation in nutrient-poor sites in the submediterranean to subboreal zones of Europe and the Macaronesia*

Minor affinities

##### **CM Molinio-Arrhenatheretea Tx. 1937**

CM01 Arrhenatheretalia elatioris Tx. 1931

CM01A Arrhenatherion elatioris Luquet 1926  
*Mesic mown meadows on mineral-rich soils in the lowland to submontane belts of temperate Europe*

**GL3G** *Arrhenatherum elatius* – *Dactylis glomerata* grassland

CM01C Cynosurion cristati Tx. 1947  
*Mesic pastures on well-drained mineral-rich soils at low to mid-altitudes of temperate Europe*

**DU2C** *Festuca rubra* – *Plantago lanceolata* – *Carex arenaria* duneland (JE01A) <sup>n</sup>

**GL3B** *Lolium perenne* – *Trifolium repens* grassland

**GL3C** *Festuca rubra* – *Plantago lanceolata* grassland

**GL3D** *Cynosurus cristatus* – *Trifolium pratense* grassland

**GL3E** *Festuca rubra* – *Rhinanthus minor* grassland

**GL3F** *Festuca rubra* – *Lotus corniculatus* grassland <sup>o</sup>

**GL4A** *Agrostis capillaris* – *Trifolium repens* grassland

**GL4C** *Agrostis capillaris* – *Potentilla erecta* grassland (CI01B)

- WE1B** *Cerastium fontanum* – *Ranunculus repens* weed community
- WE1D** *Lolium perenne* – *Anagallis arvensis* weed community
- WE1E** *Poa annua* – *Plantago major* weed community (QE01A) <sup>p</sup>
- CM05 Molinietalia caeruleae Koch 1926
- CM05A Molinion caeruleae Koch 1926  
*Mown meadows on temporarily wet soils at low altitudes of temperate Western and Central Europe*
- GL1C** *Molinia caerulea* – *Succisa pratensis* grassland
- GL1D** *Molinia caerulea* – *Potentilla erecta* – *Agrostis stolonifera* grassland
- GL4D** *Agrostis canina/vinealis* – *Rhytidiadelphus squarrosus* grassland (PA03B)
- HE4D** *Molinia caerulea* – *Potentilla erecta* – *Erica tetralix* heath <sup>q</sup>
- CM05B Calthion palustris Tx. 1937  
*Herb-rich temporarily wet mown meadows on mineral soils at low altitudes of suboceanic Western and subcontinental Central Europe*
- FE3D** *Carex nigra* – *Calliergonella cuspidata* fen
- GL1A** *Juncus acutiflorus* – *Holcus lanatus* grassland
- GL1B** *Agrostis stolonifera* – *Filipendula ulmaria* marsh-grassland
- GL1E** *Juncus acutiflorus* – *Rhytidiadelphus squarrosus* grassland
- GL2A** *Agrostis stolonifera* – *Ranunculus repens* marsh-grassland
- GL2B** *Juncus effusus* – *Holcus lanatus* grassland
- GL2C** *Holcus lanatus* – *Lolium perenne* grassland
- GL2D** *Juncus effusus* – *Rumex acetosa* grassland
- CM08 Filipendulo ulmariae-Lotetalia uliginosi Passarge 1975
- CM08D Filipendulion ulmariae Segal ex Westhoff et Den Held 1969  
*Tall-herb fringe wet meadow vegetation on acidic mineral soil of temperate Europe*
- FW3F** *Filipendula ulmaria* – *Valeriana officinalis* tall-herb swamp
- FW3N** *Iris pseudacorus* beds (OD01A)
- CM10 Potentillo-Polygonetalia avicularis Tx. 1947
- CM10A Potentillion anserinae Tx. 1947  
*Temporarily flooded and heavily grazed nutrient-rich pastures experiencing variable wet-dry or brackish-fresh alternating conditions of temperate Europe*
- DU3B** *Agrostis stolonifera* – *Calliergonella cuspidata* – *Carex arenaria* grassland
- DU3C** *Agrostis stolonifera* – *Festuca rubra* – *Carex arenaria* duneland
- DU3D** *Festuca rubra* – *Bellis perennis* grassland
- DU3E** *Succisa pratensis* – *Epipactis palustris* duneland
- FE3B** *Carex nigra* – *Potentilla anserina* fen
- SM6B** *Agrostis stolonifera* – *Triglochin maritimum* grassland (MF03C) <sup>r</sup>
- SM6C** *Agrostis stolonifera* – *Potentilla anserina* grassland (MF03C) <sup>r</sup>
- CR Betulo carpaticae-Alnetea viridis Rejmánek ex Bœuf, Theurillat, Willner, Mucina et Simler in Bœuf et al. 2014**
- CR01 Alnetalia viridis Rübél ex Karner et Willner in Willner et Grabherr 2007
- CR01C Salicion helveticae Rübél ex Theurillat in Theurillat et al. 1995  
*Subalpine silicolous willow krummholz of the Alps*
- SC1G** *Salix aurita* – *Luzula sylvatica* scrub <sup>s</sup>
- CS Mulgedio-Aconitetea Hadač et Klika in Klika et Hadač 1944**
- CS01 Adenostyletalia alliariae Br.-Bl. 1930
- CS01A Adenostylon alliariae Br.-Bl. 1926 nom. conserv. propos.  
*Tall-herb vegetation on siliceous substrates at high altitudes in the nemoral zone of Europe*
- RH2D** *Angelica sylvestris* – *Breutelia chrysocoma* ledge community (CT01B, CI01B) <sup>k</sup>
- CT Juncetea trifidi Hadač in Klika et Hadač 1944**
- CT01 Juncetalia trifidi Daniëls 1994
- CT01B Nardo-Caricion rigidae Nordhagen 1943  
*Moderately chionophilous siliceous mat-grass swards of Scandinavia and as relicts in the Hercynian mountains*
- RH2B** *Racomitrium fasciculare* – *Festuca vivipara* scree community (SE01F) <sup>t</sup>
- RH2D** *Angelica sylvestris* – *Breutelia chrysocoma* ledge community (CS01A, CI01B) <sup>k</sup>
- RH2F** *Festuca vivipara* – *Oligotrichum hercynicum* fellfield

## D. Vegetation of the steppe zone

### DA Festuco-Brometea Br.-Bl. et Tx. ex Soó 1947

DA01 Brachypodietalia pinnati Korneck  
1974 nom. conserv. propos.

DA01A Bromion erecti Koch 1926  
*Meso-xerophytic basiphilous grasslands of  
Western Europe and subatlantic Central Europe*

**DU2D** *Festuca rubra* – *Thymus  
polytrichus* duneland (JE01A) <sup>u</sup>

**GL3A** *Briza media* – *Thymus  
polytrichus* grassland <sup>v</sup>

**HE1A** *Dryas octopetala* – *Sesleria  
caerulea* heath (AB01A) <sup>a</sup>

**RH1A** *Asplenium trichomanes* – *Ctenidium  
molluscum* crevice community (KC01A)

**RH1B** *Teucrium scorodonia* – *Mycelis  
muralis* pavement community

## F. Vegetation of the mediterranean zone

### FE Cytisetea scopario-striati Rivas-Mart. 1974

FE03 Spartio juncei-Cytisetalia scoparii  
Mucina in Mucina et al. 2016

FE03A Sarothamnion scoparii Oberd. 1957  
*Acidophilous broom and gorse mantle on  
forest edges and in forest clearings of the  
(sub)atlantic regions of Western Europe*

**SC1D** *Ulex europaeus* – *Rubus  
fruticosus* agg. scrub

## H. Alluvial forests and scrub

### HA Alno glutinosae-Populetea albae

#### P. Fukarek et Fabijanić 1968

HA02 Alno-Fraxinetalia excelsioris Passarge 1968  
HA02A Alnion incanae Pawłowski et al. 1928  
*Alder-ash and oak riparian floodplain forests on  
nutrient-rich alluvial soils in the nemoral zone of Europe*

**WL3A** *Fraxinus excelsior* – *Galium  
palustre* woodland <sup>w</sup>

**WL3B** *Alnus glutinosa* – *Ranunculus  
repens* woodland (IA01A) <sup>x</sup>

**WL3C** *Fraxinus excelsior* – *Iris  
pseudacorus* woodland <sup>w</sup>

### HB Salicetea purpureae Moor 1958

HB01 Salicetalia purpureae Moor 1958

HB01B Salicion albae Soó 1951  
*Willow and poplar low open forests of lowland to  
submontane river alluvia in the nemoral zone of  
Europe and at high altitudes of the Mediterranean*

**WL3D** *Salix cinerea* – *Urtica  
dioica* woodland (IB01A) <sup>y</sup>

## I. Swamp forests and scrub

### IA Alnetea glutinosae Br.-Bl. et Tx.

#### ex Westhoff et al. 1946

IA01 Alnetalia glutinosae Tx. 1937

IA01A Alnion glutinosae Malcuit 1929  
*European mesotrophic regularly flooded alder carr*

**WL3B** *Alnus glutinosa* – *Ranunculus  
repens* woodland (HA02A) <sup>x</sup>

IA03 Sphagno-Betuletalia pubescentis  
Scamoni et Passarge 1959

IA03A Betulion pubescentis Lohmeyer  
et Tx. ex Oberd. 1957  
*Eurasian acidophilous wet birch  
forests on mesotrophic mires*

**WL4C** *Betula pubescens* – *Sphagnum  
palustre* woodland

**WL4E** *Betula pubescens* – *Salix cinerea* woodland

### IB Franguletea Doing ex Westhoff in

#### Westhoff et Den Held 1969

IB01 Salicetalia auritae Doing 1962

IB01A Salicion cinereae T. Müller  
et Görs ex Passarge 1961  
*Willow carr of Western Europe and the  
subatlantic regions of Central Europe*

**WL3D** *Salix cinerea* – *Urtica dioica*  
woodland (HB01B) <sup>y</sup>

**WL3E** *Salix cinerea* – *Galium palustre* woodland <sup>z</sup>

**WL3F** *Salix cinerea* – *Phalaris  
arundinacea* woodland <sup>z</sup>

## J. Vegetation of coastal cliffs and dunes

### JA Saginetea maritimae Westhoff et al. 1962

*Atlantic-Mediterranean and Macaronesian  
ephemeral winter-annual vegetation in disturbed  
saline habitats and inland saline badlands*

Minor affinities

### **JB Crithmo-Staticetea Br.-Bl. in Br.-Bl. et al. 1952**

JB01 Crithmo-Staticetalia Molinier 1934

JB01A Crithmion maritimi Tx. et Oberd. 1958  
*Rupicolous vegetation of salt-sprayed rocky cliffs of the Atlantic coasts of Western Europe*

**RH3B** *Silene uniflora* – *Euphrasia officinalis*  
agg. rock community (KE10A) <sup>aa</sup>

**RH4B** *Plantago coronopus* – *Armeria maritima*  
coastal rock community

JB03 Crithmo-Armerietalia maritimae

Géhu et Géhu-Franck 1984

JB03B Cochleario officinalis-Armerion maritimae Géhu et Géhu-Franck 1984  
*Subaerohaline coastal grasslands on inland edges of salt-sprayed rocky cliffs of the boreo-atlantic coasts of Scotland and Iceland*

**GL3F** *Festuca rubra* – *Lotus corniculatus*  
grassland <sup>o</sup>

### **JC Cakiletea maritimae Tx. et Preising**

#### **in Tx. ex Br.-Bl. et Tx. 1952**

JC01 Atriplicetalia littoralis Sissingh  
in Westhoff et al. 1946

JC01A Atriplicion littoralis Nordhagen 1940  
*Pioneer halo-nitrophilous vegetation of silty strandlines of the North Atlantic Ocean and the Baltic Sea*

**ST1A** *Atriplex prostrata* – *Tripleurospermum maritimum*  
strandline community <sup>bb</sup>

JC01B Salsolo-Minuartion peploidis

Tx. in Br.-Bl. et Tx. 1952

*Pioneer halo-nitrophilous vegetation of sandy and gravelly strandlines of the North Atlantic Ocean and the Baltic Sea*

**ST1B** *Cakile maritima* – *Salsola kali*  
strandline community

**ST1C** *Honckenya peploides* – *Eryngium maritimum*  
strandline community (JD02A)

JC01C Agropyro-Rumicion Nordhagen

1940 nom. ambig. rejic. propos.

*Pioneer halo-nitrophilous vegetation of coastal shingle beaches of the boreo-atlantic coasts of the Baltic and North Seas*

**SM7A** *Elytrigia repens*  
coarse grassland (QF03A) <sup>cc</sup>

### **JD Ammophiletea Br.-Bl. et Tx. ex Westhoff et al. 1946**

JD01 Ammophiletalia Br.-Bl. et Tx.  
ex Westhoff et al. 1946

JD01C Elymion arenarii Christiansen 1927

*Tall-grass perennial swards on mobile white and embryonic coastal dunes of the temperate North Atlantic Ocean*

**DU1B** *Ammophila arenaria*  
duneland

**DU2A** *Ammophila arenaria* –  
*Festuca rubra*  
duneland

JD02 Honckenyo-Elymetalia arenarii Tx. 1966

JD02A Agropyro-Honckenyon peploidis Tx.  
in Br.-Bl. et Tx. 1952 nom. mut. propos.

*Perennial grassy swards on coastal foredunes of the cold-temperate Atlantic and the Baltic seaboard*

**DU1A** *Elytrigia juncea*  
duneland

**ST1C** *Honckenya peploides* – *Eryngium maritimum*  
strandline community (JC01C)

### **JE Helichryso-Crucianelletea maritimae**

#### **Géhu et al. in Sissingh 1974**

JE01 Artemisio-Koelerietalia Sissingh 1974

JE01A Koelerion arenariae Tx. 1937

corr. Gutermann et Mucina 1993

*Sandy grasslands on base-rich stabilised grey hind dunes of the North Sea coasts*

**DU2B** *Festuca rubra* – *Syntrichia ruraliformis*  
duneland <sup>dd</sup>

**DU2C** *Festuca rubra* – *Plantago lanceolata*  
– *Carex arenaria*  
duneland (CM01C) <sup>n</sup>

**DU2D** *Festuca rubra* – *Thymus polytrichus*  
duneland (DA01A) <sup>u</sup>

## **K. Vegetation of rock crevices and screes**

### **KA Adiantetea Br.-Bl. et al. 1952**

*Relict chomophytic and chasmophytic vegetation in the shaded and water-splashed habitats of the Mediterranean, the Atlantic islands, North Africa and Middle East*

Minor affinities

### **KB Polypodietea Jurko et Peciar ex Boşcaiu,**

#### **Gergely et Codoreanu in Rațiu et al. 1966**

KB02 Anomodonto-Polypodietalia serrati O.

de Bolòs et Vives in O. de Bolòs 1957

KB02C Hymenophyllion tunbrigensis

Tx. in Tx. et Oberd. 1958

*Sciophilous chomophytic and epiphytic fern-rich vegetation in humid and perhumid regions of the Atlantic coasts*

**RH2A** *Hymenophyllum wilsonii* – *Isoetecium myosuroides*  
crevice community

**KC Asplenietea trichomanis (Br.-Bl. in Meier et Br.-Bl. 1934) Oberd. 1977**

KC01 Geranio robertiani-Asplenietalia trichomanis Ferrez ex Mucina ined.

KC01A Asplenio scolopendrii-Geranion robertiani Ferrez 2010  
*Chasmophytic vegetation of semi-shaded and sunny rock faces and crevices in the lowland to submontane belts of temperate Europe*

**RH1A** *Asplenium trichomanes* – *Ctenidium molluscum* crevice community (DA01A)

KC10 Asplenietalia septentrionalo-cuneifolii Mucina in Mucina et Theurillat 2015

KC10A Asplenion marini Segal 1969  
*Fern-rich chasmophytic vegetation of siliceous rock crevices in supralittoral habitats of the Cantabro-Atlantic coasts*

**RH4A** *Asplenium marinum* crevice community<sup>ee</sup>

**KD Cymbalario-Parietarietea diffusae Oberd. 1969**

KD01 Tortulo-Cymbalarietalia Segal 1969

KD01A Cymbalario-Asplenion Segal 1969  
*Fern-rich chasmophytic vegetation of sunny walls of the atlantic to subcontinental regions of cool-temperate Europe*

**RH1C** *Asplenium ruta-muraria* – *Cymbalaria muralis* wall community<sup>ff</sup>

KD01B Galio valantiae-Parietarion judaicae Rivas-Mart. ex O. de Bolòs 1967  
*Thermomediterranean chasmophytic vegetation of limestone walls of the Iberian Peninsula and the Western Tyrrhenian archipelago*

**RH1D** *Parietaria judaica* – *Tortula muralis* wall community

**KE Thlaspietea rotundifolii Br.-Bl. 1948**

KE10 Violetalia calaminariae Br.-Bl. et Tx. ex Ernst 1965

KE10A Thlaspion calaminarii Ernst 1965  
*Heavy-metal tolerant vegetation on mining spoil heaps of Western Europe*

**RH3A** *Cephaloziella stellulifera* – *Dicranella varia* mine-spoil community<sup>gg</sup>

**RH3B** *Silene uniflora* – *Euphrasia officinalis* agg. rock community (JB01A)<sup>aa</sup>

**L. Vegetation of arctic-alpine vegetation of snow-rich habitats**

**LA Salicetea herbaceae Br.-Bl. 1948**

*Arctic and alpine-subnival snow-bed vegetation at high altitudes of the mountain ranges of Eurasia and the Arctic Ocean islands*

Minor affinities

**M. Vegetation of saline and brackish waters and swamps**

**MA Zosteretea Pignatti 1953**

MA01 Zosteretalia Béguinot ex Pignatti 1953

MA01A Zosterion marinae Br.-

Bl. et Tx. ex Pignatti 1953

*Vegetation of perennial sea-grass meadows of the sandy-muddy sea sublittoral of the cold- and cool-temperate seas surrounding Europe*

**SW1B** *Zostera marina* saline community

**MC Ruppiaetea maritima J. Tx. ex**

**Den Hartog et Segal 1964**

MC01 Ruppialia J. Tx. ex Den Hartog et Segal 1964 nom. conserv. propos.

MC01A Ruppion maritima Br.-Bl. ex Westhoff in Bennema et al. 1943

*Submerged rooted herbaceous vegetation of temperate brackish waters of Europe*

**SW1A** *Ruppia maritima/cirrhosa* saline community

**MD Spartinetea maritima Beeffink 1962**

MD01 Spartinetalia glabrae Conard 1935

MD01A Spartinion glabrae Conard 1935

*Pioneer vegetation of perennial cord grasses on tidal flats of temperate seas of Europe and North America*

**SM1B** *Spartina* agg. saltmarsh

**ME Therosalicornietea Tx. in Tx. et Oberd. 1958**

ME01 Therosalicornietalia Pignatti 1952

ME01A Therosalicornion Br.-Bl. 1933

*Mediterranean and thermo-atlantic pioneer vegetation of annual succulent plants of tidal flats and irregularly flooded inland depressions*

**SM1A** *Salicornia* agg. saltmarsh

**SM1C** *Suaeda maritima* saltmarsh

### **MF Juncetea maritimi Br.-Bl. in Br.-Bl. et al. 1952**

MF01 Juncetalia maritimi Br.-Bl. ex Horvatić 1934

MF01A Juncion maritimi Br.-Bl. ex Horvatić 1934  
*Mediterranean and thermo-atlantic coastal saline rush marsh vegetation under a prolonged flooding regime*

**SM5A** *Juncus maritimus* – *Festuca rubra* saltmarsh

**SM5B** *Juncus maritimus* – *Plantago maritima* saltmarsh

MF02 Agropyretalia pungentis Géhu 1968

MF02A Agropyron pungentis Géhu 1968  
*Halo-nitrophilous grasslands of salt-sprayed sandy-loamy shores of thermo-atlantic Europe*

**SM7B** *Elytrigia atherica* saltmarsh

MF03 Puccinellio maritimae-Salicornietalia

Br.-Bl. et De Leeuw 1936

MF03A Festucion maritimae Christiansen 1927  
*Vegetation of grass-rich saline swards at low tide mark of the European Atlantic coasts*

**SM2A** *Puccinellia maritima* – *Glaux maritima* saltmarsh

**SM2B** *Atriplex portulacoides* – *Puccinellia maritima* saltmarsh

**SM2C** *Puccinellia maritima* – *Limonium humile* saltmarsh

**SM2D** *Puccinellia maritima* – *Aster tripolium* saltmarsh

MF03C Armerion maritimae Br.-

Bl. et De Leeuw 1936

*Vegetation of grass- and chamaephyte-rich saline swards at high tide mark of the Atlantic seaboard of Europe*

**SM3A** *Plantago maritima* – *Armeria maritima* saltmarsh

**SM3B** *Plantago maritima* – *Puccinellia maritima* saltmarsh

**SM4A** *Festuca rubra* – *Agrostis stolonifera* saltmarsh<sup>hh</sup>

**SM4B** *Festuca rubra* – *Juncus gerardii* saltmarsh

**SM4C** *Festuca rubra* – *Armeria maritima* saltmarsh

**SM4D** *Festuca rubra* – *Plantago maritima* saltmarsh

**SM6B** *Agrostis stolonifera* – *Triglochin maritimum* grassland (CM10A) †

**SM6C** *Agrostis stolonifera* – *Potentilla anserina* grassland (CM10A) †

**SM6D** *Agrostis stolonifera* – *Juncus gerardii* saltmarsh

### **MG Salicornietea fruticosae Br.-Bl. et Tx. ex A. Bolòs y Vayreda et O. de Bolòs in A. Bolòs y Vayreda 1950**

*Mediterranean and thermo-atlantic perennial salt-marsh herblands and scrub*

Minor affinities

## **N. Freshwater aquatic vegetation**

### **NA Lemnetea O. de Bolòs et Masclans 1955**

*Free-floating duckweed vegetation of still and relatively nutrient-rich freshwater bodies of the Holarctic*

Minor affinities

### **NB Potamogetonetea Klika in Klika et Novák 1941**

NB01 Potamogetonetalia Koch 1926

NB01A Potamogetonion Libbert 1931

*Vegetation of rooted and floating macrophytes of freshwater bodies at low and mid-altitudes of temperate Eurasia*

**FW2F** *Potamogeton pectinatus* – *Myriophyllum spicatum* aquatic community

**FW2G** *Potamogeton natans* – *Equisetum fluviatile* aquatic community

**FW2H** *Potamogeton filiformis* – *Myriophyllum alterniflorum* aquatic community

NB01B Nymphaeion albae Oberd. 1957

*Vegetation of rooted floating-leaf macrophytes of sheltered nutrient-rich freshwaters of Western and Central Europe*

**FW2I** *Nymphaea alba* aquatic community

**FW2J** *Nuphar lutea* aquatic community

NB01D Potamogetonion graminei

Westhoff et Den Held 1969

*Vegetation of rooted macrophytes of nutrient-poor shallow freshwaters at mid-altitudes of Europe*

**FW1D** *Najas flexilis* aquatic community

NB02 Callitricho hamulatae-Ranunculietalia aquatilis

Passarge ex Theurillat in Theurillat et al. 2015

NB02A Batrachion fluitantis Neuhäusl 1959

*Vegetation of crowfoot and milfoil rooted macrophytes in shallow moving freshwaters of Europe*

**FW2C** *Ranunculus penicillatus* – *Fontinalis antipyretica* aquatic community

**FW2D** *Apium nodiflorum* – *Ranunculus penicillatus* aquatic community (OD05A)

NB03 Zannichellietalia pedicellatae Schaminée,  
Lanjouw et Schipper ex Mucina et Theurillat ined.  
NB03A Zannichellion pedicellatae Schaminée,  
Lanjouw et Schipper ex Passarge 1996  
*Vegetation of rooted macrophytes in meso-eutrophic  
brackish waters of Western and Central Europe*  
**FW2K** *Zannichellia palustris* aquatic community

## O. Vegetation of freshwater springs, shorelines and swamps

### OA Montio-Cardaminetea Br.-Bl. et

#### Tx. ex Klika et Hadač 1944

OA02 Montio-Cardaminetalia Pawłowski et al. 1928  
OA02C Cardamino-Montion Br.-Bl. 1926  
*Vegetation of cold oligotrophic water springs  
in the subalpine and alpine belts of mountains  
of Central and southwestern Europe*  
**FE4A** *Philonotis fontana* – *Chrysosplenium  
oppositifolium* spring  
OA02F Cratoneurion commutati Koch 1928  
*Vegetation of moss-rich calcareous water springs in the  
montane and subalpine belts of Europe and Greenland*  
**FE4B** *Palustriella commutata* – *Bryum  
pseudotriquetrum* spring<sup>ii</sup>

### OB Littorelletea uniflorae Br.-Bl. et

#### Tx. ex Westhoff et al. 1946

OB01 Littorelletalia uniflorae Koch ex Tx. 1937  
OB01E Littorellion uniflorae Koch ex Klika 1935  
*Vegetation of amphibious plants in  
fluctuating shallow oligo-mesotrophic  
waters of temperate and boreal Europe*  
**FW1A** *Littorella uniflora* – *Ranunculus  
flammula* aquatic community  
OB01D Lobelion dortmannae Vanden Berghen 1964  
*Temperate-boreal amphibious Lobelia and  
Isoëtes communities in nutrient-poor standing  
waters of the Atlantic regions of Europe*  
**FW1B** *Eriocaulon aquaticum* – *Lobelia  
dortmanna* aquatic community

### OC Isoëto-Nanojuncetea Br.-Bl. et Tx. in Br.-Bl. et al. 1952

OC02 Nanocyperetalia Klika 1935

OC02D Eleocharition soloniensis Philippi 1968  
*Pioneer ephemeral rush-rich vegetation in  
temporarily flooded mesotrophic habitats  
of Central and Western Europe*

**WE2A** *Persicaria maculosa* – *Limosella  
aquatica* inundation community

**WE2B** *Juncus bufonius* – *Triglochin  
palustre* inundation community

### OD Phragmito-Magnocaricetea

#### Klika in Klika et Novák 1941

OD01 Phragmitetalia Koch 1926  
OD01A Phragmition communis Koch 1926  
*Reed swamp vegetation of mesotrophic and  
eutrophic standing freshwater bodies or gently  
moving streams of boreo-temperate Eurasia*  
**FE2A** *Equisetum fluviatile* – *Menyanthes  
trifoliata* mire (PA03B)  
**FW3A** *Schoenoplectus lacustris* –  
*Sparganium erectum* swamp  
**FW3B** *Phragmites australis* – *Agrostis  
stolonifera* swamp (OD02A)  
**FW3D** *Schoenoplectus lacustris* swamp  
**FW3E** *Phragmites australis* –  
*Equisetum fluviatile* swamp  
**FW3G** *Equisetum fluviatile* –  
*Eleocharis palustris* swamp  
**FW3I** *Schoenoplectus tabernaemontani* swamp  
**FW3L** *Glyceria maxima* swamp  
**FW3M** *Typha latifolia* swamp  
**FW3N** *Iris pseudacorus* beds (CM08D)  
OD02 Bolboschoenetalia maritimi  
Hejný in Holub et al. 1967  
OD02A Scirpion maritimi Dahl et Hadač 1941  
*Meso-eutrophic brackish swamp reeds of  
European temperate coastal regions*  
**FW3B** *Phragmites australis* – *Agrostis  
stolonifera* swamp (OD01A)  
**SM6A** *Bolboschoenus maritimus* – *Agrostis  
stolonifera* saltmarsh-swamp<sup>ij</sup>  
OD04 Magnocaricetalia Pignatti 1953  
OD04A Magnocaricion elatae Koch 1926

Sedge-bed marsh vegetation on oligotrophic to mesotrophic organic sediments of temperate Europe

**FW3C** *Carex rostrata* swamp (PA03D) <sup>kk</sup>

**FW3H** *Cladium mariscus* –  
*Phragmites australis* swamp

**FW3J** *Carex elata* swamp <sup>ll</sup>

**FW3K** *Carex paniculata* swamp

OD05 Nasturtio-Glycerietalia Pignatti 1953

OD05A Glycerio-Sparganion Br.-  
Bl. et Sissingh in Boer 1942

Herbland vegetation of small freshwater streams  
and in shallow water bodies of temperate Europe

**FW2D** *Apium nodiflorum* – *Ranunculus  
penicillatus* aquatic community (OB02A)

**FW2E** *Apium nodiflorum* – *Rorippa nasturtium-  
aquaticum* agg. aquatic community

OD06 Oenanthetalia aquaticae Hejny

ex Balátová-Tuláčková et al. 1993

OD06A Eleocharito palustris-Sagittarion  
sagittifoliae Passarge 1964

Vegetation of emergent helophytes on muddy soils  
of shallows streams and ponds with fluctuating  
water table of temperate and boreal Eurasia

**FE3C** *Eleocharis palustris* – *Agrostis stolonifera* fen

## P. Vegetation of bogs and fens

### PA Scheuchzerio palustris-Caricetea fuscae Tx. 1937

PA01 Caricetalia davallianae Br.-Bl.

1950 nom. conserv. propos.

PA01A Caricion davallianae Klika 1934

Sedge-moss calcareous mineral-rich phosphorus-  
limited fen vegetation of Europe and Western Asia

**FE1A** *Schoenus nigricans* –  
*Campylium stellatum* fen

**FE1B** *Schoenus nigricans* – *Succisa pratensis* fen <sup>mmm</sup>

**FE1C** *Carex panicea* – *Carex viridula* fen

**FE1D** *Juncus subnodulosus* –  
*Mentha aquatica* fen <sup>nn</sup>

**FE3A** *Carex nigra* – *Ranunculus flammula* fen <sup>oo</sup>

PA03 Caricetalia fuscae Koch 1926

PA03B Caricion fuscae Koch 1926  
nom. conserv. propos.

Sedge-moss vegetation moderately to low calcium-rich  
slightly acidic fens dominated by calcifuge brown-  
mosses or nutrient-demanding peat-mosses of Europe

**GL4D** *Agrostis canina/vinealis* – *Rhytidiadelphus*

*squarrosus* grassland (CM05A)

**FE2A** *Equisetum fluviatile* – *Menyanthes  
trifoliata* mire (OD01A)

**FE2B** *Carex limosa* – *Menyanthes trifoliata* mire

**FE2C** *Carex lasiocarpa* –  
*Menyanthes trifoliata* mire

**FE2D** *Carex rostrata* – *Menyanthes  
trifoliata* mire <sup>pp</sup>

**FE2F** *Menyanthes trifoliata* –  
*Calliergonella cuspidata* mire <sup>pp</sup>

PA03C Anagallido tenellae-

Juncion bulbosi Br.-Bl. 1967

Ibero-Atlantic moderately-rich fens

**FW1C** *Juncus bulbosus* aquatic community

PA03D Sphagno-Caricion canescentis Passarge  
(1964) 1978 nom. conserv. propos.

Peat-moss acidic poor yet minerotrophic  
fens of the boreal and temperate zones  
of the Northern Hemisphere

**FE2E** *Menyanthes trifoliata* –  
*Sphagnum recurvum* agg. mire

**FW3C** *Carex rostrata* swamp (OD04A) <sup>kk</sup>

PA04 Scheuchzerietalia palustris

Nordhagen ex Tx. 1937

PA04A Scheuchzerion palustris

Nordhagen ex Tx. 1937

Ombrotrophic bog-hollow vegetation of Eurasia

**BG1A** *Sphagnum cuspidatum* – *Sphagnum  
subsecundum* agg. hollow

**BG1B** *Rhynchospora alba* –  
*Narthecium ossifragum* bog

**BG1D** *Eriophorum angustifolium* –  
*Campylopus introflexus* bog

### PB Oxycocco-Sphagnetalia Br.-Bl. et

#### Tx. ex Westhoff et al. 1946

PB01 Erico-Ledetalia palustris Tx. 1937

PB01A Ericion tetralicis Schwickerath 1933

Dwarf-shrub, sedge and peat-moss vegetation of  
moist peaty heath on gleic and podzolic soils of the  
atlantic and subatlantic regions of Western Europe

**BG2C** *Erica tetralix* – *Molinia caerulea* –  
*Cladonia portentosa* peatland (PB01B)

**BG2F** *Trichophorum cespitosum/germanicum* –  
*Eriophorum angustifolium* peatland (PB01B) <sup>qa</sup>

**HE2D** *Calluna vulgaris* – *Molinia caerulea*  
– *Erica cinerea* heath (CHO2B) <sup>i</sup>

**HE2E** *Calluna vulgaris* – *Trichophorum cespitosum/germanicum* heath (CHO2B) <sup>i</sup>

**HE4A** *Molinia caerulea* – *Trichophorum cespitosum/germanicum* peatland (PB01B) <sup>rr</sup>

**HE4B** *Molinia caerulea* – *Nardus stricta* heath (C101C) <sup>l</sup>

**HE4C** *Molinia caerulea* – *Schoenus nigricans* – *Calluna vulgaris* peatland (PB01B) <sup>ss</sup>

**HE4E** *Molinia caerulea* – *Calluna vulgaris* – *Erica tetralix* heath

**HE4F** *Molinia caerulea* – *Myrica gale* flush <sup>tt</sup>

PB01B *Oxycocco-Ericion tetralicis*

Nordhagen ex Tx. 1937

*Sedge and peat-moss vegetation of oligotrophic bogs on organic peat of the atlantic and subatlantic regions of Western and Northern Europe*

**BG1C** *Schoenus nigricans* – *Eriophorum angustifolium* bog <sup>qa</sup>

**BG2A** *Eriophorum vaginatum* – *Vaccinium oxycoccos* bog

**BG2B** *Erica tetralix* – *Andromeda polifolia* bog

**BG2C** *Erica tetralix* – *Molinia caerulea* – *Cladonia portentosa* peatland (PB01A)

**BG2D** *Erica tetralix* – *Schoenus nigricans* bog <sup>qa</sup>

**BG2E** *Calluna vulgaris* – *Eriophorum* spp. bog

**BG2F** *Trichophorum cespitosum/germanicum* – *Eriophorum angustifolium* peatland (PB01A) <sup>qa</sup>

**HE3F** *Calluna vulgaris* – *Eriophorum vaginatum* bog

**HE3G** *Juncus squarrosus* – *Rhynchospora loreus* heath (C101C)

**HE4A** *Molinia caerulea* – *Trichophorum cespitosum/germanicum* peatland (PB01A) <sup>rr</sup>

**HE4C** *Molinia caerulea* – *Schoenus nigricans* – *Calluna vulgaris* peatland (PB01A) <sup>ss</sup>

## Q. Anthropogenic vegetation

### QA *Papaveretalia rhoeadis* S. Brullo et

#### al. 2001 nom. conserv. propos.

QA02 *Papaveretalia rhoeadis* Hüppe et Hofmeister ex Theurillat et al. 1995 nom. conserv. propos.

QA02C *Veronico-Euphorbion*

Sissingh in Passarge 1964

*Weed segetal vegetation of vineyards and gardens on the base-rich soils of Central and Western Europe*

**WE1A** *Stellaria media* – *Senecio vulgaris* weed community

**WE1C** *Veronica persica* – *Lamium purpureum* weed community

**WE1F** *Persicaria maculosa* – *Polygonum aviculare* weed community (QE01A) <sup>uu</sup>

### QB *Sisymbrietea Gutte et Hilbig 1975*

*Zoo-anthropogenic and modern anthropogenic vegetation of animal shelters and disturbed ruderal sites in cool- and cold-temperate regions of Eurasia*

Minor affinities

### QC *Chenopodietea Br.-Bl. in Br.-Bl. et al. 1952*

*Winter-annual weed segetal and ruderal vegetation of man-made habitats of the Mediterranean, the mild-winter Atlantic seaboard and Macaronesia*

Minor affinities

### QE *Polygono-Poetea annuae Rivas-Mart. 1975*

QE01 *Polygono arenastri-Poetalia annuae* Tx. in

Géhu et al. 1972 corr. Rivas-Mart. et al. 1991

QE01A *Polygono-Coronopodium* Sissingh 1969

*Herb-rich vegetation in trampled habitats in the temperate to boreal zones of Europe*

**WE1E** *Poa annua* – *Plantago major* weed community (CM01C) <sup>p</sup>

**WE1F** *Persicaria maculosa* – *Polygonum aviculare* weed community (QA02C) <sup>uu</sup>

### QF *Artemisietea vulgaris Lohmeyer et al. in Tx. ex von Rochow 1951*

QF03 *Agropyretalia intermedio-*

*repentis* T. Müller et Görs 1969

QF03A *Convolvulo arvensis-*

*Agropyron repentis* Görs 1967

*Semiruderal grasslands and herblands in the nemoral and subboreal zones of Europe*

**SM7A** *Elytrigia repens* coarse grassland (JC01C) <sup>cc</sup>

### QG *Epilobietea angustifolii Tx. et*

#### Preising ex von Rochow 1951

QG02 *Circaeo lutetianae-Stachyretalia sylvaticae*

Passarge 1967 nom. conserv. propos.

QG02C *Aegopodium podagrariae* Tx.  
1967 nom. conserv. propos.  
*Semi-ruderal herb-rich clearing vegetation on mesic margins and clearings of forests and scrub in the temperate and subboreal zones of Europe*  
**SC1F** *Galium aparine* – *Urtica dioica*  
wayside community<sup>vv</sup>

**QI Bidentetea Tx. et al. ex von Rochow 1951**

*Summer-annual pioneer vegetation of seasonally flooded nutrient-rich river alluvia, lacustrine banks and heavily nutrient-loaded anthropogenic habitats of boreo-temperate Europe and North Africa*  
Minor affinities

**S. Epilithic bryophyte and lichen vegetation**

**SA Platyhypnidio-Fontinalietea antipyreticae Philippi 1956**

- SA01 *Hygrohypnetalia* Krajina 1933  
SA01A *Racomitrium acicularis* von Krustenstjerna 1945 nom. inval. ad interim  
*Temporarily inundated bryophyte vegetation with occasional lichens in oligotrophic, clear, cool and acidic running waters and cascades in mountainous regions*  
**FW2B** *Rhynchostegium riparioides* – *Chiloscyphus polyanthos* aquatic community<sup>www</sup>
- SA01B *Hygrohypnion dilatati* Krajina 1933  
*Inundated bryophyte vegetation in oligotrophic, clear, cool and acidic streams in mountainous regions*  
**FW2A** *Fontinalis antipyretica* – *Myriophyllum alterniflorum* aquatic community<sup>www</sup>

**SE Racomitrietea heterostichi Neumayr 1971**

- SE01 *Grimmialia commutatae* Šmarda et Vaněk in Šmarda 1947  
SE01F *Racomitrium lanuginosi* von Krusenstjerna 1945  
*Wefts and mats of bryophytes on lava streams, boulder fields and occasionally on stabilised soil in regions of oceanic climate*  
**RH2B** *Racomitrium fasciculare* – *Festuca vivipara* scree community (CT01B)<sup>t</sup>  
**RH2C** *Racomitrium lanuginosum* – *Hypnum jutlandicum* scree community<sup>t</sup>

- a. The majority of **HE1A** plots were assigned by the EES to the *Festuco-Brometea* (DA) with only a small minority assigned to the *Carici rupestris-Kobresietea billardii* (AB). In the subset of plots where *Dryas octopetala* is abundant, however, a good case can be made for the latter class. Rodwell (2000) placed similar vegetation from Scotland within the *Kobresio-Dryadion* (AB01A).
- b. None of the plots from **HE3C**, **HE3D** or **HE3E** were actually assigned by the EES to the *Loiseleurio procumbentis-Vaccinietea* (AC). Instead, they were predominantly assigned to the *Calluno-Ulicetea* (CH) or the *Nardetea strictae* (CI). However, comments in Mucina et al. (2016) indicate that such dwarf shrub heath from above the theoretical tree line belongs in the *Loiseleurio procumbentis-Vaccinietea*. *Racomitrium lanuginosum*, a key character species of Irish montane heaths, is not listed as a diagnostic species for any of these three classes. Rodwell (2000) and Kočí and Chytrý (2007) both assign similar vegetation to the *Loiseleurio procumbentis-Vaccinietea*.
- c. The *Carpino-Fagetea sylvatica* (CA) featured heavily in the affinities for the **WL1** group of acidophilous oakwoods where it might be expected that the *Quercetea robori-petraeae* (CC) would be more prominent. This is because some characteristic species of acid oakwoods in Ireland are diagnostic for both of these classes, e.g., *Quercus petraea* and *Luzula sylvatica*, and others are diagnostic for the former but not the latter, e.g., *Betula pubescens* and *Ilex aquifolium*. The EEC does regard *Hedera hibernica* (= *Hedera helix* subsp. *hibernica*) as only diagnostic for the *Quercetea robori-petraeae*, but as our dataset does not separate this taxon from *Hedera helix*, which is also diagnostic for the *Carpino-Fagetea sylvatica*, some analytical power was lost. It is apparent that the most fitting class for acidophilous oakwoods represented by **WL1** communities is the *Quercetea robori-petraeae*. **WL1B** and **WL1D** likely contain elements of both the *Hymenophyllo-Quercion petraeae* (CC01A) and the *Quercion roboris* (CC01B).
- d. The drier birch woodlands of the **WL4** group had high affinities for the *Carpino-Fagetea sylvatica* (CA) because *Betula pubescens* is a diagnostic species for that class. This tree is not a diagnostic species for the *Quercetea robori-petraeae* (CC) despite the *Lonicero periclymeni-Betuletalia pubescentis* (CC02B) being a constituent order.

- e. The majority of the **SC1B** and **SC1E** plots were assigned to the Molinio-Arrhenatheretea (CM) with none assigned to the Crataego-Prunetea (CD). The EES requires *Rubus* to have been identified to the species level, whereas most *Rubus* records in our dataset are of *Rubus fruticosus* agg. The Crataego-Prunetea would appear to be the most suitable home for these communities.
- f. **WL2E** scored strongly for the Fagetalia sylvaticae (CA) and hazel scrub-woodland in Ireland has previously been classified there (Ivimey-Cook and Proctor, 1964; White and Doyle, 1982). However, the Astrantio-Corylion avellanae (CD01E) appears a more suitable location.
- g. Rodwell (1991a, 1992) comments how the classification of bracken-dominated communities is a problem. Most our **SC1C** plots were assigned either the Molinio-Arrhenatheretea (CM) or the Nardetea strictae (CI). Whilst many of our plots may represent bracken-invaded versions of vegetation from those classes, these classes appear poor solutions to that problem. Of the other non-wooded classes for which *Pteridium* is a diagnostic species, the Lonicerio-Rubetea plicati (CE) is perhaps the most appropriate. As mentioned under note 'e', our *Rubus fruticosus* agg. records have no diagnostic value in the EES.
- h. Very few (1.8%) of our **DU3A** plots were assigned to the Salicetea arenariae (CG). *Salix arenaria* (= *Salix repens* ssp. *argentea*) is one of only two diagnostic species for that class. As our *Salix repens* records were not to the subspecies level and this species as a whole is diagnostic for two other classes, diagnostic power was lost and most plots were instead assigned to the Molinio-Arrhenatheretea (CM). Nevertheless, the Salicetea arenariae appears to be the appropriate class for this willow-dominated community.
- i. The majority of **HE2B** plots were assigned to the Nardetea strictae (CI) rather than the Calluno-Ulicetea (CH). Whilst *Calluna vulgaris* is diagnostic for both classes, *Hypnum jutlandicum* and *Potentilla erecta* are diagnostic for the former but not the latter. Vegetation in which *Calluna vulgaris* is a very strong dominant is better placed in the Calluno-Genistion pilosae (CH02B) within the Calluno-Ulicetea. Similarly, many **HE2D** and **HE2E** plots were assigned to the Nardetea strictae, but both communities seem better split between the Calluno-Genistion pilosae and the Ericion tetracilis (PB01A).
- j. The majority of plots of both **HE3A** and **HE3B** were assigned to either the Vaccinio-Piceetea (a forest class) or the Nardetea strictae (CI), with a minority in each case assigned to the Calluno-Ulicetea (CH). *Rhytidiadelphus loreus*, *Hylocomium splendens* and *Sphagnum capillifolium* sens. str. are all diagnostic for the Vaccinio-Piceetea (BA) but not for the Calluno-Ulicetea. As mentioned under note 'i', *Hypnum jutlandicum* and *Potentilla erecta* are diagnostic for the Nardetea strictae but not the Calluno-Ulicetea. Nevertheless, these communities are clearly dwarf shrub heaths and have thus been placed in the Calluno-Ulicetea.
- k. **RH2D** is a variable community that did not score very highly for any of the classes. Although the Scheuchzerio palustris-Caricetea fuscae (PA) scored best, the Junceetea trifidi (CT) and the Nardetea strictae (CI) seem more appropriate classes for this upland assemblage of rocky habitats. Whilst no plots were assigned to the Mulgedio-Aconitetea (CS), the tall-herb element of the community could be referred to this class. Rodwell (2000) referred related vegetation, his U17 *Luzula sylvatica*-*Geum rivale* community, to it.
- l. **HE4B** scored highest for the Scheuchzerio palustris-Caricetea fuscae (PA) and the Nardetea strictae (CI). It is however poorly accommodated at the alliance level in the former class and is probably better split between the Oxycocco-Sphagnetea (PB) and the Nardetea strictae instead.
- m. **RH2E** has been classified under the Sedion anglici (CK02C) but it also has an affinity with the Thero-Airion (CK03A), an alliance within the same class that is very similar to the Sedion anglici and has been regarded as synonymous with it (Dengler, 2004; White and Doyle, 1982).
- n. **DU2C** scored highly for the Molinio-Arrhenatheretea (CM) like most of the **GL** grasslands, demonstrating the rather weak differentiation between fixed-dune grassland and inland mesic grassland in Ireland. Some plots were assigned to the Koelerio-Corynephoretea canescentis (CJ). However, this class is primarily for inland dunes and sandy steppes. Although no plots were assigned to it, the Helichryso-Crucianelletea maritimae (JE) appears to be a more suitable class for Atlantic coastal hind dune vegetation. Disagreement between phytosociologists about the separation of these latter two classes is noted in Mucina et al. (2016).

- o. The majority of **GL3F** plots were assigned to the Molinio-Arrhenatheretea (CM) and no plots were assigned to the Crithmo-Staticetea (JB). A case could be made, however, that the maritime cliff-top grassland of the **GL3Fi** *Plantago maritima* – *Plantago coronopus* sub-community would be better placed within this latter class. *Plantago coronopus*, a key indicator of this sub-community, is not listed as a diagnostic species for the Crithmo-Staticetea. We have opted to list **GL3F** under the Cochleario officinalis-Armerion maritimae (JB03B), but its sister alliance, the Silenion maritimae (JB03A), is a valid alternative. Similar vegetation to the **GL3Fi** has been classified to the Silenion maritimae in Britain (Malloch, 1971; Rodwell, 2000).
- p. The majority of **WE1E** plots were assigned to either the Polygono-Poetea annuae or the Molinio-Arrhenatheretea reflecting this is predominantly a community of trampled grasslands. Within the Polygono-Poetea annuae, **WE1E** was placed in the Polygono-Coronopodium rather than the Saginion procumbentis as *Polygonum aviculare* is more common than *Sagina procumbens*.
- q. The majority of plots of **HE4D** were assigned to the Alnetea glutinosae but **HE4D** is not a wooded community.
- r. Both **SM6B** and **SM6C** scored very highly for the Molinio-Arrhenatheretea (CM) and each does occur in mesic inland situations as the **SM6Bii** and **SM6Cii** sub-communities. However, the **SM6Bi** and **SM6Ci** sub-communities are found in the upper parts of saltmarshes and support halophytes such as *Juncus gerardii*, so these communities are also listed under the Armerion maritimae (MF03C) within the Juncetea maritimi (MF).
- s. Most **SC1G** plots were assigned to the Carpino-Fagetea sylvaticae (CA), partly due to the abundance of *Luzula sylvatica*. However, this class does not seem a great fit for this upland scrub community. *Salix aurita* is only diagnostic within the EES for the Franguletea (IB) but this also seems suboptimal as that class comprises willow carr vegetation. **SC1G** seems to be linked to the W20 *Salix lapponum-Luzula sylvatica* scrub of the NVC that is found in Scotland (Rodwell, 1991a). Although **SC1G** is lacking in truly montane willow species, MacKenzie (1997) mentions that *Salix aurita* can be a component of montane scrub. We have followed Rodwell (2000) in placing our *Salix-Luzula* scrub in the Salicion helveticae (= Salicion arbusculae) but the connection with Continental examples is admittedly tenuous.
- t. Vascular plant cover is very sparse in **RH2C** and bryophyte-dominated classes were not considered by our analysis. Consequently, this community did not score highly for any class. **RH2C** clearly, however, has affinities with the Racomitrietea heterostichi (SE). **RH2B** can also be linked with this class but it additionally can be listed under the Juncetea trifidi (CT).
- u. **DU2D** scored fairly strongly for the Festuco-Brometea (DA) but as discussed under note 'n', a case can be made for also listing it under the Helichryso-Crucianelletea maritimae (JE), a class which Preislerová et al. (2022) map as occurring in Ireland but to which very few if any of our plots were actually assigned. *Galium verum*, *Hypochaeris radicata*, *Poa pratensis/humilis*, *Lotus corniculatus* and *Luzula campestris* were all regarded as diagnostic species for the Koelerion arenariae by Marcenò et al. (2018) and are common in **DU2D** (and **DU2C**).
- v. The majority of plots of **GL3A** were assigned to the Molinio-Arrhenatheretea (CM) but a sizeable minority were assigned to the Festuco-Brometea (DA). Other communities in the **GL3** group were overwhelmingly assigned to the former class, but all occur on distinctly more fertile soils than **GL3A**, which with its suite of calcicolous species appears to fit better within the Festuco-Brometea.
- w. *Fraxinus excelsior* is not listed as a diagnostic species for the Alno glutinosae-Populetea albae (HA) despite the Alno-Fraxinetales excelsioris (HA02) being a constituent order. It is only listed as a diagnostic species for the Carpino-Fagetea sylvaticae (CA). This led to the wet ash woodlands of **WL3A** and **WL3C** having poor calculated correspondence for the Alno glutinosae-Populetea albae. Nevertheless, this appears to be the most appropriate placement for these communities.
- x. **WL3B** did not score particularly well for any class with the Molinio-Arrhenatheretea (CM), a non-wooded class, coming out on top. These alder stands are probably best split between the Alno glutinosae-Populetea albae (HA) and the Alnetea glutinosae (IA).
- y. **WL3D** did not score particularly well for any class with the Molinio-Arrhenatheretea (CM), a non-wooded class, coming out on top. The **WL3Dii** *Crataegus monogyna* – *Dryopteris dilatata* sub-community is best placed within the Franguletea (IB), whereas the **WL3Dii** *Salix fragilis* – *Calystegia sepium* sub-community clearly be-

- longs in the *Salicetea purpureae* (HB).
- z. **WL3E** and **WL3F** had higher affinities for the *Alnetea glutinosae* (IA) than for the *Franguletea* (IB), but the former class enjoys a long list of diagnostic field layer species, whereas the latter does not. It is apparent that these willow carr communities are best regarded as part of the *Franguletea*.
  - aa. **RH3B** scored highest for the *Ammophiletea* (JD) but coastal rock elements are probably better accommodated within the *Crithmo-Staticetea* (JB). The mine-spoil aspect of this community could be referred to the *Thlaspietea rotundifolia* (KE) although no plots were assigned there.
  - bb. **ST1A** has been placed under the *Atriplicion littoralis* (JC01A) as *Tripleurospermum maritimum* is a character species according to White and Doyle (1982), but note that *Atriplex littoralis* is seldom found in **ST1A**, which could instead be placed under the *Salsolo-Minuartion peploides* (JC01B).
  - cc. The **SM7Ai** *Atriplex prostrata* sub-community is best placed within the *Cakiletea maritimae* (JC). The **SM7Aii** *Holcus lanatus* - *Potentilla anserina* sub-community has been placed in the *Artemisietea vulgaris* (QF). It largely occurs in semi-ruderal situations in Ireland and similar vegetation was classified within the *Artemisietea* by Láníková et al. (2009). A proportion of **SM7A** plots were assigned to the *Molinio-Arrhenatheretea* (CM) but the vegetation seems to be poorly accommodated at the alliance level within that class. *Elytrigia repens* is a diagnostic species for all three of these classes.
  - dd. The majority of **DU2B** plots were assigned to the *Koelerio-Corynephoretea canescentis* (CJ), the *Festuco-Brometea* (DA) or the *Molinio-Arrhenatheretea* (CM). No plots were assigned to the *Helichryso-Crucianelletea maritimae* (JE), yet this appears to be the intended home for coastal grey dunes as the *Koelerio-Corynephoretea canescentis* instead represents inland dunes (see notes 'n' and 'u'). Rodwell assigned some British duneland to the *Koelerion arenariae* (JE01A). White and Doyle (1982) assigned Irish dune vegetation to the *Galio-Koelerion* (= *Koelerion arenariae*). The *Koelerion arenariae* was previously in the *Koelerio-Corynephoretea canescentis* but is now in the *Helichryso-Crucianelletea maritimae*.
  - ee. The large majority of **RH4A** plots were classified by the EES to the *Crithmo-Staticetea* (JB) and none to the *Asplenietea trichomanis* (KC). Both classes list *Asplenium marinum* as a diagnostic species, but it appears that the intention is for vegetation characterized primarily by the presence of this species to be classified as under the *Asplenion marini* (KC10A).
  - ff. The **RH1C** community could also be placed under the *Asplenietea trichomanis* (KC).
  - gg. **RH3A** did not score particularly well for any class with the *Molinio-Arrhenatheretea* (CM) coming out on top. This is partly because several of the specialist bryophyte species that characterise **RH3A** are not listed by the EES as diagnostic species. The *Thlaspietea rotundifolia* (KE) appears to be a more logical place for such vegetation as it contains alliances specifically for heavy-metal mine spoil. Arguably, **RH3A** could be regarded as a bryophyte assemblage, but none of the moss and lichen communities of Mucina et al. (2016) mention metallophytes.
  - hh. **SM4A** scored highly for the *Molinio-Arrhenatheretea* (CM) and can occasionally occur in mesic inland habitats. However, it is mostly found containing halophytes as part of the upper saltmarsh and so has instead been listed under the *Armerion maritimae* (MF03C) within the *Juncetea maritimi* (MF).
  - ii. **FE4B** did not score particularly well for any class, with the *Molinio-Arrhenatheretea* (CM) and the *Scheuchzerio palustris-Caricetea fuscae* (PA) coming out as the top matches. The dominance of *Palustriella commutata*, however, better places this community in the *Cratoneurion commutati* within the *Montio-Cardaminetea* (OA).
  - jj. **SM6A** plots scored highly for the *Juncetea maritimi* (MF) and rather lowly for the *Phragmito-Magnocaricetea* (OD). This was because *Bolboschoenus maritimus* is only listed as a diagnostic species for the former class. However, **SM6A** vegetation does not appear to be suitably accommodated anywhere at the alliance level within the *Juncetea maritimi*. The *Scirpion maritimi* (OD02A) appears to be the intended alliance for vegetation dominated by this species. In Mucina et al. (2016), it is suggested that the *Bolboschoenetalia maritimi* (OD02) order could instead be classified within the *Juncetea maritimi*.

- kk. The **FW3Ci** *Phragmites australis* - *Equisetum fluviatile* sub-community is best placed in the Phragmito-Magnocaricetea (OD). The **FW3Cii** *Sphagnum subsecundum* agg. - *Potamogeton polygonifolius* sub-community is best placed in the Scheuchzerio palustris-Caricetea fuscae (PA).
- ll. **FW3J** scored highest for the Alnetea glutinosae (IA) but it is a non-wooded swamp community.
- mm. **FE1B** plots were divided between the Scheuchzerio palustris-Caricetea fuscae (PA) and the Molinio-Arrhenatheretea (CM). *Schoenus nigricans* is a diagnostic species for both classes. However, within the Molinio-Arrhenatheretea, the only place to accommodate *Schoenus*-rich vegetation appears to be in the Holochoenetalia (CM07) and this does not seem to match well with Irish vegetation.
- nn. **FE1D** scored highest for the Alnetea glutinosae (IA) but it is a non-wooded fen community.
- oo. **FE3A** was placed within the Caricetalia davallianae (PA01) rather than the Caricetalia fuscae (PA03) as it is slightly calcareous in nature rather than slightly acidic.
- pp. **FE2D** and **FE2F** both scored highest for the Alnetea glutinosae (IA) but they are non-wooded mire communities.
- qq. The majority of plots of **BG1C**, **BG2D** and **BG2F** were assigned to the Scheuchzerio palustris-Caricetea fuscae (PA). This was partly because *Schoenus nigricans* and *Trichophorum cespitosum/germanicum* are both diagnostic species for this class. They are not diagnostic species for the Oxycocco-Sphagnetea (PB). However, these are clearly communities of wet heath and bog rather than fen, transition mire or bog hollow, so they have been placed in the Oxycocco-Sphagnetea. Hájková (2011) classified bog vegetation with *Trichophorum cespitosum* to the Oxycocco-Sphagnetea.
- rr. **HE4A** scored highly for the Scheuchzerio palustris-Caricetea (PA). This was partly because *Trichophorum cespitosum/germanicum* is a diagnostic species for that class. It is not a diagnostic species for the Oxycocco-Sphagnetea (PB), yet HE4A is clearly a wet heath and bog community so it has been placed in the Oxycocco-Sphagnetea.
- ss. The majority of **HE4C** plots were assigned to the Scheuchzerio palustris-Caricetea (PA), for which *Schoenus nigricans* is a diagnostic species, or to the Molinio-Arrhenatheretea (CM), for which *Molinia caerulea* is a diagnostic species. Neither *Schoenus nigricans* nor *Molinia caerulea* is diagnostic for the Oxycocco-Sphagnetea (PB), yet **HE4C** is clearly a wet heath and bog community so it has been placed in the Oxycocco-Sphagnetea.
- tt. The majority of **HE4F** plots were assigned to the Alnetea glutinosae (IA), Scheuchzerio palustris-Caricetea (PA) or the Molinio-Arrhenatheretea (CM). *Myrica gale* is a diagnostic species for the Alnetea glutinosae (and no other class), but this wooded class seems a poor fit for **HE4F** which is clearly related to other wet heath communities of the Oxycocco-Sphagnetea (PB).
- uu. The majority of plots of **WE1F** were assigned to the Papaveretea rhoeadis (QA) but the constant presence of *Polygonum aviculare* and the frequent presence of *Poa annua* and *Plantago major* suggest that this community could also be considered with the trampled habitats of the Polygono-Poetea annuae (QE).
- vv. **SC1F** scores highest for the Molinio-Arrhenatheretea (CM) and it can be rather grassy, yet it is probably better placed in the second-best scoring class, the Epilobieteae angustifolia (QG).
- ww. Vascular plant cover is very sparse in **FW2A** and **FW2B** and bryophyte-dominated classes were not considered by our analysis. Consequently, this community did not score highly for any class. Both communities can be comfortably accommodated in the Platyhypnidio-Fontinalietea antipyreticae (SA) however.

**Table 7.** Results of the analysis based on the EuroVegChecklist Expert System. For each IVC community, the codes for the three phytosociological classes with the highest percentage of points are presented. Class codes are explained in the preceding conspectus.

IVC	1		2		3		IVC	1		2		3	
BG1A	PA	92.5	PB	5.8	OB	1.7	FE2F	IA	62.4	PA	24.9	OD	7.5
BG1B	PA	97.9	PB	2.1	-	-	FE3A	PA	47.9	CM	34.6	IA	13.4
BG1C	PA	76.9	PB	15.6	CM	5.3	FE3B	CM	95.5	IA	1.7	PA	1.7
BG1D	PA	95.4	CJ	1.8	PB	1.8	FE3C	OD	77.5	CM	12.4	PA	3.8
BG2A	PB	85.9	PA	14.1	-	-	FE3D	CM	40.3	IA	27.7	OD	18.4
BG2B	PB	84.6	PA	15.4	-	-	FE4A	OA	54.5	CM	27.3	CI	9.1
BG2C	PB	51.7	PA	46.4	CH	1.5	FE4B	CM	29.4	PA	29.4	OA	17.6
BG2D	PA	74.9	PB	24.7	IA	0.4	FW1A	OB	71.0	PA	13.3	NB	6.2
BG2E	PB	51.7	PA	47.5	CI	0.8	FW1B	OB	96.0	OD	2.2	PA	1.8
BG2F	PA	94.3	PB	5.7	-	-	FW1C	PA	53.8	CJ	20.0	CM	10.8
DU1A	JD	90.9	JC	4.1	MF	1.2	FW1D	NB	98.7	OB	1.3	-	-
DU1B	JD	98.6	DA	0.7	CM	0.5	FW2A	OD	25.7	NB	24.3	NA	22.4
DU2A	JD	50.2	CM	37.4	DA	10.1	FW2B	OD	21.6	OA	21.5	NB	19.6
DU2B	CJ	36.3	DA	27.7	CM	23.8	FW2C	NB	48.8	OD	43.1	NA	4.1
DU2C	CM	81.3	DA	12.9	CJ	5.0	FW2D	OD	65.8	NB	34.2	-	-
DU2D	DA	51.3	CM	40.3	CL	3.8	FW2E	OD	71.2	NB	23.4	KA	2.2
DU3A	CM	72.4	DA	15.8	IA	5.3	FW2F	NB	69.4	MC	19.0	OD	11.2
DU3B	CM	76.4	IA	22.0	OD	0.8	FW2G	NB	70.5	OD	22.7	QI	4.5
DU3C	CM	88.9	CJ	2.8	QE	2.8	FW2H	NB	100.0	-	-	-	-
DU3D	CM	88.3	PA	8.4	DA	2.8	FW2I	NB	92.0	IA	4.0	PA	4.0
DU3E	CM	91.8	DA	8.2	-	-	FW2J	NB	80.0	OD	15.0	IA	5.0
FE1A	PA	99.0	IA	0.5	CM	0.5	FW2K	NB	100.0	-	-	-	-
FE1B	PA	56.3	CM	38.1	IA	3.4	FW3A	OD	82.0	NB	18.0	-	-
FE1C	PA	88.5	OB	5.7	CM	4.6	FW3B	OD	55.5	CM	14.5	PA	10.0
FE1D	IA	38.5	PA	25.7	CM	18.2	FW3C	OD	35.0	PA	34.3	IA	17.4
FE2A	OD	35.9	PA	26.6	IA	21.9	FW3D	OD	88.8	NB	6.1	QI	2.0
FE2B	PA	85.3	OB	8.2	IA	4.9	FW3E	OD	56.6	IA	28.5	CM	4.4
FE2C	PA	83.5	IA	12.2	BA	1.7	FW3F	CM	70.8	OD	18.1	IA	10.4
FE2D	IA	34.3	PA	31.3	OD	25.4	FW3G	OD	56.7	NB	13.5	IA	10.6
FE2E	PA	69.6	CM	15.5	IA	14.9	FW3H	OD	91.5	PA	3.4	OB	1.7

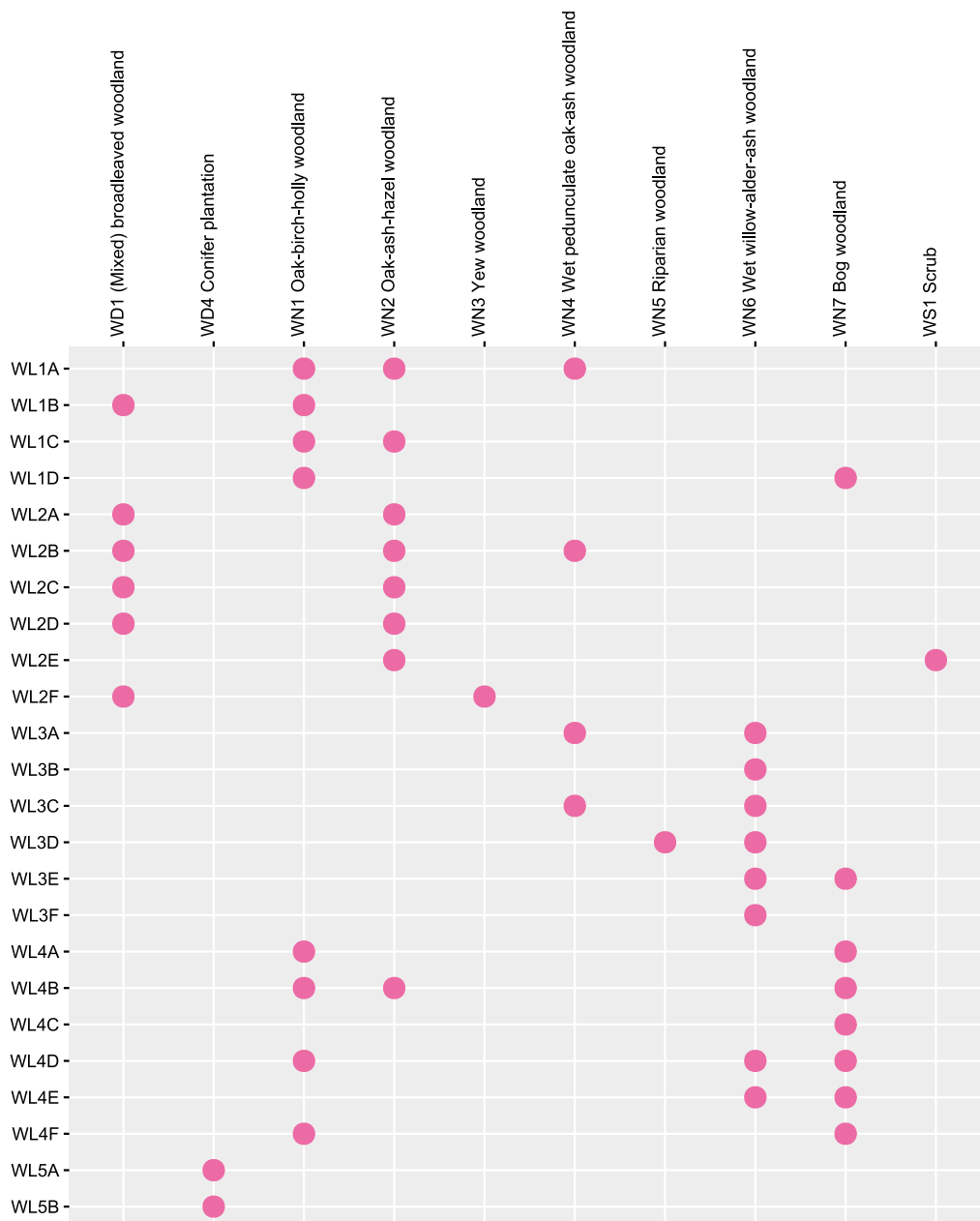
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FW3I	OD	82.2	NB	13.3	MF	2.2	HE3A	BA	69.9	CI	19.2	CH	4.2
FW3J	IA	39.6	OD	31.3	PA	25.0	HE3B	BA	40.6	CH	22.4	CI	19.6
FW3K	OD	60.0	CM	33.3	IA	6.7	HE3C	CI	57.6	PA	21.2	CH	20.2
FW3L	OD	100.0	-	-	-	-	HE3D	CH	52.0	CI	26.6	LA	6.5
FW3M	OD	100.0	-	-	-	-	HE3E	CI	41.6	BA	15.9	CT	10.6
FW3N	OD	56.6	CM	43.4	-	-	HE3F	PB	65.5	BA	16.0	PA	12.6
GL1A	CM	98.2	IA	1.8	-	-	HE3G	CI	63.7	PB	19.6	BA	10.7
GL1B	CM	92.7	IA	7.3	-	-	HE4A	PA	57.8	PB	28.6	CM	6.1
GL1C	CM	91.7	IA	5.3	PA	2.6	HE4B	PA	64.4	CI	21.9	CM	3.8
GL1D	CM	81.7	IA	14.3	PA	1.5	HE4C	PA	60.6	CM	20.1	PB	16.3
GL1E	CM	97.8	IA	1.8	PA	0.4	HE4D	IA	50.0	CM	33.2	PA	7.4
GL2A	CM	98.7	OD	1.3	-	-	HE4E	PB	31.0	IA	30.4	PA	21.1
GL2B	CM	100.0	-	-	-	-	HE4F	IA	59.2	PA	29.3	CM	8.2
GL2C	CM	99.7	OC	0.3	-	-	IN1A	CA	33.3	HA	14.8	IA	11.1
GL2D	CM	93.6	IA	2.3	CJ	1.8	IN1B	CM	72.3	IA	13.8	CA	10.8
GL3A	CM	59.3	DA	37.5	CI	2.6	RH1A	DA	40.7	KC	25.3	CD	7.1
GL3B	CM	99.9	CJ	0.1	-	-	RH1B	DA	46.8	CD	21.4	CA	11.5
GL3C	CM	99.7	DA	0.3	-	-	RH1C	KC	50.0	KD	38.2	CM	5.9
GL3D	CM	100.0	-	-	-	-	RH1D	KD	50.0	QC	30.0	KC	20.0
GL3E	CM	98.5	DA	0.7	KE	0.7	RH2A	KB	64.3	KE	14.3	KC	7.1
GL3F	CM	89.7	DA	6.8	CI	1.4	RH2B	CT	40.3	CI	37.8	BA	5.6
GL3G	CM	96.8	OD	3.2	-	-	RH2C	AE	18.4	LA	18.4	BA	15.8
GL4A	CM	99.1	CI	0.7	CH	0.2	RH2D	PA	30.6	CT	16.3	CI	10.2
GL4B	CI	87.7	CM	7.5	BA	2.4	RH2E	CK	63.6	QE	18.2	CJ	9.1
GL4C	CM	73.8	CI	21.0	CL	2.1	RH2F	CI	41.4	CT	34.5	LA	20.7
GL4D	CM	73.9	PA	10.9	IA	9.2	RH3A	CM	28.9	CI	16.7	CL	12.2
HE1A	DA	69.4	CI	12.3	AB	6.8	RH3B	JD	62.5	JB	28.1	JC	6.3
HE2A	CH	94.9	CI	5.1	-	-	RH4A	JB	90.9	CA	9.1	-	-
HE2B	CI	64.6	CH	24.9	BA	3.7	RH4B	JB	32.3	JA	23.7	CM	19.4
HE2C	CH	48.7	CI	37.3	KB	4.7	SC1A	CD	69.0	CA	13.8	HA	6.9
HE2D	CH	25.3	PB	22.8	CI	21.5	SC1B	CM	67.3	CA	18.4	HA	8.2
HE2E	CH	50.4	CI	20.9	PA	20.1	SC1C	CM	48.4	CI	25.4	CL	6.5

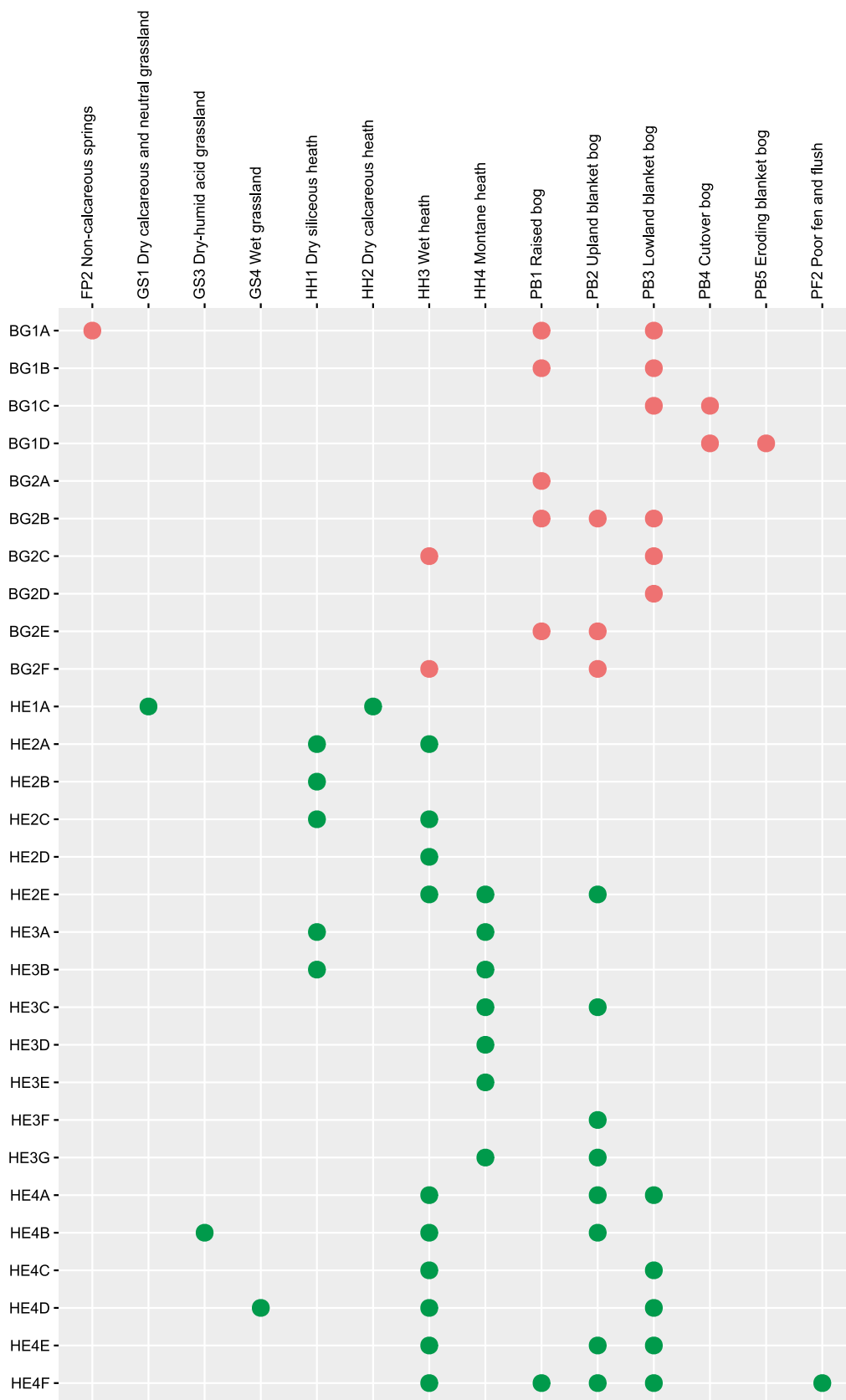
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SC1D	FE	50.0	CA	25.0	CM	12.5
SC1E	CM	83.9	OD	6.5	KA	3.2
SC1F	CM	65.0	QG	13.3	QF	6.7
SC1G	CA	73.3	CM	20.0	OA	6.7
SM1A	ME	87.9	MD	5.4	MF	5.3
SM1B	MD	66.2	MF	30.2	ME	2.9
SM1C	ME	71.4	MF	21.4	QI	2.9
SM2A	MF	83.0	ME	15.5	JA	0.7
SM2B	MF	85.1	JB	6.5	MG	4.4
SM2C	MF	63.1	ME	34.6	MG	1.3
SM2D	MF	61.4	ME	26.6	MD	9.4
SM3A	MF	88.4	ME	3.8	JA	1.6
SM3B	MF	99.4	ME	0.4	JB	0.2
SM4A	CM	81.0	MF	16.8	QF	0.5
SM4B	MF	86.7	CM	11.8	JD	0.5
SM4C	MF	82.3	CM	10.2	JB	4.7
SM4D	MF	65.0	CM	27.0	JB	2.6
SM5A	MF	76.9	CM	23.1	-	-
SM5B	MF	94.5	CM	3.9	QI	0.6
SM6A	MF	83.3	OD	5.9	QI	4.3
SM6B	CM	89.8	MF	4.8	OD	4.0
SM6C	CM	98.9	OC	0.7	JC	0.4
SM6D	MF	74.9	CM	23.4	QI	0.4
SM7A	QF	75.0	CM	21.3	MF	1.9
SM7B	MF	83.3	QF	16.7	-	-
ST1A	JC	68.4	CM	11.8	MF	9.2
ST1B	JC	85.4	JD	14.6	-	-
ST1C	JD	54.4	JC	27.8	JB	6.7
SW1A	MC	88.8	NB	10.4	OD	0.8
SW1B	MA	92.9	MC	7.1	-	-
WE1A	QA	62.5	QB	20.8	CM	11.7

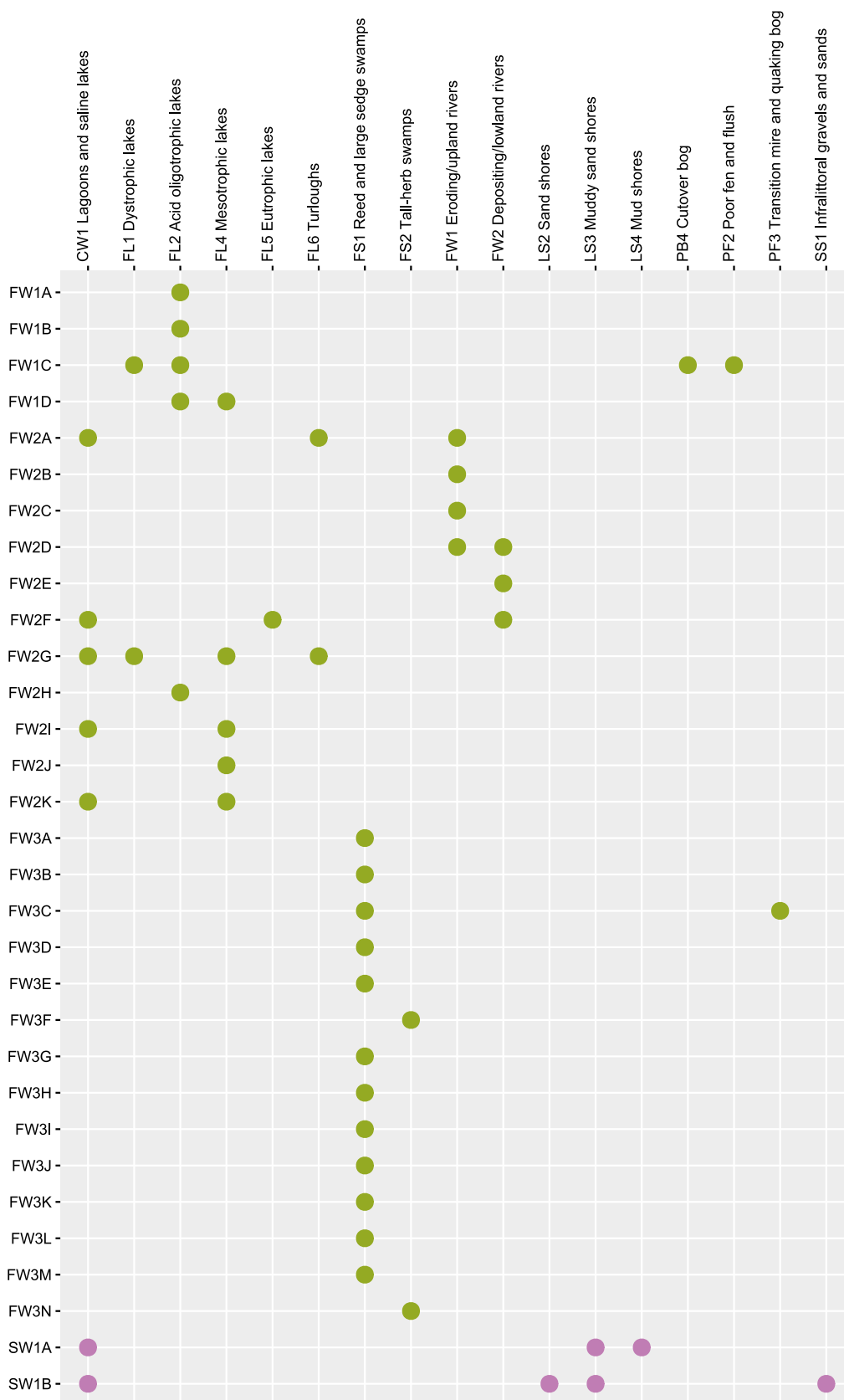
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WE1C	QA	81.1	QB	10.1	CM	3.5
WE1D	CM	81.7	QA	15.4	QB	1.9
WE1E	CM	57.9	QE	30.3	QB	5.3
WE1F	QA	50.6	CM	39.8	QB	7.2
WE2A	OC	66.7	QI	16.7	CM	16.7
WE2B	OC	65.4	PA	17.3	OD	11.5
WL1A	CA	93.8	CC	6.2	-	-
WL1B	CA	95.1	CC	4.2	HA	0.7
WL1C	CA	86.7	CD	9.6	CM	1.5
WL1D	CA	60.8	CC	17.6	BA	11.1
WL2A	CA	96.5	CD	1.4	CM	0.7
WL2B	CA	98.2	BC	0.6	QG	0.6
WL2C	CA	93.0	HA	4.0	CD	1.5
WL2D	CA	97.8	HA	1.1	CC	1.1
WL2E	CA	63.1	CD	31.6	CM	1.2
WL2F	CA	83.3	KB	16.7	-	-
WL3A	CA	67.2	IA	8.6	HA	8.6
WL3B	CM	31.4	HA	20.9	CA	17.4
WL3C	CA	65.2	HA	14.5	IA	10.1
WL3D	CM	32.6	CA	18.6	IB	15.1
WL3E	IA	61.1	CM	13.9	OD	11.1
WL3F	OD	34.9	IA	31.7	CM	14.3
WL4A	CA	77.5	KB	14.1	IA	1.4
WL4B	CA	25.4	KB	23.9	CM	16.9
WL4C	IA	62.5	PB	22.5	PA	7.5
WL4D	CA	61.7	KB	18.5	IB	13.6
WL4E	IA	47.5	CA	15.3	IB	13.6
WL4F	CA	38.2	IB	21.2	CL	8.2
WL5A	CM	19.3	KB	18.9	CI	18.4
WL5B	CI	41.2	KB	20.6	CM	14.7

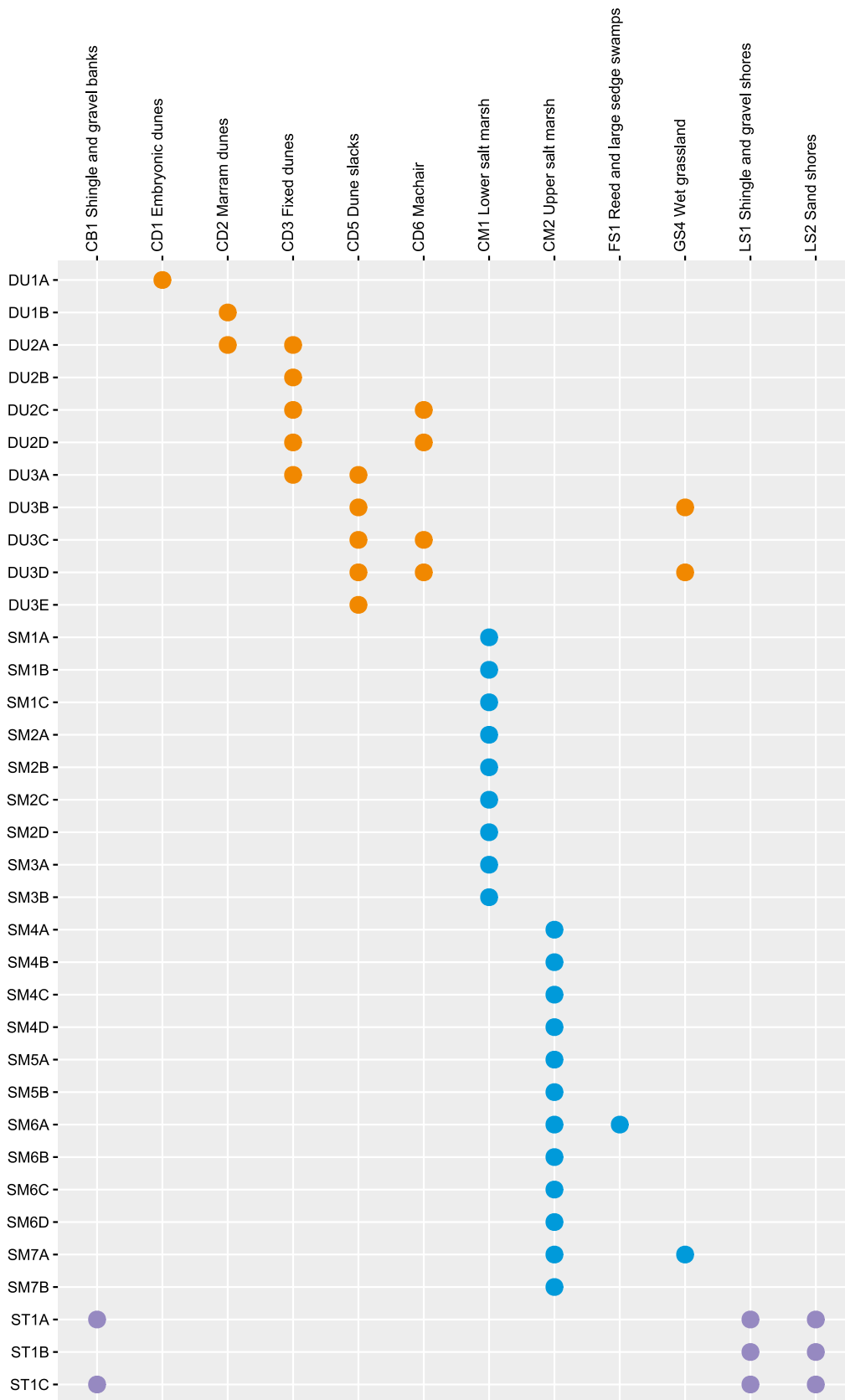
# Heritage Council habitats

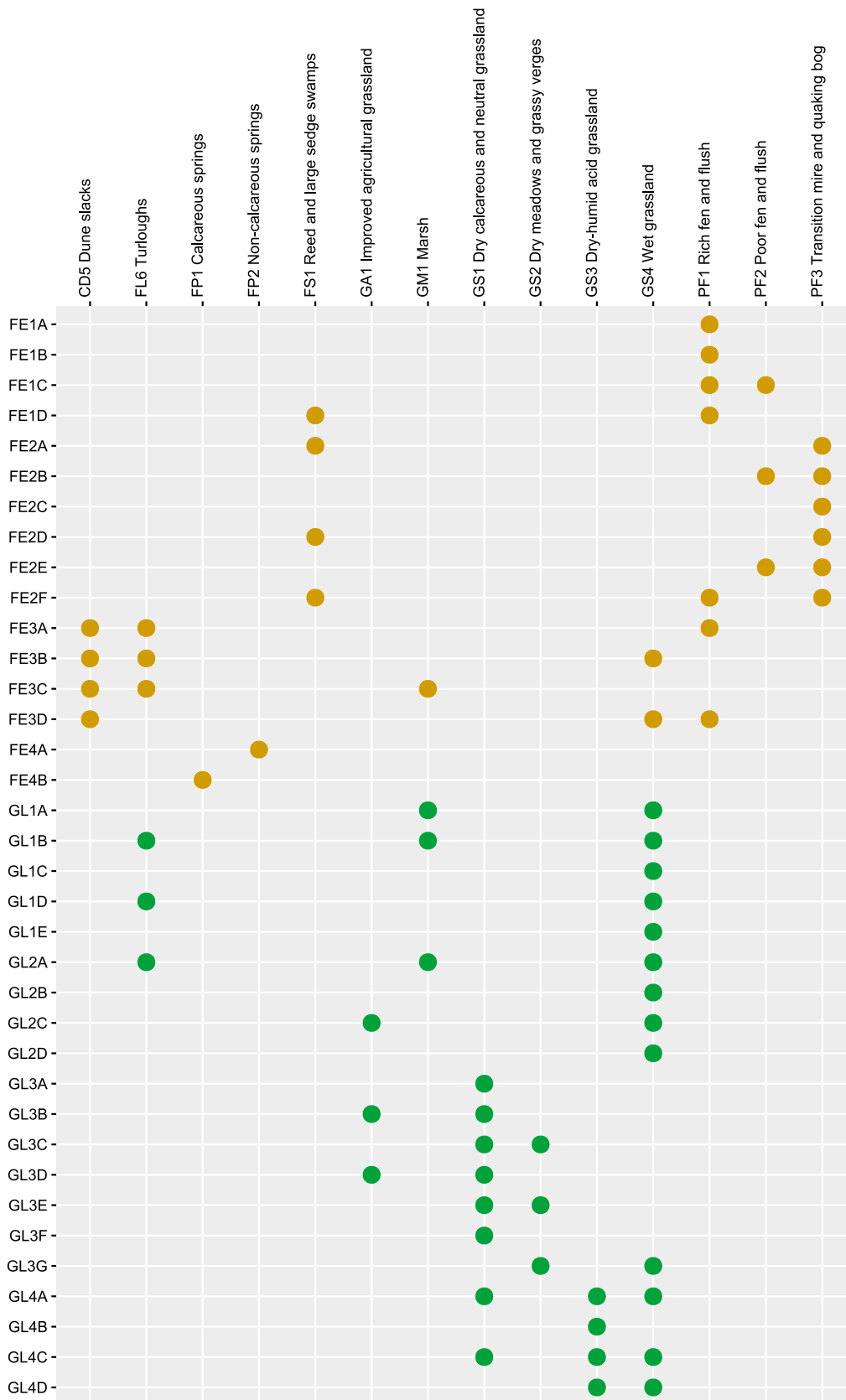
In this section, the main affinities between IVC communities and habitat categories of *A Guide to Habitats in Ireland* (Fossitt, 2000) are summarised. Other connections between the two classification schemes are possible but are probably weaker.

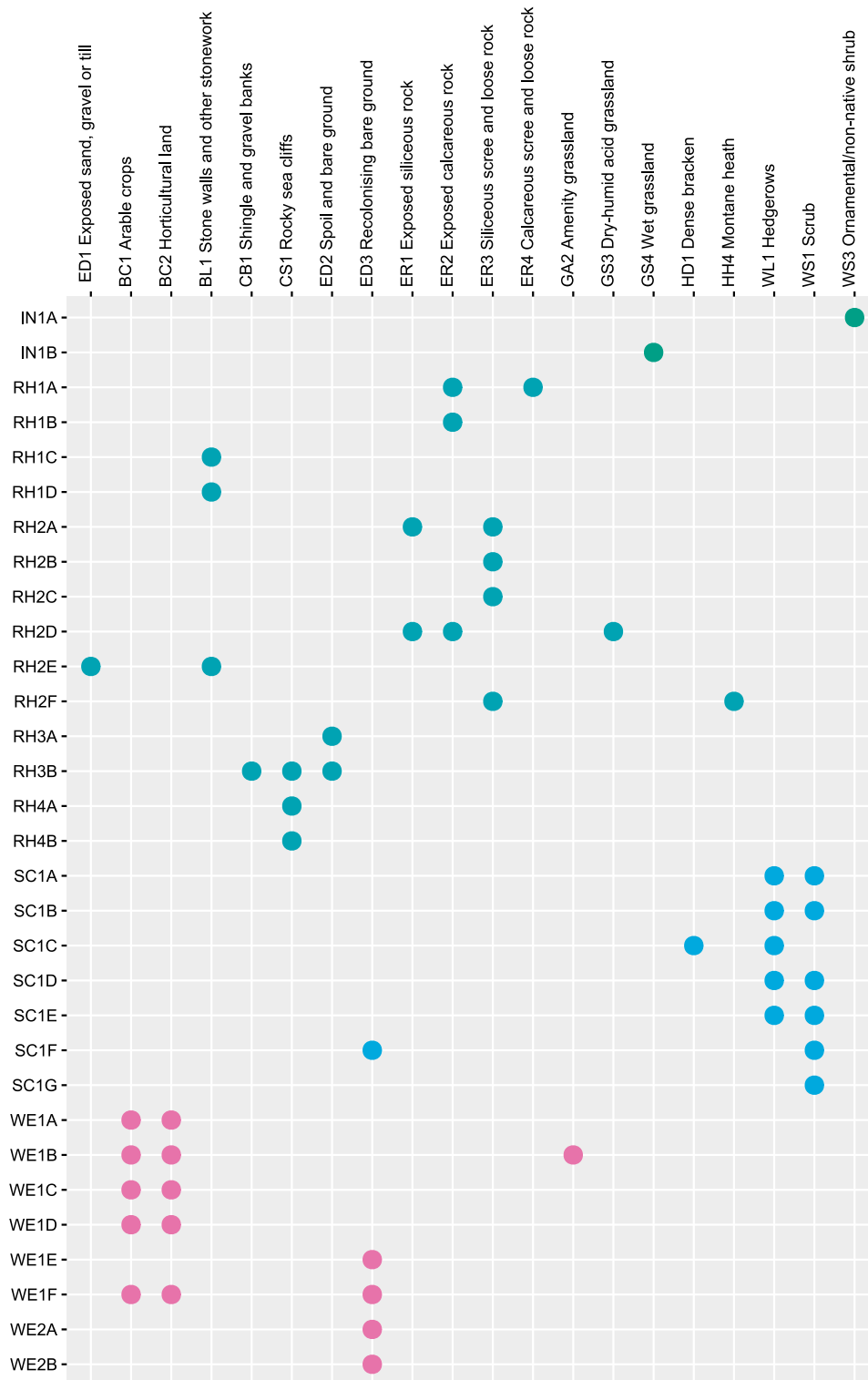










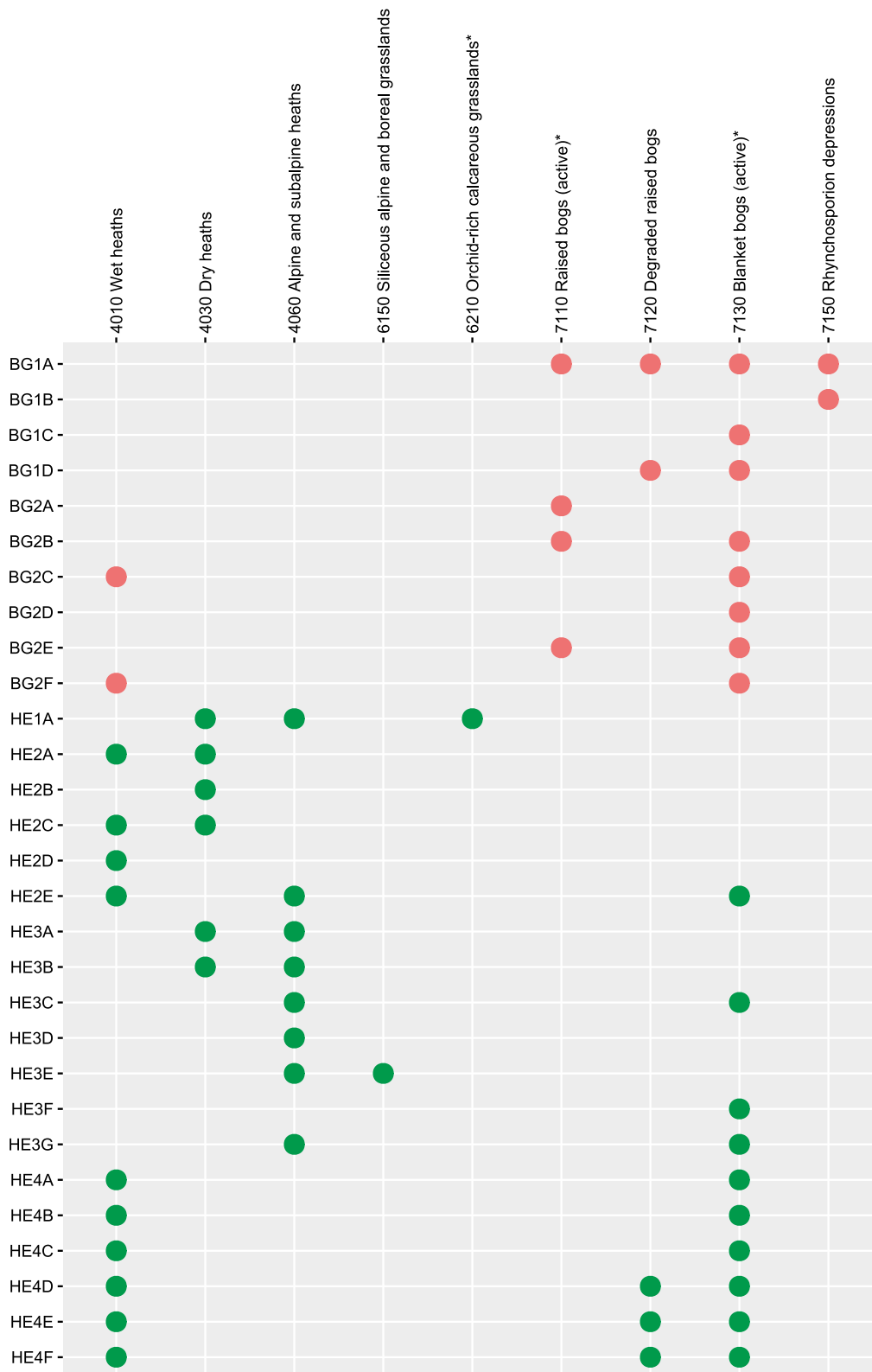


# EU Habitats Directive

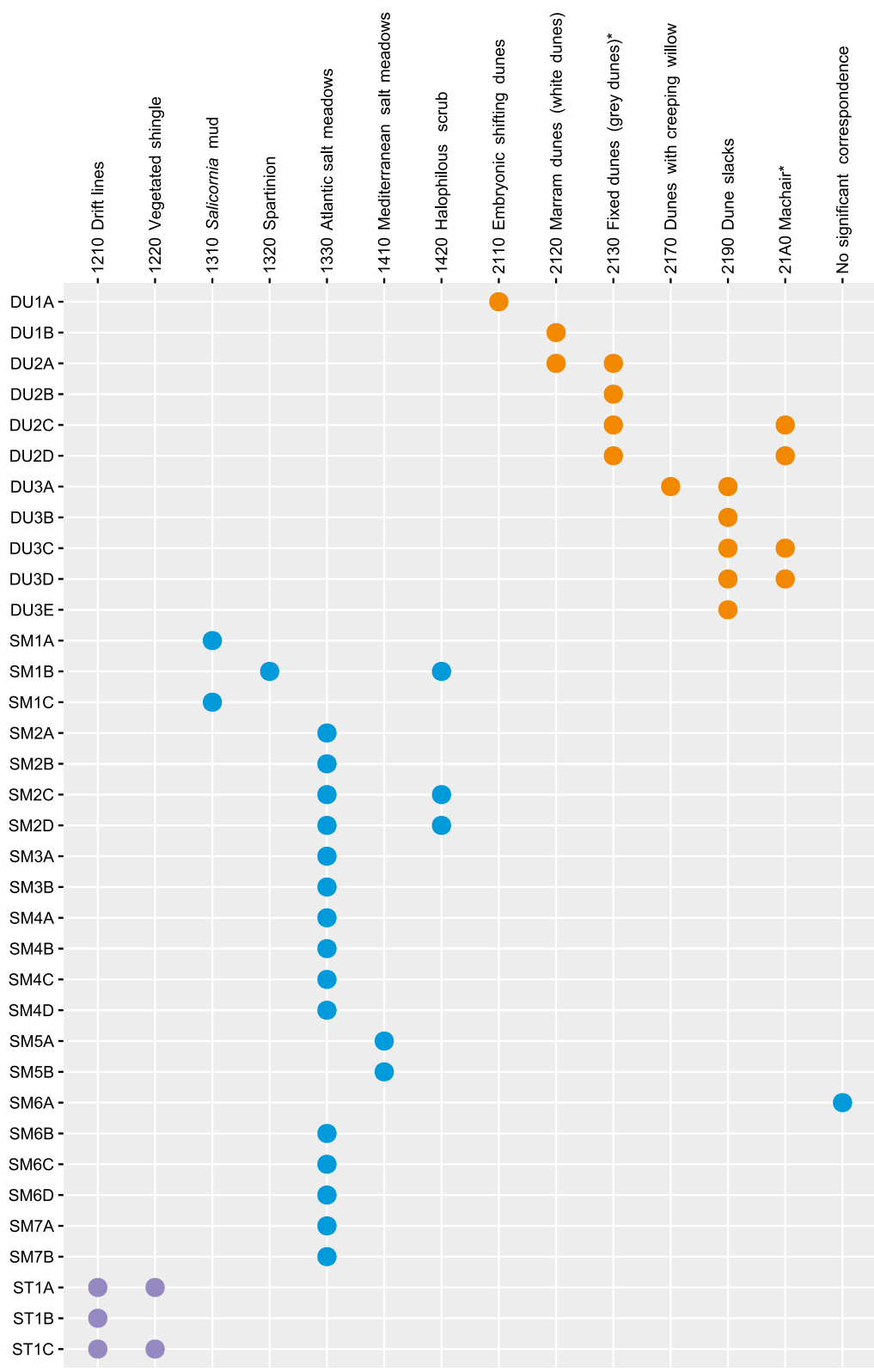
## Annex I habitats

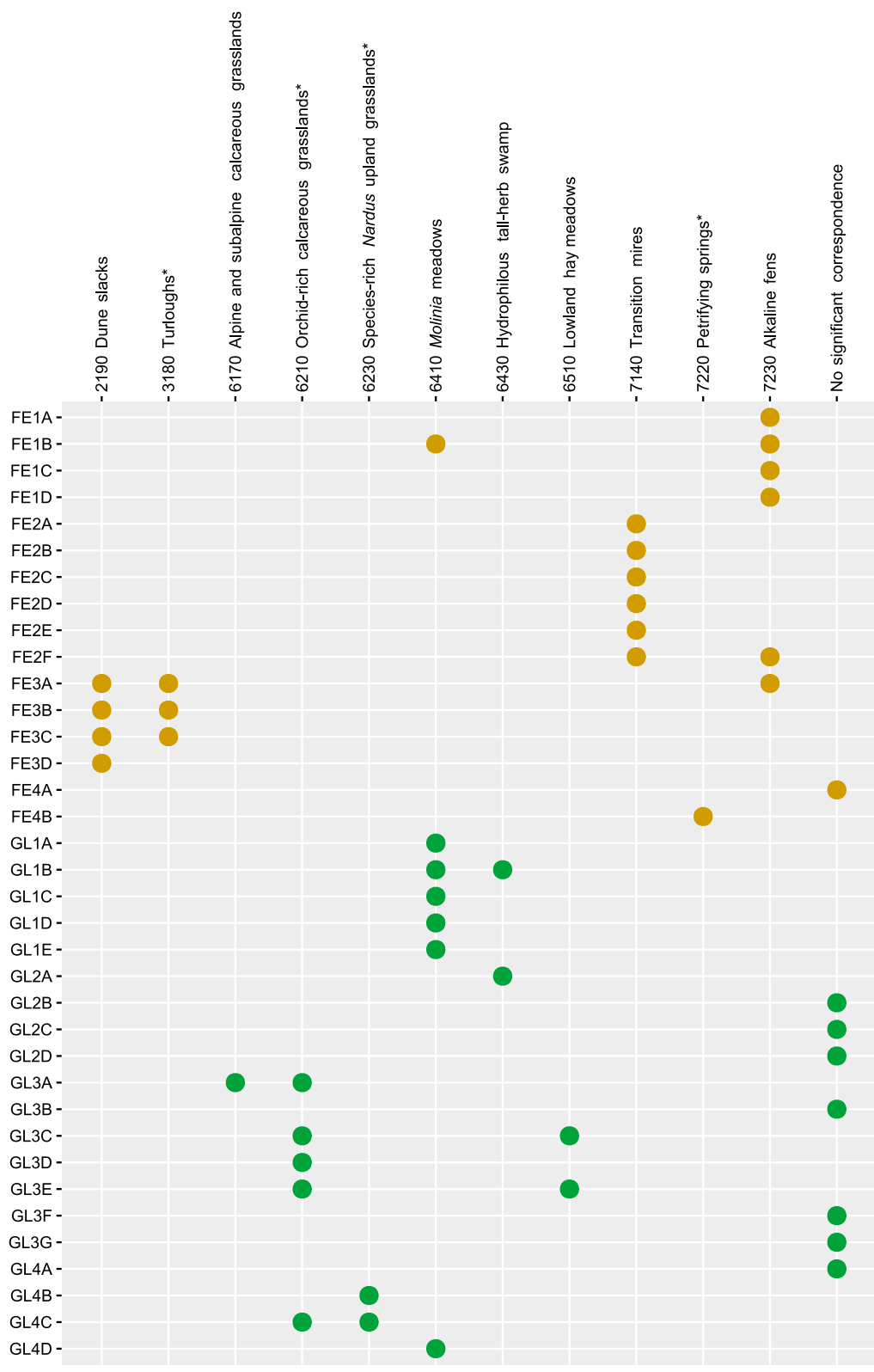
**I**n this section, the main affinities between IVC communities and habitats listed under Annex I of the EU Habitats Directive are summarised. Other connections between the two schemes are possible but are probably weaker. Note that the interpretation of Annex I habitats in Ireland is still evolving and where the identification of Annex I habitats is important to your project, you should always refer directly to the most recent definitions provided by NPWS.

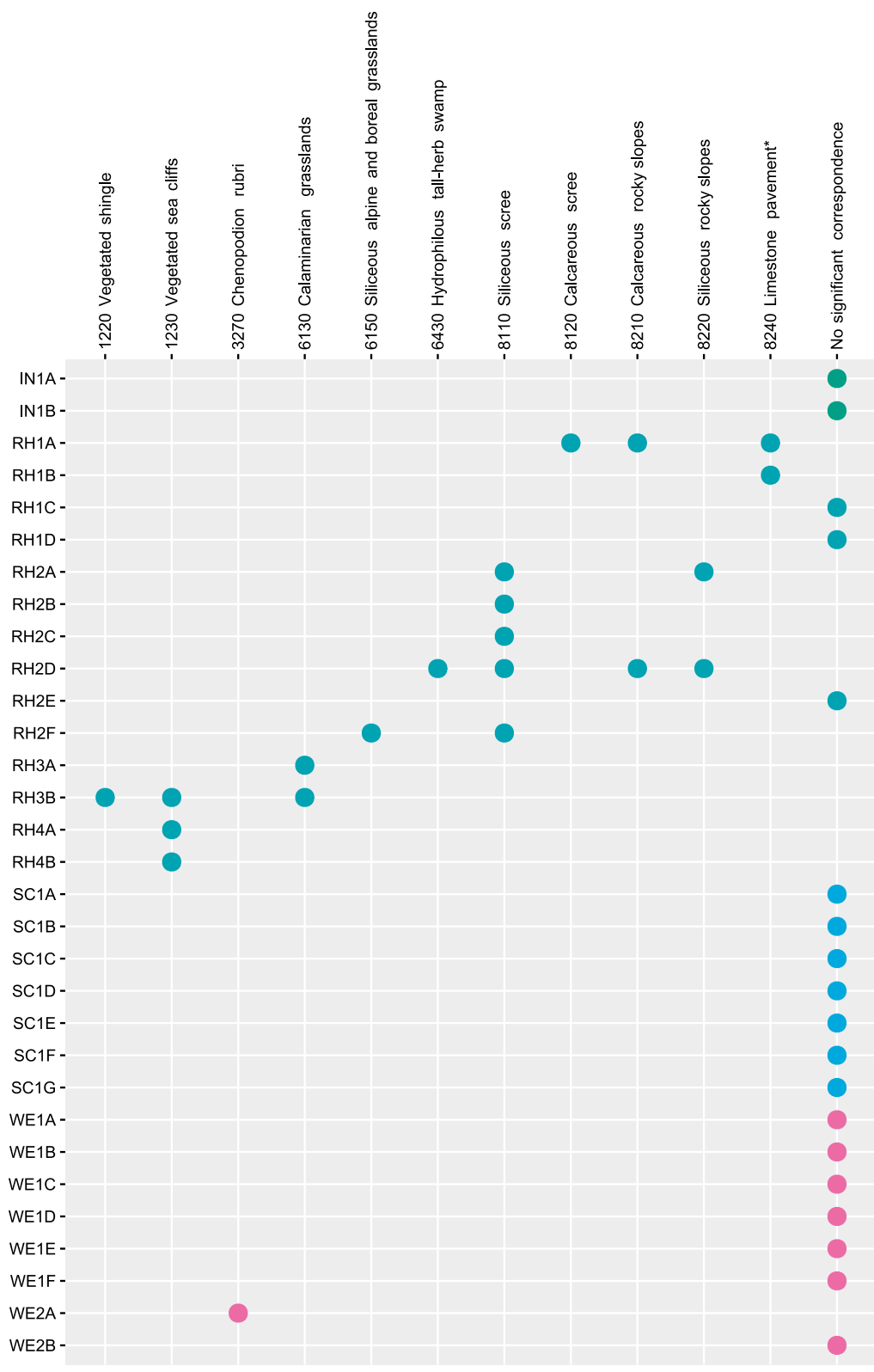












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**NPWS**

An tSeirbhís Páirceanna  
Náisiúnta agus Fiadhúlra  
National Parks and Wildlife Service



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**An Chomhairle Oidhreachta  
The Heritage Council**



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