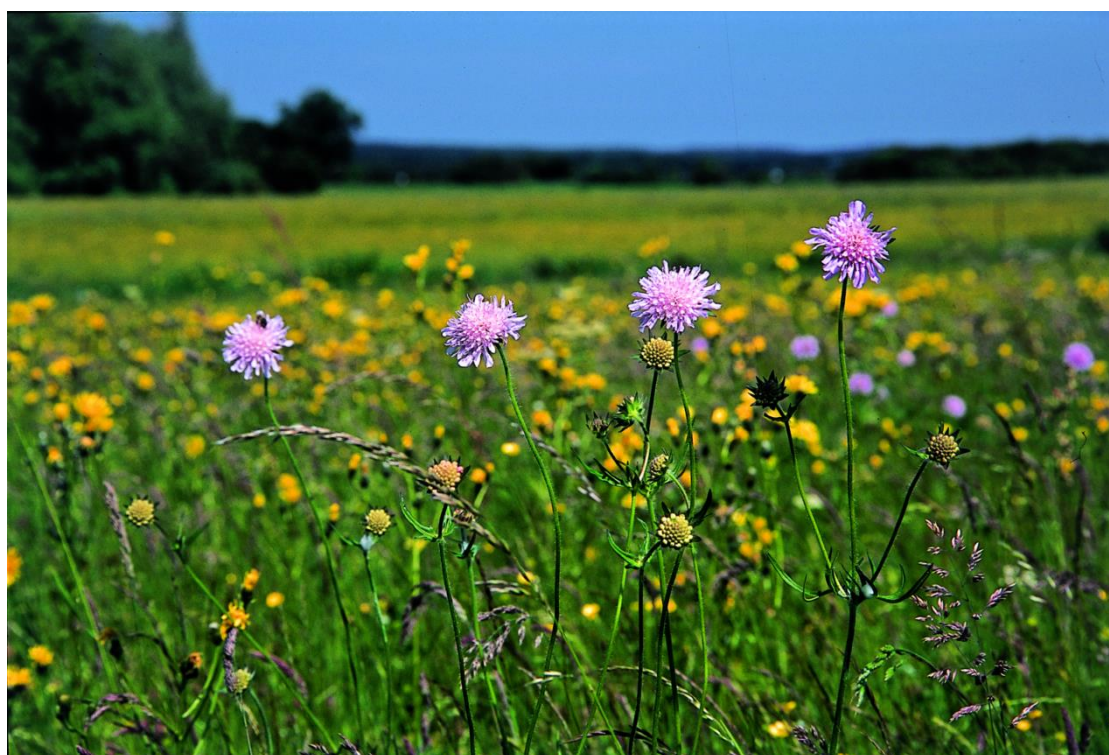


Review of grassland habitats and development of distribution maps of heathland, scrub and tundra habitats of EUNIS habitats classification



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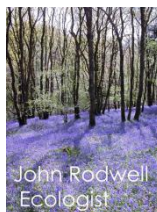
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1 Introduction

Documenting, monitoring and assessing habitats in a comparable manner across Europe is required for reporting under the EU Habitats Directive and Bern Convention, within the frame of the Common Agricultural Policy and Regional Development Funds, and for the implementation of the INSPIRE Directive. The EUNIS Habitat Classification (Davies & Moss 1999) provides a pan-European reference set of units for meeting such requirements for particular policy objectives and for supporting applications that relate to biodiversity monitoring and reporting.

Enhanced capability in such operations is expected under the EU and global biodiversity targets for 2020. The European Environment Agency (EEA) hosts and maintains the biodiversity data centre, where European data sets and information on sites, species and habitats of Europe are published. Together with data sets provided by other environmental data centres, these data sets support the assessment of progress in achieving biodiversity targets as shown in the Biodiversity Information System for Europe (BISE). BISE, along with the Water Information System for Europe (WISE), anticipates an integration of ecosystem assessment across Europe.

The EEA has developed the EUNIS habitat classification and maintains it as part of the biodiversity data centre. The aim of the EUNIS habitat classification is to provide a pan-European reference set of habitat units with a common unit description within a hierarchy aiming to fulfil specific objectives and support specific applications related to biodiversity monitoring and reporting at the European scale. Such applications include reporting for the implementation of the EU Habitats Directive and the Bern Convention, as well as providing information in the context of the Common Agricultural Policy and the Regional Development Funds. A European standard list of habitat types is also necessary for the implementation of the INSPIRE Directive, to which other national or regional classifications will have to make reference so as to be comparable.

Further to the above, the EEA is participating in MAES (Mapping and Assessment of Ecosystem and their Services), an activity within the framework of the EU Biodiversity Strategy. Relevant to this activity and in support of the ecosystem assessment of Europe, is the development of a baseline for documenting, monitoring and assessing the quality of habitats across Europe, by analysing existing in situ vegetation monitoring data in accordance with the EUNIS habitat classification.

Such monitoring data, in accordance with the EUNIS habitat classification, will support the development of a baseline for documenting, monitoring and assessing the quality of habitats across Europe, in the framework of the ecosystem assessment and Copernicus (former GMES) activities in which the

EEA is participating. In this context, as part of the current review of information relating to habitat types and ecosystems, the EEA anticipates a revision of the existing scientific basis for the EUNIS Habitat Classification. In 2012, a project was carried out to revise the crosswalk of EUNIS to phytosociological syntaxa (Rodwell et al. 1998, 2002) and to inform on the capacity of in situ vegetation recording for demonstrating trends in habitat diversity and quality (Schaminée et al. 2012). The outcome of this project, coordinated by the present consortium, offered the ground for a next step, the actual underpinning of the EUNIS classification with in situ vegetation plot data. As a first group of habitat types the forests were considered, resulting in the EEA technical report "Review of EUNIS forest habitat classification", presented by the same team (Schaminée et al. 2013). A second group of habitat types (heathland, scrub and tundra vegetation) was the subject of an EEA project that was carried out in 2014 (Schaminée et al. 2014). This project also provided revised text descriptions of the proposed EUNIS forest habitat types (now renamed 'woodland') as well as maps of distribution of phytosociological relevés and probability of occurrence based on distribution models for each of these types.

Now it is proposed that a third group of habitat types should be examined, resulting in a review – on the basis of in situ vegetation measurements across Europe – of the description and classification of habitat group E of EUNIS (Grasslands) as well as grasslands included under habitat group B (B1.4 Coastal stable dune grassland and B1.9 Machair grassland). Grasslands are of great importance in European nature policy, of widespread distribution, housing a large proportion of the biodiversity in this part of the world, and everywhere under threat. The existing descriptions are insufficient and inadequately supported by in situ vegetation data which limit the usability of the EUNIS habitat classification.

As standardisation of environmental references greatly enhances the recording of habitat character and condition, the harmonisation of environmental data sources and the delivery of habitat protection and other environmental policies, it was asked to provide recommendations and a roadmap for the further development of a EUNIS habitat parameter framework. The value of such harmonisation was trailed in an early attempt to encourage common data standards in the recording of relevés (Mucina et al. 2000) and in an unpublished crosswalk between a suite of possible phytosociological parameters and those of EUNIS at that time (Rodwell et al. 2001), but it remains a pressing challenge.

A further focus of the project is to provide descriptions and maps for each of the revised heathland, scrub and tundra habitat types as described in the 2014 EUNIS report (Schaminée et al. 2014). The maps will present the distribution of phytosociological relevés attributed to each EUNIS habitat type. Additionally, the suitability distribution of each habitat type based on distribution modelling by the ETC/BD will be presented.

The objectives of this project were specified as tasks in the Annex I of the project specification (EEA/NSV/15/005) and elucidated in the Inception Report (September 2015, Service Contract No. 3417/B2015/EEA.56197):¹

WP 1

Task 2 To determine and provide the floristic composition of European grassland habitat types of Level 3 of the EUNIS classification using the available vegetation databases and published sources of vegetation syntaxa at the level of alliances of the EuroVegChecklist.

Task 3 Based on the results of Task 2, review (level 3) and propose improvements of delimitation of the grassland habitat types included under habitat group E, specifically subgroups E1, E2, E3 and E4 and, if appropriate, subgroups E5 and E6, as well as grassland included under habitat group B subgroups B1.4: Coastal stable dune grassland and B1.9: Machair of the EUNIS habitats classification. To provide input for relevant updates in relation to grasslands to the 'Crosswalk EUNIS-EuroVegChecklist' for each alliance of the EuroVegChecklist, and also to provide recommendations on how the work carried out would contribute to organising a further European-wide in situ data collection for assessment of grassland ecosystems, e.g. distribution mapping for grassland habitats.

Task 4 To provide recommendations and a roadmap for the further development of a EUNIS habitat parameter framework based on a scoping exercise on data sources, user needs and database structures.

WP 2

Task 2 To deliver lists of indicator species of all heathland, scrub and tundra habitat types at level 3, taking into account the outcome of Schaminée et al. (2014), based on vegetation database analyses.

Task 3 To deliver maps of distribution of phytosociological relevés for each of the heathland, scrub and tundra habitat types as described in Appendix D of Schaminée et al. (2014).

Task 4 To provide descriptions in a standard format for each of revised the heathland, scrub and tundra habitat types as presented in Schaminée et al. (2014), and to provide input for relevant updates in relation to heathland/scrub for each alliance of the EuroVegChecklist to the EUNIS-EuroVegChecklist crosswalks of 2012 (in case changes have been introduced to the latter).

¹ Task 1 of both Work Packages concerned the preparation and presentation of the Inception Report.

2 Determination and floristic composition of EUNIS grassland habitat types on the basis of in situ vegetation measurements throughout Europe

2.1 Background

The present study is based on cross-walking two different European classification systems, which were developed more or less independently and for different purposes. On the one hand, there is the classification of vegetation types provided by phytosociology, the tradition which uses fine-scale vegetation-plot data on plant species composition and cover for 'bottom-up' fine-grained delimitation and characterisation of plant associations (Braun-Blanquet 1928; Tüxen 1937). On the other hand, there is the classification of habitat types, providing a pan-European reference system for policy making with a common unit description within a hierarchical classification, presently known as the EUNIS habitat classification (Davies & Moss 1999; Davies et al. 2004; Moss 2008).

The vegetation classification in particular is facing a new era, as a result of the availability nowadays of high-capacity computers and software packages for processing phytosociological data. During the last century, numerous studies have resulted in a large number of formally described associations, alliances, orders and classes throughout Europe, but their delimitation usually remained incomplete and contentious due to various theoretical constraints and methodological problems. In an attempt to achieve a respectable level of stability, the European Vegetation Survey (EVS) developed in the early years of the 21st century the first overview of European vegetation units at the levels of alliances, orders and classes, published as *The Diversity of European Vegetation* (Rodwell et al. 2002). From that moment onwards, the overview of European syntaxa has undergone substantial expert revision by a team under the leadership of Professor Ladislav Mucina. The new product, the EuroVegChecklist, is more comprehensive (covering all Europe as well as territories such as the Azores, Canary Islands, Cyprus, Caucasus and Greenland), scientifically robust, better grounded within current phytosociological understanding, and more meaningful for application within the user community. The 2013 version of this EuroVegChecklist was used for the EUNIS woodland habitat revision (Schaminée et al. 2013) and, after further revision, was submitted to the journal *Applied Vegetation Science* for publication in 2013 and resubmitted after review in June 2014 (Mucina et al. 2014).

2.2 Vegetation-plot data as a scientific basis for habitat classification

As described in the project plan (*Research proposal EEA/NSV/15/005*), plot samples as collected by phytosociologists (Braun-Blanquet 1928, Mueller-Dombois & Ellenberg 1974) provide the most numerous and widely dispersed in-situ records of vegetation across Europe. Comprising at minimum a list of vascular plant species with an estimate of cover-abundance in plots ranging from less than 1 m² to a few hundreds m² (Chytrý & Otýpková 2003), such samples are usually dated and spatially located in a way that gives a record of the composition of vegetation at a particular time and place. In phytosociology, they have formed the basis of the classification of vegetation into associations organised into hierarchical systems, and have thus helped furnish inventories and maps of sites and accounts of the vegetation of countries and regions (e.g. Rodwell 1991 et seq.; Mucina et al. 1993; Schaminée et al. 1995 et seq.; Valachovič et al. 1995 et seq. Chytrý 2007 et seq.).

Various enquiries within and outside the EVS (Ewald 2001; Schaminée et al. 2009) have provided an insight into the patterns of accumulation of vegetation plots across Europe over the past 90 years. The latest estimates (based on data from 32 countries) suggest that more than 4.3 million vegetation descriptions have been recorded. Most of plots have been made in the countries of central and western Europe, particularly Germany, the Netherlands and France, but considerable numbers were also estimated for Poland, Spain, the Czech Republic, Italy, the United Kingdom and Austria (Schaminée et al. 2009).

The development of compatible software tools, one of the EVS core work objectives, has greatly encouraged the development of national and regional vegetation databases and fostered the creation of a network facilitating data exchange and research collaborations, and assisted the emergence of supra-national vegetation revisions and overviews over the last twenty years. The major software tool for database development has been TURBOVEG (Hennekens & Schaminée 2001), now accepted as an international standard for data input, storage, management and retrieval, and installed in over 30 countries in Europe and beyond. Complementary to TURBOVEG, the JUICE program (Tichý 2002) has added a wide range of analytical tools for data sets that can comprise thousands of relevés.

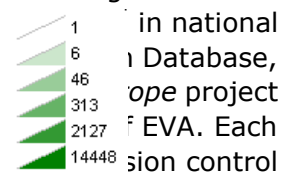
The most recent study designed to collect estimates of the total number of vegetation plots in Europe (Schaminée et al. 2009), revealed that more than 1.8 million relevés had been already computerised, 75% of which were found in centralised databases of countries or regions. Of all captured relevés, 59% were available in TURBOVEG format. Further key steps have now been taken by many EVS members to locate and capture additional plots, and to centralise data storage of such plots. In 2011, the Global Index of Vegetation-Plot

Databases platform (GIVD) was launched (Dengler et al. 2011) to provide a meta-resource of electronic databases whose hosts are willing in principle to share the captured data. At present (18 Feb 2016; <http://www.givd.info/>), 237 databases with 3,160,243 vegetation plots have been registered, a large proportion of them providing records of European vegetation. The GIVD platform also assists in revealing gaps in the coverage and/or availability of the vegetation plot data.

Another young initiative – the European Vegetation Archive (EVA) – yielded a centralised database of vegetation plots by storing copies of national and regional databases on a single software platform using a unified taxonomic reference database. Data storing in EVA does not affect the ongoing independent development of the source databases. EVA Data Property and Governance Rules (www.euroveg.org/eva-database), approved in 2012, guarantee that data property rights of the original contributors are respected. By December 2015, 62 databases from all European regions, including the largest examples, joined EVA. The centralised database contained in total 1,126,004 vegetation plots from most European regions, especially from western, central and southern Europe (see Figure 2.1). However, there is a remarkable lack of data from Scandinavia and eastern European countries, i.e. European regions with less strong or interrupted phytosociological traditions. The majority of these plots (87%) have geographic coordinates. The vegetation-plot records are stored in EVA in three access regimes: free (available to anybody), semi-restricted (available in principle to the group of other data contributors) and restricted (available in principle to the group of other data contributors based on specific consent). These three access regimes are represented respectively by 6%, 82% and 12% of the total EVA database (Chytrý et al. 2016).

A prototype of the database management software TURBOVEG 3 was developed for joint management of multiple databases that use different species lists. This software also includes procedures for handling data requests, selections and provisions according to the approved EVA Rules. A specific challenge for EVA is combining multiple species lists based on different taxonomic and regional databases. This is managed using the SynBio Synonymy Database, which was initially established for the purposes of the SynBio Europe project and is now further developed and extended within the framework of EVA. Each relevé in EVA has a unique Global Unified Identifier (GUID), which will be used to keep track of date changes. Several specific projects devoted to detailed diversity assessment of selected vegetation types started within the EVA initiative in 2014. A prototype project for the EVA initiative is the Braun-Blanquet Project, aiming at the compilation and analysis of floristic and geographical information on European vegetation types. The project, led by Dr. Borja Jiménez-Alfaro, is dedicated to Josias Braun-Blanquet, whose legacy has been the inspiration for collecting large datasets of vegetation-plot data in Europe

(http://www.sci.muni.cz/botany/vegsci/braun_blanquet.php?lang=en).



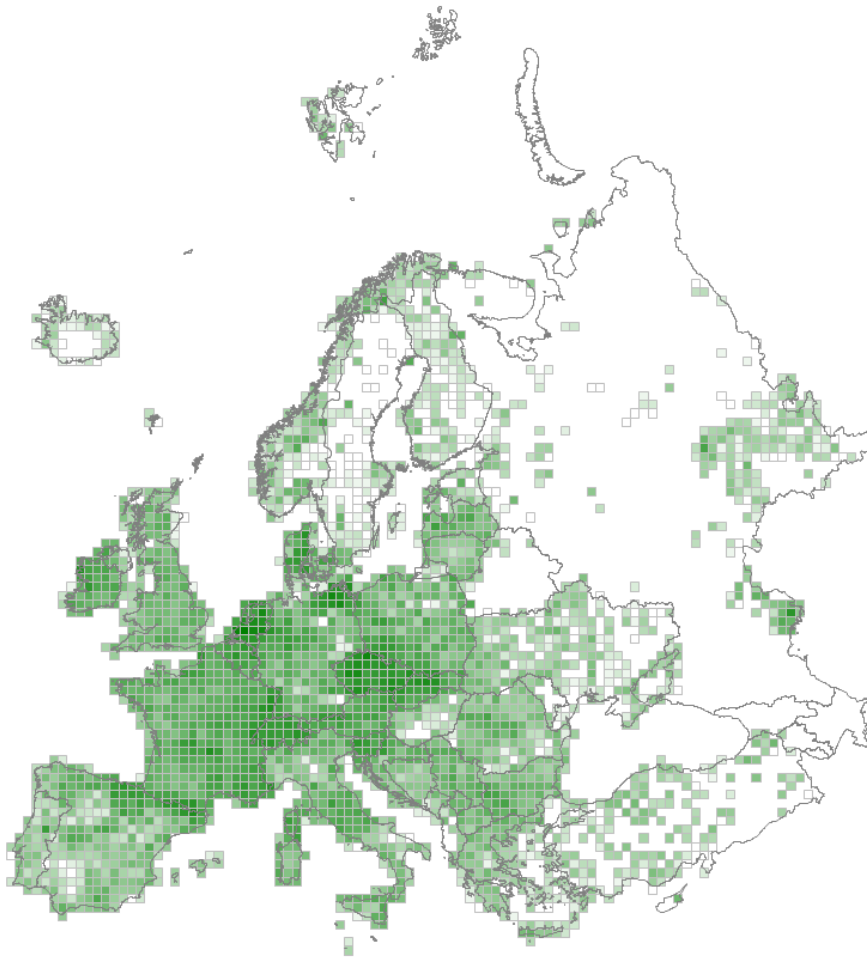


Figure 2.1. Density of georeferenced plots in 50 x 50 km grid cells.

The vegetation-plot data used in the Braun-Blanquet Project form the basis for determining and providing the floristic composition of grassland vegetation data, in a similar fashion as in the EEA 2014 project on heathland, scrub and tundra habitat types (Schaminée et al. 2014), and in the EEA 2013 project on woodland habitat types (Schaminée et al. 2013). As indicated before, the main input has come from computerized databases set up at many places throughout Europe.

The task to revise the EUNIS grassland habitat types is based on the current version of EUNIS level 3 and the 2013 version of the EuroVegChecklist, as presented at the Annual Symposium of the International Association for Vegetation Science (IAVS) in Perth in September 2014 and submitted to the international journal *Applied Vegetation Science* for publication.

2.3 Update of crosswalks between EUNIS grassland habitats and EuroVegChecklist

The crosswalk between the EUNIS habitat types and phytosociological alliances, prepared for the 2012 report on the development of vegetation syntaxa crosswalks to EUNIS habitat classification (Schaminée et al. 2012),

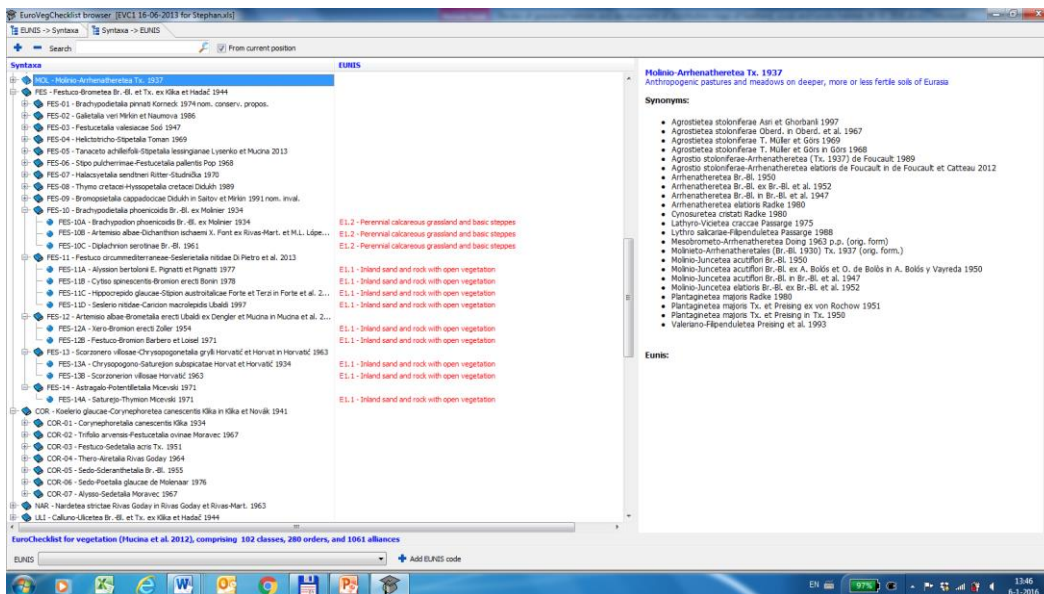


Figure 2.2. EuroVegChecklist browser with tab "Syntaxa -> EUNIS" open, based on the 2013 version of the EuroVegChecklist.

was based on a version of the EuroVegChecklist from July 2012 but this was subjected to further modifications after that date until it was ultimately submitted for publication on 30 March 2013. In the process of peer reviewing, the checklist has been further updated, based on the latest taxonomic discussions and insights. The submitted version of EuroVegChecklist recognizes 101 classes, 279 orders and 1,052 alliances. The document comprises 274 pages of text and several electronic appendices, including indicator species of classes, glossary of terms, bibliographic appendices, desktop browser and analytical tools. There are 32 authors from 16 countries. The overview also includes more than 4,000 scientific synonyms that provide the connection with vegetation types published in the past (Mucina et al. 2014).

In order to work with the updated version of European vegetation classification in the current project, we revised the EUNIS-syntaxa crosswalk to match the

submitted version of EuroVegChecklist. Ladislav Mucina, the senior author of EuroVegChecklist, took part in this revision. This revision reflected the merging of some alliances, the splitting of others, the introduction of new alliances and changes in the delimitation of some alliances that influenced established matches to the EUNIS habitat types.

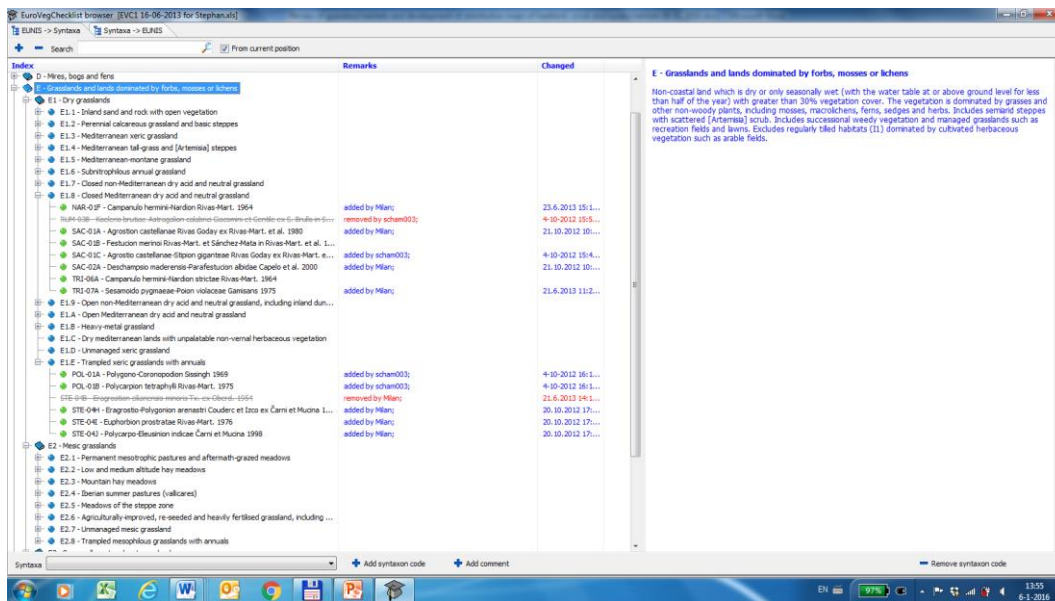


Figure 2.3. EuroVegChecklist browser with tab "EUNIS -> syntaxa" open, based on the 2013 version of the EuroVegChecklist.

To ease the workflow, a tool, called the EuroVegChecklist browser (see Figure 2.2 and Figure 2.3), has been developed for linking EUNIS habitats to alliances.

In relation to the definition of grasslands, the following EUNIS habitat types have been taken into account for the current task: B1.4 (Coastal stable dune grassland), B1.9 (Machair), and E (Grasslands and lands dominated by forbs, mosses or lichens). The syntaxa of the EuroVegChecklist that have been considered were selected on the basis of the crosswalks. The EUNIS categories E7 (Sparsely wooded grasslands) were not dealt with, as these types are complexes of different vegetation types. Some habitat types were omitted as they are not grasslands, such as E1.C (Dry mediterranean lands with unpalatable non vernal herbaceous vegetation) and E5.3 (*Pteridium aquilinum* fields), having not a clear definition, such as E1.D (Unmanaged xeric grassland), E2.7 (Unmanaged mesic grassland) and E2.8 (Trampled mesophilous grasslands with annuals), or are anthropogenic/agricultural habitats, such as E1.6 (Subnitrophilous annual grasslands), E2.6 (Agriculturally-improved, re-seeded and heavily fertilised grassland, including sports fields and grass lawns), E1.E (Trampled xeric grasslands with annuals) and E5.1

(Anthropogenic herb stands). In total, 32 EUNIS grassland habitat types were considered as target habitat types.

2.4 The floristic composition of EUNIS grassland habitat types at the level of alliances of the EuroVegChecklist

The floristic composition of the EUNIS grassland types has been determined on the basis of the floristic composition of the corresponding phytosociological alliances, according to the revised crosswalk EUNIS-syntaxa (Appendix A). As a basis for the analysis, a database of 1,190,000 relevés has been compiled, in TURBOVEG format (see Paragraph 2.2), of which 370,000 relevés could be assigned to grasslands. The database for grasslands contains datasets from a wide range of data providers throughout Europe (Appendix H).

The procedure consists of two steps. In a first step, the relevés of these – regional and national – datasets were classified at the level of alliances of the 2013 EuroVegChecklist (submitted version). This was done by matching the original assignment of the relevés to alliances (in most cases reflecting the national or regional classification systems) to the syntaxonomical criteria applied in the European overview. At present, about 57% of the 1,190,000 relevés could be assigned to one of the alliances accepted in the 2013 EuroVegChecklist, 31% of which belong to grasslands. In a second step, the assignment to the EUNIS grassland habitat types was performed by merging the data of the alliances to the corresponding EUNIS type (according to the EUNIS-syntaxa crosswalk) and by averaging based on national constancy columns (not by simply adding up). Here we give an example to illustrate this. Let us presume that we have data from two countries for a certain alliance, from the Czech Republic and Spain. If the occurrence of species A is 50% of Czech relevés from a total of 1,000 (=500) and 10% of Spanish relevés from a total of 100 (=10), then by simply taking the total number of relevés, a total frequency of 46% (510 relevés from a total of 1,100) would be the outcome, which is mainly determined by the larger dataset of the Czech Republic. If we apply average frequencies, the result would be a mean frequency of 30%, which probably is more representative across a broader region of Europe. For Russia, separate constancy columns were made for different regions before averaging, not for the whole country, because it is extremely large.

In the crosswalk, 366 grassland alliances of the EuroVegChecklist have been assigned to one of the 32 EUNIS habitat types. At present, there are relevés for 242 of these alliances (i.e. 66%). Nevertheless, all 32 EUNIS grassland habitat types have been covered by real data (100%), in most cases providing a representative number of relevés in relation to the geographic distribution and commonness of each habitat type. The reasons for having no in-situ vegetation data for certain alliances are the following:

(1) Alliances from regions with general lack of phytosociological data. Some areas are still not well covered in the vegetation databases available for the Braun-Blanquet project, like the Boreal zone of Scandinavia and Russia, Ukraine, Caucasus, parts of Balkan, and Cyprus.

(2) Alliances recently described for the work developed in the EuroVegChecklist which have not been used before. Thus, the corresponding relevés in the original databases are not classified and correct assignment is difficult. This is the case especially for grassland alliances from Italy and the Balkans.

3 Reviewing the EUNIS grassland habitat types

3.1 Background

The development of the EUNIS Habitat Classification (Davies & Moss 1999) afforded a fresh opportunity to provide a sound scientific cross-reference between widely accepted classification of European habitats and phytosociological definitions of vegetation types, as indicated in the *Introduction* (Chapter 1). Some 15 years ago, a team of the European Vegetation Survey (EVS) developed a crosswalk between phytosociological units to the level of the alliance and EUNIS habitats at level 3. *The Scientific Background to the EUNIS Habitat Classification* (Rodwell et al. 1998) provided the first overview of European vegetation types to the level of alliance, after which, in 2002, the booklet *The Diversity of European Vegetation* provided crosswalks from the EUNIS Level 3 habitats to the syntaxa and vice versa, accompanied by brief verbal descriptors of the vegetation units (Rodwell et al. 2002). In a recent EEA project, these crosswalks have been revised and updated (Schaminée et al. 2012).

Since the original crosswalk was developed (Rodwell et al. 2002), there have been only relatively modest changes to the terrestrial sections of the EUNIS Habitat Classification (Evans, personal communication). However, the overview of European syntaxa has undergone substantial expert revision, as discussed in Chapter 2. In Paragraph 2.3, information has been provided on the update of the EuroVegChecklist (version 2013) and the crosswalks between the EUNIS classification and this checklist.

3.2 Review of the EUNIS grassland habitat types

As mentioned above (Par. 2.3), the following EUNIS grassland habitat types were reviewed: B1.4 (Coastal stable dune grassland), B1.9 (Machair), and E (Grasslands and lands dominated by forbs, mosses or lichens). Within the E group, exceptions were made for E1.6, E1.C, E1.D, E1.E, E2.6, E2.7, E2.8, E5.1, E5.3 and E7, whereas for some other habitat types the proposal is made to merge them with types from other groups. The latter concerns the habitat types E1.4, E2.5 and E4.2 (see Table 3.1 and Appendix C for explanation). The reasons for exclusion are further explained in Paragraph 2.3; some of the types are not grasslands, others anthropogenic or vegetation complexes.

In line with the recommendations for improving the EUNIS forest habitat classification (Schaminée et al. 2013) and the heathland, tundra and scrub classification (Schaminée et al. 2014), similar conclusions can be drawn for the grasslands. They will involve two types of recommendations, one concerning the classification itself, with recommendations for new units, splitting and merging existing units, and one dealing with their naming (see the EEA 2013 report for further details).

Our main conclusion is that the EUNIS habitat types are generally too broad and therefore should be divided. The proposed revision is mainly based on floristic composition, whereas EUNIS sometimes follows a division based on vegetation structure (for example open and closed grassland). Especially the order level in syntaxonomy proves to be appropriate for making distinctions. The proposed classification based on species composition brings grasslands together with a similar soil, hydrology and management. Quite often these grasslands are zonal and confined to a specific geographic region, which can be reflected in the name (boreal, continental, submediterranean, and so on). The term 'ultramafic' relates to serpentine rocks and related rocks with high concentrations of metals. The term 'annual grassland' is used for grasslands containing a large amount of annual species, in contrast with the term 'perennial grassland' for grasslands harbouring many perennial species.

Classification By comparing the existing EUNIS classification with the floristic composition of the assigned syntaxa, we found strong grounds for revising the EUNIS types B1.4, B1.9, E1.1, E1.2, E1.3, E1.5, E1.7, E1.8, E1.9, E2.1, E3.1, E3.2, E3.4, E3.5, E4.3, E4.4, E5.2, and E5.4. We further propose to add one new EUNIS habitat type, occurring on the Azores (E1.F Azorean open, dry, acid to neutral grassland), and to define the temperate inland salt marshes as an additional habitat type E6.3 within subgroup E6 (Inland salt steppes). Furthermore some changes in names are proposed (see Paragraph 3.3 and Table 3.1). Special attention is paid to B1.9 (Machair), as this habitat type might be concerned as a vegetation complex as well as – more restricted – grassland habitat type (see below).

Proposal for improvement of the EUNIS types:

EUNIS B1.4 Coastal dune grassland. These stable dune grasslands (grey dunes) should be split into three types, according to their geographic position, and distinguished by different species composition: B1.4a Atlantic and Baltic coastal dune grasslands, B1.4b Mediterranean and Macaronesian coastal dune grasslands, and B1.4c Black Sea coastal dune grasslands.

EUNIS B1.9 Machair. This habitat type actually is a complex of various habitat types that on themselves are already recognized within the EUNIS classification (X27). Nevertheless, because of their specific position in the coastal landscape and the strong interest for nature conservation (Machairs are a priority habitat type within Natura 2000, H21A0), machairs might be considered as a separate

EUNIS habitat type within Group B, referring to the grassland part of the machairs, that are generally considered as separate ecosystems (e.g. Ritchie 1976, Angus 2004). To indicate that only the grassland part of the machairs is considered within Group B, we propose to rename the habitat type into B1.9a Machair grasslands. Floristically these grasslands have the same content as the Irish and Scottish representatives of B1.4a Atlantic and Baltic coastal dune grasslands.

EUNIS E1.1 Inland sand and rock with open vegetation. EUNIS makes a high level distinction based on a sand and rock substrate, so there is a duplication of such grasslands with E1.9, where they figure as non-Mediterranean types of dry acid and neutral open grassland. From the lower level EUNIS types, it is clear that inland dunes (mobile sands fluviatile dunes) better fit under E1.9, while vegetation on skeletal soil (rocks) and sandy steppes fit better here. We propose a division in ten types: E1.1a Pannonian and Pontic sandy steppe, E1.1b Temperate and boreal pioneer grassland on shallow soils on siliceous rock outcrops, E1.1c Boreal open, sub-thermophilous grassland on shallow soils on siliceous rocky outcrops, E1.1d Submediterranean and temperate pioneer grassland on calcareous and ultramafic rocky outcrops, E1.1e Submediterranean xeric open grassland of skeletal calcareous and ultramafic soils, E1.1f Continental dry rocky steppic grassland and dwarf scrub on chalk outcrops, E1.1g Perennial grassland on rocky outcrops at low altitudes in Central and Southeastern Europe, E1.1h Submontane to supramontane ultramafic rocky grassland of the Balkans, E1.1i Subatlantic and submediterranean perennial grassland on calcareous shallow soils, and E1.1j Dry steppic, submediterranean pasture of South-Eastern Europe.

EUNIS E1.2 Perennial calcareous grassland and basic steppes. This habitat type could be split into two types, representing grasslands of different floristic composition and occurring in different geographic regions: E1.2a Semi-dry perennial calcareous grassland and E1.2b Continental dry steppe. The first refer to the order *Brometalia*, the latter represents the order *Festucetalia valesiaca*.

EUNIS E1.3 Mediterranean xeric grassland. This habitat type could be split according to geographical distribution and floristic composition, reflected at the class level. The first two types refer to closely grazed (*Poetea bulbosae*) and perennial grasslands (*Thero-Brachypodietea*), the third to annual-rich grasslands (*Stipo-Trachynietea distachyi*): E1.3a Mediterranean closely grazed dry grassland, E1.3b Mediterranean tall perennial dry grassland, and E1.3c Mediterranean annual-rich dry grassland.

EUNIS E1.5 Mediterranean montane grassland. This habitat type, with many endemic species, could be split into five types according to geographical distribution and the floristic composition. As such, there are different habitat types for the Iberian, Corsican and Sardinian, Greek and Anatolian, and Madeiran region, with a further split of the Iberian communities for siliceous and basiphilous communities: E1.5a Iberian oromediterranean siliceous dry

grassland, E1.5b Iberian oromediterranean basiphilous dry grassland, E1.5c Corsican and Sardinian oromediterranean siliceous dry grassland, E1.5d Greek and Anatolian oromediterranean siliceous dry grassland, and E1.5e Madeiran oromediterranean siliceous dry grassland.

EUNIS E1.7 Closed non-Mediterranean dry acid and neutral grassland. For this habitat type we propose a change of content and consequently a change of name. Excluded are specific boreal grasslands (E4.3) and steppic grassland (E1.2). The newly proposed type is more restricted: E1.7a Lowland to submontane, dry to mesic *Nardus* grassland.

EUNIS E1.8 Mediterranean dry acid and neutral closed grassland. Because of large overlap with other (oromediterranean) habitat types (E1.5, E1.7 and E1.A) we propose to restrict this habitat type to specific Iberian communities, belonging to the the order *Jasiono sessiliflorae-Koelerietalia crassipedis*. In line with this change in content we propose a change of name: E1.8a Open Iberian supra-mediterranean dry acid and neutral grassland.

EUNIS E1.9 Non-Mediterranean dry acid and neutral open grassland, including inland dune grassland. We propose to restrict this habitat type to inland dune grasslands, and to split off the mobile sand communities (mainly *Corynephorion canescentis*) as a separate habitat type, in line with the Habitats Directive (H2330): E1.9a Oceanic to subcontinental inland sand grassland on dry acid and neutral soils, and E1.9b Inland mobile sand and dune with siliceous grassland.

EUNIS E2.1 Permanent mesotrophic pastures and aftermath-grazed meadows. We propose a change of content as the aftermath grazed meadows should be included in E2.2 and E2.3. Consequently, there will be a change in name: E2.1a Mesic permanent pastures of lowlands and mountains.

EUNIS E3.1 Mediterranean tall humid grassland. This habitat type should be restricted to the inland areas, as the coastal communities belong to habitat type B1.8 (Moist and wet dune slacks). Therefore we also propose a change of name: E3.1a Mediterranean tall humid inland grassland.

EUNIS E3.2 Mediterranean short humid grassland. This habitat type could be divided into two types, one of the lowlands and one for the mountains, going along with differences in floristic composition: E3.2a Mediterranean short moist grassland of lowlands, and E3.2b Mediterranean short moist grassland of mountains.

EUNIS E3.4 Moist or wet mesotrophic to eutrophic grassland. This habitat type could be split into two types, according to management (mowing versus grazing), and coinciding with a different species composition: E3.4a Moist or wet mesotrophic to eutrophic hay meadow, and E3.4b Moist or wet mesotrophic to eutrophic pasture.

EUNIS E3.5 Moist or wet oligotrophic grassland. We propose to restrict these wet oligotrophic grasslands to the non-Mediterranean regions, and consequently propose a new name: E3.5a Non-Mediterranean moist or wet oligotrophic grassland.

EUNIS E4.3 Acid alpine and subalpine grassland. We propose to split this habitat type into two types, according to their distinct geographical occurrence in the boreal-arctic and alpine zone respectively: E4.3a Boreal and arctic acidophilous alpine grassland, and E4.3b Temperate acidophilous alpine grassland.

EUNIS E4.4 Calcareous alpine and subalpine grassland. This habitat type could be split into two types, according to floristic composition and geographical distribution. The arctic-alpine grasslands belong to the orders *Carici-Kobresietea* and *Seslerietalia caerulea*, the alpine-subalpine grasslands of the Balkan and Apennines to the orders *Seslerietalia tenuifoliae* and *Onobrychido-Seslerietalia*: E4.4a Arctic-alpine calcareous grassland, and E4.4b Alpine and subalpine calcareous grasslands of the Balkan and Apennines.

EUNIS E5.2 Thermophile woodland fringes could be split into three types, according to floristic composition, going along with geographical distribution (Macaronesia) and soil characteristics (base-rich versus acidic): E5.2a Thermophile woodland fringe of base-rich soils, E5.2b Thermophilous woodland fringe of acidic soils, and E5.2c Macaronesian thermophile woodland fringe.

EUNIS E5.4 Moist or wet tall-herb and fern fringes and meadows. We propose to restrict this habitat type to the lowlands and to exclude anthropogenic stands. Therefore, a change of name is proposed: E5.4a Moist or wet tall-herb and fern fringe of the lowlands. The mountain forms of such stands are assigned to E5.5.

Naming: With regard to the names of the EUNIS grassland habitat types we could derive a set of general recommendations, which we have applied to the existing classification. Where relevant, we have clarified our suggestions by one or more examples.

General recommendation 1: Adopt brief and clear names for the habitat types.

General recommendation 2: Names within a group of related habitat types should be mutually exclusive with regard to, for example, biogeographic zone. Example: Atlantic and Baltic coastal dune grassland (B1.4a) versus Mediterranean and Macaronesian coastal dune grasslands (B1.4b) and Black Sea coastal dune grassland (B1.4c).

General recommendation 3: Do not use square brackets to indicate scientific names. If included, scientific taxon names should be in italics. This only concerns one habitat type within group E: E5.3 [*Pteridium aquilinum*] fields, a

habitat type that we will not consider as these bracken fields are no grassland. In the web version of the EUNIS classification this change has already been made.

General recommendation 4: Use a standardized naming. Example: use only the name grassland instead of alternatively grasslands or grassland, like in E2 Mesic grasslands and E2.8 Trampled mesophylous grasslands versus E2.7 Unmanaged mesic grassland. We propose to use singular instead of the plural for terms like steppe, meadow and stand.

3.3 Proposed changes in the EUNIS grassland habitat types

Applying these recommendation with regard to content and naming would result in the following updated list of EUNIS grassland habitat types (habitat types with just changes in names – without splitting and/or change of content – are indicated with an *; in such case, the existing name is put within brackets behind the proposed new name):

- ▶ B1.4 Coastal dune grassland could be divided into three types, according to geographical distribution:
 - ▶▶ B1.4a Atlantic and Baltic coastal dune grassland
 - ▶▶ B1.4b Mediterranean and Macaronesian coastal dune grassland
 - ▶▶ B1.4c Black Sea coastal dune grassland
- ▶ B1.9 Machair should be restricted to the grassland part of the habitats and accordingly renamed:
 - ▶▶ B1.9a Machair grasslands*
- ▶ E1.1 Inland sand and rock with open vegetation is much too general and could be divided into ten types, mainly based on different regions and floristic composition
 - ▶▶ E1.1a Pannonian and Pontic sandy steppe
 - ▶▶ E1.1b Temperate and boreal pioneer grassland on shallow soils on siliceous rocky outcrops
 - ▶▶ E1.1c Boreal open, sub-thermophilous grassland on shallow soils on siliceous rocky outcrops

- ▶▶ E1.1d Submediterranean and temperate pioneer grassland on calcareous and ultramafic rocky outcrops
- ▶▶ E1.1e Submediterranean xeric open grasslands of skeletal calcareous and ultramafic soils
- ▶▶ E1.1f Continental dry rocky steppic grassland and dwarf scrub on chalk outcrops
- ▶▶ E1.1g Perennial grassland on rocky outcrops at low altitudes in Central and Southeastern Europe
- ▶▶ E1.1h Submontane to supramontane ultramafic rocky grassland of the Balkans
- ▶▶ E1.1i Subatlantic and submediterranean perennial grassland on calcareous shallow soils
- ▶▶ E1.1j Dry steppic, submediterranean pasture of South-Eastern Europe
- ▶ E1.2 Perennial calcareous grassland and basic steppes could be split into three types, according to floristic composition and geographical distribution:
 - ▶▶ E1.2a Semi-dry perennial calcareous grassland
 - ▶▶ E1.2b Continental dry steppe
- ▶ E1.3 Mediterranean xeric grassland could be split into three types, according to floristic composition and geographical distribution:
 - ▶▶ E1.3a Mediterranean closely grazed dry grassland
 - ▶▶ E1.3b Mediterranean tall perennial dry grassland
 - ▶▶ E1.3c Mediterranean annual-rich dry grassland
- ▶ E1.5 Mediterranean-montane grassland could be split into five types, according to floristic composition and representing different regions:
 - ▶▶ E1.5a Iberian oromediterranean siliceous dry grassland
 - ▶▶ E1.5b Iberian oromediterranean basiphilous dry grassland
 - ▶▶ E1.5c Corsican and Sardinian oromediterranean siliceous dry grassland
 - ▶▶ E1.5d Greek and Anatolian oromediterranean siliceous dry grassland

- ▶▶ E1.5e Madeiran oromediterranean siliceous dry grassland
- ▶ E1.7 Closed non-Mediterranean dry acid and neutral grassland. Change of content and consequently change of name:
 - ▶▶ E1.7a Lowland to submontane, dry to mesic *Nardus* grassland
- ▶ E1.8 Mediterranean dry acid and neutral closed grassland. Change of content and consequently change of name:
 - ▶▶ E1.8a Open Iberian supra-mediterranean dry acid and neutral grassland
- ▶ E1.9 Non-Mediterranean dry acid and neutral open grassland, including inland dune grasslands, has to be more restricted to these dune systems and could be divided over two types according to floristic composition and geomorphology:
 - ▶▶ E1.9a Oceanic to subcontinental inland sand grassland on dry acid and neutral soils
 - ▶▶ E1.9b Inland mobile sand and dune with siliceous grassland
- ▶ E1.A Mediterranean to Atlantic open, dry, acid and neutral grassland* [Mediterranean dry acid and neutral open grassland]
- ▶ E1.B Heavy metal grassland
- ▶ E1.F Azorean open, dry, acid to neutral grassland
- ▶ E2.1 Permanent mesotrophic pastures and aftermath-grazed meadows. Change of content and consequently change of name:
 - ▶▶ E2.1a Mesic permanent pasture of lowlands and mountains
- ▶ E2.2 Low and medium altitude hay meadow* [Low and medium altitude hay meadows]
- ▶ E2.3 Mountain hay meadow* [Mountain hay meadows]
- ▶ E2.4 Iberian summer pasture (vallicar)* [Iberian summer pastures (vallicar)]
- ▶ E3.1 Mediterranean tall humid grassland. Change of content and consequently change of name:
 - ▶▶ E3.1a Mediterranean tall humid inland grassland

- ▶ E3.2 Mediterranean short humid grassland could be split into two types, according to altitude:
 - ▶▶ E3.2a Mediterranean short moist grassland of lowlands
 - ▶▶ E3.2b Mediterranean short moist grassland of mountains
- ▶ E3.3 Sub-mediterranean moist meadows
- ▶ E3.4 Moist or wet mesotrophic to eutrophic grassland could be split into two types, according to management:
 - ▶▶ E3.4a Moist or wet mesotrophic to eutrophic hay meadow
 - ▶▶ E3.4b Moist or wet mesotrophic to eutrophic pasture
- ▶ E3.5 Moist or wet oligotrophic grassland has to be renamed as we propose to restrict this grassland to the non-Mediterranean regions:
 - ▶▶ E3.5a Non-Mediterranean moist or wet oligotrophic grassland
- ▶ E4.1 Vegetated snow-patch
- ▶ E4.3 Acid alpine and subalpine grassland could be split into two types, according to their geographical distribution:
 - ▶▶ E4.3a Boreal and arctic acidophilous alpine grassland
 - ▶▶ E4.3b Temperate acidophilous alpine grassland
- ▶ E4.4 Calcareous alpine and subalpine grassland could be split into two types, according to floristic composition and geographical distribution:
 - ▶▶ E4.4a Arctic-alpine calcareous grassland
 - ▶▶ E4.4b Alpine and subalpine calcareous grassland of the Balkan and Apennines
- ▶ E5.2 Thermophile woodland fringes could be split into three types, according to geographical distribution and soil characteristics:
 - ▶▶ E5.2a Thermophile woodland fringe of baserich soils
 - ▶▶ E5.2b Thermophilous woodland fringe of acidic soils
 - ▶▶ E5.2c Macaronesian thermophile woodland fringe

- ▶ E5.4 Moist or wet tall-herb and fern fringes and meadows. Change of content and consequently change of name:
 - ▶▶ E5.4a Moist or wet tall-herb and fern fringe of the lowlands
- ▶ E5.5 Subalpine moist or wet tall-herb and fern stand* [Subalpine moist or wet tall-herb and fern stands]
- ▶ E6.1 Mediterranean inland salt steppe* [Mediterranean inland salt steppes]
- ▶ E6.2 Continental inland salt steppe* [Continental inland salt steppes]
- ▶ E6.3 Temperate inland salt marsh
- ▶ E7.1 Temperate and hemiboreal wooded pasture and meadow* [Atlantic parkland]
- ▶ E7.2 Hemiboreal and boreal wooded pasture and meadow* [Sub-continental parkland]
- ▶ E7.3 Mediterranean wooded pasture and meadow* [Dehesa]

Table 3.1. Overview of old and revised EUNIS habitat types.

EUNIS code new	EUNIS-3 habitat name new	EUNIS code old	EUNIS-3 habitat name old
B1.4a	Atlantic and Baltic coastal dune grassland (grey dunes)	B1.4	Coastal stable dune grassland
B1.4b	Mediterranean and Macaronesian coastal dune grassland (grey dunes)		
B1.4c	Black Sea coastal dune grassland (grey dunes)		
B1.9	Machair grassland	B1.9	Machair
E1.1a	Pannonian and Pontic sandy steppe	E1.1	Inland sand and rock with open vegetation
E1.1b	Temperate and boreal pioneer grassland on shallow soils on siliceous rock outcrops		
E1.1c	Boreal open, sub-thermophilous grassland on shallow soils on siliceous rock outcrops		
E1.1d	Submediterranean and temperate pioneer grassland on calcareous and ultramafic rock outcrops		
E1.1e	Submediterranean open dry grassland of skeletal calcareous and ultramafic soils		
E1.1f	Continental dry rocky steppic grasslands and dwarf scrub on chalk outcrops		
E1.1g	Perennial grassland on rocky outcrops at low altitudes in Central and Southeastern Europe		
E1.1h	Submontane to supramontane ultramafic rocky grassland of the Balkans		
E1.1i	Subatlantic and submediterranean perennial grassland on calcareous shallow soils		

E1.1j	Dry steppic, submediterranean pasture of Southeastern Europe		
E1.2a	Semi-dry perennial calcareous grassland	E1.2	Perennial calcareous grassland and basic steppes
E1.2b	Continental dry steppe		
E1.3a	Mediterranean closely grazed dry grassland	E1.3	Mediterranean xeric grassland
E1.3b	Mediterranean tall perennial dry grassland		
E1.3c	Mediterranean annual-rich dry grassland		
E1.4	Merged with other habitats in EUNIS revision, partly with E1.3b and partly with F6.8a and F6.8b	E1.4	Mediterranean tallgrass and Artemisia steppes
E1.5a	Iberian oromediterranean siliceous dry grassland	E1.5	Mediterranean montane grassland
E1.5b	Iberian oromediterranean basiphilous dry grassland		
E1.5c	Corsican and Sardinian oromediterranean siliceous dry grassland		
E1.5d	Greek and Anatolian oromediterranean siliceous dry grassland		
E1.5e	Madeiran oromediterranean siliceous dry grassland		
E1.6	Subnitrophilous annual grasslands	E1.6	Subnitrophilous annual grasslands (excluded)
E1.7a	Lowland to submontane, dry to mesic Nardus grassland	E1.7	Non-Mediterranean dry acid and neutral closed grassland
E1.8	Open Iberian supramediterranean dry acid and neutral grassland	E1.8	Mediterranean dry acid and neutral closed grassland
E1.9a	Oceanic to subcontinental inland sand grassland on dry acid and neutral soils	E1.9	Non-Mediterranean dry acid and neutral open grassland, including inland dune grassland
E1.9b	Inland mobile sand and dunes with siliceous grassland		
E1.A	Mediterranean to Atlantic open, dry, acid and neutral grassland	E1.A	Mediterranean dry acid and neutral open grassland
E1.B	Heavy-metal grassland	E1.B	Heavy-metal grassland
E1.C	Dry Mediterranean lands with unpalatable non-vernal herbaceous vegetation	E1.C	Dry mediterranean lands with unpalatable non-vernal herbaceous vegetation (excluded)
E1.D	Unmanaged dry grassland	E1.D	Unmanaged xeric grassland (excluded)
E1.E	Trampled dry grassland with annuals	E1.E	Trampled xeric grasslands with annuals (excluded)
E1.F	Azorean open, dry, acid to neutral grassland		
E2.1a	Mesic permanent pasture of lowlands and mountains	E2.1	Permenant mesotrophic pastures and aftermath-grazed meadows
E2.2	Low and medium altitude hay meadows	E2.2	Low and medium altitude hay meadows
E2.3	Mountain hay meadow	E2.3	Mountain hay meadows
E2.4	Iberian summer pasture (vallicar)	E2.4	Iberian summer pastures (vallicares)
E2.5	Now included within E1.2a	E2.5	Meadows of the steppe zone
E3.1a	Mediterranean tall humid inland grassland	E3.1	Mediterranean tall humid grassland
E3.2a	Mediterranean short moist grassland of lowlands	E3.2	Mediterranean short humid grassland
E3.2b	Mediterranean short moist grassland of mountains		
E3.3	Submediterranean moist meadow	E3.3	Sub-mediterranean humid meadows
E3.4a	Moist or wet mesotrophic to eutrophic hay meadow	E3.4	Moist or wet mesotrophic to eutrophic grassland
E3.4b	Moist or wet mesotrophic to eutrophic pasture		
E3.5	Non-Mediterranean moist or wet oligotrophic grassland	E3.5	Moist or wet oligotrophic grassland

E4.1	Vegetated snow-patch	E4.1	Vegetated snow-patch
E4.2	Moved in EUNIS revision to H	E4.2	Moss and lichen dominated mountain summits, ridges and exposed slopes
E4.3a	Boreal and arctic acidophilous alpine grassland	E4.3	Acid alpine and subalpine grassland
E4.3b	Temperate acidophilous alpine grassland		
E4.4a	Arctic-alpine calcareous grassland	E4.4	Calcareous alpine and subalpine grassland
E4.4b	Alpine and subalpine calcareous grassland of the Balkan and Apennines		
E4.5	Alpine and subalpine enriched grassland	E4.5	Alpine and subalpine enriched grassland
E5.1	Anthropogenic herb stands	E5.1	Anthropogenic herb stands (excluded)
E5.2a	Thermophilous woodland fringe of base-rich soils	E5.2	Thermophile woodland fringes
E5.2b	Thermophilous woodland fringe of acidic soils		
E5.2c	Macaronesian thermophilous woodland fringe		
E5.3	Pteridium aquilinum stand	E5.3	Pteridium aquilinum fields
E5.4	Moist or wet tall-herb and fern fringe of the lowlands	E5.4	Moist or wet tall-herb and fern fringes and meadows
E5.5	Subalpine moist or wet tall-herb and fern stand	E5.5	Subalpine moist or wet tall-herb and fern stands
E6.1	Mediterranean inland salt steppe	E6.1	Mediterranean inland salt steppes
E6.2	Continental inland salt steppe	E6.2	Continental inland salt steppes
E6.3	Temperate inland salt marsh		
E7.1	Temperate and hemiboreal wooded pasture and meadow	E7.1	Atlantic parkland
E7.2	Hemiboreal and boreal wooded pasture and meadow	E7.2	Sub-continental parkland
E7.3	Mediterranean wooded pasture and meadow	E7.3	Dehesa

4 Description and distribution of the revised EUNIS heathland, scrub and tundra habitat types

4.1 Background

In the 2014 report (Schaminée et al. 2014), vegetation plots (phytosociological relevés) representing habitat types of heathlands, scrub or tundra were identified in the databases of the Braun-Blanquet project and EVA using a crosswalk between syntaxa (phytosociological alliances) and EUNIS habitat types (Schaminée et al. 2012, with later updates). This work was very important for identifying gaps in the data and subsequent targeted gap filling. It also made it possible to identify the preliminary lists of constant species for each of these types (Schaminée et al. 2014).

Here we present the next step of the analysis, which includes two significant improvements:

1) A computer expert system for heathland, scrub and tundra habitats was developed. It contains formal definitions of individual habitats and uses them to identify vegetation plots belonging to these habitats in the databases. Thus it (i) applies habitat classification consistently across Europe, unlike classification based on expert assignments to phytosociological alliances, which depend on subjective judgement of various experts; (ii) enables identification of vegetation plots that have not been labelled by the alliance names; (iii) can be used to classify any vegetation plot obtained in the future using the same criteria.

2) The lists of constant species were supplemented by the lists of diagnostic and dominant species. These three categories of indicator species have different meaning and together they provide a comprehensive characterization of the habitat's species diversity. Diagnostic species are species with occurrences concentrated in the habitat, being absent or rare in other habitats. As such they are good positive indicators of the habitat, but they do not need to occur in every location of the habitat. Constant species are species that frequently occur in the habitat, but they may include generalist species that are also frequent in other habitats. Dominant species are those that often reach high cover in the habitat, thus determining the habitat physiognomy. Species lists for all of these categories were computed based on the groups of vegetation plots classified by the expert system, using consistent numerical criteria.

4.2 Indicator species of the revised EUNIS heathland, scrub and tundra habitat types

The initial dataset used for the analysis was compiled from the EVA database and the Braun-Blanquet project database. This data set contained a total of 1,126,004 vegetation plots from Europe, including a small number of plots from adjacent regions such as Greenland, Siberia, Anatolia and the Mediterranean coast of North Africa. This dataset was imported to the JUICE 7.0 program (Tichý 2002), in which the subsequent analyses were performed. In this data set, plots identified as belonging to heathland, scrub and tundra habitat types were identified based on the assignments provided by Schaminée et al. (2014). New plots, especially those added to the source databases over the past year, were assigned to these habitat types based on the classification to the alliances by their original authors or expert judgement. These groups of plots belonging to respective habitat types were used as a basis for developing the formal definitions of habitat types for the expert system.

A database of European trees and shrubs developed in 2014 was further extended and revised and dwarf shrubs were added as a separate category. A refined ecological and morphological classification of these species was introduced.

Species groups were created using our expert judgement based on the lists of indicator species for EUNIS habitat types from Schaminée et al. (2014), descriptions of habitat types in European phytosociological literature, and lists of trees and shrubs. These species groups were defined in such a way that they can clearly separate the EUNIS habitat types based on their occurrence and total cover of their species. In general, some species groups included tree species, other groups included shrub species and yet others included the herb-layer species. Each group consisted of species of similar ecology and distribution.

These species groups were combined to create formal definitions of all habitat types of heathlands, scrub and tundra at EUNIS Level 3, with modifications proposed by Schaminée et al. (2014) and in the project of the Red List of European habitats. These formal definitions consist of formulas that combine covers of individual species, total covers of species groups, and numbers of co-occurring species of individual species groups using the logical operators AND, OR and AND NOT, following the proposals of Bruelheide (1997), and also relational operators GR (=greater than). Total covers of each species group were calculated assuming the random overlap of covers of their individual species based on the approach proposed by Chytrý et al. (2005) and formally described by Fischer (2015). Details of this procedure are described in Landucci et al. (2015). Some new software functions were not previously available and had to be developed by L. Tichý specifically for this project for the purpose of defining some types of scrub and dwarf scrub.

As an example, the formal definition of the habitat type F7.1 *Western Mediterranean spiny heath* is represented by the following logical formula:

(<#TC W-Mediterranean-coastal-spiny-shrubs GR25> AND <#TC W-Mediterranean-coastal-spiny-shrubs GR #TC Shrubs|#TC Dwarf-shrubs|#TC Garrigue-phrygana-shrubs EXCEPT #TC W-Mediterranean-coastal-spiny-shrubs>) NOT <#TC Trees GR10>,

which means that the total cover (#TC) of the species group of the Western Mediterranean coastal spiny shrubs is greater than 25% (GR25) and at the same time the total cover of this group is greater than (GR) the total cover of other groups of shrub species (Shrubs, Dwarf shrubs and Garrigue-phrygana shrubs) and at the same time the total cover of trees is not greater than 10%.

A total of 52 definitions of habitat types was developed and included in the expert system (Appendix E). Some of them were defined more narrowly than the EUNIS habitat types used in the final output. These narrower definitions make it possible to create finer classification whenever needed, but the habitat types they define are perfectly nested within the target EUNIS habitat types. This means that EUNIS habitat types can be defined by simply merging the narrower units of the expert system. In contrast, some habitat types defined mainly by geographic criteria, but having very similar species composition in different areas, had a common definition, namely the arctic-alpine and boreo-mountain-temperate types.

The species composition of all 1,126,004 vegetation plots was compared with all the formal definitions. This procedure was computationally very intensive, taking several days on a cloud computer. As a result, plots belonging to some of the 52 habitat types of heathlands, scrub or tundra were identified. These plots were checked for species composition, mapped, and based on the results, formal definitions were adjusted and errors in the input database were corrected. This procedure was repeated several times until an optimal solution was achieved. At the end 40,885 plots were classified to heathland, scrub or tundra habitat types.

The group of plots assigned to EUNIS habitat types were used to prepare distribution maps. The plots assigned by a common definition to groups representing more than one geographically conceived habitat type were subsequently separated to these habitat types based on the occurrence in Ecoregions as defined by Olson et al. (2001). Coastal scrub habitat types belonging to the habitat group B of EUNIS were defined by intersecting plot assignment to scrub habitat types and occurrence on coastal dunes, defined according to the coastal dune area of the Map of the Natural Vegetation of Europe (Bohn et al. 2000-2004) with a buffer of 1 km.

Three groups of indicator species were defined for each EUNIS habitat type based on the groups of vegetation plots assigned to this type using the

procedure described in the previous chapter. These groups included diagnostic, constant and dominant species.

An important issue that had to be solved before computing indicator species was the geographical stratification of the vegetation-plot dataset (Knollová et al. 2005). This was needed in order to remove the effect of geographically unbalanced sampling effort across Europe, which meant that some relatively small areas had a high concentration vegetation plots, while other (often large) areas were represented by few or no plots, even though the habitat type most probably occurs there.

For the purpose of the stratified resampling the data set was divided into two parts – plots classified as heathland, scrub and tundra habitat types and plots of other types. Aquatic vegetation plots and vegetation plots from Greenland, North Africa and Asia east of 60° E were deleted prior to the stratification. Geographical stratification of the classified part of the data set was performed in a grid of 3 x 5 minutes. If a cell of this grid contained more than 1 plot belonging to the same habitat type, one plot was selected randomly and the other plots were deleted. Geographical stratification of the unclassified part of the data set (plots with geographical coordinates) started with its random division to 10 subsets with equal number of plots. Within each subset, one randomly selected plot from each grid cell of 3 x 5 minutes (approximately 5.5 x 6 km at 50° N) was included in the stratified file, while others were deleted. In this way, up to 10 times more unclassified plots were selected from each grid cell, which is justified by the fact that unclassified plots belonged to many habitat types, while for the classified plots selection was always made from a single habitat type.

As a result of stratified resampling, a dataset was prepared that contained 11,727 plots belonging to heathland, scrub and tundra habitat types and 279,741 plots belonging to other habitat types. The number of plots was much smaller than the total number of plots of these habitats available, but the advantage of this dataset was that it was more representative. Plots of the other types had to be retained in the dataset to provide a background for calculating the degree of concentration of species occurrences within the target vegetation type in the computation of diagnostic species. For computation of indicator species of coastal dune scrub habitats, a separate file had to be created, because the coastal dune habitats were represented by the same plots as some scrub habitats of group F. A total of 894 plots belonging to coastal dune scrub and 242,236 plots of other habitats were included in this dataset.

Diagnostic species were determined based on the degree of concentration of their occurrences in groups of plots representing each EUNIS habitat type. This degree of concentration was calculated using the phi coefficient of association (Sokal & Rohlf 1995) standardized for the identical number of relevés across all groups, which was arbitrarily set to 1% of the total data set (Tichý & Chytrý 2006). The species with a value of phi for the particular habitat higher than

0.15 were considered as diagnostic for this habitat type. However, for some habitat types represented by a low number of plots in the stratified dataset, the concentration of species occurrence within the type may not have been statistically significant. Therefore statistical significance of the species-habitat type association was tested using the Fisher's exact test (Sokal & Rohlf 1995) and if this association was not significant at $P < 0.05$, the species was excluded from the list of diagnostic species (Tichý & Chytrý 2006).

Constant species were defined as those with constancy (= percentage occurrence frequency) in the target habitat type at least 10%.

Dominant species were defined as those that occurred with a cover higher than 25% in at least 5% of vegetation plots. This means that a species is considered as dominant even if it does not belong to the highest vegetation layer, and a single plot can have more than one dominant species, or no dominant species if vegetation is very sparse or if cover values of all species are lower than 25%.

Records of species identified only to the genus level and records of epiphytic lichens were removed from the lists of indicator species.

The resulting lists of indicator species for EUNIS heathlands, scrub and tundra habitat types, including diagnostic, constant and dominant species, are presented in Appendix F. After excluding a few habitat types for which no or less than 10 vegetation plots were available, indicator species were defined for the following 41 types:

B1.5a	Atlantic and Baltic coastal <i>Empetrum</i> heath
B1.5b	Atlantic coastal <i>Calluna</i> and <i>Ulex</i> heath
B1.6a	Atlantic and Baltic coastal dune scrub
B1.6b	Mediterranean and Black Sea coastal dune scrub
F1.1	Shrub tundra
F1.2	Moss and lichen tundra
F2.1	Subarctic and alpine dwarf <i>Salix</i> scrub
F2.2a	Alpine and subalpine ericoid heath
F2.2b	Alpine and subalpine <i>Juniperus</i> scrub
F2.2c	Balkan subalpine genistoid scrub
F2.3	Subalpine deciduous scrub
F2.4	Subalpine <i>Pinus mugo</i> scrub
F3.1a	Lowland to montane temperate and submediterranean <i>Juniperus</i> scrub
F3.1b	Temperate <i>Rubus</i> scrub
F3.1c	Lowland to montane temperate and submediterranean genistoid scrub
F3.1d	Balkan-Anatolian submontane genistoid scrub
F3.1e	Temperate and submediterranean thorn scrub
F3.1f	Low steppic scrub

F3.1g	Corylus avellana scrub
F3.1h	Temperate woodland clearing scrub
F4.1	Wet heath
F4.2	Dry heath
F5.1-2	Mediterranean maquis and arborescent matorral
F5.3	Submediterranean pseudomaquis
F5.4	Spartium junceum scrub
F5.5	Thermomediterranean scrub
F6.1a	Western basiphilous garrigue
F6.1b	Western acidophilous garrigue
F6.2	Eastern garrigue
F6.6	Supramediterranean garrigue
F6.7	Mediterranean gypsum scrub
F6.8a	Mediterranean halo-nitrophilous scrub
F6.8b	Caspian halo-nitrophilous scrub
F7.1	Western Mediterranean spiny heath
F7.3	Eastern Mediterranean spiny heath (phrygana)
F7.4a	Western Mediterranean mountain hedgehog-heath
F7.4b	Central Mediterranean mountain hedgehog-heath
F7.4c	Eastern Mediterranean mountain hedgehog-heath
F9.1a	Arctic, boreal and alpine riparian scrub
F9.1b	Temperate riparian scrub
F9.2	Salix fen scrub
F9.3	Mediterranean riparian scrub

In contrast, due to lack of data, indicators could not be defined for the following five habitat types:

B1.6c	Macaronesian coastal dune scrub
F4.3	Macaronesian heath
F7.4d	Canarian mountain hedgehog-heath
F8.1	Canarian xerophytic scrub
F8.2	Madeiran xerophytic scrub

4.3 Update of indicator species of the revised EUNIS woodland habitat types

The new approach developed here to define indicator species of heathland, scrub and tundra habitats was also applied to woodlands. The expert system for EUNIS woodland habitats developed in a previous report (Schaminée et al. 2014) was refined, using the updated species groups and new software functions developed for the work on heathlands/scrub/tundra. Based on this, refined classification of woodlands was prepared and diagnostic, constant and dominant species were also computed for woodlands. This new species list represents a substantial improvement of the species list for woodlands developed by Schaminée et al. (2013) and can replace it.

The stratified dataset for woodland habitat types contained 37,988 plots belonging to the types of group G and 253,405 plots belonging to other habitat types. The stratified dataset for coastal woodlands contained 559 plots belonging to these habitat types and 242,571 plots belonging to other types.

The resulting lists of indicator species for EUNIS woodland habitat types, including diagnostic, constant and dominant species, are presented in Appendix D. After excluding a few habitat types for which no or less than 10 vegetation plots were available, indicator species were defined for the following 40 woodland habitat types:

B1.7a	Atlantic and Baltic broad-leaved coastal dune woodland
B1.7c	Baltic coniferous coastal dune woodland
B1.7d	Mediterranean coniferous coastal dune woodland
G1.1	Temperate and boreal softwood riparian woodland
G1.2a	Alnus woodland on riparian and mineral soils
G1.2b	Temperate and boreal hardwood riparian woodland
G1.3	Mediterranean and Macaronesian riparian woodland
G1.4	Broadleaved swamp woodland on non-acid peat
G1.5	Broadleaved bog woodland on acid peat
G1.6a	Fagus woodland on non-acid soils
G1.6b	Fagus woodland on acid soils
G1.7a	Temperate and submediterranean thermophilous deciduous woodland
G1.7b	Mediterranean thermophilous deciduous woodland
G1.8	Acidophilous Quercus woodland
G1.9a	Boreal-nemoral mountain Betula and Populus tremula woodland on mineral soils
G1.9b	Mediterranean mountain Betula and Populus tremula woodland on mineral soils
G1.Aa	Carpinus and Quercus mesic deciduous woodland
G1.Ab	Ravine woodland
G1.Ba	Alnus cordata woodland
G2.1	Mediterranean evergreen Quercus woodland
G2.2	Mainland laurophyllous woodland
G2.3	Macaronesian laurophyllous woodland

G2.5a	South-Aegean Phoenix grove
G2.6	Ilex aquifolium woodland
G3.1a	Temperate mountain Picea woodland
G3.1b	Temperate mountain Abies woodland
G3.1c	Mediterranean mountain Abies woodland
G3.2-3	Temperate subalpine Larix, Pinus cembra and Pinus uncinata woodland
G3.4a	Temperate and continental Pinus sylvestris woodland
G3.4b	Temperate and submediterranean montane Pinus sylvestris-nigra woodland
G3.4c	Mediterranean montane Pinus sylvestris-nigra woodland
G3.6	Mediterranean and Balkan subalpine Pinus heldreichii-peuce woodland
G3.7	Mediterranean lowland to submontane Pinus woodland
G3.9a	Taxus baccata woodland
G3.9b	Mediterranean Cupressaceae woodland
G3.A	Picea taiga woodland
G3.B	Pinus sylvestris taiga woodland
G3.C	Larix sibirica taiga woodland
G3.Da	Pinus bog woodland
G3.Db	Picea bog woodland

In contrast, due to lack of data, indicator species could not be defined for the following 13 habitat types:

B1.7b	Black Sea broad-leaved coastal dune woodland
G1.C	Highly artificial broadleaved deciduous forestry plantations
G1.D	Fruit and nut tree orchards
G2.4	Olea europaea-Ceratonia siliqua woodland
G2.5b	Canarian Phoenix grove
G2.7	Macaronesian heathy woodland
G2.8	Highly artificial broadleaved evergreen forestry plantations
G2.9	Evergreen orchards and groves
G3.4d	Mediterranean montane Cedrus woodland
G3.8	Pinus canariensis woodland
G3.9c	Macaronesian Juniperus woodland
G3.Dc	Larix sibirica bog woodland
G3.F	Highly artificial coniferous plantations

4.4 Description in a standard format of the revised EUNIS heathland, scrub and tundra habitat types

4.4.1 The existing EUNIS habitat text descriptions

From the start, the aim of a European habitat classification has been to provide a comprehensive and definitive reference list that is scientific, unambiguous and easily understood (Moss & Roy 1998, Moss 2008). To this end, an integral feature of the EUNIS Habitat Classification is the habitat text descriptions which are incorporated into the underlying database, accessible as an interface via the EUNIS website portal and available in the hard-copy download of the classification published as Davies *et al.* (2004).

Such text descriptions were not at first included for the CORINE Biotopes that were the forerunner of EUNIS, simply English language titles of the habitats (Internal Technical Handbook 1988, partially updated 1989, see Moss & Roy 1998). The later development of the CORINE Biotopes Manual (Devillers *et al.* 1991) included a descriptive text for each habitat, together with phytosociological and scientific references. When the classification was expanded to the whole Palaearctic, the published version of the classification (Devillers & Devillers-Terschuren 1996) did not include text descriptions, simply habitat codes and titles, but in 1995 these were added to the underlying PHYSIS database which had first been released the previous year.

The development of the existing text descriptions in the EUNIS Habitat Classification from earlier versions is detailed in Hill *et al.* (2004a, 2004b). The text descriptions are variable in length, detail and content: they often include some kind of general statement about the structure of the habitat, many mention particular characteristic species, sometimes highlighting endemic floras, and references to climatic, terrain and soil characteristics vary in detail and order, often being summarised using broad categories or terms.

There is a glossary appended to the EUNIS Habitats Classification (Davies *et al.* 2004, since been updated in 2006, version supplied by Doug Evans of the ETC-BD) and this has been derived from various sources, detailed in section 5.1.2 of this report, to be delivered in the next stage of the work. In fact, many of the terms in the Glossary, particularly more specific geographical and topographic terms, are redundant, never figuring in the text descriptions.

4.4.2 Other considerations and sources for describing European habitats

The Habitats Directive provides 'a common framework for the conservation of wild animal and plant species and natural habitats of Community importance'

(CEC 2003) and the definitions provided in the *Interpretation Manual of European Union Habitats* (European Commission 2013) include a text description derived from the CORINE Biotopes Manual (Devillers et al. 1991). For each priority habitat (and some non-priority habitats) in the EUR-12, this description was later incorporated into more formalised descriptive sheet which established 'clear, operational, scientific definitions of habitat types using pragmatic descriptive elements and taking into account regional variation' and a 'minimal interpretation' was provided for the remaining non-priority habitats based on CORINE. Text descriptions for new habitats and revisions of existing habitat definitions were made for EUR15, EUR25, EUR 27 and EUR28 with the accession of new countries in 1995, 2004, 2007 and 2013, mostly using the PHYSIS database which gives access to descriptions at EUNIS-4 and -5. Although there is a simple 1:1 correspondence between EUNIS-3 Heath, scrub and tundra types and Annex 1 habitats in only a minority of cases (21%), a further 24 heath and scrub types figure among the Annex 1 habitats and the information at these lower levels of equivalence could allow the often complex relationships between the remainder to be explored. Unlike the definitions of the EUNIS habitats, the interpretations of the Annex 1 habitats have acquired legislative force through the implementation of the Habitats Directive.

The Diversity of European Vegetation (Rodwell et al. 2002) established the idea of a simple descriptor for each alliance which included, as far as possible, standardised references to the vegetation type, the typical physiography and the geographical range, though these were not based on explicit standards nor summarised in a glossary. And the crosswalk to EUNIS-3 (Schaminée et al. 2012) enables such tags to be used to interpret those habitats. In the more ambitious EuroVegChecklist (Mucina et al. in press), such descriptors have been provided for the more comprehensive range of alliances using terminology summarised in a glossary appended to the typology. This has been compiled bottom-up from the definitions provided by contributors to the EuroVegChecklist, so no terms are redundant.

The current 'Red List of European Habitats' project funded by DG Environment uses as its typology a modified version of EUNIS at level 3 (Rodwell et al. 2013) which incorporates, with some further very minor modifications, the changes for heath, scrub and tundra habitats recommended in Schaminée et al. (2014). Discussions between the EEA, the ETC-BD and the Red List project team could from now on ensure that there is a harmonisation between the developing EUNIS-3 habitat typologies. Moreover, and very relevant to the current task of providing revised descriptions of EUNIS habitats is the fact that much more detailed Red List Habitat Definitions are being prepared by experts for the territorial assessments of extent and quality. These Definitions include an audit trail from EUNIS, a detailed text description, crosswalk to the EuroVegChecklist and other typologies, species lists and further details relevant to the character and status of habitats across Europe and images. Though they have not yet been edited into a standardised and harmonious format, we have been able to

draw upon these definitions for the current task of providing brief revised descriptions of heath, scrub and tundra habitats

4.4.3 Description in a standard format of the revised EUNIS Heath, scrub and tundra habitat types

Like the existing EUNIS habitat and Annex I habitat descriptions and the EuroVegChecklist descriptors, the Red List Habitat definitions sit rather lightly to the questions of explicit standardised terminology and parameter frames; and there are unresolved questions about the compatibility of terms in the various glossaries that are currently applied to the description of habitats. Furthermore, there is actually no accepted standard format for the description of a EUNIS habitat. Here we therefore provide only a provisional response to the challenge of what such brief descriptions should look like.

As with the work on woodland habitats provided in Schaminée (2014), what we would recommend is that the descriptions are regarded essentially as definitions: they should provide, as accurately, briefly and precisely as possible, the key distinguishing features of the habitat. They are not the place for small essays in ecology or status, particularly where the habitat is more recognisable. In general, the detail provided should reflect the variability in the habitat, not its richness or structural complexity.

The descriptions we provide have a roughly standardised shape:

- ▶ we have used the terms 'heath' and 'scrub' in the singular throughout;
- ▶ we include a general reference to the character of the vegetation but, with details of species composition now available through analysis of constituent relevés for the alliances of each habitat, we believe that there is no need to repeat this information in the description unless particular species are absolutely definitive;
- ▶ we mention vegetation structure or species-richness only when it is a diagnostic feature of the woodland type;
- ▶ we use non-technical terms as far as possible to describe terrain, soil types, altitudinal belts;
- ▶ we use the biogeographic zones from the Habitats Directive but otherwise avoid any specialised terminology to describe climatic relationships or broad geographical distribution.
- ▶ for the sake of simplicity, we have used lower case for the names of all regions, zones and belts, retaining them only for strictly geographic terms, like

the names of countries and seas, and omitted hyphens in such terms, except where they are split.

The new descriptions along with the originals are attached as Appendix E.

4.5 Maps of distribution of phytosociological relevés and probability of occurrence based on distribution models for each of the revised EUNIS heathland, scrub and tundra habitat types

4.5.1 Habitat suitability modelling

For the habitat suitability modelling, the widely used software Maxent for maximum entropy modelling of species' geographic distributions was used. Maxent is a general-purpose machine-learning method with a simple and precise mathematical formulation, and has a number of aspects that make it well-suited for species distribution modelling when only presence (occurrence) data but not absence data are available (Philips et al. 2006). Because EUNIS habitats have a particular species composition, they are assumed to respond to specific ecological requirements, allowing us to generate correlative estimates of geographic distributions. Modelling habitats that have been floristically defined is a well-known procedure for ecological modelling at local scales, and a promising technique to be applied also at the continental level.

The Maxent method considers presence data (known observations of a given entity) and the so-called background data. Background data comprise a set of points used to describe the environmental variation of the study area according to the available environmental layers. It is assumed that these layers represent well the most important ecological gradients on a European scale. These layers were selected from meaningful environmental predictors commonly used for modelling non-tropical plant and vegetation diversity, and are not mutually strongly correlated.

As environmental data (and their sources) the following climate and soil layers have been used:

- Potential Evapotranspiration
<http://www.cgiar-csi.org/data/global-aridity-and-pet-database>
- Solar radiation
<http://www.worldgrids.org/doku.php?id=wiki:inmsre3>
- Temperature Seasonality (standard deviation *100)
<http://www.worldclim.org/bioclim>

- Mean Temperature of Wettest Quarter
<http://www.worldclim.org/bioclim>
- Annual Precipitation
<http://www.worldclim.org/bioclim>
- Precipitation Seasonality (Coefficient of Variation)
<http://www.worldclim.org/bioclim>
- Precipitation of Warmest Quarter
<http://www.worldclim.org/bioclim>
- Distance to water (rivers, lakes, sea)
derived from the shapefile 'Inland_Waters.shp'
- Bulk density of the soil (kg/m³)
Hengl et al. 2014
- Cation Exchange Capacity of the soil
Hengl et al. 2014
- Weight in % of clay particles (<0.0002 mm)
Hengl et al. 2014
- Volume % of coarse fragments (> 2 mm)
Hengl et al. 2014
- Soil organic carbon content (‰)
Hengl et al. 2014
- Soil pH (water)
Hengl et al. 2014
- Weight in % of silt particles (0.0002-0.05 mm)
Hengl et al. 2014
- Weight in % of sand particles (0.05-2 mm)
Hengl et al. 2014

Compared with the habitat suitability models set up for the EUNIS forest types (Schaminée et al. 2014) we have now included 8 recently published soil parameters (Hengl et al 2014), instead of only one (soil pH).

Maxent is expected to perform well for estimating the geographic distribution of EUNIS habitats in Europe. However, as with any other modelling techniques this method is sensitive to sampling bias, i.e. when the spatial distribution of presence data is reflecting an unequal sampling effort in different geographic regions. In Maxent, it has been proposed that the best way to account for sampling bias (when bias is known or expected to occur) is to generate background data reflecting the same bias of the presence data. When a complete set of presence data is available, a general recommendation is to generate background points from the occurrences of other species/communities that were sampled in a similar way (Elith et al. 2011).

Two different approaches have been followed for the selection of a maximum of 5,000 locations for the background data, assuming biased and non-biased

presence data. For the first approach, 5,000 locations were randomly selected from the heathland, scrub and tundra plot pool, assuming that they reflect the general geographic bias of heathland, scrub and tundra sampling in Europe. The second approach concerns a random selection of 5,000 background points in the whole study area, assuming that the presence data describe a representative subset of the real distribution range of the target habitat.

In Appendix I the preliminary results of the analysis are presented. The two modelling approaches (assuming biased and non-biased data) were evaluated for each of the EUNIS habitat types in order to estimate which assumption is more likely. This evaluation was based on the expert knowledge of the team members in the distribution of heathland, scrub and tundra types by assessing (i) the distribution of the available presence data as an estimate of geographic bias, (ii) the realism of the habitat suitability maps to reflect known distribution of heathland, scrub and tundra, and (iii) the environmental predictors that contribute most substantially to the models. The best performing model was then selected by consensus of the expert team for each habitat type. In the overview of EUNIS types on the first page of the Appendix, the preference for one of the two outputs is indicated in the column 'Background data pool used'.

For each EUNIS heathland, scrub and tundra type the following data are presented:

- A distribution map showing the location of the relevés that have been assigned to the EUNIS type concerned and therefore used as presence data.
- A habitat suitability map with colours varying from gray, through green to red, indicating increasingly favourable ecological conditions for the type (expressing the logistic output of the model between 0 and 1).
- AUC, or the Area Under the Curve, as a general estimate of model performance. This is the probability that the classifier correctly orders two points (a random positive example and a random negative example). In general, AUC values in the range 0.5-0.7 were considered low, 0.7-0.9 were moderate and >0.9 were high, suggesting poor, good and very good model performances, respectively. We provide two estimates of the AUC as calculated by Maxent. 'AUC training' reflects the internal fit between observed and predicted occurrences in the computed model. 'AUC test' provides the mean AUC obtained from a 10-fold cross-validation procedure in which ten different models were computed with a random selection of 90% of data (calibration data set) and 10% for testing the model (validation data set).
- Contribution variables to the Maxent model (%). Indicates to what extent the environmental variables contribute to the model.

The habitat suitability maps will be further reviewed and processed in the ETC/BD Task 1.7.5.C: 'Ecosystem mapping and assessment' in which the maps will be further downscaled to the actual land cover situation.

5 Recommendations and roadmap for a EUNIS environmental parameter framework

5.1 The existing state of EUNIS habitat parameterisation

The 1995 Paris Workshop on the CORINE Biotopes Sites Database and Habitat Classification initiated the development of the EUNIS Habitat Classification and recognised the value of a multi-faceted approach in which parameters other than vegetation alone could be used for habitat definition (Moss & Roy 1995, 1998). It also saw the value of a user-friendly software tool for accessing and displaying the classification through various search options in which such parameters could be interrogated.

The parameterisation task was scoped then in terms of a generalisation of the parameter framework that had already been developed for the Nordic Vegetation Classification (Påhlsson 1994) where information on biogeography, geomorphology, climate, soils and water could be included alongside floristic and structural data and relationships of the habitat types to other classification schemes including phytosociology (Moss & Roy 1998 where an example was scoped by Pierre Devillers).

Subsequently a parameter framework was designed for the EUNIS database comprising a central habitats table, a set of parameter tables (one for each parameter) and a set of associated look-ups (one for each code to be documented). The database design allowed each parameter to be treated independently with regard to data type and meta-data, and for some parameters to be fully complete while information for others remained unavailable (Dorian Moss unpublished documentation summarised in Dring 2001 and Rodwell & Dring 2001). The various tables and their descriptions, including those relevant, at that stage, to marine habitats, are shown in Table 5.1.

When first proposed, it was considered that full parameterisation of the EUNIS habitats would take many years to complete (Moss & Roy 1995, 1998) but partial parameterisation was undertaken for incorporation into the EUNIS database and the hard-copy *EUNIS Habitat Classification* (Davies et al. 2004). A *Guide for Users* was produced to assist in interrogating the EUNIS website as it stood in 2008 (Moss 2008) and this outlined the various query routines which could give access to a limited number of parameters included on the factsheet for each habitat. These parameters were: habitat name and description, audit trail to CORINE and the Palaeartic Habitats Classification, geographical distribution by country and biogeographic region, legal instruments, a crosswalk to syntaxa (based on Rodwell et al. 2002), sites where recorded,

species, references and other information, where a limited number of entries for various environmental parameters were indicated. Other search options available in the 2008 version of the EUNIS website allowed interrogation by species, site, country, biogeographic region but not by environmental parameters.

The environmental parameters encoded in the database are listed, along with the habitat text description, as 'Descriptive and diagnostic parameters' under each habitat in the *EUNIS Habitat Classification* (Davies et al. 2004). What appears to remain of the database entries themselves were supplied for this contract by the EEA as an extract dump spreadsheet though this appears to be incomplete, to include EUNIS habitats at various levels and to be around 60% concerned with marine habitats. A small and varying number of the most relevant parameters have been filled for each habitat - for the grasslands included, there are between one and six parameters. A varying

Table 5.1. The parameter and look-up tables developed for the EUNIS database.

Parameter table	Description	Look-up table	Description
HABALTZONE	Altitudinal zones	ALTZONE	Altitude zone units
HABCLIALT	Climate & altitude text		
HABCLIMZONE	Climate zone units	CLIZONE	Climate zone units
HABCOMP	Biotope complex units	COMPLEXES	Biotope complex units, description & source
HABDEPTH	Depth for marine	DEPTH	Depth units
HABEQUIV	Crosswalk to others	CLASSCODES	Habitat classification codes
HABGEOG	NUTS & regions	GEO	Geographic units
HABGEOGTEXT	Geography text		
HABGEOL	Geology units	GEOLOGY	Geology units
HABINFLTEXT	Influence text		
HABINFLUENCE	Impacts & influences	IMPACTS	Impact units
		INFLUENCES	Influence units
HABINV	Invertebrates	ABUNDANCES	Abundance units
		CONSTATUS	Conservation status units, source & type
		FREQUENCIES	Frequency units
		FAITHFULNESS	Faithfulness units

		SPECIES	Species dictionary
		STRATA	Vegetation strata
		SPECSTATUS	Species status in habitat units
HABITAT	EUNIS units		
HABLAND	Landscape text		
HABLANDGEOM	Geomorphology	EXPOSURE	Exposure units
		EXPOSOURCE	Exposure source units
		GEOMORPH	Geomorphology units
		SLOPE	Slope units
HABLEGNM	Legally designated habitats	HBHDAX	Habitats Directive habitat units
		EMERALD ANNEX 1	Emerald Annex 1 & Berne Convention units
		LEGDESIG	Legal designation units & their area
HABLOCS	Localities name, code & type site	GEO	Geographic units
		SITEDATABASE	Site database units
HABMARINE	General text on marine habitats		
HABMICRO	Microhabitats	MICROHABITATS	Microhabitat units
HABNAMES	Alternative names & language	LANGUAGE	Language codes
HABPLANT	Plants	ABUNDANCES	Abundance units
		CONSTATUS	Conservation status units, source & type
		FREQUENCIES	Frequency units
		FAITHFULNESS	Faithfulness units
		SPECIES	Species dictionary
		STRATA	Vegetation strata
		SPECSTATUS	Species status in habitat units
HABREFS	References and relevance flags	REFERENCES	Literature and other references
HABREL	Related habitat units & type	RELATIONS	Habitat relation type units
HABSALINE	Salinity	SALINITY	Salinity units
HABSOIL	General soils text		
HABSOILFRACT	Soil fraction units	SUBSTRATES	Substrate units

HABSOLILMOIST	Soil moisture units	SOILMOIST	Soil moisture units
HABSOILPAR	Soil parent material units	SOILPAR	Soil parent material units
HABSOILPH	Soil pH	PH	Soil pH units
HABSOILTROPH	Soil trophic status	TROPHIC STATUS	Soil trophic status units
HABSOILTYPE	Soil type units	SOILTYPES	Soil type units and alternative codes
HABSOILWATERFLOW	Soil water mobility units	SOILWATERFLOW	Soil water mobility units
HABSPECTEXT	Species descriptive text		
HABSTRUC	Habitat structure text		
HABSTRUCSPAT	Structural spatial units	SPATIAL	Habitat structure spatial units
HABSTRUCTEMP	Structural temporal units	TEMPORAL	Habitat structure temporal units
HABSYN	Crosswalk to syntaxa	SYNTAXA	Syntaxa unit summaries
HABTEXT	Text description	LANGUAGE	Language codes
HABTIDE	Tidal units	TIDAL	Tidal units
HABVERT	Vertebrates	ABUNDANCES	Abundance units
		CONSTATUS	Conservation status units, source & type
		FREQUENCIES	Frequency units
		FAITHFULNESS	Faithfulness units
		SPECIES	Species dictionary
		STRATA	Vegetation strata
		SPECSTATUS	Species status in habitat units
HABWATER	Water characteristic units		
HABWATERLOW	Water flow units	WATERFLOW	Water flow units
HABWATERPH	Water pH units	PH	Water pH units
HABWATERQUAL	Water quality units	WATERQUAL	Water quality units
HABWATERSUBS	Water substrate sediment units	SUBSTRATES	Water substrate sediment units
HABWATERTROPH	Water trophic status units	TROPHIC STATUS	Water trophic status units
HABWATERTYPE	Water type units	WATERTYPE	Water type units

categories per look-up is included and not always with a text explanation. As an example of the status quo, Table 5.2 and Figure 5.1 show the entry in the 2008 database dump spreadsheet and fact sheet from the *EUNIS Habitat Classification* (Davies et al. 2004) for E2.3 Mountain hay meadows.

Table 5.2. Entry for E2.3 Mountain hay meadows in the 2008 EUNIS database dump.

ID_HAB	SCIENTIFIC_NAME	LOOKUP_TYPE	NAME	DESCRIPTION
170	Mountain hay meadows	ALTITUDE	Montane (sensu stricto)	Middle altitudinal level of high mountains and upper altitudinal level of high hills
170	Mountain hay meadows	IMPACT	Mowing/cutting	NULL
170	Mountain hay meadows	COVER	Vegetation >30%	Vegetation cover exceeds 30%
170	Mountain hay meadows	HUMIDITY	Moist/mesic	Conditions of medium water supply, neither extremely wet (hydric) nor extremely dry (xeric)
170	Mountain hay meadows	USAGE	Active management	NULL
170	Mountain hay meadows	LIFE_FORM	Herbs	Non-woody, seed-bearing plants
170	Mountain hay meadows	LIFE_FORM	Grasses	Flowering plants with very narrow leaves and small greenish petal-less flowers in heads or spikes belonging to the family Graminae
170	Mountain hay meadows	LIFE_FORM	Low-growing herbs	Low-growing non-woody, seed-bearing plants

Database and published factsheet should not be confused with the so-called 'Defining parameters' used as criteria for the keys to the habitats for the upper 3 hierarchical levels of EUNIS (Davies et al. 2004). These again can refer to biogeographic zones, substrate type, hydrology and biotic impacts, so that E2.3

Mountain hay meadows can be identified through the following steps of the decision tree:

Significant tree presence? NO
 Saline? NO
 Tall forbs and ferns dominant? NO
 Alpine? NO
 Mesic, Dry or wet? MESIC

EUNIS habitat code and names	E2.3	Mountain hay meadows
Description		
Often species-rich hay meadows of the montane and subalpine levels of higher mountains of the nemoral and southern boreal zones.		
<i>Source Hill, M.O., Moss, D. & Davies, C.E. (2004a)</i>		
Legal instruments		
<u>Legal instrument habitat</u>	<u>Legally designated Code</u>	
EU Habitats Directive Annex I meadows	Mountain hay	6520
Descriptive or diagnostic parameters		
Parameter	Value(s)	
Altitude zones (terrestrial and marine): montane (<i>sensu stricto</i>)	Mo	
Human activities and impacts: mowing / cutting	Mo	
Levels of habitat usage (when used in criteria):	Active management	
Dominant life forms: growing herbs, grasses	Herbs, Low-	
Cover characteristics (when used as criteria):	Vegetation	

Figure 5.1. Habitat fact sheet for E2.3 mountain hay meadows in Davies et al. (2004)

Heavily managed? NO
 Steppe zone? NO
 Unmanaged? NO
 Pasture, possibly mown or predominantly hay meadow? PREDOMINANTLY HAY MEADOW
 Low-medium altitude or montane? MONTANE

Negotiating the fuzzy boundaries that often exist between habitats is aided in the keys by the use of extensive and detailed footnotes to the decision points: here, for example, 'Alpine' is defined in a footnote as a climate zone typically

found at or above the tree limit, while 'Montane' is an altitudinal belt normally above 600m.

While information from the original environmental parameterisation is still available (apparently only in part) from the datadump and summarised as 'Descriptive and diagnostic parameters' in the *EUNIS Habitat Classification* (Davies et al. 2004), it is not shown on the current fact sheet for the habitats (See Figure 5.2). There, along with the original text description, there is a key navigation facility which uses the original 2008 'Defining parameters' to identify habitats and a limited number of query tabs for interrogating legal status, vegetation types (now incorporating a crosswalk to the provisional EuroVegChecklist), species (empty), other classifications and historical relationships to CORINE and the Palaeartic Habitats Classification.

The screenshot shows the EUNIS web interface for the habitat 'Mountain hay meadows'. At the top, there are navigation links for Networks, Subscriptions, Mobile, Contact us, and EEA homepage. Below this is the European Environment Agency logo and a search bar with an 'Advanced search' link and an 'A-Z Glossary' link. A secondary navigation bar includes Topics, Data and maps, Indicators, Publications, Media, and About EEA. The main content area has a breadcrumb trail: EUNIS Home > Species > Habitat types > Sites > Global queries > References > About > EUNIS. The current page is titled 'Mountain hay meadows' and includes a description in English, a 'Quick facts' section with EUNIS habitat type (code E2.3), Bern Convention status, and Resolution 4 habitat type information. Below the description are several expandable sections: Legal status, Vegetation types, Species mentioned in habitat description, Other classifications, and History.

Figure 5.2. Habitat fact sheet for E2.3 Mountain hay meadows on the current EUNIS web pages.

Recommendation: A decision needs to be made about whether to return to the original vision of an environmental parameter frame for EUNIS habitats (Moss & Roy 1998) and to consider what are the implications for the structure, format and functionality of the EUNIS database and webpages.

5.2 Other relevant sources for environmental references

From the start, an integral feature of the EUNIS Habitat Classification has been the habitat text descriptions which are incorporated into the underlying database, accessible as an interface via the EUNIS website portal and available in the hard-copy download of the classification published as Davies *et al.* (2004). Such text descriptions were not at first included for the CORINE Biotopes that were the forerunner of EUNIS, simply English language titles of the habitats (Internal Technical Handbook 1988, partially updated 1989; see Moss & Roy 1998). The later development of the CORINE Biotopes Manual (Devillers *et al.* 1991) included a descriptive text for each habitat, together with phytosociological and scientific references. When the classification was expanded to the whole Palaearctic, the published version of the classification (Devillers & Devillers-Terschuren 1993) did not include text descriptions, simply habitat codes and titles, but in 1995 these were added to the underlying PHYSIS database that had first been released the previous year. The development of the existing text descriptions in the EUNIS Habitat Classification from earlier versions is detailed in Hill *et al.* (2004a, 2004b). The original descriptions vary in length and detail but often contain further references to parameters such as vegetation structure, species composition, biogeographic region, altitude, climate, terrain and soils. Qualifiers can indicate what kind of vegetation is excluded from the habitat.

Similar text descriptions and other parameter frames for habitats provide further sources of environmental references. The Habitats Directive provides 'a common framework for the conservation of wild animal and plant species and natural habitats of Community importance' (CEC 2003) and the definitions provided in the Annex 1 Manual include a text description derived from the CORINE Biotopes Manual (Devillers *et al.* 1991). For each priority habitat (and some non-priority habitats) in the EUR-12, this was later incorporated into more formalised descriptive sheet which established 'clear, operational, scientific definitions of habitat types using pragmatic descriptive elements and taking into account regional variation' and a 'minimal interpretation' was provided for the remaining non-priority habitats based on CORINE (CEC 1995). Text descriptions for new habitats and revisions of existing habitat definitions were produced for EUR15, EUR25, EUR27 and EUR28 with the accession of new countries in 1995, 2004, 2007 and 2013. The new and revised descriptions were based on a mix of information from the PHYSIS database which gives access to descriptions at EUNIS-4 and EUNIS-5 and information in the proposals, then subject to negotiation with the existing Member States and accession countries (Evans 2012). However, unlike the definitions of the EUNIS habitats, the interpretations of the Annex 1 habitats have acquired legislative force through the implementation of the Habitats Directive.

The Diversity of European Vegetation (Rodwell et al. 2002) established the idea of a simple English language descriptor for each phytosociological alliance that included, as far as possible, standardised references to the vegetation type, the typical physiography and the geographical range, though these were not based on explicit standards nor were the terms used summarised in a glossary. The crosswalk to EUNIS-3 included in that overview enabled such tags to be used to interpret those EUNIS habitats. In the more ambitious EuroVegChecklist (Mucina et al. in press), such descriptors have been provided for a more comprehensive and updated range of alliances. These descriptors include ecological and environmental categories of various frameworks for describing geographical regions, altitudinal levels and bioclimatic zones that have found widespread, though not always universal, favour. Some of these are more applicable to certain parts of Europe than others, like the World Bioclimatic Classification (Rivas-Martínez et al. 2012) which is especially valued around the Mediterranean.

For all the ultimate mapping units of the *Map of the Natural Vegetation of Europe* (including 338 forest types), there is a modular descriptive text including the vegetation characters and environmental parameters shown in Figure 5.3 (Bohn et al. 2000-2004). The legend also uses standard environmental classifications like the Walter & Leith climate types and the FAO soil classification.

<p>Geographical distribution (countries, area in km², number polygons) Main syntaxa/plant communities Structural features Dominant & frequent species by layer Diagnostic species Ecological variants Geographical variants Natural accompanying vegetation Adjacent climax communities Land use Site conditions (landscape, geomorphology, altitudinal belt, geology) Soil conditions Climate (Walter & Leith type, mean annual temperature, average annual precipitation, average temperature warmest month, average temperate coldest month, local peculiarities) Importance for nature protection Type sites References Author(s) Images</p>
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Figure 5.3. Parameters used for the mapping units of the *Map of the Natural Vegetation of Europe* (Bohn et al. 2000-2004).

The current 'Red List of European Habitats' project funded by DG(Env) uses as its Habitats Typology a modified version of EUNIS-3 (Rodwell et al. 2013) which incorporates, with some further very minor modifications, the changes for Forests recommended in Schaminée et al. (2013), those for Heath, scrub and tundra habitats (Schaminee et al 2014) and those being currently developed for Grasslands. The Habitat Definitions that have been prepared by experts for the territorial assessments of changes in extent and quality in the EU28 and EU28+² include a substantial habitat text description, associated floristic, structural and environmental parameters and crosswalks to other typologies. The Red List assessments include further information about a range of characteristics and parameters summarised in Figure 5.4.

Figure 5.4. Parameters used in habitat assessment in the Red List of European Habitats project.

<p>Habitat description (including references to structure, species composition, relationships to climate, terrain, soils & biotic interventions)</p> <p>Characteristic species</p> <p>Indicators of quality</p> <p>Relationships to other typologies (including EUNIS, Annex 1, Emerald, MAES, IUCN & the Map of the Natural Vegetation of Europe)</p> <p>Geographical distribution by country, Extent Of Occurrence & Area Of Occurrence</p> <p>Map (point source data and uncertain occurrence as country shading)</p> <p>Changes in extent & quality over recent past time</p> <p>Pressures & Threats (using Article 17 categories)</p> <p>Conservation actions</p> <p>Restorability</p> <p>Red List assessment (IUCN category)</p> <p>References</p> <p>Author & contributors</p> <p>Images</p>

Recommendation: If revision of the EUNIS environmental parameter frame is undertaken, this should include a review of other relevant frameworks, so that agreed parameters and categories could provide a comprehensive and harmonised basis for further development.

² EU 28 plus West Balkans, Norway and Switzerland.

5.3 Glossaries for habitat description and parameterisation

In both the text descriptions of the EUNIS habitats and in the units or categories of the look-ups in the parameter frame, there are frequent uses of a wide range of ecological and environmental terms. Appended to the *EUNIS Habitats Classification* (Davies et al. 2004, since updated in 2006, version supplied by Doug Evans of the ETC-BD) there is a glossary of such terms derived from various sources: for terrestrial and freshwater habitats, 28% of terms originate from the Institut Royal des Sciences naturelles de Belgique (presumably the Palaearctic Habitats Classification glossary that was also included in Moss & Roy (1998 as Annex III), 16% from the General Multilingual Environmental Thesaurus of EIONET and the remainder from a variety of published dictionaries of the environment, ecology or science and technology in general. In fact, many of the terms in the EUNIS Glossary, particularly more specific geographical and topographic terms, are redundant, never figuring in the text descriptions. And some terms in the *EUNIS Habitats Classification* (Davies et al. 2004) do not appear in the glossary. A spreadsheet version of the glossary supplied for this contract has abbreviated text for many terms, possibly because it has been derived by transfer from an Access database into an older edition of Excel with a limited number of characters per cell.

The forthcoming EuroVegChecklist (Mucina et al. in press) has a glossary of botanical, ecological and environmental terms used in the syntaxa descriptors, tagged with one or more broad heads such as Geography, Biogeography, Biome, Vegetation zone, Altitudinal zone, Topography, Geology, Soils, Habitat, Vegetation, Organism, Life-form. It has been compiled bottom-up by contributors, so no terms are redundant. A comparison undertaken for this contract reveals that only a minority of terms in this EuroVegChecklist glossary are common to the EUNIS glossary mentioned above (Davies et al. 2004, revised 2006) and, where terms are represented in both glossaries, the definitions are not always identical.

The *Map of the Natural Vegetation of Europe* (Bohn et al. 2000-2004) has a comprehensive and standardised glossary of phytogeographical terms, vegetation and climate zones, ecological and geobotanical terms, geological, geomorphological and edaphic terms. The current 'Red List of European Habitats' project funded by DG(Env) makes extensive reference to ecological and environmental terms in the Habitat Definitions but there has been, as yet, no editorial standardisation of these terms and there is no accompanying glossary.

From these sources and those used for the EUNIS glossary itself, it is clear that the problems of standardisation of terms are various and sometimes complex, some scientific or otherwise technical, some concerned more with norms of style, where the editorial policies of influential journals may also be relevant. Some terms are especially vexatious and illustrative of the challenge – like

'Mediterranean', which as well as being the name of a sea, has geographical, climatic, biogeographical and cultural references which are often not explicit and sometimes contentious. Then there is the question of what to do with derived terms like 'supra-Mediterranean', 'supraMediterranean' or 'supramediterranean'.

Recommendation: Revision of the EUNIS glossary should ensure that it is a subset, relevant to the task and with no redundancies, of more widely acceptable definitions of categories and terms, so as to maximise utility and limit confusion.

Recommendation: With a framework of agreed parameters, categories and terms to define the environmental characteristics of habitats, expert knowledge could be used to refine, revise and complete a parameterisation.

5.4 Environmental parameters in use for recording habitats

Increased availability of high quality point-source data such as relevés, with reliable crosswalks of phytosociological syntaxa to EUNIS, can make the distribution of habitats spatially explicit with an accuracy previously beyond reach. It is then possible to relate such distribution patterns, as points or via grids of various scales, to environmental variations on digital platforms of point-source, grid or envelope data for climate, terrain and soils. Clearly such maps have both descriptive and predictive value (Schaminée et al. 2013, 2014) in understanding present patterns and possible shifts in habitat character and range with environmental change.

Additional information of value for describing and interpreting the character and dependencies of habitats might also be available from point-source survey data themselves. Within the limited scope of this project, it was impossible to offer a comprehensive analysis of the various approaches to the recording of environmental data in the survey and definition of habitats or the full range of environmental parameters in use but we here summarise the current state of play in two major initiatives together with a snapshot of current activity among relevant practitioners.

5.4.1 The Global Index of Vegetation Plot databases

The Global Index of Vegetation Plot databases (GIVD) was launched in 2010 as an internet-based resource offering metadata on existing electronic databases (Dengler et al. 2011, Jansen et al. 2012). At present it comprises 237 databases with more than 3.1 million plots (<http://www.givd.info>), mostly from Europe but with some substantial contributions from elsewhere. Habitat types represented are broadly classified into formations with forests and semi-natural

grasslands, heaths and scrub in the majority. GIVD Fact Sheets summarise key information about registered databases in a standardised fashion and include fields for geographical location (at 4 scales of precision) and environmental information under the nine heads shown in Table 5.3 (Glöckler et al. 2012). Other environmental data comprise 22 categories which can be broadly grouped into climate, geology, hydrology, management and conservation status.

Interrogations of 145 European databases in GIVD kindly carried out for this contract by Florian Jansen in November 2015 gave an indication of the size of the databases and the representation of these environmental data among them. The databases vary greatly in size, scope and purpose from just a few hundred plots to over 500000. 21 databases (14%) include no geo-reference nor any environmental data under the various categories, some of these with many hundreds of plots and totalling 121769 plots.

Table 5.3. Environmental data represented in GIVD European databases.

	% databases with any records	% positive with 100% Plots	No plots with 100% records	% positive with 50-99% plots	% positive with 25-49% plots	% positive with <25% plots
GPS 25 m or less	63	35	39858	41	17	7
Points to 1 km	49	12	54180	41	31	16
Small grid <10 km	35	14	39577	46	26	16
Coarser scale/territory	31	29	151198	35	10	26
Any geo-reference	84	37	284813			
Altitude	67	40	168796	34	9	17
Slope aspect	61	25	87055	44	15	16
Slope Inclination	64	27	84025	40	15	18
Microrelief	24	17	5734	37	20	26
Bare rock, soil, litter	39	32	171937	16	7	45
Soil pH	21	10	2759	37	30	23
Soil depth	10	23	8500	31	8	38
Other soil attributes	34	17	14573	30	16	37
Land use	36	42	95252	17	10	31

As an indication of the minimum number of plots which could provide environmental data in the categories listed, a calculation has been included showing the number of plots for those databases where 100% have a record.

5.4.2 Environmental recording among current practitioners

A recent questionnaire to members of the EVS and the European Dry Grassland Group used a framework of environmental parameters based on the original EUNIS categories to enquire what kind of environmental data were being recorded at the present time in field survey, which were mandatory and which optional. Supplementary questions asked what information was accessed from other secondary sources like grid maps, map envelopes or by interpolations from contours or point sources away from relevés; and which standard frames, typologies or look-ups are used to define, for example, soil types or climatic regimes.

A total of 77 responses was received from 35 countries across the wider Europe, varying from major national vegetation surveys to modest local research projects. Surveys were sometimes all inclusive or tightly focused on particular vegetation types or habitats and most involved the collection of traditional relevés, though of very variable plot size. Some ongoing work began in the early 20th century but the majority of data collected covered the period 1980 to the present.

Table 5.4 shows the % respondents recording the various environmental parameters and the % of recording which was mandatory, dark shading highlighting values over 75% and over, light shading 50-75%. Most of the more frequently recorded parameters were mandatory, many of the less frequently recorded relevant for particular vegetation types, like those of aquatic habitats, though even then often optional.

Table 5.4. Environmental parameters recorded by EVS & EDGG practitioners.

Parameter	% recording	% mandatory recording
HABITAT vegetation layers height	80	76
HABITAT vegetation layers cover	97	97
HABITAT microhabitat	29	33
HABITAT cover of bare rock	68	58
HABITAT cover of bare earth	76	60
HABITAT cover of litter	65	54
HABITAT cover of free water	41	50
HABITAT list of associated fauna	10	33

LOCATION biogeographic zone	25	69
LOCATION country	68	91
LOCATION province/cadaster	63	75
LOCATION settlement	60	71
LOCATION local topographic name	73	78
LOCATION lat/long georeference	78	80
LOCATION UTM grid reference	29	50
LOCATION other international grid	10	17
LOCATION national grid system	32	75
TERRAIN bedrock or superficial deposit	54	71
TERRAIN landform type	51	66
TERRAIN altitude/altitudinal belt	71	76
TERRAIN slope/inclination	79	82
TERRAIN aspect/orientation	76	83
TERRAIN microhabitat	32	50
CLIMATE climatic zone	14	66
CLIMATE regional climate	11	71
CLIMATE topoclimate/microclimate	3	50
CLIMATE precipitation	11	57
CLIMATE temperate	11	57
CLIMATE insolation	8	40
CLIMATE wind exposure	6	25
SOIL profile type	51	42
SOIL depth	49	32
SOIL moisture content/status	41	31
SOIL reaction	52	27
SOIL trophic state	27	35
SOIL salinity level	24	33
SOIL complete soil analysis	48	13
WATER substrate type	17	57
WATER depth	32	30
WATER length of inundation	21	31
WATER speed of flow	19	33
WATER reaction	11	43
WATER trophic state	14	44
WATER salinity level	16	20
MANAGEMENT grazing intensity	60	50
MANAGEMENT cutting frequency	59	46
MANAGEMENT burning frequency	35	27
MANAGEMENT degree of hemeroby	13	37

Among other parameters indicated in responses were a range usually related to the particular purpose of the survey such as measures of vegetation dynamics; dendro-metrics, age-structure and regeneration of woodlands;

edaphic features in studies of soil-plant relationships; hydrological characteristics and processes in floodplains; specific management actions and conservation designations.

Data on geology and soils at survey points are frequently added but these are usually taken from secondary sources such as regional or national maps of bedrock, superficial deposits and soils at various scales. Climate data are generally used for interpretation or modelling with habitat survey data and are taken from various international, al or national platforms with point or interpolation values, vector maps or climate models.

Edaphic categories used for habitat description originate mostly from regional or national typologies but occasionally from more general standards like the FAO or the Kubiens classification. Climatic/bioclimatic/biogeographic categories are sourced from the Rivas-Martinez 'Bioclimatic Map of Europe', various EEA or European Commission maps, the European Biodiversity Observation Network (EBONE), the Global Environmental Stratification (Metzger et al. 2005) or other regional or national zonings.

A wide variety of glossaries is used for text descriptions of environmental relationships among practitioners, often without explicit reference.

5.4.3 Environmental data in the European Vegetation Archive and TURBOVEG

The 62 databases registered in EVA as at December 2015 comprised in total over 1.1M plots of high quality point-source data on plant species composition from across Europe. They represent the most abundant and richest source of data which can be used, as here and in previous reports, for the interpretation of EUNIS habitats, to make spatially explicit their distribution and provide a basis for suitability modelling in association with environmental data from other platforms. However, though very many plots have associated environmental data, these have been encoded through headers of the database management software TURBOVEG under very diverse parameters, usually bespoke to the data source. A recent query of EVA data in TURBOVEG revealed the following degree of harmonisation among the plots:

Country code 99% plots
Latitude/longitude geo-reference 80%
Altitude 59%
Slope inclination 35%
Slope aspect 24%
plus another 1100 parameters needing harmonisation.

Within the frame of another initiative, sPlot³ (Purschke, O. et al. 2015), where EVA data are combined with international sources of plot data for addressing trait-environment relationships across world biomes, there is a programme for

³ https://www.idiv.de/en/sdiv/working_groups/wg_pool/splot.html.

harmonisation of these diverse environmental fields in data stored in TURBOVEG that could add environmental value to the use of EVA data in relation to EUNIS.

Recommendation: Harmonisation of parameters used in capturing, storing and querying environmental data would bring great benefits for the availability and interpretation of existing and future point-source information on habitats, in particular for the development of the EUNIS database and habitat classification.

5.5 A roadmap for a EUNIS environmental parameter frame

The above recommendations can together provide a roadmap for developing a revised and expanded EUNIS environmental parameter frame (Figure 5.5). An institutional commitment to return to the original vision of EUNIS as a multi-faceted approach in which habitats were defined by parameters other than vegetation alone would be necessary to initiate this process and it would involve a thorough technical overhaul of the existing EUNIS database and the query routines offered on the EUNIS web portal. Expert knowledge could then revise the range of parameters and update a glossary within a wider frame of experience of environmental parameterisation and description. This would build in a wider appeal and applicability of the ultimate product.

<p>Habitat code & name</p> <p>Relation to Annex 1 & other legal frames</p> <p>Descriptor</p> <p>Full text description</p> <p>Characteristic plant species</p> <p>Other characteristic biota</p> <p>EuroVegChecklist alliances</p> <p>Other synonymy</p> <p>Map (relevés and other sources)</p> <p>Distribution by country and NUTS</p> <p>EOO & AOO</p> <p>Biogeographic zone(s)</p> <p>Climatic zones</p> <p>Altitudinal belts</p> <p>Geology</p> <p>Topography</p> <p>Soil/sediment type(s)</p> <p>Soil/water base status</p> <p>Soil/water trophic state</p> <p>Soil/water salinity</p> <p>Soil hydrological regime</p> <p>Open water depth</p> <p>Open water flow</p> <p>Necessary biotic interventions</p>	 <p>Image</p>
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Pressures and threats
Restorability
Red List category & criteria
Type localities

Figure 5.5. A revised EUNIS habitat fact sheet (red indicates Red List source).

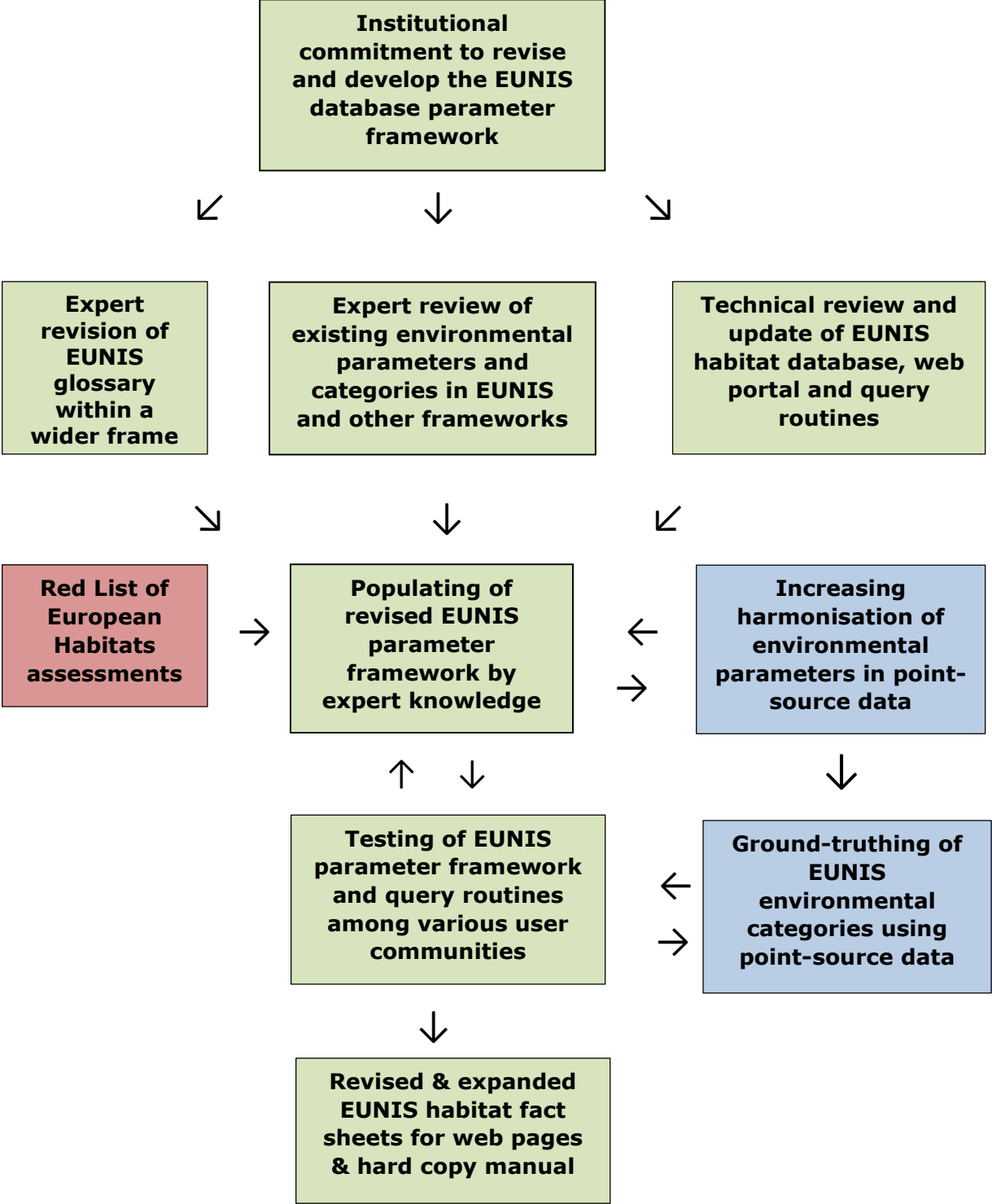


Figure 5.6. A roadmap for a EUNIS environmental parameter framework.

Populating the revised parameter frame with categorical values for the EUNIS habitats is also an expert task and could be greatly enriched by the upcoming products of the Red List of European Habitats project. Such a renewed parameter framework could then be widely tested among as variety of user communities for its application for habitat description and mapping, monitoring.

A parallel process among practitioners and database managers concerned with the recording, storage and querying of point-source vegetation and environmental data (shown blue in Figure 5.6) could help ensure some harmonisation in parameterisation and greatly enhance the content of a EUNIS parameter frame with ground-truthed data.

An ultimate end point of such a developing roadmap could be a more comprehensive and detailed fact sheet for each EUNIS habitat (Figure 5.5).

6 Recommendations and future prospects

6.1 Further steps to collect European wide in-situ data to assess other EUNIS habitat types

Three major European groups of habitats have been reviewed in 2013, 2014 and 2015-2016, the EUNIS G forest habitat types, EUNIS F the heathland, scrub and tundra habitat types, and the EUNIS E grassland habitat types, together with a few other closely associated habitats, based on the crosswalks between the EUNIS habitat classification and the EuroVegChecklist syntaxa. Of these habitats, the floristic composition has been determined on the basis of in-situ vegetation measurements across Europe (the work on grasslands will be completed this year in an additional EEA project). An obvious next step would be to analyse further EUNIS habitat groups, such as aquatic communities, peatlands, wetlands and anthropogenic vegetation.

Furthermore, mapping the distribution of phytosociological relevés and habitat suitability modelling as shown for the EUNIS forest habitat types, heathland, scrub and tundra habitat types and grassland habitat types in the present and earlier projects could be extended to other habitats. The same applies for the development of formal definitions for supervised classification and revision of EUNIS habitat descriptions.

To illustrate the importance of linking the EUNIS habitat classification with the EuroVegChecklist syntaxa (and all the underlying data) and harmonising with other existing EU data platforms and research initiatives, three examples of further steps of integration are discussed here, dealing with (1) standardised parameterisation of habitats, and (2) linkages between EUNIS and the Red List of European Habitats.

6.2 Development of a EUNIS parameter framework

The roadmap for developing a EUNIS parameter framework is fairly straightforward but needs some clear institutional commitment before the process could start and funding to enable the necessary technical and expert assistance to be mobilised for the various stages. With tasks such as reviewing the EUNIS environmental parameters and categories, and developing a lexicon, the scope of consultation needs careful consideration so as to maximise ownership of the developing product. Which experts to involve in populating the parameter frame, and who constitutes the wider frame of testing, will also affect the potency and credibility of the result. Producing some early provisional

examples of revised EUNIS habitat fact sheets would demonstrate the ultimate value of one ultimate output of the roadmap.

An appealing web portal and simple query routines should be seen as an integral part of developing a parameter frame in a revised EUNIS database since this will broaden the user communities of the habitat classification. Demonstrations of benefits of different kinds of enquiries would be a valuable adjunct, maybe in a new version of EUNIS habitat classification – a guide for users (Moss 2008).

It is hoped that a parallel process of harmonisation of parameter frames in databases which hold considerable amounts of point-source environmental data will enable ground-truthing of the validity of the environmental categories in a revised EUNIS and stimulate future data capture so as to include more detailed information and reference of relevés and plots to the relevant EUNIS habitat. Data-capture software could be structured so as to promote such wider environmental benefits of surveyor-vegetation encounters.

6.3 Linkages between EUNIS and the 'Red List of European habitats' project

The DG(Env) 'Red List of European Habitats' uses a modified EUNIS typology as a framework for assessment, at level 3 for terrestrial and freshwater habitats, at levels 4 and below for marine, across the EU28 and EU28+. It also compares the Red List threat categories for the habitats with the overall Conservation Status assessments for the nearest equivalent Annex 1 habitats. The completion of the Red List project in June 2016 presents an unparalleled opportunity to combine and harmonise its outputs with those of this current series of projects for the EEA, for the enhancement of the EUNIS habitat classification, its scientific meaning and applications.

A number of specific challenges remain: (1) to decide how far the existing EUNIS typology for terrestrial and freshwater habitats needs revision, and, in wider consultation, to enquire whether the proposals for changing codes, names and definitions used for the 'Red List' are acceptable; (2) to decide which particular elements of the Red List assessment are most relevant for enhanced EUNIS habitat fact sheets and how these might be combined within a single frame; (3) to harmonise environmental references within a single acceptable glossary.

The 'Red List' has also been able to draw upon an impressive community of experts across Europe, including from beyond the EU28, though, as with the experience of EVA, a Scandinavian contribution to the project has been incomplete. Nonetheless, the accessibility of such experts as potential participants in the development of a single parameter framework for EUNIS, selecting the parameters and their categories and populating the framework, and integrating the products with the EEA EUNIS revision, is a considerable legacy of the 'Red List'.

7 References

- Angus, S. (2004). Da tha machair? Towards a machair definition. In: *Delivering sustainable coasts: connecting Science and Policy*. Proceedings Litoral 2004, Volume 2. Cambridge Publications, pp. 552-558.
- Braun-Blanquet, J. (1928). *Pflanzensoziologie. Grundzüge der Vegetationskunde*. Springer-Verlag, Berlin.
- Bohn, U., Neuhäusl, R., Hettwer, C., Gollub, G. & Weber, H. (2000–2004). *Karte der natürlichen Vegetation Europas – Map of the Natural Vegetation of Europe. Maßstab/Scale 1 : 2 500 000*. Bundesamt für Naturschutz, Bonn.
- Bruelheide, H. (1997). Using formal logic to classify vegetation. *Folia Geobotanica et Phytotaxonomica* 32: 41–46.
- Commission of the European Communities (2003). Interpretation Manual of European Union Habitats. DG Environment, Brussels.
- Chytrý, M. (2007, ed.). *Vegetace České republiky 1. Travinná a keříčková vegetace (Vegetation of the Czech Republic 1. Grassland and heathland vegetation)*. Academia, Praha.
- Chytrý, M. (2009, ed.). *Vegetace České republiky 2. Ruderální, plevelová, skalní a suťová vegetace. Vegetation of the Czech Republic 2. Ruderal, weed, rock and scree vegetation*. Academia, Praha.
- Chytrý, M. (2011, ed.). *Vegetace České republiky 3. Vodní a mokřadní vegetace. Vegetation of the Czech Republic 3. Aquatic and wetland vegetation*. Academia, Praha.
- Chytrý, M. (2013, ed.). *Vegetace České republiky 4. Lesní a křovinná vegetace. Vegetation of the Czech Republic 4. Forest and scrub vegetation*. Academia, Praha.
- Chytrý M., Hennekens S.M., Jiménez-Alfaro B., Knollová I., Dengler J., Jansen F., Landucci F., Schaminée J.H.J. et al. (2016). European Vegetation Archive (EVA): an integrated database of European vegetation plots. *Applied Vegetation Science* 19: 173–180.
- Chytrý, M. & Otýpková Z. (2003). Plot sizes used for phytosociological sampling of European vegetation. *Journal of Vegetation Science* 14: 563–570.
- Chytrý, M., Pyšek, P., Tichý, L., Knollová, I. & Danihelka, J. (2005). Invasions by alien plants in the Czech Republic: a quantitative assessment across habitats. *Preslia* 77: 339–354.
- Davies, C & Moss, D. (1999). EUNIS Habitats Classification. Final report to the European Topic Centre on Nature Conservation, European Environment Agency. Institute of Terrestrial Ecology, Huntingdon.
- Davies, C.E., Moss, D. & Hill, M.O. (2004). *Eunis Habitat Classification*. Copenhagen: European Environment Agency.
- Dengler, J., Jansen F., Glöckler F., Peet R.K., De Cáceres M., Chytrý M., Ewald J., Oldeland J., Lopez-Gonzalez G., Finckh M., Mucina L., Rodwell J.S., Schaminée J.H.J. & Spencer N. (2011). The Global Index of Vegetation-Plot Databases (GIVD): a new resource for vegetation science. *Journal of Vegetation Science* 22: 582–597.

- Dengler, J., Oldeland J., Jansen F., Chytrý M., Ewald J., Finckh M., Glöckler F., Lopez-Gonzalez G., Peet R.K., & Schaminée J.H.J. (2012). Vegetation databases for the 21st century. *Biodiversity & Ecology* 4, 1-447.
- Devillers, P. & Devillers-Terschuren, L. (1996). A classification of Palaearctic habitats. Nature & Environment No 78. Council of Europe, Strasbourg.
- Devillers, P., Devillers-Terschuren, J. & Ledant, J.-P. (1991). Habitats of the European Community. CORINE Biotopes Manual. Volume 2. Luxembourg: Commission of the European Communities.
- Dengler, J., Oldeland J., Jansen F., Chytrý M., Ewald J., Finckh M., Glöckler F., Lopez-Gonzalez G., Peet R.K., & Schaminée J.H.J. (2012). Vegetation databases for the 21st century. *Biodiversity & Ecology* 4, 1-447.
- Dring, J. (2001). The design for parameterising EUNIS and its relation to SYNTAXA parameters. Lancaster: Unit of Vegetation Science Report.
- Elith, J., Phillips, S. J., Hastie, T., Dudík, M., Chee, Y. E. & Yates, C. J. (2011). A statistical explanation of MaxEnt for ecologists. *Diversity and Distributions*, 17: 43-57.
- European Commission (2013). Interpretation Manual of European Union Habitats – EUR28. European Commission DG Environment, 144pp.
- Evans, D. (2012). The EUNIS habitats classification – past, present & future. *Revista de Investigación Marina* 19(2) 28-29.
- Ewald, J. (2001). Der Beitrag pflanzensoziologischer Datenbanken zur vegetations-ökologischen Forschung. *Berichte der Reinhold-Tüxen-Gesellschaft* 13: 53-69.
- Fischer, H.S. (2015). On the combination of species cover values from different vegetation layers. *Applied Vegetation Science* 18: 169-170.
- Géhu, J.-M. (1984). *Classification des écosystèmes d'Europe*. (Doc. SN-VS (84)3). Strasbourg: Council of Europe.
- Glöckler, F., Dengler, J., Jansen, F., Oldeland, J & Peet, R.K. (2012) Guide to GIVD's Fact Sheets. In Dengler, J. et al. *Vegetation databases for the 21st century*, *Biodiversity & Ecology* 4, 83-88.
- Hengl T, de Jesus J.M., MacMillan R.A., Batjes N.H., Heuvelink G.B.M., Ribeiro E., Alessandro Samuel-Rosa, Kempen, B., Leenaars, J.G.B., Walsh, M.G., Gonzalez. M.R. (2014) SoilGrids1km – Global Soil Information Based on Automated Mapping. *PLoS ONE* 9(8): e105992. doi:10.1371/journal.pone.0105992
- Hennekens S. M. & Schaminée, J.H.J. (2001). TURBOVEG, a comprehensive data base management system for vegetation data. *Journal of Vegetation Science* 12: 589-591.
- Hill, M.O., Moss, D. & Davies C.E. (2004a). Revision of habitat descriptions originating from Deviller et al. (2001). Paris: European Topic Centre on Nature Protection and Biodiversity.
- Hill, M.O., Moss, D. & Davies C.E. (2004b). EUNIS Habitat classification descriptions. Paris: European Topic Centre on Nature Protection and Biodiversity.
- Ichter, J., Evans, D. & Richard, D. (2014). *Terrestrial habitat mapping in Europe: an overview*. Luxembourg: Publications Office of the European Union.

- Jansen, F., Glöckler, F., Chytrý, M., De Cáceres, M., Ewald, J., Finck, M., Lopez-Gonzalez, G., Oldeland, J., Peet, R.K., Schaminée, J.H.J. & Dengler, J. (2012) News from the Global Index of Vegetation-Plot Databases (GIVD): the metadata platform, available data and their properties. In Dengler, J. et al. *Vegetation databases for the 21st century*, Biodiversity & Ecology 4, 77-82.
- Knollová, I., Chytrý, M., Tichý, L. & Hájek, O. (2005). Stratified resampling of phytosociological databases: some strategies for obtaining more representative data sets for classification studies. *Journal of Vegetation Science* 16: 479–486.
- Landucci, F., Tichý, L., Šumberová, K. & Chytrý, M. (2015). Formalized classification of species-poor vegetation: a proposal of a consistent protocol for aquatic vegetation. *Journal of Vegetation Science* 26: 791–803.
- Maes, J., Paracchini, M.L. & Zulian, G. (2011). *A European assessment of the provision of ecosystem services: Towards an atlas of ecosystem services*. Luxembourg: Publications Office of the European Union.
- Maes, J. et al. (40 authors) (2013). *Mapping and assessment of Ecosystems and their Services: An analytical framework for ecosystem assessments under action 5 of the EU Biodiversity Strategy to 2020*. Luxembourg: Publications Office of the European Union.
- Metzger, M. J., Bunce, R. G. H., Jongman, R. H. G., Múcher, C. A., & Watkins, J. W. (2005). A climatic stratification of the environment of Europe. *Global ecology and biogeography* 14 (6): 549-563.
- Moss, D. (2005). How was EUNIS Habitats constructed? How were their original divisions made and levels decided? Unpublished report from Dorian Ecological Information Ltd.
- Moss, D. (2008). EUNIS Habitat Classification – a guide for users. Paris: European Topic Centre on Biological Diversity. European Environment Agency, Copenhagen.
- Moss, D. & Roy, D. (1995). MN2.5 Report to ETC/NC on the International Workshop on the CORINE Biotopes sites database and habitat classification. Institute of Terrestrial Ecology, Huntingdon.
- Moss, D. & Roy, D. (1998). *Towards a European Habitat Classification: Background Review 1989-1995*, European Environment Agency, Copenhagen.
- Mucina, L., Schaminée, J.H.J. & Rodwell, J.S. (2000). Common data standards for recording relevés in field survey for vegetation classification. *Journal of Vegetation Science* 11: 769–772.
- Mucina, L., Grabherr G., Ellmauer T. & S. Wallnöfer (1993, eds.). *Die Pflanzengesellschaften Österreichs. Teil I–III*. Gustav Fischer, Jena.
- Mueller-Dombois, D. & Ellenberg, H. (1974). *Aims and methods of Vegetation Ecology*. John Wiley & Sons, New York.
- Olson, D. M., Dinerstein, E., Wikramanayake, E. D., Burgess, N. D., Powell, G. V., Underwood, E. C., et al. (2001). *Terrestrial Ecoregions of the World: A New Map of Life on Earth*. A new global map of terrestrial ecoregions

- provides an innovative tool for conserving biodiversity. *BioScience* 51: 933-938.
- Påhlsson, L. (1994). *Vegetation Types of the Nordic Countries*. Copenhagen: Nordic Council of Ministers.
- Phillips, S.J., R.P. Anderson & R.E. Schapire (2006). Maximum entropy modeling of species geographic distributions. *Ecological Modelling* 190: 231–259.
- Purschke, O., Dengler, J., Bruehlheide, H., Chytrý, M., Jansen, F., Hennekens, S., Jandt, U., Jiménez-Alfaro, B., Kattge, J., Da Patta Pillar, V., Sandsel, B & Winter, M. (2015). sPlot – the new global vegetation-plot database for addressing trait-environment relationship[s across the world biomes. *Geophysical Research Abstracts* 17: EGU2015-15727-2.
- Ritchie, W. (1976). The meaning and deficiation of machair. *Transactions of the Botanical Society of Edinburgh*: 431-440.
- Rodwell, J.S. (1990, ed.). *British plant communities. Volume 1. Woodlands and scrub*. Cambridge University Press, Cambridge.
- Rodwell, J.S. (1991, ed.). *British plant communities. Volume 2. Mires and heaths*. Cambridge University Press, Cambridge.
- Rodwell, J.S. (1992, ed.). *British plant communities. Volume 3. Grasslands and montane communities*. Cambridge University Press, Cambridge.
- Rodwell, J.S. (1995, ed.). *British plant communities. Volume 4. Aquatic communities, swamps and tall-herb fens*. Cambridge University Press, Cambridge.
- Rodwell, J.S. (1992, ed.). *British plant communities. Volume 5. Maritime communities and vegetation of open habitats*. Cambridge University Press, Cambridge.
- Rodwell, J. & Dring, J. (2001). Parameters for EUNIS, SYNTAXA and the Vegetation Map of Europe. Lancaster: Unit of Vegetation Science.
- Rodwell, J.S., Pignatti, S. & Dring, J. (2001). *A Parameter Frame for Syntaxa*. Unit of Vegetation Science, Lancaster.
- Rodwell, J.S., Schaminée J.H.J., Mucina, L., Pignatti, S., Dring, J. & Moss, D. (1998). The Scientific Basis of the EUNIS Habitat Classification. Report to the European Topic Centre on Nature Conservation. Unit of Vegetation Science, Lancaster.
- Rodwell, J.S., Schaminée, J.H.J., Mucina L., Pignatti, S., Dring, J. & Moss, D. (2002). *The Diversity of European Vegetation. An overview of phytosociological alliances and their relationships to EUNIS habitats*. EC-LNV, Wageningen.
- Rodwell, J.S., Janssen, J., Gubbay, S. & Schaminée, J.H.J. (2013). *Red List Assessment of European Habitat Types, a Feasibility Study. Report to DG (Environment)*. Alterra, Wageningen.
- Schaminée, J.H.J., Hennekens, S.M. & Ozinga, W.A. (2007). Use of the ecological information system SynBioSys for the analysis of large databases. *Journal of Vegetation Science* 18: 463–470.
- Schaminée, J.H.J., M. Chytrý, S.M. Hennekens, L. Mucina, J.S. Rodwell & L. Tichý (2012). Development of vegetation syntaxa crosswalks to EUNIS habitat classification and related data sets. Report for the European Environmental Agency, Copenhagen.

- Schaminée, J.H.J., Chytrý, M., Hennekens, S.M., Jiménez-Alfaro, B., Mucina, L., Rodwell, J.S. & Tichý, L. (2013). *Review of EUNIS forest habitat classification*. Report for the European Environmental Agency, Copenhagen.
- Schaminée, J.H.J., Chytrý, M., Hennekens, S.M., Janssen, J.A.M., Jiménez-Alfaro, B., Knollová, I., Mucina, L., Rodwell, J.S. & Tichý, L. (2014). Vegetation analysis and distribution maps for EUNIS habitats. Report for the European Environmental Agency (EEA/NSV/14/006), Copenhagen.
- Schaminée J.H.J., Hennekens S.M., Chytrý M. & Rodwell, J.S. (2009). Vegetation-plot data and databases in Europe: an overview. *Preslia* 81: 173–185.
- Schaminée, J.H.J., Janssen, J.A.M., Hennekens, S.M. & Ozinga, W.A. (2011). Large vegetation databases and information systems: new instruments for ecological research, nature conservation and policy making. *Plant Biosystems* 145: 85–90.
- Schaminée, J.H.J., Stortelder, A.H.F. & Westhoff, V. (1995). *De Vegetatie van Nederland 1. Inleiding tot de plantensociologie: grondslagen, methoden en toepassingen*. Opulus, Uppsala/Leiden.
- Schaminée, J.H.J., Weeda, E.J. & Westhoff, V. (1995). *De Vegetatie van Nederland 2. Plantengemeenschappen van wateren, moerassen en natte heiden*. Opulus, Uppsala/Leiden.
- Schaminée, J.H.J., Stortelder, A.H.F. & Weeda, E.J. (1996). *De Vegetatie van Nederland 3. Plantengemeenschappen van graslanden zomen en droge heiden*. Opulus, Uppsala/Leiden.
- Schaminée, J.H.J., Weeda, E.J. & Westhoff, V. (1998). *De Vegetatie van Nederland 4. Plantengemeenschappen van de kust en van binnenlandse pioniermilieus*. Opulus, Uppsala/Leiden.
- Smart, S.M., Clarke, R.T., Van de Poll, H.M., Robertson E.J., Shield E.R., Bunce, R.G.H. & Maskell, L.C. (2003). National-scale vegetation change across Britain; an analysis of sample-based surveillance data from the Countryside Surveys of 1990 and 1998. *Journal of Environmental Management* 67: 239–254.
- Sokal, R.R. & Rohlf, F.J. (1995). *Biometry*. 3rd ed. Freeman, New York, NY.
- Stortelder, A.H.F., Schaminée, J.H.J. & Hommel, P.W.F.M. (1999). *De Vegetatie van Nederland 5. Plantengemeenschappen van ruigten, struwelen en bossen*. Opulus, Uppsala/Leiden.
- Tichý, L. (2002). JUICE, software for vegetation classification. *Journal of Vegetation Science* 13: 451–453.
- Tichý, L. & Chytrý, M. (2006). Statistical determination of diagnostic species for site groups of unequal size. *Journal of Vegetation Science* 17: 809–818.
- Valachovič, M., Ořahel'ová, H., Stanová, V. & Maglocký, Š. (1995). *Rastlinné spoločenstvá Slovenska 1. Pionierska vegetácia*. Veda, Bratislava.

Appendix A: An updated crosswalk EUNIS grassland habitat types (B1.4, B1.9, E1-E6) to the 2013 EuroVegChecklist syntaxa

B - Coastal habitats

B1 - Coastal dunes and sandy shores

B1.4 - Coastal stable dune grassland

- * TUB-02B - *Alkanno-Maresion nanae* Rivas Goday ex Rivas Goday et Rivas-Mart. 1963 corr. Díez Garretas et al. 2001
- * TUB-03A - *Anthyllido hamosae-Malcolmion lacerae* Rivas Goday 1958
- * COR-01A - *Corynephorion canescentis* Klika 1931
- * CRU-02A - *Crucianellion maritimae* Rivas Goday et Rivas-Mart. 1958
- * TUB-02D - *Cutandio maritimae-Vulpion membranaceae* de Foucault et Géhu in de Foucault 1999
- * CRU-03B - *Cynodonto-Teucrium polii* Korzhenevsky et Klyukin 1990
- * COR-02D - *Diantho catalaunici-Scrophularion humifusae* Baudiere et Simonneau 1974
- * MOQ-01C - *Euphorbio paraliae-Lotion glauci* Jardim et al. 2003
- * CRU-01A - *Euphorbio portlandicae-Helichrysion stoechadis* Géhu et Tx. ex Sissingh 1974
- * CRU-02B - *Helichrysion picardii* (Rivas-Mart., Costa et Izco in Rivas-Mart. et al. 1990) Rivas-Mart. et al. 1999
- * CRU-01B - *Koelerion arenariae* Tx. 1937 corr. Gutermann et Mucina 1993
- * TUB-02C - *Laguro ovati-Vulpion fasciculatae* Géhu et Biondi 1994
- * TUB-02A - *Linarion pedunculatae* Díez Garretas et al. in Díez Garretas 1984
- * TUB-02G - *Maresion nanae* Géhu et al. 1987
- * TUB-02H - *Medicagini-Triplachnion nitentis* Mayer 1995
- * CRU-03E - *Melico chrysolepidis-Ephedron distachyae* Umanets et Solomakha 1999
- * TUB-02I - *Ononidion tournefortii* Géhu et al. 1996
- * CRU-01C - *Psammo-Koelerion Pignatti* 1953
- * TUB-02E - *Psammo-Vulpion Pignatti* 1953
- * CRU-03D - *Scabiosion ucranicae* Sanda et al. 1980
- * CRU-03A - *Sileno thymifoliae-Jurineion kilaeae* Géhu et Uslu ex Mucina et Iakushenko ined.
- * CRU-03C - *Verbascion pinnatifidi* Korzhenevsky et Klyukin 1990
- * TUB-02F - *Vulpio-Lotion Horvatic* 1963

B1.9 - Machair

- * AMM-01A - *Ammophilion Br.-Bl.* 1921
- * COR-02B - *Armerion elongatae* Pötsch 1962
- * MOL-01C - *Cynosurion cristati* Tx. 1947
- * CRU-01B - *Koelerion arenariae* Tx. 1937 corr. Gutermann et Mucina 1993
- * COR-04A - *Thero-Airion* Tx. ex Oberd. 1957
- * NAR-01C - *Violion caninae* Schwickerath 1944

E - Grasslands and lands dominated by forbs, mosses or lichens

E1 - Dry grasslands

E1.1 - Inland sand and rock with open vegetation

- * COR-07E - *Aethionemion saxatilis* Bergmeier et al. 2009
- * FES-11A - *Alyssion bertolonii* E. Pignatti et Pignatti 1977
- * FES-07C - *Alyssion heldreichii* Bergmeier et al. 2009
- * FES-06A - *Alyso-Festucion pallentis* Moravec in Holub et al. 1967
- * COR-07A - *Alyso-Sedion* Oberd. et T. Müller in T. Müller 1961
- * COR-02B - *Armerion elongatae* Pötsch 1962
- * COR-02E - *Armerion junceae* Br.-Bl. ex Br.-Bl. et al. 1952
- * COR-02F - *Armerio-Potentillion* Micevski 1978
- * FES-08A - *Artemisio hololeucae-Hyssopion cretacei* Romashchenko et al. 1996
- * FES-06B - *Asplenio septentrionalis-Festucion pallentis* Zólyomi 1936 corr. 1966
- * FES-06C - *Avenulo adsurgentis-Festucion pallentis* Mucina in Mucina et Kolbek 1993
- * COR-03C - *Bassio laniflorae-Bromion tectorum* Borhidi 1996 nom. conserv. propos.
- * FES-06D - *Bromo pannonici-Festucion csikhegyensis* Zólyomi 1966 corr. Mucina hoc loco
- * FES-08C - *Centaureo carbonatae-Koelerion talievii* Romashchenko et al. 1996
- * FES-07B - *Centaureo-Bromion fibrosi* Blečić et al. 1969
- * COR-01A - *Corynephorion canescentis* Klika 1931
- * FES-11B - *Cytiso spinescentis-Bromion erecti* Bonin 1978
- * FES-06H - *Diantho lumnitzeri-Seslerion* (Soó 1971) Chytrý et Mucina in Mucina et Kolbek 1993
- * COR-05F - *Diantho pinifolii-Jasionion heldreichii* Bergmeier et al. 2009
- * FES-08B - *Euphorbio cretophilae-Thymion cretacei* Didukh 1989
- * COR-03E - *Festucion beckeri* Vicherek 1972
- * COR-03D - *Festucion vaginatae* Soó 1929
- * FES-12B - *Festuco-Bromion* Barbero et Loisel 1971
- * FES-06E - *Galio campanulatae-Poion versicoloris* Kukovitsa et al. ex Didukh et Mucina in Mucina et al. 2013
- * FES-11C - *Hippocrepido glaucae-Stipion austroitalicae* Forte et Terzi in Forte et al. 2005
- * COR-02A - *Hyperico perforati-Scleranthion perennis* Moravec 1967
- * FES-06F - *Chrysopogono-Festucion dalmatica* Borhidi 1996
- * FES-13A - *Chrysopogono-Saturejion subspicatae* Horvat et Horvatic 1934
- * COR-03A - *Koelerion glaucae* Volk 1931
- * FES-07A - *Polygonion albanicae* Ritter-Studnicka 1970
- * FES-06G - *Saturejion montanae* Horvat in Horvat et al. 1974
- * FES-14A - *Saturejo-Thymion* Micevski 1971
- * COR-05E - *Scabioso-Trifolion dalmatici* Horvatic et N. Randelovic in N. Randelovic 1977
- * FES-13B - *Scorzonerion villosae* Horvatic 1963
- * COR-05B - *Sedion anglici* Br.-Bl. in Br.-Bl. et Tx. 1952
- * COR-07C - *Sedion micrantho-sediformis* Rivas-Mart., P. Sánchez et Alcaraz ex P. Sánchez et Alcaraz 1993
- * COR-05C - *Sedion pyrenaici* Tx. in Rivas-Mart. et al. 2011
- * COR-05D - *Sedo albi-Veronicion dillenii* Korneck 1974
- * COR-02C - *Sedo-Cerastion arvensis* Sissingh et Tideman 1960
- * COR-05A - *Sedo-Scleranthion* Br.-Bl. 1950
- * COR-06B - *Sedo-Thymion* De Molenaar 1976

- * FES-11D - Seslerio nitidae-Caricion macrolepidis Ubaldi 1997
 - * FES-06I - Seslerion rigidae Zólyomi 1936
 - * COR-03B - Sileno conicae-Cerastion semidecandri Korneck 1974
 - * COR-04A - Thero-Airion Tx. ex Oberd. 1957
 - * COR-07B - Tortello tortuosae-Sedion albi Hallberg ex Dengler et Löbel 2006
 - * COR-07D - Valerianion tuberosae Guinochet 1975
 - * COR-06A - Veronico-Poion glaucae Nordhagen 1943
 - * FES-12A - Xero-Bromion erecti Zoller 1954
- E1.2 - Perennial calcareous grassland and basic steppes
- * FES-09A - Adonido vernalis-Stipion tirsae Didukh 1983 nom. inval.
 - * FES-03G - Agropyron pectinati Golub et Uzhametskaya 1991
 - * FES-10B - Artemisio albae-Dichanthion ischaemi X. Font ex Rivas-Mart. et M.L. López in Rivas-Mart. et al. 2002
 - * ART-04A - Artemisio marschalliani-Elytrigion intermedii Korotchenko et Didukh 1997
 - * FES-03F - Artemisio tauricae-Festucion Korzhenevsky et Klyukin 1991
 - * FES-03B - Artemisio-Kochion Soó 1964
 - * ART-04B - Bassio-Artemision austriacae Solomeshch in Mirkin et al. 1986
 - * FES-10A - Brachypodion phoenicoidis Br.-Bl. ex Molinier 1934
 - * FES-01A - Bromion erecti Koch 1926
 - * FES-09B - Carici humilis-Androsacion tauricae Didukh 1983 nom. inval.
 - * FES-05C - Caricion stenophyllae Golub et Saveleva 1991
 - * FES-04B - Centaurion sumensis Golub et Uzhametskaya 1992
 - * FES-01B - Cirsio-Brachypodion pinnati Hadac et Klika in Klika et Hadac ex Klika 1951
 - * FES-10C - Diplachnion serotinae Br.-Bl. 1961
 - * FES-03A - Festucion sulcatae Soó 1930
 - * FES-01C - Filipendulo vulgaris-Helictotrichion pratensis Dengler et Löbel in Dengler et al. 2003
 - * FES-01D - Gentianello amarellaе-Helictotrichion pratensis Royer ex Dengler in Mucina et al. 2009
 - * FES-04A - Helictotricho desertori-Stipion rubentis Toman 1969
 - * FES-01G - Chrysopogono-Danthonion Kojic 1957
 - * FES-03E - Pimpinello-Thymion zygoidi Dihoru et Donita 1970
 - * FES-01F - Polygalo mediterraneae-Bromion erecti (Biondi et al. 2005) Di Pietro et al. 2013
 - * FES-01E - Potentillo splendentis-Brachypodion pinnati Br.-Bl. 1967
 - * FES-05B - Stipion korshinskyi Toman 1969
 - * FES-03D - Stipion lessingianaе Soó 1947
 - * FES-03C - Stipo-Poion xerophilae Br.-Bl. et Tx. ex Br.-Bl. 1949
 - * FES-05A - Tanaceto achilleifolii-Stipion lessingianaе Royer ex Lysenko et Mucina 2013
 - * FES-09C - Veronico multifidae-Stipion ponticae Didukh 1983 nom. inval.
- E1.3 - Mediterranean xeric grassland
- * LYG-03A - Agropyro pectinati-Lygeion sparti Br.-Bl. et O. de Bolòs 1958 corr. Rivas-Mart. et al. 1999
 - * SAC-01A - Agrostion castellanae Rivas Goday ex Rivas-Mart. et al. 1980
 - * TRA-02A - Asterisco-Velezion rigidae (Rivas Goday 1964) S. Brullo 1985
 - * TRA-01A - Brachypodion distachyi Rivas-Mart. 1978

- * LYG-02A - *Cymbopogono hirti-Brachypodium ramosi* Horvatic 1963
 - * TRA-02C - *Dauco-Catananchion luteae* S. Brullo 1985
 - * SAC-02A - *Deschampsio maderensis-Parafestucion albidae* Capelo et al. 2000
 - * TRA-01I - *Diantho humilis-Velezion rigidae* Korzhenevsky et Klyukin ex Mucina in Mucina et al. 2013
 - * SAC-01B - *Festucion merinoi* Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 1986 corr. Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 2002
 - * LYG-01C - *Festucion scariosae* Martínez-Parras et al. 1984
 - * LYG-02B - *Hyparrhenion hirtae* Br.-Bl. et al. 1956
 - * TRA-01F - *Hypochoeridion achyrophori* Biondi et Guerra 2008
 - * LYG-01E - *Leontodono tuberosi-Bellion sylvestris* Biondi et al. 2001
 - * LYG-03C - *Moricandio-Lygeion sparti* S. Brullo et al. 1990
 - * TRA-01D - *Omphalodion commutatae* Rivas-Mart. et al. ex Izco 1976 corr. Pérez Raya et al. 1991
 - * TRA-02D - *Onobrychido-Ptilostemion stellati* S. Brullo et al. 2001
 - * TRA-02B - *Plantagini-Catapodion marini* S. Brullo 1985
 - * BUL-01D - *Plantaginion cupanii* S. Brullo et Grillo 1978
 - * BUL-01B - *Plantaginion serrariae* Galán de Mera et al. 2000
 - * BUL-01C - *Poo bulbosae-Astragalion sesamei* Rivas Goday et Ladero 1970
 - * LYG-01F - *Reichardio maritimae-Dactylidion hispanicae* Biondi et al. 2001
 - * BUL-01E - *Romulion* Oberd. 1954
 - * LYG-03D - *Scorzonero creticae-Lygeion sparti* S. Brullo et al. 2002
 - * TRA-01C - *Sedo-Ctenopsion gypsophilae* Rivas Goday et Rivas-Mart. ex Izco 1974
 - * LYG-01D - *Stipion parviflorae* De la Torre et al. 1996
 - * TRA-01B - *Stipion retortae* Br.-Bl. et O. de Bolòs ex O. de Bolòs 1957
 - * LYG-03B - *Stipion tenacissimae* Rivas-Mart. 1984
 - * LYG-01A - *Thero-Brachypodium retusi* Br.-Bl. 1925
 - * BUL-01A - *Trifolio subterranei-Periballion minutae* Rivas Goday 1964
 - * LYG-01B - *Trisetum velutini-Brachypodium boissieri* Rivas-Mart. et al. 2002
 - * TRA-01E - *Vulpion ciliatae-Crepidion neglectae* Poldini 1989
 - * TRA-01G - *Vulpion ligusticae* Aubert et Loisel 1971
 - * TRA-01H - *Xeranthemion annui* Oberd. 1954
- E1.4 - Mediterranean tallgrass and *Artemisia* steppes
- * LYG-03A - *Agropyro pectinati-Lygeion sparti* Br.-Bl. et O. de Bolòs 1958 corr. Rivas-Mart. et al. 1999
 - * LYG-02A - *Cymbopogono hirti-Brachypodium ramosi* Horvatic 1963
 - * LYG-01C - *Festucion scariosae* Martínez-Parras et al. 1984
 - * LYG-02B - *Hyparrhenion hirtae* Br.-Bl. et al. 1956
 - * LYG-01E - *Leontodono tuberosi-Bellion sylvestris* Biondi et al. 2001
 - * LYG-03C - *Moricandio-Lygeion sparti* S. Brullo et al. 1990
 - * LYG-01F - *Reichardio maritimae-Dactylidion hispanicae* Biondi et al. 2001
 - * LYG-03D - *Scorzonero creticae-Lygeion sparti* S. Brullo et al. 2002
 - * LYG-01D - *Stipion parviflorae* De la Torre et al. 1996
 - * LYG-03B - *Stipion tenacissimae* Rivas-Mart. 1984
 - * LYG-01A - *Thero-Brachypodium retusi* Br.-Bl. 1925
 - * LYG-01B - *Trisetum velutini-Brachypodium boissieri* Rivas-Mart. et al. 2002
- E1.5 - Mediterranean montane grassland
- * IND-02B - *Armerion eriophyllae* Pinto da Silva 1970

- * ONO-01H - *Avenion sempervirentis* Barbero 1968
 - * ONO-02A - *Festucion burnatii* Rivas Goday et Rivas-Mart. ex Mayor et al. 1973
 - * ONO-01C - *Festucion scopariae* Br.-Bl. 1948
 - * ONO-01D - *Genistion lobelii* Molinier 1934
 - * IND-02A - *Hieracio castellani-Plantaginion radicatae* Rivas-Mart. et Cantó 1987
 - * IND-01B - *Jasionion carpetanae* González-Albo 1941
 - * ONO-02B - *Minuartio-Poion ligulatae* O. de Bolòs 1962
 - * ONO-01B - *Ononidion cristatae* Royer 1991
 - * ONO-01A - *Ononidion striatae* Br.-Bl. et Susplugas 1937
 - * ONO-02C - *Plantagini discoloris-Thymion mastigophori* Molina et Izco 1989
 - * GEN-01B - *Plantaginion insularis* Klein 1972
 - * IND-01C - *Ptilotrichion purpurei* Quézel 1953
 - * IND-01A - *Teesdaliopsis confertae-Luzulion caespitosae* Rivas-Mart. 1987
 - * IND-02C - *Thymion serpylloidis* Rivas Goday et Rivas-Mart. in Rivas-Mart. 1965
 - * TRI-09A - *Trifolion parnassii* Quézel ex Quézel et al. 1992
- E1.6 - Subnitrophilous annual grasslands
- * STE-06F - *Hordeion murini* Br.-Bl. in Br.-Bl. et al. 1936
 - * STE-06G - *Laguro ovati-Bromion rigidi* Géhu et Géhu-Franck 1985
 - * STE-06H - *Linario polygalifoliae-Vulpion alopecuri* Br.-Bl., Rozeira et Silva in Br.-Bl. et al. 1972
 - * STE-06I - *Taeniathero-Aegilopion geniculatae* Rivas-Mart. et Izco 1977
- E1.7 - Non-Mediterranean dry acid and neutral closed grassland
- * NAR-01G - *Achilleo-Arnicion* Horvat et Pawlowski in Horvat 1960
 - * COR-02B - *Armerion elongatae* Pötsch 1962
 - * COR-02E - *Armerion juncea* Br.-Bl. ex Br.-Bl. et al. 1952
 - * COR-02F - *Armerio-Potentillion* Micevski 1978
 - * NAR-01E - *Nardo-Agrostion tenuis* Sillinger 1933
 - * NAR-01A - *Potentillo-Polygonion vivipari* Nordhagen ex Dierßen 1992
 - * COR-02C - *Sedo-Cerastion arvensis* Sissingh et Tideman 1960
 - * NAR-01C - *Violion caninae* Schwickerath 1944
- E1.8 - Mediterranean dry acid and neutral closed grassland
- * SAC-01C - *Agrostio castellanae-Stipion giganteae* Rivas Goday ex Rivas-Mart. et Fernández González 1991
 - * SAC-01A - *Agrostion castellanae* Rivas Goday ex Rivas-Mart. et al. 1980
 - * NAR-01F - *Campanulo herminii-Nardion* Rivas-Mart. 1964
 - * TRI-06A - *Campanulo herminii-Nardion strictae* Rivas-Mart. 1964
 - * SAC-02A - *Deschampsio maderensis-Parafestucion albidae* Capelo et al. 2000
 - * SAC-01B - *Festucion merinoi* Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 1986 corr. Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 2002
 - * TRI-07A - *Sesamoido pygmaeae-Poion violaceae* Gamisans 1975
- E1.9 - Non-Mediterranean dry acid and neutral open grassland, including inland dune grassland
- * COR-02B - *Armerion elongatae* Pötsch 1962
 - * COR-02E - *Armerion juncea* Br.-Bl. ex Br.-Bl. et al. 1952
 - * COR-02F - *Armerio-Potentillion* Micevski 1978
 - * COR-01A - *Corynephorion canescentis* Klika 1931
 - * COR-05F - *Diantho pinifolii-Jasionion heldreichii* Bergmeier et al. 2009
 - * COR-02A - *Hyperico perforati-Scleranthion perennis* Moravec 1967
 - * COR-03A - *Koelerion glaucae* Volk 1931

- * COR-05E - Scabioso-Trifolion dalmatici Horvatic et N. Randelovic in N. Randelovic 1977
 - * COR-05B - Sedion anglici Br.-Bl. in Br.-Bl. et Tx. 1952
 - * COR-05C - Sedion pyrenaici Tx. in Rivas-Mart. et al. 2011
 - * COR-05D - Sedo albi-Veronicion dillenii Korneck 1974
 - * COR-02C - Sedo-Cerastion arvensis Sissingh et Tideman 1960
 - * COR-05A - Sedo-Scleranthion Br.-Bl. 1950
 - * COR-03B - Sileno conicae-Cerastion semidecandri Korneck 1974
 - * COR-04A - Thero-Airion Tx. ex Oberd. 1957
- E1.A - Mediterranean dry acid and neutral open grassland
- * TUB-03A - Anthyllido hamosae-Malcolmion lacerae Rivas Goday 1958
 - * IND-02B - Armerion eriophyllae Pinto da Silva 1970
 - * TUB-03C - Corynephorion maritimi Costa, Pinto-Gomes, Neto et Rivas-Mart. in Costa et al. 2012
 - * TUB-03B - Corynephorion articulati-Malcolmion patulae Rivas Goday 1958
 - * TUB-01B - Crassulo tillaeae-Sedion caespitosi de Foucault 1999
 - * TUB-03E - Evaco asterisciflorae-Linarion humilis Minissale et Sciandrello 2013 nom. inval.
 - * TOL-01A - Festucion francoi Lüpnitz 1976 corr. F. Prieto, Aguiar, J.C. Costa, Lousã et Rivas-Mart. in F. Prieto et al. 2012
 - * TUB-01A - Helianthemion guttati Br.-Bl. in Br.-Bl. et al. 1940
 - * IND-02A - Hieracio castellani-Plantaginion radicatae Rivas-Mart. et Cantó 1987
 - * TUB-01C - Molinerion laevis Br.-Bl. et al. 1952
 - * TUB-03D - Ormenido multicaulis-Malcolmion broussoletii Br.-Bl. in Br.-Bl. et al. 1940
 - * TUB-01H - Ornithopo pinnati-Gaudinion coarctatae F. Prieto et Aguiar, in F. Prieto et al. 2012
 - * BUL-01E - Romulion Oberd. 1954
 - * TUB-01F - Sclerantho-Myositidion incrassatae S. Brullo et al. 2001
 - * TUB-01D - Sedion pedicellato-andegavensis Rivas-Mart. et al. 1986
 - * TUB-01G - Thymion micans J.C. Costa et al. 2005
 - * IND-02C - Thymion serpylloides Rivas Goday et Rivas-Mart. in Rivas-Mart. 1965
 - * TOL-01B - Tolpido succulentae-Agrostion congestiflorae Aguiar et F. Prieto in F. Prieto et al. 2012
 - * BUL-01A - Trifolio subterranei-Periballion minutae Rivas Goday 1964
 - * TUB-01E - Trifolion cherleri Micevski 1972
- E1.B - Heavy-metal grassland
- * COR-07E - Aethionemion saxatilis Bergmeier et al. 2009
 - * THL-09B - Armerion halleri Ernst 1965
 - * DRY-03C - Ptilostemo casabonae-Euphorbion cupanii Angiolini et al. 2005
 - * THL-09A - Thlaspion calaminarii Ernst 1965
- E1.C - Dry mediterranean lands with unpalatable non-vernal herbaceous vegetation
- E1.D - Unmanaged xeric grassland
- E1.E - Trampled xeric grasslands with annuals
- * STE-04H - Eragrostio-Polygonion arenastri Couderc et Izco ex Carni et Mucina 1998
 - * STE-04I - Euphorbion prostratae Rivas-Mart. 1976
 - * POL-01B - Polycarpion tetraphylli Rivas-Mart. 1975
 - * STE-04J - Polycarpo-Eleusinion indicae Carni et Mucina 1998

- * POL-01A - Polygono-Coronopodium Sissingh 1969
- E1.F - Azorean open, dry, acid to neutral grassland
- E2 - Mesic grasslands
 - E2.1 - Permanent mesotrophic pastures and aftermath-grazed meadows
 - * MOL-01C - Cynosurion cristati Tx. 1947
 - * MOL-04D - Deschampsion cespitosae Horvatic 1930
 - * MOL-01G - Lino biennis-Gaudinon fragilis (Br.-Bl. 1967) de Foucault 1989
 - * MOL-04A - Molinion caeruleae Koch 1926
 - * MOL-02D - Poion alpinae Gams ex Oberd. 1950
 - * MOL-02E - Poion supinae Rivas-Mart. et Géhu 1978
 - * MOL-05A - Potentillion anserinae Tx. 1947
 - E2.2 - Low and medium altitude hay meadows
 - * MOL-01A - Arrhenatherion elatioris Luquet 1926
 - * MOL-01E - Brachypodio-Centaureion nemoralis Br.-Bl. 1967
 - * MOL-04E - Conioselinion tatarici Golub et al. 2003
 - * MOL-01C - Cynosurion cristati Tx. 1947
 - * MOL-04D - Deschampsion cespitosae Horvatic 1930
 - * FEP-06A - Glycyrrhizion echinatae Golub et Saveleva in Golub 1995
 - * FEP-06C - Glycyrrhizion glabrae Golub et Mirkin in Golub 1995
 - * FEP-06B - Glycyrrhizion korshinskyi Lysenko 2010
 - * MOL-04A - Molinion caeruleae Koch 1926
 - * MOL-01F - Ranunculo neapolitani-Arrhenatherion elatioris Allegrezza et Biondi 2011
 - * MOL-01H - Rumicion thrysiflori Micevski ex Carni et Mucina 2013
 - E2.3 - Mountain hay meadows
 - * MOL-02C - Pancicion serbicae Lakušić 1966
 - * MOL-01B - Phyteumato-Trisetion flavescens Hundt ex Passarge 1969
 - * MOL-03A - Polygonion krascheninnikovii Kashapov 1985
 - * MOL-02A - Trisetio flavescens-Polygonion bistortae Br.-Bl. et Tx. ex Marschall 1947
 - * MOL-02B - Violion cornutae Nègre 1972
 - E2.4 - Iberian summer pastures (vallicares)
 - * SAC-01A - Agrostion castellanae Rivas Goday ex Rivas-Mart. et al. 1980
 - * SAC-01B - Festucion merinoi Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 1986 corr. Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 2002
 - E2.5 - Meadows of the steppe zone
 - * FES-02A - Agrostion vinealis Sipailova et al. 1985
 - * FES-02C - Artemision ponticae Golub et Saveleva in Golub 1995
 - * FES-02B - Galio veri-Aristolochion clematitidis Shevchyk et Solomakha in Shevchyk et al. 1996
 - * FES-02D - Seselion libanotis Ageleulov et Golub in Golub 1995
 - * FES-02E - Trifolion montani Naumova 1986
- E3 - Seasonally wet and wet grasslands
 - E3.1 - Mediterranean tall humid grassland
 - * MOL-09D - Gaudinio fragilis-Hordeion bulbosi Galán de Mera et al. 1997
 - * MOL-09A - Molinio-Holoschoenion Br.-Bl. ex Tchou 1948
 - E3.2 - Mediterranean short humid grassland

- * MOL-09E - *Brachypodio sylvatici-Holoschoenion romani* Gradstein et Schmittenberg 1977
 - * MOL-09B - *Dactylorhizo-Juncion striati* S. Brullo et Grillo 1978
 - * MOL-09C - *Deschampsion mediae* Br.-Bl. et al. 1952 nom. conserv. propos.
 - * TRI-07B - *Sieglingion decumbentis* Gamisans 1976
 - * MOL-05D - *Trifolion maritimi* Br.-Bl. ex Br.-Bl. et al. 1952
- E3.3 - Sub-mediterranean humid meadows
- * MOL-08A - *Molinio-Hordeion secalini* Horvatic 1934
 - * MOL-08E - *Ranunculion velutini* Pedrotti 1978
 - * MOL-08D - *Trifolion pallidi* Ilijanic 1969
 - * MOL-08B - *Trifolion resupinati* Micevski 1957
- E3.4 - Moist or wet mesotrophic to eutrophic grassland
- * MOL-07A - *Althaeion officinalis* Golub et Mirkin in Golub 1995
 - * MOL-04B - *Calthion palustris* Tx. 1937
 - * MOL-04E - *Conioselinion tatarici* Golub et al. 2003
 - * MOL-04D - *Deschampsion cespitosae* Horvatic 1930
 - * MOL-07B - *Euphorbion palustris* Ageleulov et Golub in Golub 1995
 - * MOL-04C - *Filipendulo-Petasition* Br.-Bl. ex Duvigneaud 1949
 - * FEP-06A - *Glycyrrhizion echinatae* Golub et Saveleva in Golub 1995
 - * FEP-06C - *Glycyrrhizion glabrae* Golub et Mirkin in Golub 1995
 - * FEP-06B - *Glycyrrhizion korshinskyi* Lysenko 2010
 - * MOL-05B - *Juncion inflexi* Knapp 1971
 - * MOL-05C - *Loto tenuis-Trifolion fragiferi* Westhoff et Den Held ex de Foucault 2009
 - * MOL-07C - *Lythro-Euphorbion* Mirkin et Naumova 1986
 - * MOL-04A - *Molinion caeruleae* Koch 1926
 - * MOL-06A - *Oenanthion fistulosae* de Foucault 2009
 - * MOL-05A - *Potentillion anserinae* Tx. 1947
 - * MOL-08C - *Trifolio-Ranunculion pedati* Slavnic 1948
- E3.5 - Moist or wet oligotrophic grassland
- * SCH-02A - *Caricion fuscae* Koch 1926
 - * MOL-04A - *Molinion caeruleae* Koch 1926
 - * NAR-01D - *Nardo-Juncion squarrosi* (Oberd. 1957) Passarge 1964
- E4 - Alpine and subalpine grasslands
- E4.1 - Vegetated snow-patch
- * HER-02A - *Arabidion caeruleae* Br.-Bl. in Br.-Bl. et Jenny 1926
 - * HER-01G - *Cassiopo-Salicion herbaceae* Nordhagen 1943
 - * HER-01C - *Festucion picturatae* Krajina 1933 corr. Dúbravcová 2007
 - * HER-01F - *Hyalopoion ponticae* Rabotnova et Onipchenko in Onipchenko 2002
 - * HER-01D - *Ranunculion crenati* Lakušić 1968
 - * HER-01I - *Ranunculo hyperborei-Drepanocladion revolventis* Philippi 1973
 - * HER-01H - *Ranunculo-Oxyrion didynae* Nordhagen 1943
 - * HER-01B - *Salici herbaceae-Caricion lachenalii* Béguin et Theurillat 1982
 - * HER-01A - *Salicion herbaceae* Br.-Bl. in Br.-Bl. et Jenny 1926
 - * HER-01E - *Sedion candollei* Rivas-Mart., Fernández González et Loidi in Rivas-Mart. et al. 2011
- E4.2 - Moss and lichen dominated mountain summits, ridges and exposed slopes
- * TRI-01A - *Carici-Juncion trifidi* Nordhagen 1943
 - * TRI-01C - *Cladonio-Viscarion alpinae* Daniëls 1982

E4.3 - Acid alpine and subalpine grassland

- * KOB-02C - *Agrostion alpinae* Jeník et al. 1980
- * TRI-04G - *Agrostion schraderanae* Grabherr 1993
- * TRI-02A - *Anemonastro sibirici-Festucion ovinae* Chytrý et al. 1993
- * TRI-03D - *Anemonion speciosae* Minaeva ex Onipchenko 2002
- * MUL-02C - *Calamagrostion arundinaceae* (Luquet 1926) Oberd. 1957
- * MUL-02A - *Calamagrostion villosae* Pawlowski et al. 1928
- * SES-03F - *Campanulion albanicae* Lakušić 1966
- * TRI-06A - *Campanulo herminii-Nardion strictae* Rivas-Mart. 1964
- * TRI-04A - *Carici macrostyli-Nardion* (Rivas-Mart. et al. 1984) de Foucault 1994
- * TRI-01A - *Carici-Juncion trifidi* Nordhagen 1943
- * TRI-03A - *Caricion curvulae* Br.-Bl. 1925
- * NAR-01B - *Equiseto-Galion borealis* Tx. in Tx. et Böttcher 1969
- * TRI-04H - *Festucion eskiae* Br.-Bl. 1948
- * TRI-04I - *Festucion macratherae* Avena et Bruno 1975 corr. Petriccione et Persia 1995
- * TRI-03C - *Festucion supinae* Br.-Bl. 1948
- * TRI-04F - *Festucion variae* Br.-Bl. ex Guinochet 1938
- * KOB-02B - *Festucion versicoloris* Krajina 1934
- * TRI-05A - *Festucion woronowii* Tsepkova 1987
- * SES-03D - *Festucion xanthinae* Lakušić et al. 1969
- * TRI-03B - *Juncion trifidi* Krajina 1934
- * KOB-01A - *Kobresio-Dryadion* Nordhagen 1943
- * KOB-02D - *Kobresion capilliformis* Tsepkova 1987
- * TRI-04B - *Nardion strictae* Br.-Bl. 1926
- * TRI-01B - *Nardo-Caricion rigidae* Nordhagen 1943
- * TRI-06B - *Plantaginion thalackeri* Quézel 1953
- * TRI-08A - *Poion violaceae* Horvat et al. 1937
- * TRI-04K - *Potentillo montenegrinae-Festucion paniculatae* Redžić ex Carni et Mucina 2013
- * TRI-04J - *Potentillo rigoanae-Festucion paniculatae* Di Pietro all. nova hoc loco
- * TRI-04E - *Potentillo ternatae-Nardion* Simon 1958
- * NAR-01A - *Potentillo-Polygonion vivipari* Nordhagen ex Dierßen 1992
- * TRI-04C - *Ranunculo pollinensis-Nardion strictae* Bonin 1972
- * TRI-07A - *Sesamoido pygmaeae-Poion violaceae* Gamisans 1975
- * TRI-08B - *Seslerion comosae* Horvat et al. 1937
- * TRI-07B - *Sieglingion decumbentis* Gamisans 1976
- * MUL-02B - *Trisetion fusci* Krajina 1933

E4.4 - Calcareous alpine and subalpine grassland

- * KOB-02C - *Agrostion alpinae* Jeník et al. 1980
- * SES-03B - *Anthyllido-Seslerion klasterskyi* Simon 1958
- * SES-01J - *Armerion cantabricae* Rivas-Mart. et al. 1984
- * ONO-01H - *Avenion sempervirentis* Barbero 1968
- * SES-01B - *Caricion austroalpinae* Sutter 1962
- * SES-01C - *Caricion ferrugineae* G. Br.-Bl. et Br.-Bl. in G. Br.-Bl. 1931
- * SES-01D - *Caricion firmae* Gams 1936
- * KOB-01B - *Dryadion integrifoliae* Ohba ex Daniëls 1982
- * ONO-02A - *Festucion burnatii* Rivas Goday et Rivas-Mart. ex Mayor et al. 1973

- * SES-02C - Festucion pungentis Horvat 1930
 - * ONO-01C - Festucion scopariae Br.-Bl. 1948
 - * KOB-02B - Festucion versicoloris Krajina 1934
 - * SES-03D - Festucion xanthinae Lakušić et al. 1969
 - * SES-01G - Festuco saxatilis-Seslerion bielzii (Pawlowski et Walas 1949) Coldea 1984
 - * SES-02D - Festuco-Knaution longifoliae Jovanovic-Dunjic 1955
 - * KOB-01A - Kobresio-Dryadion Nordhagen 1943
 - * KOB-02D - Kobresion capilliformis Tsepkova 1987
 - * SES-01H - Laserpitio nestleri-Ranunculion thorae Vigo ex Molero 1981
 - * ONO-02B - Minuartio-Poion ligulatae O. de Bolòs 1962
 - * ONO-01B - Ononidion cristatae Royer 1991
 - * ONO-01A - Ononidion striatae Br.-Bl. et Susplugas 1937
 - * SES-03A - Oxytropidion dinaricae Lakušić 1966
 - * KOB-02A - Oxytropido-Elynion myosuroidis Br.-Bl. 1950
 - * SES-01I - Primulion intricatae Br.-Bl. ex Vigo 1972
 - * SES-02B - Seslerio juncifoliae-Caricion firmae Trinajstić 2005
 - * SES-01E - Seslerio-Asterion alpini Hadac ex Hadac et al. 1969
 - * SES-03C - Seslerio-Festucion xanthinae Horvat in Horvat et al. 1974
 - * SES-02E - Seslerion apenninae Bruno et Furnari 1966
 - * SES-01A - Seslerion coeruleae Br.-Bl. in Br.-Bl. et Jenny 1926
 - * SES-03E - Seslerion nitidae Horvat 1936
 - * SES-01F - Seslerion tatrae Pawlowski 1935 corr. Klika 1955
 - * SES-02A - Seslerion tenuifoliae Horvat 1930
- E4.5 - Alpine and subalpine enriched grassland
- * MOL-02C - Pancicion serbicae Lakušić 1966
 - * MOL-01B - Phyteumato-Trisetion flavescens Hundt ex Passarge 1969
 - * MOL-02D - Poion alpinae Gams ex Oberd. 1950
 - * MOL-02E - Poion supinae Rivas-Mart. et Géhu 1978
 - * MOL-02A - Trisetio flavescens-Polygonion bistortae Br.-Bl. et Tx. ex Marschall 1947
 - * MOL-02B - Violion cornutae Nègre 1972
- E5 - Woodland fringes and clearings and tall forb stands
- E5.2 - Thermophile woodland fringes
- * GER-02D - Dictamno albi-Ferulagion galbaniferae (van Gils et al. 1975) de Foucault et al. ex Carni et Dengler in Mucina et al. 2009
 - * GER-02B - Galio litoralis-Geranion sanguinei Géhu et Géhu-Franck in de Foucault et al. 1983
 - * GER-02A - Geranion sanguinei Tx. in T. Müller 1962
 - * GER-01B - Knaution dipsacifoliae Julve ex Dengler et Boch 2008
 - * GER-02E - Lathyro laxiflori-Trifolion velenovskyi (Carni et al. 2000) Carni 2005
 - * GER-03E - Linarion triornithophorae Rivas-Mart. et al. 1984
 - * GER-03A - Melampyrion pratensis Passarge 1979
 - * GER-03F - Origanion virentis Rivas-Mart. et O. de Bolòs in Rivas-Mart. et al. 1984
 - * GER-04B - Pericallion malvifoliae F. Prieto, Dias et Aguiar in F. Prieto et al. 2012
 - * GER-03C - Poion nemoralis Dengler et al. 2006
 - * GER-04A - Ranunculo cortusifolii-Geranion canariensis Rivas-Mart. et al. 1993
 - * GER-02C - Stachyo lusitanicae-Cheirolophion sempervirentis (Capelo 1996) Capelo in Mucina et al. 2013

- * GER-03D - *Teucrium scorodoniae* de Foucault et al. 1983
 - * GER-01A - *Trifolium medii* T. Müller 1962
 - * GER-03B - *Viola riviniana*-*Stellarium holostea* Passarge 1994
- E5.3 - *Pteridium aquilinum* fields
- * EPI-01A - *Epilobium angustifolium* Oberd. 1957
 - * LON-01A - *Lonicero-Rubium silvatici* Tx. et Neumann ex Wittig 1977
- E5.4 - Moist or wet tall-herb and fern fringes and meadows
- * EPI-02C - *Aegopodium podagrariae* Tx. 1967 nom. conserv. propos.
 - * MOL-07A - *Althaeion officinalis* Golub et Mirkin in Golub 1995
 - * EPI-04B - *Archangelicum litoralis* Scamoni et Passarge 1963
 - * MUL-03B - *Arunco-Petasition albae* Br.-Bl. et Sutter 1977
 - * MOL-04E - *Conioselinium tatarici* Golub et al. 2003
 - * EPI-04D - *Cynancho-Convolvulium sepium* Rivas Goday et Rivas-Mart. ex Rivas-Mart. 1977
 - * MOL-04D - *Deschampsium cespitosum* Horvatic 1930
 - * EPI-04E - *Dorycnium recti-Rumicium conglomerati* Gradstein et Schmittenberg 1977
 - * MOL-07B - *Euphorbium palustre* Ageleulov et Golub in Golub 1995
 - * MOL-04C - *Filipendulo-Petasition* Br.-Bl. ex Duvigneaud 1949
 - * EPI-02B - *Impatiens noli-tangere-Stachyum sylvaticum* Görs ex Mucina 1993
 - * EPI-04F - *Ipomoeo acuminatae-Ageratinium adenophorae* Espírito-Santo et al. 2004
 - * MOL-07C - *Lythro-Euphorbium* Mirkin et Naumova 1986
 - * EPI-04C - *Nardosmium laevigatum* Klotz et Köck 1986
 - * MUL-03A - *Petasition officinalis* Sillinger 1933
 - * EPI-04A - *Senecionium fluviatile* Tx. ex Moor 1958
 - * MUL-03C - *Senecionium samniti* Bonin 1978
- E5.5 - Subalpine moist or wet tall-herb and fern stands
- * MUL-01A - *Adenostylion alliarum* Br.-Bl. 1926 nom. conserv. propos.
 - * MUL-01F - *Cirsium appendiculatum* Horvat et al. 1937
 - * MUL-01D - *Cirsium flavispinum* Quézel 1953
 - * MUL-01C - *Delphinium elatum* Hadac ex Hadac et al. 1969
 - * MUL-01E - *Doronium corsicum* Gamisans 1975
 - * MUL-01B - *Dryopterido-Athyrium distentifolium* (Holub ex Sýkora et Štursa 1973) Jeník et al. 1980
 - * MUL-05A - *Mulgedium alpinum* Nordhagen 1943
 - * MUL-06A - *Polemonium acutiflorum-Veratrum lobelianum* Telyatnikov 2012
 - * MUL-04A - *Rumicium alpinum* Rübél ex Scharfetter 1938
 - * MUL-07A - *Trisetum sibiricum-Aconitum septentrionale* Ermakov et al. 2000
- E6 - Inland salt steppes
- E6.1 - Mediterranean inland salt steppes
- * FEP-02C - *Atraphaxo-Capparidion* Korzhenevsky 1992
 - * SAG-02A - *Frankenium pulverulentum* Rivas-Mart. ex Castroviejo et Porta 1976
 - * SAG-02C - *Gaudinio-Podospermium cani* S. Brullo et Siracusa 2000
 - * FEP-02A - *Halo-Artemision* Pignatti 1953
 - * CRY-01B - *Helechloium schoenoides* Br.-Bl. ex Rivas Goday 1956
 - * SAL-03A - *Limoniastrum monopetalum* Pignatti 1952
 - * SAL-02D - *Limonium algarvensi-lanceolatum* Costa et al. 2012
 - * SAL-02C - *Limonium catalaunicum-viciosum* Rivas-Mart. et Costa 1984

- * SAL-02E - Limonion confusi (Br.-Bl. 1933) Rivas-Mart. et Costa 1984
 - * SAL-02B - Lygeo sparti-Limonion furfuracei Rigual 1972
 - * SAL-02A - Lygeo-Lepidion cardaminis Rivas Goday et Rivas-Mart. ex Rivas-Mart. et Costa 1984
 - * SAG-02E - Mesembryanthemion nodiflori Géhu et al. 1990
 - * SAG-02D - Pholiuro-Spergularion Pignatti 1952
 - * SAG-02B - Polypogonion subspathacei Gamisans 1990
 - * FEP-01D - Puccinellion convolutae Micevski 1965
 - * FEP-01E - Puccinellion lagascanae Rivas-Mart. in Rivas-Mart. et Costa 1976 corr. Alonso et De la Torre 2004
 - * SAL-02F - Triglochino barrelieri-Limonion glomerati Biondi et al. 2001
- E6.2 - Continental inland salt steppes
- * FEP-03G - Alhagion pseudalhagi Golub et Czorbazde in Golub 1994
 - * FEP-04A - Artemisio pauciflorae-Camphorosmion monspeliacae Karpov 2001
 - * KAL-02A - Artemisio santonicae-Puccinellion fominii Shelyag-Sosonko et al. 1989
 - * FEP-02B - Artemision maritimae Micevski 1970
 - * KAL-02B - Camphorosmo-Agropyron desertori Korzhenevsky et Klyukin 1991
 - * KAL-01B - Climacoptero crassae-Suaedion acuminatae Golub et Corbadze 1989 corr. Lysenko ex Mucina in Mucina et al. 2013
 - * CRY-01A - Cypero-Spergularion salinae Slavnic 1948
 - * FEP-03F - Diantho guttati-Million vernalis Umanets et Solomakha 1998
 - * FEP-01A - Festucion pseudovinae Soó 1933
 - * FEP-03E - Festuco valesiaca-Limonion gmelinii Mirkin in Golub et Solomakha 1988
 - * KAL-01A - Kalidion caspici Golub, Rukhlenko et Sokolof 2001
 - * CRY-01C - Lepidion latifolii Golub et Mirkin 1986
 - * FEP-03B - Limonion sareptani Golub 1994
 - * FEP-03C - Limonion tomentelli Agafonov et Golub in Golub 1994
 - * FEP-01B - Peucedano officinalis-Asterion sedifolii Borhidi 1996
 - * FEP-03A - Plantagini salsae-Artemision santonici Lysenko et Mucina in Lysenko et al. 2011
 - * FEP-03D - Puccinellion giganteae Dubyna et Neuhäuslová 2000
 - * FEP-01C - Puccinellion limosae Soó 1933
- E6.3 - Temperate inland salt marsh
- E7 - Sparsely wooded grasslands
- E7.1 - Atlantic parkland
- E7.2 - Sub-continental parkland
- E7.3 - Dehesa

Appendix B: An updated crosswalk Syntaxa to EUNIS grassland habitat types (B1.4, B1.9, E1-E6)

- MUL-01A - *Adenostylion alliariae* Br.-Bl. 1926 nom. conserv. propos.
 * E5.5 - Subalpine moist or wet tall-herb and fern stands
- FES-09A - *Adonido vernalis-Stipion tirsae* Didukh 1983 nom. inval.
 * E1.2 - Perennial calcareous grassland and basic steppes
- EPI-02C - *Aegopodion podagrariae* Tx. 1967 nom. conserv. propos.
 * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- COR-07E - *Aethionemion saxatilis* Bergmeier et al. 2009
 * E1.1 - Inland sand and rock with open vegetation
 * E1.B - Heavy-metal grassland
- FES-03G - *Agropyron pectinati* Golub et Uzhamskaya 1991
 * E1.2 - Perennial calcareous grassland and basic steppes
- LYG-03A - *Agropyro pectinati-Lygeion sparti* Br.-Bl. et O. de Bolòs 1958 corr. Rivas-Mart. et al. 1999
 * E1.4 - Mediterranean tall-grass and [*Artemisia*] steppes
 * E1.3 - Mediterranean xeric grassland
- SAC-01C - *Agrostio castellanae-Stipion giganteae* Rivas Goday ex Rivas-Mart. et Fernández González 1991
 * E1.8 - Closed Mediterranean dry acid and neutral grassland
- KOB-02C - *Agrostion alpinae* Jeník et al. 1980
 * E4.3 - Acid alpine and subalpine grassland
 * E4.4 - Calcareous alpine and subalpine grassland
- SAC-01A - *Agrostion castellanae* Rivas Goday ex Rivas-Mart. et al. 1980
 * E2.4 - Iberian summer pastures (vallicares)
 * E1.8 - Closed Mediterranean dry acid and neutral grassland
 * E1.3 - Mediterranean xeric grassland
- TRI-04G - *Agrostion schraderanae* Grabherr 1993
 * E4.3 - Acid alpine and subalpine grassland
- FES-02A - *Agrostion vinealis* Sipailova et al. 1985
 * E2.5 - Meadows of the steppe zone
- NAR-01G - *Achilleo-Arnicion* Horvat et Pawlowski in Horvat 1960
 * E1.7 - Closed non-Mediterranean dry acid and neutral grassland
- FEP-03G - *Alhagion pseudalhagi* Golub et Czorbádze in Golub 1994
 * E6.2 - Continental inland salt steppes
- TUB-02B - *Alkanno-Maresion nanae* Rivas Goday ex Rivas Goday et Rivas-Mart. 1963 corr. Díez Garretas et al. 2001
 * B1.4 - Coastal stable dune grassland (grey dunes)
- MOL-07A - *Althaeion officinalis* Golub et Mirkin in Golub 1995
 * E3.4 - Moist or wet eutrophic and mesotrophic grassland
 * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- FES-11A - *Alyssion bertolonii* E. Pignatti et Pignatti 1977
 * E1.1 - Inland sand and rock with open vegetation
- FES-07C - *Alyssion heldreichii* Bergmeier et al. 2009
 * E1.1 - Inland sand and rock with open vegetation
- FES-06A - *Alyso-Festucion pallentis* Moravec in Holub et al. 1967

- * E1.1 - Inland sand and rock with open vegetation
- COR-07A - *Alyso-Sedion Oberd.* et T. Müller in T. Müller 1961
- * E1.1 - Inland sand and rock with open vegetation
- AMM-01A - *Ammophilion Br.-Bl.* 1921
- * B1.9 - Machair
- TRI-02A - *Anemonastro sibirici-Festucion ovinae* Chytrý et al. 1993
- * E4.3 - Acid alpine and subalpine grassland
- TRI-03D - *Anemonion speciosae* Minaeva ex Onipchenko 2002
- * E4.3 - Acid alpine and subalpine grassland
- TUB-03A - *Anthyllido hamosae-Malcolmion lacerae* Rivas Goday 1958
- * B1.4 - Coastal stable dune grassland (grey dunes)
- * E1.A - Open Mediterranean dry acid and neutral grassland
- SES-03B - *Anthyllido-Seslerion klasterskyi* Simon 1958
- * E4.4 - Calcareous alpine and subalpine grassland
- HER-02A - *Arabidion caeruleae Br.-Bl.* in Br.-Bl. et Jenny 1926
- * E4.1 - Vegetated snow-patch
- EPI-04B - *Archangelicion litoralis* Scamoni et Passarge 1963
- * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- SES-01J - *Armerion cantabricae* Rivas-Mart. et al. 1984
- * E4.4 - Calcareous alpine and subalpine grassland
- COR-02B - *Armerion elongatae* Pötsch 1962
- * E1.7 - Closed non-Mediterranean dry acid and neutral grassland
- * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
- * E1.1 - Inland sand and rock with open vegetation
- * B1.9 - Machair
- IND-02B - *Armerion eriophyllae* Pinto da Silva 1970
- * E1.A - Open Mediterranean dry acid and neutral grassland
- * E1.5 - Mediterranean-montane grassland
- THL-09B - *Armerion halleri* Ernst 1965
- * E1.B - Heavy-metal grassland
- COR-02E - *Armerion junceae Br.-Bl.* ex Br.-Bl. et al. 1952
- * E1.7 - Closed non-Mediterranean dry acid and neutral grassland
- * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
- * E1.1 - Inland sand and rock with open vegetation
- COR-02F - *Armerio-Potentillion Micevski* 1978
- * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
- * E1.1 - Inland sand and rock with open vegetation
- * E1.7 - Closed non-Mediterranean dry acid and neutral grassland
- MOL-01A - *Arrhenatherion elatioris* Luquet 1926
- * E2.2 - Low and medium altitude hay meadows
- FES-10B - *Artemisio albae-Dichanthion ischaemi* X. Font ex Rivas-Mart. et M.L. López in Rivas-Mart. et al. 2002
- * E1.2 - Perennial calcareous grassland and basic steppes
- FES-08A - *Artemisio hololeucaae-Hyssopion cretacei* Romashchenko et al. 1996
- * E1.1 - Inland sand and rock with open vegetation
- ART-04A - *Artemisio marschalliani-Elytrigion intermedii* Korotchenko et Didukh 1997

- * E1.2 - Perennial calcareous grassland and basic steppes
- FEP-04A - *Artemisio pauciflorae-Camphorosmion monspeliacae* Karpov 2001
- * E6.2 - Continental inland salt steppes
- KAL-02A - *Artemisio santonicae-Puccinellion fominii* Shelyag-Sosonko et al. 1989
- * E6.2 - Continental inland salt steppes
- FES-03F - *Artemisio tauricae-Festucion Korzhenevsky et Klyukin* 1991
- * E1.2 - Perennial calcareous grassland and basic steppes
- FES-03B - *Artemisio-Kochion* Soó 1964
- * E1.2 - Perennial calcareous grassland and basic steppes
- FEP-02B - *Artemision maritimae* Micevski 1970
- * E6.2 - Continental inland salt steppes
- FES-02C - *Artemision ponticae* Golub et Saveleva in Golub 1995
- * E2.5 - Meadows of the steppe zone
- MUL-03B - *Arunco-Petasition albae* Br.-Bl. et Sutter 1977
- * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- FES-06B - *Asplenio septentrionalis-Festucion pallentis* Zólyomi 1936 corr. 1966
- * E1.1 - Inland sand and rock with open vegetation
- TRA-02A - *Asterisco-Velezion rigidae* (Rivas Goday 1964) S. Brullo 1985
- * E1.3 - Mediterranean xeric grassland
- FEP-02C - *Atraphaxo-Capparidion* Korzhenevsky 1992
- * E6.1 - Mediterranean inland salt steppes
- ONO-01H - *Avenion sempervirentis* Barbero 1968
- * E4.4 - Calcareous alpine and subalpine grassland
- * E1.5 - Mediterranean-montane grassland
- FES-06C - *Avenulo adsurgentis-Festucion pallentis* Mucina in Mucina et Kolbek 1993
- * E1.1 - Inland sand and rock with open vegetation
- COR-03C - *Bassio laniflorae-Bromion tectorum* Borhidi 1996 nom. conserv. propos.
- * E1.1 - Inland sand and rock with open vegetation
- ART-04B - *Bassio-Artemision austriacae* Solomeshch in Mirkin et al. 1986
- * E1.2 - Perennial calcareous grassland and basic steppes
- MOL-09E - *Brachypodio sylvatici-Holoschoenion romani* Gradstein et Schmitzenberg 1977
- * E3.2 - Mediterranean short humid grassland
- MOL-01E - *Brachypodio-Centaureion nemoralis* Br.-Bl. 1967
- * E2.2 - Low and medium altitude hay meadows
- TRA-01A - *Brachypodion distachyi* Rivas-Mart. 1978
- * E1.3 - Mediterranean xeric grassland
- FES-10A - *Brachypodion phoenicoidis* Br.-Bl. ex Molinier 1934
- * E1.2 - Perennial calcareous grassland and basic steppes
- FES-01A - *Bromion erecti* Koch 1926
- * E1.2 - Perennial calcareous grassland and basic steppes
- FES-06D - *Bromo pannonici-Festucion csikhegyensis* Zólyomi 1966 corr. Mucina hoc loco
- * E1.1 - Inland sand and rock with open vegetation
- MUL-02C - *Calamagrostion arundinaceae* (Luquet 1926) Oberd. 1957
- * E4.3 - Acid alpine and subalpine grassland
- MUL-02A - *Calamagrostion villosae* Pawlowski et al. 1928
- * E4.3 - Acid alpine and subalpine grassland
- MOL-04B - *Calthion palustris* Tx. 1937
- * E3.4 - Moist or wet eutrophic and mesotrophic grassland

- SES-03F - *Campanulion albanicae* Lakušić 1966
* E4.3 - Acid alpine and subalpine grassland
- NAR-01F - *Campanulo herminii-Nardion* Rivas-Mart. 1964
* E1.8 - Closed Mediterranean dry acid and neutral grassland
- TRI-06A - *Campanulo herminii-Nardion strictae* Rivas-Mart. 1964
* E1.8 - Closed Mediterranean dry acid and neutral grassland
* E4.3 - Acid alpine and subalpine grassland
- KAL-02B - *Camphorosmo-Agropyrion desertori* Korzhenevsky et Klyukin 1991
* E6.2 - Continental inland salt steppes
- FES-09B - *Carici humilis-Androsacion tauricae* Didukh 1983 nom. inval.
* E1.2 - Perennial calcareous grassland and basic steppes
- TRI-04A - *Carici macrostyli-Nardion* (Rivas-Mart. et al. 1984) de Foucault 1994
* E4.3 - Acid alpine and subalpine grassland
- TRI-01A - *Carici-Juncion trifidi* Nordhagen 1943
* E4.2 - Moss and lichen dominated mountain summits, ridges and exposed slopes
* E4.3 - Acid alpine and subalpine grassland
- SES-01B - *Caricion austroalpinae* Sutter 1962
* E4.4 - Calcareous alpine and subalpine grassland
- TRI-03A - *Caricion curvulae* Br.-Bl. 1925
* E4.3 - Acid alpine and subalpine grassland
- SES-01C - *Caricion ferrugineae* G. Br.-Bl. et Br.-Bl. in G. Br.-Bl. 1931
* E4.4 - Calcareous alpine and subalpine grassland
- SES-01D - *Caricion firmae* Gams 1936
* E4.4 - Calcareous alpine and subalpine grassland
- SCH-02A - *Caricion fuscae* Koch 1926
* E3.5 - Moist or wet oligotrophic grassland
- FES-05C - *Caricion stenophyllae* Golub et Saveleva 1991
* E1.2 - Perennial calcareous grassland and basic steppes
- HER-01G - *Cassiopo-Salicion herbaceae* Nordhagen 1943
* E4.1 - Vegetated snow-patch
- FES-08C - *Centaureo carbonatae-Koelerion talievii* Romashchenko et al. 1996
* E1.1 - Inland sand and rock with open vegetation
- FES-07B - *Centaureo-Bromion fibrosi* Blečić et al. 1969
* E1.1 - Inland sand and rock with open vegetation
- FES-04B - *Centaurion sumensis* Golub et Uzhmetskaya 1992
* E1.2 - Perennial calcareous grassland and basic steppes
- FES-01B - *Cirsio-Brachypodion pinnati* Hadac et Klika in Klika et Hadac ex Klika 1951
* E1.2 - Perennial calcareous grassland and basic steppes
- MUL-01F - *Cirsion appendiculati* Horvat et al. 1937
* E5.5 - Subalpine moist or wet tall-herb and fern stands
- MUL-01D - *Cirsion flavispinae* Quézel 1953
* E5.5 - Subalpine moist or wet tall-herb and fern stands
- TRI-01C - *Cladonio-Viscarion alpinae* Daniëls 1982
* E4.2 - Moss and lichen dominated mountain summits, ridges and exposed slopes
- KAL-01B - *Climacoptero crassae-Suaedion acuminatae* Golub et Corbadze 1989 corr. Lysenko ex Mucina in Mucina et al. 2013
* E6.2 - Continental inland salt steppes
- MOL-04E - *Conioselinion tatarici* Golub et al. 2003

- * E2.2 - Low and medium altitude hay meadows
- * E3.4 - Moist or wet eutrophic and mesotrophic grassland
- * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- COR-01A - *Corynephorion canescentis* Klika 1931
 - * B1.4 - Coastal stable dune grassland (grey dunes)
 - * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
 - * E1.1 - Inland sand and rock with open vegetation
- TUB-03C - *Corynephorion maritimi* Costa, Pinto-Gomes, Neto et Rivas-Mart. in Costa et al. 2012
 - * E1.A - Open Mediterranean dry acid and neutral grassland
- TUB-03B - *Corynephorion articulati-Malcolmion patulae* Rivas Goday 1958
 - * E1.A - Open Mediterranean dry acid and neutral grassland
- TUB-01B - *Crassulo tillaeae-Sedion caespitosi* de Foucault 1999
 - * E1.A - Open Mediterranean dry acid and neutral grassland
- CRU-02A - *Crucianellion maritimae* Rivas Goday et Rivas-Mart. 1958
 - * B1.4 - Coastal stable dune grassland (grey dunes)
- TUB-02D - *Cutandio maritimae-Vulpion membranaceae* de Foucault et Géhu in de Foucault 1999
 - * B1.4 - Coastal stable dune grassland (grey dunes)
- LYG-02A - *Cymbopogono hirti-Brachypodion ramosi* Horvatic 1963
 - * E1.4 - Mediterranean tall-grass and [*Artemisia*] steppes
 - * E1.3 - Mediterranean xeric grassland
- EPI-04D - *Cynancho-Convolvulion sepium* Rivas Goday et Rivas-Mart. ex Rivas-Mart. 1977
 - * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- CRU-03B - *Cynodonto-Teucrium polii* Korzhenevsky et Klyukin 1990
 - * B1.4 - Coastal stable dune grassland (grey dunes)
- MOL-01C - *Cynosurion cristati* Tx. 1947
 - * E2.1 - Permanent mesotrophic pastures and aftermath-grazed meadows
 - * E2.2 - Low and medium altitude hay meadows
 - * B1.9 - Machair
- CRY-01A - *Cypero-Spergularion salinae* Slavnic 1948
 - * E6.2 - Continental inland salt steppes
- FES-11B - *Cytiso spinescentis-Bromion erecti* Bonin 1978
 - * E1.1 - Inland sand and rock with open vegetation
- MOL-09B - *Dactylorhizo-Juncion striati* S. Brullo et Grillo 1978
 - * E3.2 - Mediterranean short humid grassland
- TRA-02C - *Dauco-Catananchion luteae* S. Brullo 1985
 - * E1.3 - Mediterranean xeric grassland
- MUL-01C - *Delphinion elati* Hadac ex Hadac et al. 1969
 - * E5.5 - Subalpine moist or wet tall-herb and fern stands
- SAC-02A - *Deschampsio maderensis-Parafestucion albidae* Capelo et al. 2000
 - * E1.8 - Closed Mediterranean dry acid and neutral grassland
 - * E1.3 - Mediterranean xeric grassland
- MOL-04D - *Deschampsion cespitosae* Horvatic 1930
 - * E2.1 - Permanent mesotrophic pastures and aftermath-grazed meadows
 - * E2.2 - Low and medium altitude hay meadows
 - * E3.4 - Moist or wet eutrophic and mesotrophic grassland
 - * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- MOL-09C - *Deschampsion mediae* Br.-Bl. et al. 1952 nom. conserv. propos.

- * E3.2 - Mediterranean short humid grassland
- COR-02D - *Diantho catalaunici-Scrophularion humifusae* Baudiere et Simonneau 1974
- * B1.4 - Coastal stable dune grassland (grey dunes)
- FEP-03F - *Diantho guttati-Million vernalis* Umanets et Solomakha 1998
- * E6.2 - Continental inland salt steppes
- TRA-01I - *Diantho humilis-Velezion rigidae* Korzhenevsky et Klyukin ex Mucina in Mucina et al. 2013
- * E1.3 - Mediterranean xeric grassland
- FES-06H - *Diantho lumnitzeri-Seslerion* (Soó 1971) Chytrý et Mucina in Mucina et Kolbek 1993
- * E1.1 - Inland sand and rock with open vegetation
- COR-05F - *Diantho pinifolii-Jasionion heldreichii* Bergmeier et al. 2009
- * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
- * E1.1 - Inland sand and rock with open vegetation
- GER-02D - *Dictamno albi-Ferulagion galbaniferae* (van Gils et al. 1975) de Foucault et al. ex Carni et Dengler in Mucina et al. 2009
- * E5.2 - Thermophile woodland fringes
- FES-10C - *Diplachnion serotinae* Br.-Bl. 1961
- * E1.2 - Perennial calcareous grassland and basic steppes
- MUL-01E - *Doronicion corsici* Gamisans 1975
- * E5.5 - Subalpine moist or wet tall-herb and fern stands
- EPI-04E - *Dorycnio recti-Rumicion conglomerati* Gradstein et Schmitzenberg 1977
- * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- KOB-01B - *Dryadion integrifoliae* Ohba ex Daniëls 1982
- * E4.4 - Calcareous alpine and subalpine grassland
- MUL-01B - *Dryopterido-Athyron distentifolii* (Holub ex Sýkora et Štursa 1973) Jeník et al. 1980
- * E5.5 - Subalpine moist or wet tall-herb and fern stands
- EPI-01A - *Epilobion angustifolii* Oberd. 1957
- * E5.3 - [*Pteridium aquilinum*] fields
- NAR-01B - *Equiseto-Galion borealis* Tx. in Tx. et Böttcher 1969
- * E4.3 - Acid alpine and subalpine grassland
- STE-04H - *Eragrostio-Polygonion arenastri* Couderc et Izco ex Carni et Mucina 1998
- * E1.E - Trampled xeric grasslands with annuals
- MOQ-01C - *Euphorbio paraliae-Lotion glauci* Jardim et al. 2003
- * B1.4 - Coastal stable dune grassland (grey dunes)
- FES-08B - *Euphorbio cretophilae-Thymion cretacei* Didukh 1989
- * E1.1 - Inland sand and rock with open vegetation
- CRU-01A - *Euphorbio portlandicae-Helichryson stoechadis* Géhu et Tx. ex Sissingh 1974
- * B1.4 - Coastal stable dune grassland (grey dunes)
- MOL-07B - *Euphorbion palustris* Ageleulov et Golub in Golub 1995
- * E3.4 - Moist or wet eutrophic and mesotrophic grassland
- * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- STE-04I - *Euphorbion prostratae* Rivas-Mart. 1976
- * E1.E - Trampled xeric grasslands with annuals
- TUB-03E - *Evaco asterisciflorae-Linarion humilis* Minissale et Sciandrello 2013 nom. inval.
- * E1.A - Open Mediterranean dry acid and neutral grassland
- COR-03E - *Festucion beckeri* Vicherek 1972
- * E1.1 - Inland sand and rock with open vegetation
- ONO-02A - *Festucion burnatii* Rivas Goday et Rivas-Mart. ex Mayor et al. 1973

- * E1.5 - Mediterranean-montane grassland
- * E4.4 - Calcareous alpine and subalpine grassland
- TRI-04H - *Festucion eskiae* Br.-Bl. 1948
 - * E4.3 - Acid alpine and subalpine grassland
- TOL-01A - *Festucion francoi* Lüpnitz 1976 corr. F. Prieto, Aguiar, J.C. Costa, Lousã et Rivas-Mart. in F. Prieto et al. 2012
 - * E1.A - Open Mediterranean dry acid and neutral grassland
- TRI-04I - *Festucion macratherae* Avena et Bruno 1975 corr. Petriccione et Persia 1995
 - * E4.3 - Acid alpine and subalpine grassland
- SAC-01B - *Festucion merinoi* Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 1986 corr. Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 2002
 - * E1.8 - Closed Mediterranean dry acid and neutral grassland
 - * E2.4 - Iberian summer pastures (vallicares)
 - * E1.3 - Mediterranean xeric grassland
- HER-01C - *Festucion picturatae* Krajina 1933 corr. Dúbravcová 2007
 - * E4.1 - Vegetated snow-patch
- FEP-01A - *Festucion pseudovinae* Soó 1933
 - * E6.2 - Continental inland salt steppes
- SES-02C - *Festucion pungentis* Horvat 1930
 - * E4.4 - Calcareous alpine and subalpine grassland
- LYG-01C - *Festucion scariosae* Martínez-Parras et al. 1984
 - * E1.4 - Mediterranean tall-grass and [*Artemisia*] steppes
 - * E1.3 - Mediterranean xeric grassland
- ONO-01C - *Festucion scopariae* Br.-Bl. 1948
 - * E4.4 - Calcareous alpine and subalpine grassland
 - * E1.5 - Mediterranean-montane grassland
- FES-03A - *Festucion sulcatae* Soó 1930
 - * E1.2 - Perennial calcareous grassland and basic steppes
- TRI-03C - *Festucion supinae* Br.-Bl. 1948
 - * E4.3 - Acid alpine and subalpine grassland
- COR-03D - *Festucion vaginatae* Soó 1929
 - * E1.1 - Inland sand and rock with open vegetation
- TRI-04F - *Festucion variae* Br.-Bl. ex Guinochet 1938
 - * E4.3 - Acid alpine and subalpine grassland
- KOB-02B - *Festucion versicoloris* Krajina 1934
 - * E4.3 - Acid alpine and subalpine grassland
 - * E4.4 - Calcareous alpine and subalpine grassland
- TRI-05A - *Festucion woronowii* Tsepikova 1987
 - * E4.3 - Acid alpine and subalpine grassland
- SES-03D - *Festucion xanthinae* Lakušić et al. 1969
 - * E4.3 - Acid alpine and subalpine grassland
 - * E4.4 - Calcareous alpine and subalpine grassland
- SES-01G - *Festuco saxatilis*-*Seslerion bielzii* (Pawłowski et Walas 1949) Coldea 1984
 - * E4.4 - Calcareous alpine and subalpine grassland
- FEP-03E - *Festuco valesiaca*-*Limonion gmelinii* Mirkin in Golub et Solomakha 1988
 - * E6.2 - Continental inland salt steppes
- FES-12B - *Festuco*-*Bromion* Barbero et Loisel 1971
 - * E1.1 - Inland sand and rock with open vegetation

- SES-02D - Festuco-Knaution longifoliae Jovanovic-Dunjic 1955
 * E4.4 - Calcareous alpine and subalpine grassland
- FES-01C - Filipendulo vulgaris-Helictotrichion pratensis Dengler et Löbel in Dengler et al. 2003
 * E1.2 - Perennial calcareous grassland and basic steppes
- MOL-04C - Filipendulo-Petasition Br.-Bl. ex Duvigneaud 1949
 * E3.4 - Moist or wet eutrophic and mesotrophic grassland
 * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- SAG-02A - Frankenion pulverulentae Rivas-Mart. ex Castroviejo et Porta 1976
 * E6.1 - Mediterranean inland salt steppes
- FES-06E - Galio campanulatae-Poion versicoloris Kukovitsa et al. ex Didukh et Mucina in Mucina et al. 2013
 * E1.1 - Inland sand and rock with open vegetation
- GER-02B - Galio litoralis-Geranion sanguinei Géhu et Géhu-Franck in de Foucault et al. 1983
 * E5.2 - Thermophile woodland fringes
- FES-02B - Galio veri-Aristolochion clematitidis Shevchyk et Solomakha in Shevchyk et al. 1996
 * E2.5 - Meadows of the steppe zone
- MOL-09D - Gaudinio fragilis-Hordeion bulbosi Galán de Mera et al. 1997
 * E3.1 - Mediterranean tall humid grassland
- SAG-02C - Gaudinio-Podospermion cani S. Brullo et Siracusa 2000
 * E6.1 - Mediterranean inland salt steppes
- ONO-01D - Genistion lobelii Molinier 1934
 * E1.5 - Mediterranean-montane grassland
- FES-01D - Gentianello amarellae-Helictotrichion pratensis Royer ex Dengler in Mucina et al. 2009
 * E1.2 - Perennial calcareous grassland and basic steppes
- GER-02A - Geranion sanguinei Tx. in T. Müller 1962
 * E5.2 - Thermophile woodland fringes
- FEP-06A - Glycyrrhizion echinatae Golub et Saveleva in Golub 1995
 * E2.2 - Low and medium altitude hay meadows
 * E3.4 - Moist or wet eutrophic and mesotrophic grassland
- FEP-06C - Glycyrrhizion glabrae Golub et Mirkin in Golub 1995
 * E2.2 - Low and medium altitude hay meadows
 * E3.4 - Moist or wet eutrophic and mesotrophic grassland
- FEP-06B - Glycyrrhizion korshinskyi Lysenko 2010
 * E2.2 - Low and medium altitude hay meadows
 * E3.4 - Moist or wet eutrophic and mesotrophic grassland
- FEP-02A - Halo-Artemision Pignatti 1953
 * E6.1 - Mediterranean inland salt steppes
- CRY-01B - Heleochloion schoenioidis Br.-Bl. ex Rivas Goday 1956
 * E6.1 - Mediterranean inland salt steppes
- TUB-01A - Helianthemion guttati Br.-Bl. in Br.-Bl. et al. 1940
 * E1.A - Open Mediterranean dry acid and neutral grassland
- FES-04A - Helictotricho desertori-Stipion rubentis Toman 1969
 * E1.2 - Perennial calcareous grassland and basic steppes
- CRU-02B - Helichryson picardii (Rivas-Mart., Costa et Izco in Rivas-Mart. et al. 1990) Rivas-Mart. et al. 1999
 * B1.4 - Coastal stable dune grassland (grey dunes)
- IND-02A - Hieracio castellani-Plantaginion radicatae Rivas-Mart. et Cantó 1987
 * E1.A - Open Mediterranean dry acid and neutral grassland

- * E1.5 - Mediterranean-montane grassland
- FES-11C - Hippocrepido glaucae-Stipion austroitalicae Forte et Terzi in Forte et al. 2005
 - * E1.1 - Inland sand and rock with open vegetation
- STE-06F - Hordeion murini Br.-Bl. in Br.-Bl. et al. 1936
 - * E1.6 - Subnitrophilous annual grassland
- HER-01F - Hyalopoion ponticae Rabotnova et Onipchenko in Onipchenko 2002
 - * E4.1 - Vegetated snow-patch
- LYG-02B - Hyparrhenion hirtae Br.-Bl. et al. 1956
 - * E1.4 - Mediterranean tall-grass and [Artemisia] steppes
 - * E1.3 - Mediterranean xeric grassland
- COR-02A - Hyperico perforati-Scleranthion perennis Moravec 1967
 - * E1.1 - Inland sand and rock with open vegetation
 - * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
- TRA-01F - Hypochoeridion achyrophori Biondi et Guerra 2008
 - * E1.3 - Mediterranean xeric grassland
- FES-01G - Chrysopogono-Danthonion Kojic 1957
 - * E1.2 - Perennial calcareous grassland and basic steppes
- FES-06F - Chrysopogono-Festucion dalmatica Borhidi 1996
 - * E1.1 - Inland sand and rock with open vegetation
- FES-13A - Chrysopogono-Saturejion subspicatae Horvat et Horvatic 1934
 - * E1.1 - Inland sand and rock with open vegetation
- EPI-02B - Impatienti noli-tangere-Stachyion sylvatica Görs ex Mucina 1993
 - * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- EPI-04F - Ipomoeo acuminatae-Ageratinion adenophorae Espírito-Santo et al. 2004
 - * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- IND-01B - Jasionion carpetanae González-Albo 1941
 - * E1.5 - Mediterranean-montane grassland
- MOL-05B - Juncion inflexi Knapp 1971
 - * E3.4 - Moist or wet eutrophic and mesotrophic grassland
- TRI-03B - Juncion trifidi Krajina 1934
 - * E4.3 - Acid alpine and subalpine grassland
- KAL-01A - Kalidion caspici Golub, Rukhlenko et Sokolof 2001
 - * E6.2 - Continental inland salt steppes
- GER-01B - Knaution dipsacifoliae Julve ex Dengler et Boch 2008
 - * E5.2 - Thermophile woodland fringes
- KOB-01A - Kobresio-Dryadion Nordhagen 1943
 - * E4.4 - Calcareous alpine and subalpine grassland
 - * E4.3 - Acid alpine and subalpine grassland
- KOB-02D - Kobresion capilliformis Tsepikova 1987
 - * E4.4 - Calcareous alpine and subalpine grassland
 - * E4.3 - Acid alpine and subalpine grassland
- CRU-01B - Koelerion arenariae Tx. 1937 corr. Gutermann et Mucina 1993
 - * B1.4 - Coastal stable dune grassland (grey dunes)
 - * B1.9 - Machair
- COR-03A - Koelerion glaucae Volk 1931
 - * E1.1 - Inland sand and rock with open vegetation

- * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
- STE-06G - *Laguro ovati-Bromion rigidi* Géhu et Géhu-Franck 1985
 - * E1.6 - Subnitrophilous annual grassland
- TUB-02C - *Laguro ovati-Vulpion fasciculatae* Géhu et Biondi 1994
 - * B1.4 - Coastal stable dune grassland (grey dunes)
- SES-01H - *Laserpitio nestleri-Ranunculion thorae* Vigo ex Molero 1981
 - * E4.4 - Calcareous alpine and subalpine grassland
- GER-02E - *Lathyro laxiflori-Trifolion velenovskyi* (Carni et al. 2000) Carni 2005
 - * E5.2 - Thermophile woodland fringes
- LYG-01E - *Leontodono tuberosi-Bellion sylvestris* Biondi et al. 2001
 - * E1.3 - Mediterranean xeric grassland
 - * E1.4 - Mediterranean tall-grass and [*Artemisia*] steppes
- CRY-01C - *Lepidion latifolii* Golub et Mirkin 1986
 - * E6.2 - Continental inland salt steppes
- SAL-03A - *Limoniastrion monopetali* Pignatti 1952
 - * E6.1 - Mediterranean inland salt steppes
- SAL-02D - *Limonion algarvensi-lanceolati* Costa et al. 2012
 - * E6.1 - Mediterranean inland salt steppes
- SAL-02C - *Limonion catalaunico-viciosoi* Rivas-Mart. et Costa 1984
 - * E6.1 - Mediterranean inland salt steppes
- SAL-02E - *Limonion confusi* (Br.-Bl. 1933) Rivas-Mart. et Costa 1984
 - * E6.1 - Mediterranean inland salt steppes
- FEP-03B - *Limonion sareptani* Golub 1994
 - * E6.2 - Continental inland salt steppes
- FEP-03C - *Limonion tomentelli* Agafonov et Golub in Golub 1994
 - * E6.2 - Continental inland salt steppes
- STE-06H - *Linario polygalifoliae-Vulpion alopecuri* Br.-Bl., Rozeira et Silva in Br.-Bl. et al. 1972
 - * E1.6 - Subnitrophilous annual grassland
- TUB-02A - *Linarion pedunculatae* Díez Garretas et al. in Díez Garretas 1984
 - * B1.4 - Coastal stable dune grassland (grey dunes)
- GER-03E - *Linarion triornithophorae* Rivas-Mart. et al. 1984
 - * E5.2 - Thermophile woodland fringes
- MOL-01G - *Lino biennis-Gaudinion fragilis* (Br.-Bl. 1967) de Foucault 1989
 - * E2.1 - Permanent mesotrophic pastures and aftermath-grazed meadows
- LON-01A - *Lonicerio-Rubion silvatici* Tx. et Neumann ex Wittig 1977
 - * E5.3 - [*Pteridium aquilinum*] fields
- MOL-05C - *Loto tenuis-Trifolion fragiferi* Westhoff et Den Held ex de Foucault 2009
 - * E3.4 - Moist or wet eutrophic and mesotrophic grassland
- SAL-02B - *Lygeo sparti-Limonion furfuracei* Rigual 1972
 - * E6.1 - Mediterranean inland salt steppes
- SAL-02A - *Lygeo-Lepidion cardaminis* Rivas Goday et Rivas-Mart. ex Rivas-Mart. et Costa 1984
 - * E6.1 - Mediterranean inland salt steppes
- MOL-07C - *Lythro-Euphorbion* Mirkin et Naumova 1986
 - * E3.4 - Moist or wet eutrophic and mesotrophic grassland
 - * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- TUB-02G - *Maresion nanae* Géhu et al. 1987
 - * B1.4 - Coastal stable dune grassland (grey dunes)

- TUB-02H - *Medicagini-Triplachnion nitentis* Mayer 1995
 * B1.4 - Coastal stable dune grassland (grey dunes)
- GER-03A - *Melampyrion pratensis* Passarge 1979
 * E5.2 - Thermophile woodland fringes
- CRU-03E - *Melico chrysolepidis-Ephedrion distachyae* Umanets et Solomakha 1999
 * B1.4 - Coastal stable dune grassland (grey dunes)
- SAG-02E - *Mesembryanthemion nodiflori* Géhu et al. 1990
 * E6.1 - Mediterranean inland salt steppes
- ONO-02B - *Minuartio-Poion ligulatae* O. de Bolòs 1962
 * E1.5 - Mediterranean-montane grassland
 * E4.4 - Calcareous alpine and subalpine grassland
- TUB-01C - *Molinerion laevis* Br.-Bl. et al. 1952
 * E1.A - Open Mediterranean dry acid and neutral grassland
- MOL-09A - *Molinio-Holoschoenion* Br.-Bl. ex Tchou 1948
 * E3.1 - Mediterranean tall humid grassland
- MOL-08A - *Molinio-Hordeion secalini* Horvatic 1934
 * E3.3 - Sub-mediterranean humid meadows
- MOL-04A - *Molinion caeruleae* Koch 1926
 * E3.4 - Moist or wet eutrophic and mesotrophic grassland
 * E2.2 - Low and medium altitude hay meadows
 * E2.1 - Permanent mesotrophic pastures and aftermath-grazed meadows
 * E3.5 - Moist or wet oligotrophic grassland
- LYG-03C - *Moricandio-Lygeion sparti* S. Brullo et al. 1990
 * E1.3 - Mediterranean xeric grassland
 * E1.4 - Mediterranean tall-grass and [*Artemisia*] steppes
- MUL-05A - *Mulgedion alpini* Nordhagen 1943
 * E5.5 - Subalpine moist or wet tall-herb and fern stands
- TRI-04B - *Nardion strictae* Br.-Bl. 1926
 * E4.3 - Acid alpine and subalpine grassland
- NAR-01E - *Nardo-Agrostion tenuis* Sillinger 1933
 * E1.7 - Closed non-Mediterranean dry acid and neutral grassland
- TRI-01B - *Nardo-Caricion rigidae* Nordhagen 1943
 * E4.3 - Acid alpine and subalpine grassland
- NAR-01D - *Nardo-Juncion squarrosi* (Oberd. 1957) Passarge 1964
 * E3.5 - Moist or wet oligotrophic grassland
- EPI-04C - *Nardosmion laevigatae* Klotz et Köck 1986
 * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- MOL-06A - *Oenanthion fistulosae* de Foucault 2009
 * E3.4 - Moist or wet eutrophic and mesotrophic grassland
- TRA-01D - *Omphalodion commutatae* Rivas-Mart. et al. ex Izco 1976 corr. Pérez Raya et al. 1991
 * E1.3 - Mediterranean xeric grassland
- TRA-02D - *Onobrychido-Ptilostemion stellati* S. Brullo et al. 2001
 * E1.3 - Mediterranean xeric grassland
- ONO-01B - *Ononidion cristatae* Royer 1991
 * E1.5 - Mediterranean-montane grassland
 * E4.4 - Calcareous alpine and subalpine grassland
- ONO-01A - *Ononidion striatae* Br.-Bl. et Susplugas 1937
 * E1.5 - Mediterranean-montane grassland

- * E4.4 - Calcareous alpine and subalpine grassland
- TUB-02I - *Ononidion tournefortii* Géhu et al. 1996
 - * B1.4 - Coastal stable dune grassland (grey dunes)
- GER-03F - *Origanion virentis* Rivas-Mart. et O. de Bolòs in Rivas-Mart. et al. 1984
 - * E5.2 - Thermophile woodland fringes
- TUB-03D - *Ormenido multicaulis-Malcolmion broussonetii* Br.-Bl. in Br.-Bl. et al. 1940
 - * E1.A - Open Mediterranean dry acid and neutral grassland
- TUB-01H - *Ornithopo pinnati-Gaudinion coarctatae* F. Prieto et Aguiar, in F. Prieto et al. 2012
 - * E1.A - Open Mediterranean dry acid and neutral grassland
- SES-03A - *Oxytropidion dinaricae* Lakušić 1966
 - * E4.4 - Calcareous alpine and subalpine grassland
- KOB-02A - *Oxytropido-Elynyion myosuroidis* Br.-Bl. 1950
 - * E4.4 - Calcareous alpine and subalpine grassland
- MOL-02C - *Pancicion serbicae* Lakušić 1966
 - * E2.3 - Mountain hay meadows
 - * E4.5 - Alpine and subalpine enriched grassland
- GER-04B - *Pericallion malvifoliae* F. Prieto, Dias et Aguiar in F. Prieto et al. 2012
 - * E5.2 - Thermophile woodland fringes
- MUL-03A - *Petasion officinalis* Sillinger 1933
 - * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- FEP-01B - *Peucedano officinalis-Asterion sedifolii* Borhidi 1996
 - * E6.2 - Continental inland salt steppes
- SAG-02D - *Pholiuro-Spergularion Pignatti* 1952
 - * E6.1 - Mediterranean inland salt steppes
- MOL-01B - *Phyteumato-Trisetion flavescens* Hundt ex Passarge 1969
 - * E2.3 - Mountain hay meadows
 - * E4.5 - Alpine and subalpine enriched grassland
- FES-03E - *Pimpinello-Thymion zygoidi* Dihoru et Donita 1970
 - * E1.2 - Perennial calcareous grassland and basic steppes
- ONO-02C - *Plantagini discoloris-Thymion mastigophori* Molina et Izco 1989
 - * E1.5 - Mediterranean-montane grassland
- FEP-03A - *Plantagini salsae-Artemision santonici* Lysenko et Mucina in Lysenko et al. 2011
 - * E6.2 - Continental inland salt steppes
- TRA-02B - *Plantagini-Catapodium marini* S. Brullo 1985
 - * E1.3 - Mediterranean xeric grassland
- BUL-01D - *Plantaginion cupanii* S. Brullo et Grillo 1978
 - * E1.3 - Mediterranean xeric grassland
- GEN-01B - *Plantaginion insularis* Klein 1972
 - * E1.5 - Mediterranean-montane grassland
- BUL-01B - *Plantaginion serrariae* Galán de Mera et al. 2000
 - * E1.3 - Mediterranean xeric grassland
- TRI-06B - *Plantaginion thalackeri* Quézel 1953
 - * E4.3 - Acid alpine and subalpine grassland
- MOL-02D - *Poion alpinae* Gams ex Oberd. 1950
 - * E4.5 - Alpine and subalpine enriched grassland
 - * E2.1 - Permanent mesotrophic pastures and aftermath-grazed meadows
- GER-03C - *Poion nemoralis* Dengler et al. 2006
 - * E5.2 - Thermophile woodland fringes

- MOL-02E - *Poion supinae* Rivas-Mart. et Géhu 1978
 * E4.5 - Alpine and subalpine enriched grassland
 * E2.1 - Permanent mesotrophic pastures and aftermath-grazed meadows
- TRI-08A - *Poion violaceae* Horvat et al. 1937
 * E4.3 - Acid alpine and subalpine grassland
- MUL-06A - *Polemonio acutiflori-Veratrimon lobeliani* Telyatnikov 2012
 * E5.5 - Subalpine moist or wet tall-herb and fern stands
- POL-01B - *Polycarpion tetraphylli* Rivas-Mart. 1975
 * E1.E - Trampled xeric grasslands with annuals
- STE-04J - *Polycarpo-Eleusinion indicae* Carni et Mucina 1998
 * E1.E - Trampled xeric grasslands with annuals
- FES-01F - *Polygalo mediterraneae-Bromion erecti* (Biondi et al. 2005) Di Pietro et al. 2013
 * E1.2 - Perennial calcareous grassland and basic steppes
- FES-07A - *Polygonion albanicae* Ritter-Studnicka 1970
 * E1.1 - Inland sand and rock with open vegetation
- MOL-03A - *Polygonion krascheninnikovii* Kashapov 1985
 * E2.3 - Mountain hay meadows
- POL-01A - *Polygono-Coronopodion* Sissingh 1969
 * E1.E - Trampled xeric grasslands with annuals
- SAG-02B - *Polypogonion subspathacei* Gamisans 1990
 * E6.1 - Mediterranean inland salt steppes
- BUL-01C - *Poo bulbosae-Astragalion sesamei* Rivas Goday et Ladero 1970
 * E1.3 - Mediterranean xeric grassland
- MOL-05A - *Potentillion anserinae* Tx. 1947
 * E2.1 - Permanent mesotrophic pastures and aftermath-grazed meadows
 * E3.4 - Moist or wet eutrophic and mesotrophic grassland
- TRI-04K - *Potentillo montenegrinae-Festucion paniculatae* Redžić ex Carni et Mucina 2013
 * E4.3 - Acid alpine and subalpine grassland
- TRI-04J - *Potentillo rigoanae-Festucion paniculatae* Di Pietro all. nova hoc loco
 * E4.3 - Acid alpine and subalpine grassland
- FES-01E - *Potentillo splendentis-Brachypodion pinnati* Br.-Bl. 1967
 * E1.2 - Perennial calcareous grassland and basic steppes
- TRI-04E - *Potentillo ternatae-Nardion* Simon 1958
 * E4.3 - Acid alpine and subalpine grassland
- NAR-01A - *Potentillo-Polygonion vivipari* Nordhagen ex Dierßen 1992
 * E4.3 - Acid alpine and subalpine grassland
 * E1.7 - Closed non-Mediterranean dry acid and neutral grassland
- SES-01I - *Primulion intricatae* Br.-Bl. ex Vigo 1972
 * E4.4 - Calcareous alpine and subalpine grassland
- CRU-01C - *Psammo-Koelerion* Pignatti 1953
 * B1.4 - Coastal stable dune grassland (grey dunes)
- TUB-02E - *Psammo-Vulpion* Pignatti 1953
 * B1.4 - Coastal stable dune grassland (grey dunes)
- DRY-03C - *Ptilostemo casabonae-Euphorbion cupanii* Angiolini et al. 2005
 * E1.B - Heavy-metal grassland
- IND-01C - *Ptilotrichion purpurei* Quézel 1953
 * E1.5 - Mediterranean-montane grassland
- FEP-01D - *Puccinellion convolutae* Micevski 1965

- * E6.1 - Mediterranean inland salt steppes
- FEP-03D - Puccinellion giganteae Dubyna et Neuhäuslová 2000
- * E6.2 - Continental inland salt steppes
- FEP-01E - Puccinellion lagascanae Rivas-Mart. in Rivas-Mart. et Costa 1976 corr. Alonso et De la Torre 2004
- * E6.1 - Mediterranean inland salt steppes
- FEP-01C - Puccinellion limosae Soó 1933
- * E6.2 - Continental inland salt steppes
- HER-01D - Ranunculion crenati Lakušić 1968
- * E4.1 - Vegetated snow-patch
- MOL-08E - Ranunculion velutini Pedrotti 1978
- * E3.3 - Sub-mediterranean humid meadows
- GER-04A - Ranunculo cortusifolii-Geranion canariensis Rivas-Mart. et al. 1993
- * E5.2 - Thermophile woodland fringes
- HER-01I - Ranunculo hyperborei-Drepanocladion revolventis Philippi 1973
- * E4.1 - Vegetated snow-patch
- MOL-01F - Ranunculo neapolitani-Arrhenatherion elatioris Allegrezza et Biondi 2011
- * E2.2 - Low and medium altitude hay meadows
- TRI-04C - Ranunculo pollinensis-Nardion strictae Bonin 1972
- * E4.3 - Acid alpine and subalpine grassland
- HER-01H - Ranunculo-Oxyrion didynae Nordhagen 1943
- * E4.1 - Vegetated snow-patch
- LYG-01F - Reichardio maritimae-Dactylidion hispanicae Biondi et al. 2001
- * E1.3 - Mediterranean xeric grassland
- * E1.4 - Mediterranean tall-grass and [Artemisia] steppes
- BUL-01E - Romulion Oberd. 1954
- * E1.A - Open Mediterranean dry acid and neutral grassland
- * E1.3 - Mediterranean xeric grassland
- MUL-04A - Rumicion alpini Rübél ex Scharfetter 1938
- * E5.5 - Subalpine moist or wet tall-herb and fern stands
- MOL-01H - Rumicion thyrsoflori Micevski ex Carni et Mucina 2013
- * E2.2 - Low and medium altitude hay meadows
- HER-01B - Salici herbaceae-Caricion lachenalii Béguin et Theurillat 1982
- * E4.1 - Vegetated snow-patch
- HER-01A - Salicion herbaceae Br.-Bl. in Br.-Bl. et Jenny 1926
- * E4.1 - Vegetated snow-patch
- FES-06G - Saturejion montanae Horvat in Horvat et al. 1974
- * E1.1 - Inland sand and rock with open vegetation
- FES-14A - Saturejo-Thymion Micevski 1971
- * E1.1 - Inland sand and rock with open vegetation
- CRU-03D - Scabiosion ucranicae Sanda et al. 1980
- * B1.4 - Coastal stable dune grassland (grey dunes)
- COR-05E - Scabioso-Trifolion dalmatici Horvatic et N. Randelovic in N. Randelovic 1977
- * E1.1 - Inland sand and rock with open vegetation
- * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
- TUB-01F - Sclerantho-Myositidion incrassatae S. Brullo et al. 2001
- * E1.A - Open Mediterranean dry acid and neutral grassland

- FES-13B - *Scorzonerion villosae* Horvatic 1963
 * E1.1 - Inland sand and rock with open vegetation
- LYG-03D - *Scorzonero creticae-Lygeion sparti* S. Brullo et al. 2002
 * E1.3 - Mediterranean xeric grassland
 * E1.4 - Mediterranean tall-grass and [*Artemisia*] steppes
- COR-05B - *Sedion anglici* Br.-Bl. in Br.-Bl. et Tx. 1952
 * E1.1 - Inland sand and rock with open vegetation
 * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
- HER-01E - *Sedion candollei* Rivas-Mart., Fernández González et Loidi in Rivas-Mart. et al. 2011
 * E4.1 - Vegetated snow-patch
- COR-07C - *Sedion micrantho-sediformis* Rivas-Mart., P. Sánchez et Alcaraz ex P. Sánchez et Alcaraz 1993
 * E1.1 - Inland sand and rock with open vegetation
- TUB-01D - *Sedion pedicellato-andegavensis* Rivas-Mart. et al. 1986
 * E1.A - Open Mediterranean dry acid and neutral grassland
- COR-05C - *Sedion pyrenaici* Tx. in Rivas-Mart. et al. 2011
 * E1.1 - Inland sand and rock with open vegetation
 * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
- COR-05D - *Sedo albi-Veronicion dillenii* Korneck 1974
 * E1.1 - Inland sand and rock with open vegetation
 * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
- COR-02C - *Sedo-Cerastion arvensis* Sissingh et Tideman 1960
 * E1.1 - Inland sand and rock with open vegetation
 * E1.7 - Closed non-Mediterranean dry acid and neutral grassland
 * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
- TRA-01C - *Sedo-Ctenopsion gypsophilae* Rivas Goday et Rivas-Mart. ex Izco 1974
 * E1.3 - Mediterranean xeric grassland
- COR-05A - *Sedo-Scleranthion* Br.-Bl. 1950
 * E1.1 - Inland sand and rock with open vegetation
 * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
- COR-06B - *Sedo-Thymion* De Molenaar 1976
 * E1.1 - Inland sand and rock with open vegetation
- EPI-04A - *Senecionion fluviatilis* Tx. ex Moor 1958
 * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- MUL-03C - *Senecionion samniti* Bonin 1978
 * E5.4 - Moist or wet tall-herb and fern fringes and meadows
- TRI-07A - *Sesamoido pygmaeae-Poion violaceae* Gamisans 1975
 * E4.3 - Acid alpine and subalpine grassland
 * E1.8 - Closed Mediterranean dry acid and neutral grassland
- FES-02D - *Seselion libanotis* Ageleulov et Golub in Golub 1995
 * E2.5 - Meadows of the steppe zone
- SES-02B - *Seslerio juncifoliae-Caricion firmae* Trinajstić 2005
 * E4.4 - Calcareous alpine and subalpine grassland
- FES-11D - *Seslerio nitidae-Caricion macrolepidis* Ubaldi 1997

- * E1.1 - Inland sand and rock with open vegetation
- SES-01E - Seslerio-Asterion alpini Hadac ex Hadac et al. 1969
- * E4.4 - Calcareous alpine and subalpine grassland
- SES-03C - Seslerio-Festucion xanthinae Horvat in Horvat et al. 1974
- * E4.4 - Calcareous alpine and subalpine grassland
- SES-02E - Seslerion apenninae Bruno et Furnari 1966
- * E4.4 - Calcareous alpine and subalpine grassland
- SES-01A - Seslerion coeruleae Br.-Bl. in Br.-Bl. et Jenny 1926
- * E4.4 - Calcareous alpine and subalpine grassland
- TRI-08B - Seslerion comosae Horvat et al. 1937
- * E4.3 - Acid alpine and subalpine grassland
- SES-03E - Seslerion nitidae Horvat 1936
- * E4.4 - Calcareous alpine and subalpine grassland
- FES-06I - Seslerion rigidae Zólyomi 1936
- * E1.1 - Inland sand and rock with open vegetation
- SES-01F - Seslerion tatrae Pawlowski 1935 corr. Klika 1955
- * E4.4 - Calcareous alpine and subalpine grassland
- SES-02A - Seslerion tenuifoliae Horvat 1930
- * E4.4 - Calcareous alpine and subalpine grassland
- TRI-07B - Sieglingion decumbentis Gamisans 1976
- * E3.2 - Mediterranean short humid grassland
- * E4.3 - Acid alpine and subalpine grassland
- COR-03B - Sileno conicae-Cerastion semidecandri Korneck 1974
- * E1.1 - Inland sand and rock with open vegetation
- * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
- CRU-03A - Sileno thymifoliae-Jurineion kilaeae Géhu et Uslu ex Mucina et Iakushenko ined.
- * B1.4 - Coastal stable dune grassland (grey dunes)
- GER-02C - Stachyo lusitanicae-Cheirolophion sempervirentis (Capelo 1996) Capelo in Mucina et al. 2013
- * E5.2 - Thermophile woodland fringes
- FES-05B - Stipion korshinskyi Toman 1969
- * E1.2 - Perennial calcareous grassland and basic steppes
- FES-03D - Stipion lessingiana Soó 1947
- * E1.2 - Perennial calcareous grassland and basic steppes
- LYG-01D - Stipion parviflorae De la Torre et al. 1996
- * E1.3 - Mediterranean xeric grassland
- * E1.4 - Mediterranean tall-grass and [Artemisia] steppes
- TRA-01B - Stipion retortae Br.-Bl. et O. de Bolòs ex O. de Bolòs 1957
- * E1.3 - Mediterranean xeric grassland
- LYG-03B - Stipion tenacissimae Rivas-Mart. 1984
- * E1.4 - Mediterranean tall-grass and [Artemisia] steppes
- * E1.3 - Mediterranean xeric grassland
- FES-03C - Stipo-Poion xerophilae Br.-Bl. et Tx. ex Br.-Bl. 1949
- * E1.2 - Perennial calcareous grassland and basic steppes
- STE-06I - Taeniathero-Aegilopion geniculatae Rivas-Mart. et Izco 1977
- * E1.6 - Subnitrophilous annual grassland
- FES-05A - Tanaceto achilleifolii-Stipion lessingiana Royer ex Lysenko et Mucina 2013

- * E1.2 - Perennial calcareous grassland and basic steppes
- IND-01A - *Teesdaliopsis confertae-Luzulion caespitosae* Rivas-Mart. 1987
 - * E1.5 - Mediterranean-montane grassland
- GER-03D - *Teucrium scorodoniae* de Foucault et al. 1983
 - * E5.2 - Thermophile woodland fringes
- COR-04A - *Thero-Airion Tx. ex Oberd.* 1957
 - * E1.9 - Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland
 - * B1.9 - Machair
 - * E1.1 - Inland sand and rock with open vegetation
- LYG-01A - *Thero-Brachypodium retusi* Br.-Bl. 1925
 - * E1.3 - Mediterranean xeric grassland
 - * E1.4 - Mediterranean tall-grass and [*Artemisia*] steppes
- THL-09A - *Thlaspion calaminarii* Ernst 1965
 - * E1.B - Heavy-metal grassland
- TUB-01G - *Thymion micans* J.C. Costa et al. 2005
 - * E1.A - Open Mediterranean dry acid and neutral grassland
- IND-02C - *Thymion serpylloidis* Rivas Goday et Rivas-Mart. in Rivas-Mart. 1965
 - * E1.A - Open Mediterranean dry acid and neutral grassland
 - * E1.5 - Mediterranean-montane grassland
- TOL-01B - *Tolpido succulentae-Agrostion congestiflorae* Aguiar et F. Prieto in F. Prieto et al. 2012
 - * E1.A - Open Mediterranean dry acid and neutral grassland
- COR-07B - *Tortello tortuosae-Sedion albi* Hallberg ex Dengler et Löbel 2006
 - * E1.1 - Inland sand and rock with open vegetation
- BUL-01A - *Trifolio subterranei-Periballion minutae* Rivas Goday 1964
 - * E1.3 - Mediterranean xeric grassland
 - * E1.A - Open Mediterranean dry acid and neutral grassland
- TUB-01E - *Trifolium cherleri* Micevski 1972
 - * E1.A - Open Mediterranean dry acid and neutral grassland
- MOL-05D - *Trifolium maritimi* Br.-Bl. ex Br.-Bl. et al. 1952
 - * E3.2 - Mediterranean short humid grassland
- GER-01A - *Trifolium medii* T. Müller 1962
 - * E5.2 - Thermophile woodland fringes
- FES-02E - *Trifolium montani* Naumova 1986
 - * E2.5 - Meadows of the steppe zone
- MOL-08D - *Trifolium pallidi* Ilijanic 1969
 - * E3.3 - Sub-mediterranean humid meadows
- TRI-09A - *Trifolium parnassii* Quézel ex Quézel et al. 1992
 - * E1.5 - Mediterranean-montane grassland
- MOL-08B - *Trifolium resupinatum* Micevski 1957
 - * E3.3 - Sub-mediterranean humid meadows
- MOL-08C - *Trifolio-Ranunculion pedati* Slavnic 1948
 - * E3.4 - Moist or wet eutrophic and mesotrophic grassland
- SAL-02F - *Triglochino barrelieri-Limonion glomerati* Biondi et al. 2001
 - * E6.1 - Mediterranean inland salt steppes
- MUL-02B - *Trisetion fusci* Krajina 1933
 - * E4.3 - Acid alpine and subalpine grassland
- MOL-02A - *Trisetio flavescentis-Polygonion bistortae* Br.-Bl. et Tx. ex Marschall 1947

- * E2.3 - Mountain hay meadows
- * E4.5 - Alpine and subalpine enriched grassland
- MUL-07A - *Trisetum sibiricum*-*Aconitum septentrionale* Ermakov et al. 2000
- * E5.5 - Subalpine moist or wet tall-herb and fern stands
- LYG-01B - *Trisetum velutinum*-*Brachypodium boissieri* Rivas-Mart. et al. 2002
- * E1.3 - Mediterranean xeric grassland
- * E1.4 - Mediterranean tall-grass and [*Artemisia*] steppes
- COR-07D - *Valerianion tuberosae* Guinochet 1975
- * E1.1 - Inland sand and rock with open vegetation
- CRU-03C - *Verbascion pinnatifidum* Korzhenevsky et Klyukin 1990
- * B1.4 - Coastal stable dune grassland (grey dunes)
- FES-09C - *Veronica multifida*-*Stipion ponticae* Didukh 1983 nom. inval.
- * E1.2 - Perennial calcareous grassland and basic steppes
- COR-06A - *Veronica-Poion glaucae* Nordhagen 1943
- * E1.1 - Inland sand and rock with open vegetation
- NAR-01C - *Violion caninae* Schwicklerath 1944
- * E1.7 - Closed non-Mediterranean dry acid and neutral grassland
- * B1.9 - Machair
- MOL-02B - *Violion cornutae* Nègre 1972
- * E2.3 - Mountain hay meadows
- * E4.5 - Alpine and subalpine enriched grassland
- GER-03B - *Viola riviniana*-*Stellaria holostea* Passarge 1994
- * E5.2 - Thermophile woodland fringes
- TRA-01E - *Vulpia ciliata*-*Crepidion neglectum* Poldini 1989
- * E1.3 - Mediterranean xeric grassland
- TUB-02F - *Vulpia-Lotium* Horvatic 1963
- * B1.4 - Coastal stable dune grassland (grey dunes)
- TRA-01G - *Vulpion ligusticae* Aubert et Loisel 1971
- * E1.3 - Mediterranean xeric grassland
- TRA-01H - *Xeranthemion annui* Oberd. 1954
- * E1.3 - Mediterranean xeric grassland
- FES-12A - *Xero-Bromion erecti* Zoller 1954
- * E1.1 - Inland sand and rock with open vegetation

Appendix C: Fact sheets EUNIS grassland habitat types

B1.4 - Coastal stable dune grassland

Origin of data (countries): BE, BG, CZ, DE, DK, ES, FR, GR, HR, HU, IT, LT, LV, NL, PL, PT, RO, RS, SK, TR, UA, UK

List of alliances: COR-01A - Corynephorion canescentis Klika 1931, CRU-01A - Euphorbio portlandicae-Helichryson stoechadis Géhu et Tx. ex Sissingh 1974, CRU-01B - Koelerion arenariae Tx. 1937 corr. Gutermann et Mucina 1993, CRU-02A - Crucianellion maritimae Rivas Goday et Rivas-Mart. 1958, CRU-02B - Helichryson picardii (Rivas-Mart., Costa et Izco in Rivas-Mart. et al. 1990) Rivas-Mart. et al. 1999, CRU-03D - Scabiosion ucranicae Sanda et al. 1980, TUB-02A - Linarion pedunculatae Díez Garretas et al. in Díez Garretas 1984, TUB-02B - Alkanno-Maresion nanae Rivas Goday ex Rivas Goday et Rivas-Mart. 1963 corr. Díez Garretas et al. 2001, TUB-02C - Laguro ovati-Vulpion fasciculatae Géhu et Biondi 1994, TUB-02E - Psammo-Vulpion Pignatti 1953, TUB-02F - Vulpio-Lotion Horvatic 1963, TUB-02G - Maresion nanae Géhu et al. 1987, TUB-03A - Anthyllido hamosae-Malcolmion lacerae Rivas Goday 1958

Additional selection rules: n/a

Implications for EUNIS classification: proposed division: B1.4a - Atlantic and Baltic coastal dune grassland (grey dunes), B1.4b - Mediterranean and Macaronesian coastal dune grassland (grey dunes), B1.4c - Black Sea coastal dune grassland (grey dunes)

Floristic composition:

Corynephorus canescens	47	Rumex acetosella	17
Carex arenaria	40	Koeleria macrantha	15
Cerastium semidecandrum	28	Hypochaeris radicata	15
Festuca rubra agg.	26	Myosotis ramosissima	14
Hypnum cupressiforme	24	Jasione montana	13
Ammophila arenaria	24	Spergula morisonii	13
Phleum arenarium	22	Cladonia rangiformis	12
Cladonia foliacea	21	Dicranum scoparium	12
Polytrichum piliferum	21	Aira praecox	11
Sedum acre	21	Crucianella maritima	10
Cladonia furcata	20	Erophila verna	10
Cetraria aculeata	18	Senecio jacobaea	10
Galium verum	17	Veronica arvensis	10
Ceratodon purpureus	17	Calamagrostis epigejos	10
Erodium cicutarium	17	Brachythecium albicans	10

B1.9 - Machair

Origin of data (countries): AT, BE, BG, CH, CZ, DE, DK, ES, FR, GR, HR, HU, IE, IT, LT, LU, LV, MK, NL, NO, PL, PT, RS, RU, SE, SI, SK, UA, UK

List of alliances: AMM-01A - Ammophilion Br.-Bl. 1921, COR-02B - Armerion elongatae Pötsch 1962, COR-04A - Thero-Airion Tx. ex Oberd. 1957, CRU-01B - Koelerion arenariae Tx. 1937 corr. Gutermann et Mucina 1993, MOL-01C - Cynosurion cristati Tx. 1947, NAR-01C - Violion caninae Schwickerath 1944

Additional selection rules: n/a

Implications for EUNIS classification: proposed to restrict to grassland part of the habitat and accordingly renamed to: Machair grassland

Floristic composition:

Agrostis capillaris	38	Hieracium pilosella	17
Plantago lanceolata	38	Bellis perennis	16
Festuca rubra agg.	37	Ranunculus repens	16
Trifolium repens	34	Lotus corniculatus	15
Achillea millefolium agg.	33	Prunella vulgaris	15
Anthoxanthum odoratum	32	Ammophila arenaria	14
Holcus lanatus	29	Danthonia decumbens	13
Poa pratensis	24	Poa trivialis	13
Trifolium pratense	24	Leontodon autumnalis	12
Lolium perenne	23	Cerastium semidecandrum	12
Hypochaeris radicata	22	Galium verum	12
Cerastium fontanum subsp. vulgare	21	Nardus stricta	12
Cynosurus cristatus	21	Festuca pratensis	11
Ranunculus acris	20	Carex arenaria	11
Rumex acetosa	20	Elymus repens	11
Dactylis glomerata	19	Eryngium maritimum	11
Luzula campestris	19	Elymus farctus	11
Potentilla erecta	17	Taraxacum sect. Ruderalia	10
Rumex acetosella	17	Cirsium arvense	10

E1.1 - Inland sand and rock with open vegetation

Origin of data (countries): AD, AT, BA, BE, BG, CH, CZ, DE, DK, EE, ES, FI, FR, GR, HR, HU, IE, IT, LT, LV, MK, NL, NO, PL, PT, RO, RS, SE, SI, SK, UA, UK, XK

List of alliances: COR-01A - *Corynephorion canescentis* Klika 1931, COR-02A - *Hyperico perforati-Scleranthion perennis* Moravec 1967, COR-02B - *Armerion elongatae* Pötsch 1962, COR-02C - *Sedo-Cerastion arvensis* Sissingh et Tideman 1960, COR-02E - *Armerion juncea* Br.-Bl. ex Br.-Bl. et al. 1952, COR-02F - *Armerio-Potentillion Micevski* 1978, COR-03A - *Koelerion glaucae* Volk 1931, COR-03B - *Sileno conicae-Cerastion semidecandri* Korneck 1974, COR-03C - *Bassio laniflorae-Bromion tectorum* Borhidi 1996 nom. conserv. propos., COR-03D - *Festucion vaginatae* Soó 1929, COR-03E - *Festucion beckeri* Vicherek 1972, COR-04A - *Thero-Airion Tx.* ex Oberd. 1957, COR-05A - *Sedo-Scleranthion Br.-Bl.* 1950, COR-05B - *Sedion anglici* Br.-Bl. in Br.-Bl. et Tx. 1952, COR-05C - *Sedion pyrenaici* Tx. in Rivas-Mart. et al. 2011, COR-05D - *Sedo albi-Veronicion dillenii* Korneck 1974, COR-05E - *Scabioso-Trifolion dalmatici* Horvatic et N. Randelovic in N. Randelovic 1977, COR-05F - *Diantho pinifolii-Jasionion heldreichii* Bergmeier et al. 2009, COR-07A - *Alyso-Sedion Oberd.* et T. Müller in T. Müller 1961, COR-07B - *Tortello tortuosae-Sedion albi* Hallberg ex Dengler et Löbel 2006, COR-07C - *Sedion micrantho-sediformis* Rivas-Mart., P. Sánchez et Alcaraz ex P. Sánchez et Alcaraz 1993, COR-07E - *Aethionemion saxatilis* Bergmeier et al. 2009, FES-06A - *Alyso-Festucion pallentis* Moravec in Holub et al. 1967, FES-06B - *Asplenio septentrionalis-Festucion pallentis* Zólyomi 1936 corr. 1966, FES-06C - *Avenulo adsurgentis-Festucion pallentis* Mucina in Mucina et Kolbek 1993, FES-06D - *Bromo pannonicum-Festucion csikhegyensis* Zólyomi 1966 corr. Mucina hoc loco, FES-06F - *Chrysopogono-Festucion dalmatica* Borhidi 1996, FES-06G - *Saturejion montanae* Horvat in Horvat et al. 1974, FES-06H - *Diantho lumnitzeri-Seslerion* (Soó 1971) Chytrý et Mucina in Mucina et Kolbek 1993, FES-06I - *Seslerion rigidae* Zólyomi 1936, FES-07A - *Polygonion albanicae* Ritter-Studnicka 1970, FES-07B - *Centaureo-Bromion fibrosi* Blečić et al. 1969, FES-07C - *Alyssion heldreichii* Bergmeier et al. 2009, FES-11B - *Cytiso spinescentis-Bromion erecti* Bonin 1978, FES-11C - *Hippocrepeo glaucae-Stipion austroitalicae* Forte et Terzi in Forte et al. 2005, FES-12A - *Xero-Bromion erecti* Zoller 1954, FES-13A - *Chrysopogono-Saturejion subspicatae* Horvat et Horvatic 1934, FES-13B - *Scorzonerion villosae* Horvatic 1963, FES-14A - *Saturejo-Thymion Micevski* 1971

Additional selection rules: n/a

Implications for EUNIS classification: proposed division: E1.1a - Pannonian and Pontic sandy steppe, E1.1b - Temperate and boreal pioneer grassland on shallow soils on siliceous rock outcrops, E1.1c - Boreal open, sub-thermophilous grassland on shallow soils on siliceous rock outcrops, E1.1d - Submediterranean and temperate pioneer grassland on calcareous and ultramafic rock outcrops, E1.1e - Submediterranean open dry grassland of skeletal calcareous and ultramafic soils, E1.1f - Continental dry rocky steppic grasslands and dwarf scrub on chalk outcrops, E1.1g - Perennial grassland on rocky outcrops at low altitudes in Central and Southeastern Europe, E1.1h - Submontane to supramontane ultramafic rocky grassland of the Balkans, E1.1i - Subatlantic and submediterranean perennial grassland on calcareous shallow soils, E1.1j - Dry steppic, submediterranean pasture of Southeastern Europe

Floristic composition:

Hieracium pilosella	31	Koeleria macrantha	16
Rumex acetosella	30	Festuca ovina	15
Plantago lanceolata	28	Polytrichum piliferum	14
Agrostis capillaris	26	Dicranum scoparium	14
Achillea millefolium agg.	24	Hypericum perforatum	14
Festuca rubra agg.	24	Jasione montana	14
Galium verum	24	Trifolium arvense	14
Carex arenaria	23	Asperula cynanchica	13
Hypochaeris radicata	23	Cladonia furcata	13
Luzula campestris	23	Teucrium chamaedrys	12
Hypnum cupressiforme	22	Aira praecox	12
Corynephorus canescens	20	Potentilla cinerea	12
Lotus corniculatus	19	Thymus pulegioides	12
Euphorbia cyparissias	19	Sanguisorba minor	12
Poa pratensis	17	Pimpinella saxifraga	12
Sedum acre	17	Artemisia campestris	11
Cerastium semidecandrum	17	Calamagrostis epigejos	11
Ceratodon purpureus	16	Carex humilis	10
Anthoxanthum odoratum	16	Cerastium arvense	10

E1.2 - Perennial calcareous grassland and basic steppes

Origin of data (countries): AD, AT, BE, BG, CH, CZ, DE, EE, ES, FR, GR, HR, HU, IE, IT, LT, LU, LV, MD, MK, NL, NO, PL, PT, RO, RS, RU, SE, SI, SK, UA, UK, XK

List of alliances: ART-04B - Bassio-Artemision austriacae Solomeshch in Mirkin et al. 1986, FES-01A - Bromion erecti Koch 1926, FES-01B - Cirsio-Brachypodion pinnati Hadac et Klika in Klika et Hadac ex Klika 1951, FES-01C - Filipendulo vulgaris-Helictotrichion pratensis Dengler et Löbel in Dengler et al. 2003, FES-01D - Gentianello amarellae-Helictotrichion pratensis Royer ex Dengler in Mucina et al. 2009, FES-01E - Potentillo splendentis-Brachypodion pinnati Br.-Bl. 1967, FES-01F - Polygalo mediterraneae-Bromion erecti (Biondi et al. 2005) Di Pietro et al. 2013, FES-01G - Chrysopogono-Danthonion Kojic 1957, FES-03A - Festucion sulcatae Soó 1930, FES-03B - Artemisio-Kochion Soó 1964, FES-03C - Stipo-Poion xerophilae Br.-Bl. et Tx. ex Br.-Bl. 1949, FES-03D - Stipion lessingianae Soó 1947, FES-03E - Pimpinello-Thymion zygoidei Dihoru et Donita 1970, FES-03G - Agropyron pectinati Golub et Uzhamskaya 1991, FES-04A - Helictotricho desertori-Stipion rubentis Toman 1969, FES-05A - Tanaceto achilleifolii-Stipion lessingianae Royer ex Lysenko et Mucina 2013, FES-10A - Brachypodion phoenicoidis Br.-Bl. ex Molinier 1934, FES-10B - Artemisio albae-Dichanthion ischaemi X. Font ex Rivas-Mart. et M.L. López in Rivas-Mart. et al. 2002, FES-10C - Diplachnion serotinae Br.-Bl. 1961

Additional selection rules: n/a

Implications for EUNIS classification: proposed division: E1.2a - Semi-dry perennial calcareous grassland, E1.2b - Continental dry steppe

Floristic composition:

Lotus corniculatus	44	Festuca ovina	18
Plantago lanceolata	42	Trifolium montanum	17
Galium verum	42	Potentilla cinerea	17
Sanguisorba minor	40	Ranunculus bulbosus	17
Plantago media	35	Anthyllis vulneraria	17
Euphorbia cyparissias	34	Scabiosa columbaria	17
Achillea millefolium agg.	34	Festuca rubra agg.	16
Pimpinella saxifraga	33	Arrhenatherum elatius	15
Brachypodium pinnatum	32	Cirsium acaule	15
Briza media	32	Avenula pratensis	15
Linum catharticum	30	Agrostis capillaris	15
Dactylis glomerata	26	Koeleria pyramidata	15
Hieracium pilosella	24	Anthoxanthum odoratum	14
Asperula cynanchica	24	Campanula rotundifolia	14
Leontodon hispidus	24	Coronilla varia	14
Eryngium campestre	24	Prunella vulgaris	14
Koeleria macrantha	23	Viola hirta	14
Hypericum perforatum	23	Carlina vulgaris	14
Helianthemum nummularium	23	Daucus carota	14

Carex flacca	23	Fragaria viridis	14
Carex caryophylla	23	Potentilla tabernaemontani	13
Trifolium pratense	22	Thymus praecox	13
Teucrium chamaedrys	22	Agrimonia eupatoria	13
Salvia pratensis	21	Carex humilis	13
Medicago lupulina	21	Scabiosa ochroleuca	12
Centaurea scabiosa	20	Phleum phleoides	12
Festuca valesiaca	20	Dianthus carthusianorum	12
Thymus pulegioides	20	Centaurea jacea	12
Festuca rupicola	20	Polygala comosa	11
Filipendula vulgaris	20	Stachys recta	11
Bromus erectus	19	Trifolium campestre	11
Leucanthemum vulgare agg.	19	Convolvulus arvensis	11
Medicago sativa subsp. falcata	19	Trifolium repens	10
Poa angustifolia	19	Ononis spinosa	10
Knautia arvensis	18		

E1.3 - Mediterranean xeric grassland

Origin of data (countries): ES, FR, GR, HR, IT, MC, PT

List of alliances: BUL-01A - *Trifolio subterranei-Periballion minutae* Rivas Goday 1964, BUL-01C - *Poo bulbosae-Astragalion sesamei* Rivas Goday et Ladero 1970, BUL-01D - *Plantaginion cupanii* S. Brullo et Grillo 1978, LYG-01A - *Thero-Brachypodion retusi* Br.-Bl. 1925, LYG-01B - *Trisetum velutini-Brachypodion boissieri* Rivas-Mart. et al. 2002, LYG-01C - *Festucion scariosae* Martínez-Parras et al. 1984, LYG-01D - *Stipion parviflorae* De la Torre et al. 1996, LYG-01E - *Leontodono tuberosi-Bellion sylvestris* Biondi et al. 2001, LYG-02A - *Cymbopogono hirti-Brachypodion ramosi* Horvatic 1963, LYG-02B - *Hyparrhenion hirtae* Br.-Bl. et al. 1956, LYG-03A - *Agropyro pectinati-Lygeion sparti* Br.-Bl. et O. de Bolòs 1958 corr. Rivas-Mart. et al. 1999, LYG-03B - *Stipion tenacissimae* Rivas-Mart. 1984, SAC-01A - *Agrostion castellanae* Rivas Goday ex Rivas-Mart. et al. 1980, SAC-01B - *Festucion merinoi* Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 1986 corr. Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 2002, TRA-01A - *Brachypodion distachyi* Rivas-Mart. 1978, TRA-01C - *Sedo-Ctenopion gypsophilae* Rivas Goday et Rivas-Mart. ex Izco 1974, TRA-01D - *Omphalodion commutatae* Rivas-Mart. et al. ex Izco 1976 corr. Pérez Raya et al. 1991, TRA-01F - *Hypochoeridion achyrophori* Biondi et Guerra 2008, TRA-01G - *Vulpion ligusticae* Aubert et Loisel 1971, TRA-02B - *Plantagini-Catapodion marini* S. Brullo 1985

Additional selection rules: n/a

Implications for EUNIS classification: proposed division: E1.3a - Mediterranean closely grazed dry grassland, E1.3b - Mediterranean tall perennial dry grassland, E1.3c - Mediterranean annual-rich dry grassland

Floristic composition:

<i>Dactylis glomerata</i>	25	<i>Sedum sediforme</i>	14
<i>Brachypodium retusum</i>	22	<i>Erophila verna</i>	13
<i>Poa bulbosa</i>	22	<i>Erodium cicutarium</i>	12
<i>Brachypodium distachyon</i>	21	<i>Eryngium campestre</i>	12
<i>Medicago minima</i>	21	<i>Filago pyramidata</i>	12
<i>Trifolium scabrum</i>	20	<i>Arenaria leptoclados</i>	12
<i>Desmazeria rigida</i>	20	<i>Bombycilaena erecta</i>	12
<i>Sherardia arvensis</i>	18	<i>Anagallis arvensis</i>	12
<i>Asterolinon linum-stellatum</i>	18	<i>Minuartia hybrida</i>	11
<i>Trifolium campestre</i>	18	<i>Stipa tenacissima</i>	11
<i>Euphorbia exigua</i>	16	<i>Sedum album</i>	11
<i>Linum strictum</i>	15	<i>Saxifraga tridactylites</i>	11
<i>Hornungia petraea</i>	15	<i>Hypochoeris achyrophorus</i>	10
<i>Plantago lanceolata</i>	15	<i>Leontodon taraxacoides</i> subsp. <i>longirostris</i>	10
<i>Thymus vulgaris</i>	14	<i>Reichardia picroides</i>	10
<i>Cerastium pumilum</i>	14	<i>Avenula bromoides</i>	10

E1.4 - Mediterranean tallgrass and Artemisia steppes

Origin of data (countries): ES, FR, GR, HR, IT, MC, PT

List of alliances: LYG-01A - Thero-Brachypodium retusi Br.-Bl. 1925, LYG-01B - Trisetum velutini-Brachypodium boissieri Rivas-Mart. et al. 2002, LYG-01C - Festucion scariosae Martínez-Parras et al. 1984, LYG-01D - Stipion parviflorae De la Torre et al. 1996, LYG-01E - Leontodono tuberosi-Bellion sylvestris Biondi et al. 2001, LYG-02A - Cymbopogono hirti-Brachypodium ramosi Horvatic 1963, LYG-02B - Hyparrhenion hirtae Br.-Bl. et al. 1956, LYG-03A - Agropyro pectinati-Lygeion sparti Br.-Bl. et O. de Bolòs 1958 corr. Rivas-Mart. et al. 1999, LYG-03B - Stipion tenacissimae Rivas-Mart. 1984

Additional selection rules: n/a

Implications for EUNIS classification: proposed to merge with other EUNIS types, partly with E1.3b and partly with F6.8a and F6.8b

Floristic composition:

Brachypodium retusum	51	Helictotrichon filifolium	14
Dactylis glomerata	47	Avena barbata	14
Stipa tenacissima	29	Asphodelus ramosus	14
Avenula bromoides	23	Plantago lanceolata	14
Thymus vulgaris	21	Brachypodium distachyon	13
Reichardia picroides	20	Hypochaeris achyrophorus	13
Eryngium campestre	19	Trifolium campestre	13
Sedum sediforme	19	Fumana thymifolia	12
Medicago minima	19	Convolvulus cantabrica	12
Desmazeria rigida	18	Trifolium scabrum	11
Carlina corymbosa	18	Sherardia arvensis	11
Bituminaria bituminosa	16	Teucrium polium	11
Rosmarinus officinalis	16	Urospermum dalechampii	11
Hyparrhenia hirta	15	Stipa offneri	10
Koeleria vallesiana	15	Ruta angustifolia	10
Linum strictum	15		

E1.5 - Mediterranean montane grassland

Origin of data (countries): AD, AL, BG, ES, FR, GR, IT, PT

List of alliances: GEN-01B - Plantaginion insularis Klein 1972, IND-01A - Teesdaliopsio confertae-Luzulion caespitosae Rivas-Mart. 1987, IND-01B - Jasionion carpetanae González-Albo 1941, IND-01C - Ptilotrichion purpurei Quézel 1953, IND-02A - Hieracio castellani-Plantaginion radicatae Rivas-Mart. et Cantó 1987, ONO-01A - Ononidion striatae Br.-Bl. et Susplugas 1937, ONO-01B - Ononidion cristatae Royer 1991, ONO-01C - Festucion scopariae Br.-Bl. 1948, ONO-01D - Genistion lobelii Molinier 1934, ONO-01H - Avenion sempervirentis Barbero 1968, ONO-02A - Festucion burnatii Rivas Goday et Rivas-Mart. ex Mayor et al. 1973, ONO-02B - Minuartio-Poion ligulatae O. de Bolòs 1962, ONO-02C - Plantagini discoloris-Thymion mastigophori Molina et Izco 1989, TRI-09A - Trifolion parnassii Quézel ex Quézel et al. 1992

Additional selection rules: n/a

Implications for EUNIS classification: proposed division: E1.5a - Iberian oromediterranean siliceous dry grassland, E1.5b - Iberian oromediterranean basiphilous dry grassland, E1.5c - Corsican and Sardinian oromediterranean siliceous dry grassland, E1.5d - Greek and Anatolian oromediterranean siliceous dry grassland, E1.5e - Madeiran oromediterranean siliceous dry grassland

Floristic composition:

Koeleria vallesiana	57	Avenula pratensis	13
Anthyllis vulneraria	37	Poa ligulata	13
Carex humilis	30	Thymus vulgaris	13
Helianthemum oelandicum	29	Ononis striata	13
Festuca hystrix	27	Thymus nervosus	13
Coronilla minima	23	Sesleria coerulans	13
Potentilla tabernaemontani	22	Asperula cynanchica	12
Anthyllis montana	20	Festuca rubra agg.	12
Festuca gautieri	20	Androsace villosa	12
Helianthemum canum	19	Lotus corniculatus	12
Seseli montanum	17	Eryngium campestre	12
Arenaria grandiflora subsp. grandiflora	17	Galium pyrenaicum	12
Teucrium chamaedrys	16	Arenaria aggregata	11
Sideritis hyssopifolia	15	Poa alpina	11
Helictotrichon sedenense	15	Ononis cristata	11
Helianthemum apenninum	14	Globularia repens	11
Bromus erectus	14	Aphyllanthes monspeliensis	10
Hieracium pilosella	14	Jurinea humilis	10
Fumana procumbens	14	Paronychia kapela	10
Hippocrepis comosa	13		

E1.6 - Subnitrophilous annual grasslands

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: exclude from grasslands (anthropogenic)

Floristic composition:

No data

E1.7 - Non-Mediterranean dry acid and neutral closed grassland

Origin of data (countries): AT, BE, BG, CZ, DE, DK, ES, FR, HR, HU, IE, IT, LT, LV, MK, NL, NO, PL, RS, SE, SI, SK, UA, UK

List of alliances: COR-02B - *Armerion elongatae* Pötsch 1962, COR-02C - *Sedo-Cerastion arvensis* Sissingh et Tideman 1960, COR-02E - *Armerion juncea* Br.-Bl. ex Br.-Bl. et al. 1952, COR-02F - *Armerio-Potentillion Micevski* 1978, NAR-01A - *Potentillo-Polygonion vivipari* Nordhagen ex Dierßen 1992, NAR-01C - *Violion caninae* Schwickerath 1944, NAR-01E - *Nardo-Agrostion tenuis* Sillinger 1933, NAR-01G - *Achilleo-Arnicion* Horvat et Pawlowski in Horvat 1960

Additional selection rules: n/a

Implications for EUNIS classification: proposed change of content and consequently change of name: Lowland to submontane, dry to mesic *Nardus* grassland

Floristic composition:

<i>Agrostis capillaris</i>	52	<i>Rubus caesius</i>	16
<i>Festuca rubra</i> agg.	48	<i>Polygala vulgaris</i>	16
<i>Luzula campestris</i>	46	<i>Carex pilulifera</i>	15
<i>Plantago lanceolata</i>	41	<i>Pimpinella saxifraga</i>	15
<i>Anthoxanthum odoratum</i>	39	<i>Lotus corniculatus</i> subsp. <i>corniculatus</i>	15
<i>Achillea millefolium</i> agg.	38	<i>Sedum acre</i>	15
<i>Hieracium pilosella</i>	36	<i>Avenula pubescens</i>	14
<i>Potentilla erecta</i>	34	<i>Artemisia campestris</i>	14
<i>Galium verum</i>	32	<i>Lotus corniculatus</i>	14
<i>Poa pratensis</i>	29	<i>Cerastium arvense</i>	14
<i>Rumex acetosella</i>	28	<i>Ceratodon purpureus</i>	14
<i>Hypochaeris radicata</i>	28	<i>Viola canina</i>	14
<i>Nardus stricta</i>	26	<i>Cladonia furcata</i>	13
<i>Carex arenaria</i>	25	<i>Cerastium fontanum</i> subsp. <i>vulgare</i>	13
<i>Danthonia decumbens</i>	24	<i>Trifolium arvense</i>	13
<i>Festuca ovina</i>	24	<i>Veronica chamaedrys</i>	12
<i>Veronica officinalis</i>	21	<i>Armeria maritima</i> subsp. <i>elongata</i>	12
<i>Holcus lanatus</i>	21	<i>Ranunculus acris</i>	12
<i>Dicranum scoparium</i>	21	<i>Pleurozium schreberi</i>	12
<i>Calamagrostis epigejos</i>	19	<i>Briza media</i>	11
<i>Festuca filiformis</i>	19	<i>Taraxacum laevigatum</i> agg.	11
<i>Calluna vulgaris</i>	19	<i>Senecio jacobaea</i>	11
<i>Pseudoscleropodium purum</i>	19	<i>Brachythecium albicans</i>	11
<i>Rhytidiadelphus squarrosus</i>	19	<i>Festuca brevipila</i>	11
<i>Cerastium semidecandrum</i>	18	<i>Hypericum perforatum</i>	11
<i>Thymus pulegioides</i>	18	<i>Vaccinium myrtillus</i>	11
<i>Hypnum cupressiforme</i>	18	<i>Galium mollugo</i>	10
<i>Trifolium repens</i>	18	<i>Salix repens</i>	10

Deschampsia flexuosa	17	Prunella vulgaris	10
Rumex acetosa	17	Campanula rotundifolia	10
Galium saxatile	17	Hypnum cupressiforme var. lacunosum	10
Koeleria macrantha	16		

E1.8 - Mediterranean dry acid and neutral closed grassland

Origin of data (countries): ES, FR, PT

List of alliances: SAC-01A - Agrostion castellanae Rivas Goday ex Rivas-Mart. et al. 1980, SAC-01B - Festucion merinoi Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 1986 corr. Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 2002, SAC-01C - Agrostio castellanae-Stipion giganteae Rivas Goday ex Rivas-Mart. et Fernández González 1991, TRI-06A - Campanulo herminii-Nardion strictae Rivas-Mart. 1964, TRI-07A - Sesamoido pygmaeae-Poion violaceae Gamisans 1975

Additional selection rules: n/a

Implications for EUNIS classification: proposed change of content and consequently change of name to: Open Iberian supramediterranean dry acid and neutral grassland

Floristic composition:

Nardus stricta	92	Agrostis capillaris	16
Juncus squarrosus	39	Trifolium pratense	16
Potentilla erecta	37	Carex caryophylla	16
Luzula campestris	28	Narcissus bulbocodium	15
Campanula herminii	27	Briza media	15
Festuca iberica	27	Calluna vulgaris	14
Anthoxanthum odoratum	26	Galium verum	14
Ranunculus bulbosus	26	Cynosurus cristatus	14
Festuca rothmaleri	24	Hypochaeris radicata	14
Hieracium pilosella	22	Carex ovalis	13
Agrostis castellana	21	Plantago alpina	12
Danthonia decumbens	21	Carex nigra	11
Lotus corniculatus	21	Genista anglica	11
Galium saxatile	21	Deschampsia flexuosa	11
Jasione laevis	20	Festuca nigrescens	11
Holcus lanatus	20	Luzula multiflora	10
Trifolium repens	18	Polygala vulgaris	10
Pedicularis sylvatica	18	Deschampsia cespitosa	10
Carum verticillatum	17		

E1.9 - Non-Mediterranean dry acid and neutral open grassland, including inland dune grassland

Origin of data (countries): AD, AT, BE, BG, CH, CZ, DE, DK, EE, ES, FI, FR, GR, HR, HU, IE, IT, LT, LV, MK, NL, NO, PL, PT, RO, RS, SE, SI, SK, UA, UK, XK

List of alliances: COR-01A - *Corynephorion canescentis* Klika 1931, COR-02A - *Hyperico perforati-Scleranthion perennis* Moravec 1967, COR-02B - *Armerion elongatae* Pötsch 1962, COR-02C - *Sedo-Cerastion arvensis* Sissingh et Tideman 1960, COR-02E - *Armerion juncea* Br.-Bl. ex Br.-Bl. et al. 1952, COR-02F - *Armerio-Potentillion Micevski* 1978, COR-03A - *Koelerion glaucae* Volk 1931, COR-03B - *Sileno conicae-Cerastion semidecandri* Korneck 1974, COR-04A - *Thero-Airion Tx. ex Oberd.* 1957, COR-05A - *Sedo-Scleranthion Br.-Bl.* 1950, COR-05B - *Sedion anglici Br.-Bl. in Br.-Bl. et Tx.* 1952, COR-05C - *Sedion pyrenaici Tx. in Rivas-Mart. et al.* 2011, COR-05D - *Sedo albi-Veronicion dillenii* Korneck 1974, COR-05E - *Scabioso-Trifolion dalmatici* Horvatic et N. Randelovic in N. Randelovic 1977, COR-05F - *Diantho pinifolii-Jasionion heldreichii* Bergmeier et al. 2009

Additional selection rules: n/a

Implications for EUNIS classification: proposed division: E1.9a - Oceanic to subcontinental inland sand grassland on dry acid and neutral soils, E1.9b - Inland mobile sand and dune with siliceous grassland

Floristic composition:

Rumex acetosella	43	Sedum acre	17
Agrostis capillaris	37	Artemisia campestris	17
Hieracium pilosella	37	Calamagrostis epigejos	16
Plantago lanceolata	36	Cerastium arvense	15
Carex arenaria	35	Brachythecium albicans	14
Festuca rubra agg.	34	Thymus pulegioides	14
Hypochaeris radicata	34	Holcus lanatus	14
Luzula campestris	33	Hypericum perforatum	14
Achillea millefolium agg.	32	Festuca filiformis	14
Galium verum	32	Bromus hordeaceus	13
Corynephorus canescens	30	Pseudoscleropodium purum	13
Hypnum cupressiforme	29	Cladonia foliacea	12
Poa pratensis	25	Rubus caesius	12
Festuca ovina	25	Pimpinella saxifraga	12
Cerastium semidecandrum	23	Veronica arvensis	12
Ceratodon purpureus	22	Lotus corniculatus subsp. corniculatus	11
Anthoxanthum odoratum	22	Senecio jacobaea	11
Dicranum scoparium	21	Trifolium campestre	11
Jasione montana	21	Avenula pubescens	11
Polytrichum piliferum	20	Hieracium umbellatum	10
Trifolium arvense	19	Veronica officinalis	10
Cladonia furcata	18	Polytrichum juniperinum	10

Aira praecox	18	Trifolium repens	10
Koeleria macrantha	18		

E1.A - Mediterranean dry acid and neutral open grassland

Origin of data (countries): BG, ES, FR, GR, IT, MK, PT

List of alliances: BUL-01A - Trifolio subterranei-Periballion minutae Rivas Goday 1964, IND-02A - Hieracio castellani-Plantaginion radicatae Rivas-Mart. et Cantó 1987, TUB-01A - Helianthemion guttati Br.-Bl. in Br.-Bl. et al. 1940, TUB-01B - Crassulo tillaeae-Sedion caespitosi de Foucault 1999, TUB-01C - Molinerion laevis Br.-Bl. et al. 1952, TUB-01D - Sedion pedicellato-andegavensis Rivas-Mart. et al. 1986, TUB-01E - Trifolion cherleri Micevski 1972, TUB-03A - Anthyllido hamosae-Malcolmion lacerae Rivas Goday 1958, TUB-03B - Corynephoron articulati-Malcolmion patulae Rivas Goday 1958, TUB-03C - Corynephorion maritimi Costa, Pinto-Gomes, Neto et Rivas-Mart. in Costa et al. 2012

Additional selection rules: n/a

Implications for EUNIS classification: proposed new name: Mediterranean to Atlantic open, dry, acid and neutral grassland

Floristic composition:

Poa bulbosa	48	Anthemis ruthenica	15
Trifolium campestre	39	Trifolium glomeratum	15
Trifolium arvense	37	Chrysopogon gryllus	14
Hypochaeris glabra	34	Taeniatherum caput-medusae	14
Tuberaria guttata	33	Cynodon dactylon	14
Filago minima	31	Trifolium smyrnaeum	13
Erodium cicutarium	29	Medicago rigidula	12
Eryngium campestre	28	Micropyrum tenellum	12
Vulpia ciliate	25	Dasypyrum villosum	12
Psilurus incurvus	25	Potentilla laciniosa	12
Ornithopus compressus	23	Teesdalia coronopifolia	12
Sherardia arvensis	23	Carthamus lanatus	12
Trifolium cherleri	21	Neatostema apulum	12
Galium divaricatum	20	Rumex acetosella	11
Scleranthus annuus	19	Vulpia bromoides	11
Vulpia myuros	19	Chondrilla juncea	11
Plantago lanceolata	19	Filago pyramidata	11
Trifolium scabrum	18	Achillea coarctata	11
Bromus squarrosus	18	Briza maxima	11
Veronica arvensis	18	Ornithogalum comosum	11
Filago gallica	17	Sedum caespitosum	11
Helianthemum salicifolium	17	Crassula tillaea	11
Sanguisorba minor	17	Aphanes arvensis	10
Plantago bellardii	16	Tolpis barbata	10
Petrorhagia prolifera	16	Medicago minima	10
Cerastium pumilum	16	Astragalus onobrychis	10
Trifolium angustifolium	16	Brachypodium distachyon	10

Trifolium subterraneum	16	Rumex bucephalophorus	10
Leontodon taraxacoides subsp. longirostris	15	Xeranthemum annuum	10
Aegilops neglecta	15		

E1.B - Heavy-metal grassland

Origin of data (countries): BE, DE, GR, IT, PL, SI, UK

List of alliances: COR-07E - Aethionemion saxatilis Bergmeier et al. 2009, DRY-03C - Ptilostemo casabonae-Euphorbion cupanii Angiolini et al. 2005, THL-09A - Thlaspion calaminarii Ernst 1965, THL-09B - Armerion halleri Ernst 1965

Additional selection rules: n/a

Implications for EUNIS classification: n/a

Floristic composition:

Helichrysum italicum subsp. microphyllum	56	Urospermum dalechampii	20
Euphorbia pithyusa subsp. cupanii	48	Rumex acetosa	17
Dittrichia viscosa	42	Piptatherum miliaceum	17
Ptilostemon casabonae	41	Campanula rotundifolia	16
Scrophularia canina subsp. bicolor	36	Cistus monspeliensis	16
Reseda luteola	34	Avena fatua	15
Carlina corymbosa	34	Agrostis capillaris	14
Reichardia picroides	32	Hypochaeris achyrophorus	13
Dactylis glomerata subsp. hispanica	31	Sanguisorba minor subsp. muricata	13
Jasione montana	31	Cladonia pyxidata	12
Daucus carota subsp. carota	30	Santolina chamaecyparissus	12
Rumex bucephalophorus	28	Cistus incanus	12
Cistus salvifolius	28	Limonium merxmulleri	12
Sixalix atropurpurea subsp. maritima	26	Pimpinella saxifraga	12
Silene vulgaris	25	Carex macrolepis	11
Festuca ovina	24	Plantago lanceolata	11
Bellium bellidioides	21	Teucrium massiliense	11
Centaurium erythraea	20	Lavandula stoechas	10

E1.C - Dry mediterranean lands with unpalatable non-vernal herbaceous vegetation

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: exclude from grasslands (anthropogenic)

Floristic composition:

No data

E1.D - Unmanaged xeric grassland

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: exclude from grasslands (anthropogenic)

Floristic composition:

No data

E1.E - Trampled xeric grasslands with annuals

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: exclude from grasslands (anthropogenic)

Floristic composition:

No data

E1.F - Azorean open, dry, acid to neutral grassland

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: proposed as new EUNIS type

Floristic composition:

No data

E2.1 - Permanent mesotrophic pastures and aftermath-grazed meadows

Origin of data (countries): AT, BE, BG, CH, CZ, DE, EE, ES, FR, HR, HU, IE, IT, LU, NL, NO, PL, PT, RO, RS, RU, SE, SI, SK, UA, UK

List of alliances: MOL-01C - *Cynosurion cristati* Tx. 1947, MOL-01G - *Lino biennis-Gaudinion fragilis* (Br.-Bl. 1967) de Foucault 1989, MOL-02D - *Poion alpinae* Gams ex Oberd. 1950, MOL-02E - *Poion supinae* Rivas-Mart. et Géhu 1978, MOL-04A - *Molinion caeruleae* Koch 1926, MOL-04D - *Deschampsion cespitosae* Horvatic 1930, MOL-05A - *Potentillion anserinae* Tx. 1947

Additional selection rules: n/a

Implications for EUNIS classification: proposed change of content and consequently change of name: Mesic permanent pasture of lowlands and mountains

Floristic composition:

<i>Trifolium repens</i>	53	<i>Potentilla anserina</i>	17
<i>Holcus lanatus</i>	50	<i>Phleum pratense</i>	17
<i>Ranunculus repens</i>	49	<i>Juncus articulatus</i>	16
<i>Poa trivialis</i>	44	<i>Cirsium arvense</i>	16
<i>Agrostis stolonifera</i>	39	<i>Leontodon autumnalis</i>	15
<i>Ranunculus acris</i>	36	<i>Carex hirta</i>	15
<i>Lolium perenne</i>	35	<i>Juncus effusus</i>	14
<i>Cerastium fontanum</i> subsp. <i>vulgare</i>	34	<i>Lathyrus pratensis</i>	14
<i>Plantago lanceolata</i>	33	<i>Lotus corniculatus</i>	14
<i>Rumex acetosa</i>	32	<i>Taraxacum</i> sect. <i>Ruderalia</i>	14
<i>Anthoxanthum odoratum</i>	31	<i>Carex panicea</i>	14
<i>Festuca rubra</i> agg.	31	<i>Lotus pedunculatus</i>	14
<i>Trifolium pratense</i>	30	<i>Phalaris arundinacea</i>	14
<i>Poa pratensis</i>	28	<i>Briza media</i>	14
<i>Cardamine pratensis</i>	26	<i>Rumex crispus</i>	13
<i>Achillea millefolium</i> agg.	24	<i>Myosotis scorpioides</i>	13
<i>Alopecurus geniculatus</i>	23	<i>Centaurea jacea</i>	12
<i>Cynosurus cristatus</i>	21	<i>Succisa pratensis</i>	12
<i>Alopecurus pratensis</i>	21	<i>Plantago major</i>	12
<i>Agrostis capillaris</i>	20	<i>Vicia cracca</i>	12
<i>Dactylis glomerata</i>	20	<i>Sanguisorba officinalis</i>	12
<i>Prunella vulgaris</i>	20	<i>Leucanthemum vulgare</i> agg.	12
<i>Deschampsia cespitosa</i>	19	<i>Glechoma hederacea</i>	12
<i>Festuca pratensis</i>	19	<i>Molinia caerulea</i>	12
<i>Bellis perennis</i>	18	<i>Poa annua</i>	12
<i>Elymus repens</i>	18	<i>Bromus hordeaceus</i>	11
<i>Potentilla erecta</i>	18	<i>Veronica chamaedrys</i>	11
<i>Taraxacum</i> sect. <i>Ruderalia</i>	18	<i>Cirsium palustre</i>	11

Glyceria fluitans	18	Lysimachia nummularia	10
Galium palustre	17	Potentilla reptans	10
Lychnis flos-cuculi	17	Carex nigra	10

E2.2 - Low and medium altitude hay meadows

Origin of data (countries): AD, AT, BE, BG, CH, CZ, DE, EE, ES, FR, HR, HU, IE, IT, LT, LU, MK, NL, NO, PL, PT, RO, RS, RU, SE, SI, SK, UA, UK, XK

List of alliances: FEP-06B - Glycyrrhizion korshinskyi Lysenko 2010, FEP-06C - Glycyrrhizion glabrae Golub et Mirkin in Golub 1995, MOL-01A - Arrhenatherion elatioris Luquet 1926, MOL-01C - Cynosurion cristati Tx. 1947, MOL-01F - Ranunculo neapolitani-Arrhenatherion elatioris Allegrezza et Biondi 2011, MOL-01H - Rumicion thyrsoflori Micevski ex Carni et Mucina 2013, MOL-04A - Molinion caeruleae Koch 1926, MOL-04B - Calthion palustris Tx. 1937, MOL-04D - Deschampsion cespitosae Horvatic 1930

Additional selection rules: n/a

Implications for EUNIS classification: n/a

Floristic composition:

Plantago lanceolata	57	Cirsium arvense	17
Holcus lanatus	51	Cardamine pratensis	16
Ranunculus acris	50	Daucus carota	16
Trifolium pratense	49	Potentilla reptans	16
Achillea millefolium agg.	48	Leontodon hispidus	16
Trifolium repens	46	Luzula campestris	16
Dactylis glomerata	45	Stellaria graminea	16
Rumex acetosa	45	Galium verum	16
Festuca rubra agg.	44	Leontodon autumnalis	16
Anthoxanthum odoratum	43	Heracleum sphondylium	16
Cerastium fontanum subsp. vulgare	38	Agrostis stolonifera	15
Poa pratensis	38	Bromus hordeaceus	15
Festuca pratensis	36	Sanguisorba officinalis	15
Ranunculus repens	34	Medicago lupulina	15
Poa trivialis	34	Trifolium dubium	14
Arrhenatherum elatius	32	Taraxacum sect. Ruderalia	14
Lolium perenne	28	Glechoma hederacea	14
Alopecurus pratensis	27	Knautia arvensis	13
Lathyrus pratensis	27	Crepis biennis	13
Cynosurus cristatus	27	Carex panicea	13
Agrostis capillaris	27	Carex hirta	13
Veronica chamaedrys	26	Lysimachia nummularia	13
Leucanthemum vulgare agg.	26	Equisetum arvense	12
Lotus corniculatus	26	Plantago media	12
Centaurea jacea	26	Rhinanthus minor	12
Prunella vulgaris	25	Succisa pratensis	12
Vicia cracca	23	Taraxacum sect. Ruderalia	12
Trisetum flavescens	23	Avenula pubescens	12
Bellis perennis	21	Pimpinella saxifraga	12

Lychnis flos-cuculi	21	Rumex crispus	12
Taraxacum sect. Ruderalia	21	Hypochaeris radicata	11
Briza media	20	Lotus pedunculatus	11
Deschampsia cespitosa	19	Ajuga reptans	11
Phleum pratense	19	Campanula patula	11
Potentilla erecta	18	Filipendula ulmaria	11
Elymus repens	18	Anthriscus sylvestris	10
Galium mollugo agg.	17	Molinia caerulea	10

E2.3 - Mountain hay meadows

Origin of data (countries): AT, CH, CZ, DE, ES, FR, IT, PL, RU, SK, UA, UK

List of alliances: MOL-01B - Phyteumato-Trisetion flavescens Hundt ex Passarge 1969, MOL-02A - Trisetio flavescens-Polygonion bistortae Br.-Bl. et Tx. ex Marschall 1947, MOL-03A - Polygonion krascheninnikovii Kashapov 1985, MOL-04B - Calthion palustris Tx. 1937

Additional selection rules: n/a

Implications for EUNIS classification: proposed new name: Submediterranean moist meadow

Floristic composition:

Ranunculus acris	58	Vicia sepium	18
Trifolium pratense	57	Heracleum sphondylium	18
Anthoxanthum odoratum	54	Centaurea jacea	18
Rumex acetosa	51	Prunella vulgaris	18
Trifolium repens	49	Luzula campestris	16
Dactylis glomerata	48	Arrhenatherum elatius	16
Plantago lanceolata	48	Ajuga reptans	15
Achillea millefolium agg.	46	Briza media	15
Poa trivialis	45	Sanguisorba officinalis	15
Veronica chamaedrys	42	Campanula patula	15
Agrostis capillaris	41	Bellis perennis	15
Festuca rubra agg.	40	Elymus repens	15
Festuca pratensis	38	Filipendula ulmaria	15
Vicia cracca	37	Knautia arvensis	15
Alopecurus pratensis	37	Potentilla erecta	14
Lathyrus pratensis	36	Rumex crispus	14
Ranunculus repens	35	Alchemilla monticola	14
Holcus lanatus	34	Alchemilla vulgaris agg.	14
Leucanthemum vulgare agg.	33	Leontodon autumnalis	14
Trisetum flavescens	31	Pimpinella major	14
Cerastium fontanum subsp. vulgare	28	Campanula rotundifolia	14
Cynosurus cristatus	27	Carum carvi	13
Taraxacum sect. Ruderalia	26	Galium verum	13
Poa pratensis	26	Phyteuma spicatum	13
Hypericum maculatum	26	Senecio aquaticus subsp. aquaticus	13
Leontodon hispidus	24	Galium mollugo agg.	13
Geranium sylvaticum	24	Rhytidadelphus squarrosus	12
Lotus corniculatus	23	Plantago media	12
Bistorta officinalis	23	Pimpinella saxifraga	12
Lychnis flos-cuculi	23	Rhinanthus minor	12
Lolium perenne	23	Cardaminopsis halleri	12
Stellaria graminea	22	Myosotis scorpioides	11

Deschampsia cespitosa	21	Bromus racemosus	11
Taraxacum sect. Ruderalia	20	Agrostis stolonifera var. stolonifera	11
Cardamine pratensis	20	Hordeum secalinum	10
Phleum pratense	19	Silene dioica	10

E2.4 - Iberian summer pastures (vallicares)

Origin of data (countries): ES, PT

List of alliances: SAC-01A - Agrostion castellanae Rivas Goday ex Rivas-Mart. et al. 1980, SAC-01B - Festucion merinoi Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 1986 corr. Rivas-Mart. et Sánchez-Mata in Rivas-Mart. et al. 2002

Additional selection rules: n/a

Implications for EUNIS classification: proposed new name: Iberian summer pasture (vallicar)

Floristic composition:

Agrostis castellana	82	Vulpia bromoides	18
Hypochaeris radicata	82	Vulpia myuros	18
Plantago lanceolata	57	Anthoxanthum odoratum	14
Jasione montana	50	Bromus hordeaceus	14
Holcus lanatus	43	Campanula lusitanica	14
Aira caryophylla	39	Ceratodon purpureus	14
Daucus carota	39	Cytisus multiflorus	14
Festuca elegans subsp. merinoi	39	Dicranum scoparium	14
Galium verum	39	Digitalis purpurea subsp. carpetana	14
Rumex acetosella	39	Erica australis	14
Trifolium striatum	39	Filago minima	14
Trifolium strictum	39	Linum bienne	14
Trifolium dubium	36	Polytrichum piliferum	14
Lotus corniculatus	32	Quercus pyrenaica	14
Arrhenatherum elatius subsp. bulbosum	32	Ranunculus bulbosus	14
Sanguisorba minor	32	Rhinanthus minor	14
Hieracium pilosella	29	Sanguisorba verrucosa	14
Crepis capillaris	25	Sedum amplexicaule subsp. tenuifolium	14
Erica arborea	25	Sesamoides purpurascens	14
Eryngium campestre	25	Anthyllis vulneraria	11
Petrorhagia prolifera	25	Bartramia pomiformis	11
Pteridium aquilinum	25	Carduus carpetanus	11
Trifolium arvense	25	Carex muricata	11
Trifolium pratense	25	Castanea sativa	11
Tuberaria guttata	25	Centaurea jacea	11
Arenaria montana	21	Centaurea paniculata subsp. castellana	11
Dactylis glomerata	21	Cynosurus echinatus	11
Festuca ampla	21	Cytisus grandiflorus	11
Halimium lasianthum subsp. alyssoides	21	Genista florida	11
Senecio sylvaticus	21	Hieracium castellanum	11
Achillea tomentosa	18	Hypericum perforatum	11
Anarrhinum bellidifolium	18	Koeleria caudata	11

Andryala integrifolia	18	Lepidium heterophyllum	11
Campanula rapunculus	18	Micropyrum tenellum	11
Convolvulus arvensis	18	Phalacrocarpum oppositifolium	11
Cynosurus cristatus	18	Rubus	11
Cytisus striatus	18	Senecio erucifolius	11
Hypnum cupressiforme	18	Silene nutans	11
Prunella laciniata	18	Teucrium scorodonia	11
Trifolium angustifolium	18	Trifolium repens	11
Trifolium campestre	18	Vicia sativa subsp. nigra	11

E2.5 - Meadows of the steppe zone

Origin of data (countries): RU, UA

List of alliances: FES-02A - Agrostion vinealis Sipailova et al. 1985, FES-02E - Trifolion montani Naumova 1986

Additional selection rules: n/a

Implications for EUNIS classification: now included within E1.2a

Floristic composition:

Achillea millefolium agg.	71	Equisetum arvense	14
Poa angustifolia	56	Hieracium umbellatum	14
Potentilla argentea	47	Sanguisorba officinalis	14
Galium verum	42	Vicia tetrasperma	14
Plantago lanceolata	39	Seseli libanotis	14
Carex praecox	34	Leucanthemum vulgare	14
Elymus repens	34	Linaria vulgaris	14
Agrostis vinealis	32	Phleum pratense	14
Festuca pratensis	28	Bistorta officinalis	14
Stellaria graminea	28	Carex hirta	13
Koeleria delavignei	27	Hypericum perforatum	13
Trifolium pratense	26	Lathyrus pratensis	13
Calamagrostis epigejos	26	Agrostis capillaris	13
Galium boreale	24	Centaurea scabiosa	13
Dactylis glomerata	22	Euphorbia esula subsp. tommasiniana	13
Rumex acetosella	21	Stachys officinalis	13
Ranunculus acris	21	Berteroa incana	13
Rumex thyrsoiflorus	21	Aegopodium podagraria	13
Ranunculus polyanthemos	21	Prunella vulgaris	13
Festuca valesiaca	20	Centaurea jacea	12
Cichorium intybus	20	Dracocephalum ruyschiana	12
Poa pratensis	19	Rumex confertus	12
Taraxacum sect. Ruderalia	19	Trifolium medium	12
Bromus inermis	19	Dianthus borbasii	12
Filipendula vulgaris	18	Heracleum sibiricum	12
Vicia cracca	18	Cerastium fontanum subsp. vulgare	11
Alopecurus pratensis	18	Veronica spicata	11
Festuca rubra agg.	18	Alchemilla	11
Lotus corniculatus	17	Phlomis tuberosa	11
Fragaria viridis	17	Primula macrocalyx	11
Veronica chamaedrys	17	Thalictrum simplex	11
Trifolium montanum	16	Artemisia austriaca	11
Plantago media	16	Veronica austriaca subsp. teucrium	11

Origanum vulgare	15	Sedum acre	10
Medicago lupulina	15	Eryngium planum	10
Rumex acetosa	15	Geranium pratense	10
Convolvulus arvensis	15	Glechoma hederacea	10

E2.6 – Agriculturally-improved, re-seeded and heavily fertilised grassland, including sport fields and grass lawns

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: exclude from grasslands (anthropogenic/agricultural)

Floristic composition:

No data

E2.7 – Unmanaged mesic grassland

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: exclude from grasslands (no clear definition)

Floristic composition:

No data

E2.8 – Trampled mesophylous grasslands with annuals

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: exclude from grasslands (no clear definition)

Floristic composition:

No data

E3.1 - Mediterranean tall humid grassland

Origin of data (countries): ES, FR, GR, IT, PT

List of alliances: MOL-09A - Molinio-Holoschoenion Br.-Bl. ex Tchou 1948

Additional selection rules: n/a

Implications for EUNIS classification: proposed change of content and consequently change of name: Mediterranean tall humid inland grassland

Floristic composition:

Scirpoides holoschoenus	67	Tetragonolobus maritimus	16
Agrostis stolonifera	33	Juncus acutus	15
Schoenus nigricans	32	Equisetum ramosissimum	15
Pulicaria dysenterica	29	Trifolium pratense	14
Molinia caerulea	29	Brachypodium phoenicoides	14
Holcus lanatus	27	Plantago lanceolata	14
Lythrum salicaria	24	Juncus maritimus	13
Daucus carota	23	Juncus articulatus	13
Mentha aquatica	22	Juncus subnodulosus	13
Phragmites australis	21	Lotus tenuis	13
Dittrichia viscosa	19	Succisa pratensis	13
Potentilla reptans	19	Carex distans	12
Carex flacca	19	Ranunculus repens	12
Rubus ulmifolius	18	Calystegia sepium	12
Saccharum ravennae	18	Eupatorium cannabinum	11
Festuca arundinacea	17	Prunella vulgaris	11
Juncus inflexus	16	Cynodon dactylon	11

E3.2 - Mediterranean short humid grassland

Origin of data (countries): BG, ES, FR, IT

List of alliances: MOL-05D - Trifolion maritimi Br.-Bl. ex Br.-Bl. et al. 1952, MOL-09C - Deschampsion mediae Br.-Bl. et al. 1952 nom. conserv. propos.

Additional selection rules: n/a

Implications for EUNIS classification: proposed division: E3.2a - Mediterranean short moist grassland of lowlands, E3.2b - Mediterranean short moist grassland of mountains

Floristic composition:

Cynodon dactylon	45	Trifolium pratense	17
Plantago lanceolata	30	Lotus tenuis	16
Trifolium fragiferum	30	Hordeum marinum	16
Potentilla reptans	23	Mentha pulegium	16
Plantago coronopus	22	Agrostis stolonifera	15
Lolium perenne	22	Plantago maritima subsp. serpentina	15
Ranunculus sardous	21	Gaudinia fragilis	14
Bromus hordeaceus	21	Deschampsia media	11
Trifolium repens	19	Poa annua	11
Lotus corniculatus	18	Poa trivialis	11
Trifolium resupinatum	17	Agrostis stolonifera var. stolonifera	10
Carex divisa	17	Prunella hyssopifolia	10

E3.3 - Sub-mediterranean humid meadows

Origin of data (countries): BG, FR, HR, IT, MK, RS, XK

List of alliances: MOL-08A - Molinio-Hordeion secalini Horvatic 1934, MOL-08B - Trifolion resupinati Micevski 1957, MOL-08D - Trifolion pallidi Ilijanic 1969, MOL-08E - Ranunculion velutini Pedrotti 1978

Additional selection rules: n/a

Implications for EUNIS classification: proposed new name: Submediterranean moist meadow

Floristic composition:

Poa trivialis	63	Lysimachia nummularia	19
Bromus racemosus	57	Cichorium intybus	19
Trifolium pratense	52	Carex divisa	19
Alopecurus pratensis	45	Lotus tenuis	18
Taraxacum sect. Ruderalia	45	Orchis laxiflora	18
Plantago lanceolata	44	Rumex acetosa	18
Lolium perenne	44	Rhinanthus minor	18
Anthoxanthum odoratum	43	Moenchia mantica	17
Trifolium fragiferum	42	Carex otrubae	17
Oenanthe silaifolia	41	Centaurea jacea	17
Cynosurus cristatus	40	Tragopogon pratensis subsp. orientalis	17
Potentilla reptans	39	Trifolium dubium	17
Ranunculus sardous	36	Achillea millefolium agg.	16
Hordeum secalinum	36	Galium verum	16
Festuca pratensis	35	Alopecurus bulbosus	16
Trifolium repens	33	Mentha pulegium	16
Lotus corniculatus	32	Leucanthemum vulgare agg.	15
Trifolium resupinatum	32	Gratiola officinalis	15
Lychnis flos-cuculi	31	Ranunculus polyanthemos	15
Ranunculus acris	30	Convolvulus arvensis	14
Rumex crispus	30	Trifolium squamosum	13
Trifolium patens	30	Crepis setosa	13
Carex hirta	29	Daucus carota	13
Agrostis stolonifera	28	Trifolium pallidum	12
Poa pratensis	27	Inula britannica	11
Galium debile	25	Gaudinia fragilis	11
Holcus lanatus	25	Rorippa sylvestris	11
Elymus repens	24	Cirsium canum	10
Ranunculus repens	23	Tragopogon pratensis	10
Carex distans	23	Bromus hordeaceus	10
Ranunculus velutinus	22	Cynodon dactylon	10
Bellis perennis	22	Oenanthe fistulosa	10

Prunella vulgaris	22	Rhinanthus rumelicus	10
Alopecurus rendlei	21	Cerastium fontanum subsp. vulgare	10
Lathyrus pratensis	20		

E3.4 - Moist or wet mesotrophic to eutrophic grassland

Origin of data (countries): AT, BE, BG, CH, CZ, DE, EE, ES, FR, HR, HU, IE, IT, NL, NO, PL, PT, RO, RS, RU, SE, SI, SK, UA, UK

List of alliances: FEP-06B - Glycyrrhizion korshinskyi Lysenko 2010, FEP-06C - Glycyrrhizion glabrae Golub et Mirkin in Golub 1995, MOL-04A - Molinion caeruleae Koch 1926, MOL-04B - Calthion palustris Tx. 1937, MOL-04C - Filipendulo-Petasition Br.-Bl. ex Duvigneaud 1949, MOL-04D - Deschampsion cespitosae Horvatic 1930, MOL-05A - Potentillion anserinae Tx. 1947, MOL-05B - Juncion inflexi Knapp 1971, MOL-05C - Loto tenuis-Trifolion fragiferi Westhoff et Den Held ex de Foucault 2009, MOL-06A - Oenanthion fistulosae de Foucault 2009, MOL-08C - Trifolio-Ranunculion pedati Slavnic 1948

Additional selection rules: n/a

Implications for EUNIS classification: proposed division: E3.4a - Moist or wet mesotrophic to eutrophic hay meadow, E3.4b - Moist or wet mesotrophic to eutrophic pasture

Floristic composition:

Ranunculus repens	51	Glyceria fluitans	17
Holcus lanatus	49	Lolium perenne	17
Poa trivialis	47	Lysimachia vulgaris	17
Ranunculus acris	38	Vicia cracca	16
Rumex acetosa	37	Lysimachia nummularia	16
Agrostis stolonifera	35	Sanguisorba officinalis	16
Trifolium repens	33	Festuca pratensis	16
Cardamine pratensis	33	Carex hirta	15
Lychnis flos-cuculi	31	Prunella vulgaris	15
Festuca rubra agg.	30	Phragmites australis	14
Anthoxanthum odoratum	30	Potentilla anserina	14
Filipendula ulmaria	29	Scirpus sylvaticus	14
Galium palustre	28	Succisa pratensis	13
Deschampsia cespitosa	26	Taraxacum sect. Ruderalia	13
Alopecurus pratensis	26	Ranunculus flammula	13
Cerastium fontanum subsp. vulgare	25	Elymus repens	12
Juncus effusus	25	Rumex crispus	12
Cirsium palustre	22	Achillea millefolium agg.	12
Lathyrus pratensis	22	Briza media	12
Lotus pedunculatus	22	Calliergonella cuspidata	12
Plantago lanceolata	22	Glechoma hederacea	12
Poa pratensis	21	Dactylis glomerata	12
Equisetum palustre	20	Juncus conglomeratus	12
Carex panicea	20	Persicaria amphibia	12
Angelica sylvestris	19	Glyceria maxima	12
Trifolium pratense	19	Cirsium arvense	11
Potentilla erecta	18	Molinia caerulea	11

Juncus articulatus	18	Carex acuta	11
Alopecurus geniculatus	18	Agrostis canina	11
Carex nigra	18	Mentha aquatica	11
Lythrum salicaria	18	Agrostis capillaris	11
Galium uliginosum	17	Centaurea jacea	10
Myosotis scorpioides	17	Bistorta officinalis	10
Caltha palustris	17	Cirsium oleraceum	10
Phalaris arundinacea	17	Urtica dioica	10

E3.5 - Moist or wet oligotrophic grassland

Origin of data (countries): AD, AT, BE, BG, CH, CZ, DE, EE, ES, FR, GL, HR, HU, IE, IS, IT, ME, MK, NL, NO, PL, PT, RO, RS, RU, SI, SK, UA, UK, XK

List of alliances: MOL-04A - Molinion caeruleae Koch 1926, NAR-01D - Nardo-Juncion squarrosi (Oberd. 1957) Passarge 1964, SCH-02A - Caricion fuscae Koch 1926

Additional selection rules: n/a

Implications for EUNIS classification: proposed change of content and consequently change of name: Non-Mediterranean moist or wet oligotrophic grassland

Floristic composition:

Potentilla erecta	46	Lathyrus pratensis	15
Molinia caerulea	45	Lythrum salicaria	15
Carex nigra	36	Nardus stricta	15
Carex panicea	36	Cardamine pratensis	15
Holcus lanatus	33	Ranunculus repens	15
Anthoxanthum odoratum	32	Valeriana dioica	14
Ranunculus acris	29	Caltha palustris	14
Agrostis canina	28	Centaurea jacea	14
Succisa pratensis	28	Juncus conglomeratus	14
Festuca rubra agg.	28	Ranunculus flammula	14
Cirsium palustre	25	Carex rostrata	13
Deschampsia cespitosa	24	Phragmites australis	13
Eriophorum angustifolium	24	Trifolium pratense	13
Lychnis flos-cuculi	22	Potentilla palustris	13
Juncus effusus	22	Aulacomnium palustre	13
Rumex acetosa	22	Poa pratensis	13
Briza media	21	Vicia cracca	12
Galium palustre	21	Achillea millefolium agg.	12
Lotus pedunculatus	21	Luzula multiflora	12
Galium uliginosum	20	Hydrocotyle vulgaris	12
Lysimachia vulgaris	20	Angelica sylvestris	12
Carex echinata	20	Agrostis capillaris	12
Sanguisorba officinalis	19	Juncus subnodulosus	11
Viola palustris	18	Juncus articulatus	11
Plantago lanceolata	17	Galium boreale	11
Filipendula ulmaria	17	Selinum carvifolia	11
Prunella vulgaris	17	Epilobium palustre	10
Equisetum palustre	16	Stachys officinalis	10
Calliergonella cuspidata	15		

E4.1 - Vegetated snow-patch

Origin of data (countries): AD, AT, CH, CZ, ES, FR, IT, MK, PL, SI, SK, UK

List of alliances: HER-01A - Salicion herbaceae Br.-Bl. in Br.-Bl. et Jenny 1926, HER-01B - Salici herbaceae-Caricion lachenalii Béguin et Theurillat 1982, HER-01C - Festucion picturatae Krajina 1933 corr. Dúbravcová 2007, HER-01E - Sedion candollei Rivas-Mart., Fernández González et Loidi in Rivas-Mart. et al. 2011, HER-02A - Arabidion caeruleae Br.-Bl. in Br.-Bl. et Jenny 1926

Additional selection rules: n/a

Implications for EUNIS classification: n/a

Floristic composition:

Luzula alpinopilosa	45	Cerastium cerastoides	16
Gnaphalium supinum	42	Deschampsia flexuosa	16
Poa alpina	39	Nardus stricta	15
Ligusticum mutellina	38	Gentiana punctata	15
Geum montanum	31	Salix retusa	14
Homogyne alpina	29	Deschampsia cespitosa	14
Veronica alpina	28	Polytrichastrum alpinum	13
Polygonum viviparum	27	Ranunculus pseudomontanus	12
Salix herbacea	25	Myosotis alpestris	12
Anthoxanthum odoratum	24	Soldanella pusilla	12
Leucanthemopsis alpina	23	Oreochloa disticha	12
Agrostis rupestris	22	Saxifraga androsacea	11
Sedum alpestre	21	Saxifraga stellaris	11
Potentilla aurea	20	Kiaeria starkei	11
Polytrichastrum sexangulare	19	Pritzelago alpina	11
Festuca picturata	19	Campanula scheuchzeri	11
Silene acaulis	18	Ranunculus alpestris subsp. alpestris	10
Sibbaldia procumbens	17	Cardamine bellidifolia subsp. alpina	10
Soldanella carpatica	17	Carex sempervirens	10

E4.2 - Moss and lichen dominated mountain summits, ridges and exposed slopes

Origin of data (countries): AT, FI, NO, RU, SK, UK

List of alliances: n/a

Additional selection rules: Selection based on dominance by mosses and liverworts in relevés

Implications for EUNIS classification: proposed to move to EUNIS Group H (no grasslands)

Floristic composition:

Racomitrium lanuginosum	73	Salix herbacea	18
Cetraria islandica	67	Huperzia selago	16
Cladonia uncialis	67	Kiaeria starkei	16
Carex bigelowii	57	Festuca airoides	15
Deschampsia flexuosa	45	Festuca ovina	15
Vaccinium myrtillus	43	Polytrichum juniperinum	15
Cladonia arbuscula	42	Cetraria nivalis	14
Ochrolechia frigida	39	Cladonia pyxidata	14
Cladonia gracilis	35	Flavocetraria nivalis	14
Empetrum nigrum subsp. hermaphroditum	33	Polytrichum piliferum	14
Juncus trifidus	31	Rhytidiadelphus loreus	14
Cladonia coccifera	30	Alectoria ochroleuca	13
Cetraria aculeata	28	Betula nana	13
Polytrichastrum alpinum	28	Cladonia bellidiflora	13
Vaccinium vitis-idaea	28	Cladonia squamosa	13
Alectoria nigricans	23	Dicranum scoparium	13
Pleurozium schreberi	23	Polytrichum strictum	13
Sphaerophorus globosus	23	Alchemilla alpina	12
Thamnolia vermicularis	23	Oreochloa disticha	12
Galium saxatile	22	Agrostis capillaris	11
Ptilidium ciliare	22	Cetraria cucullata	11
Cladonia rangiferina	21	Hylocomium splendens	11
Dicranum fuscescens	21	Luzula spicata	11
Vaccinium uliginosum	19	Nardus stricta	11
Festuca vivipara	18		

E4.3 - Acid alpine and subalpine grassland

Origin of data (countries): AD, AT, BG, BH, CH, CZ, DE, ES, FR, HR, IT, ME, MK, MN, PL, PT, RS, SK, SR, UA, UK, XK

List of alliances: KOB-01A - Kobresio-Dryadion Nordhagen 1943, KOB-02B - Festucion versicoloris Krajina 1934, KOB-02C - Agrostion alpinae Jeník et al. 1980, MUL-02A - Calamagrostion villosae Pawlowski et al. 1928, MUL-02B - Trisetion fusci Krajina 1933, MUL-02C - Calamagrostion arundinaceae (Luquet 1926) Oberd. 1957, NAR-01A - Potentillo-Polygonion vivipari Nordhagen ex Dierßen 1992, TRI-01B - Nardo-Caricion rigidae Nordhagen 1943, TRI-03A - Caricion curvulae Br.-Bl. 1925, TRI-03B - Juncion trifidi Krajina 1934, TRI-03C - Festucion supinae Br.-Bl. 1948, TRI-04B - Nardion strictae Br.-Bl. 1926, TRI-04C - Ranunculo pollinensis-Nardion strictae Bonin 1972, TRI-04E - Potentillo ternatae-Nardion Simon 1958, TRI-04F - Festucion variae Br.-Bl. ex Guinochet 1938, TRI-04G - Agrostion schraderanae Grabherr 1993, TRI-04H - Festucion eskiae Br.-Bl. 1948, TRI-06A - Campanulo herminii-Nardion strictae Rivas-Mart. 1964, TRI-06B - Plantaginion thalackeri Quézel 1953, TRI-07A - Sesamoido pygmaeae-Poion violaceae Gamisans 1975, TRI-08A - Poion violaceae Horvat et al. 1937, TRI-08B - Seslerion comosae Horvat et al. 1937

Additional selection rules: n/a

Implications for EUNIS classification: proposed division: E4.3a - Boreal and arctic acidophilous alpine grassland, E4.3b - Temperate acidophilous alpine grassland

Floristic composition:

Nardus stricta	51	Trifolium alpinum	14
Anthoxanthum odoratum	37	Solidago virgaurea	14
Deschampsia flexuosa	33	Vaccinium vitis-idaea	14
Vaccinium myrtillus	33	Bistorta officinalis	14
Potentilla erecta	24	Achillea millefolium agg.	13
Homogyne alpina	24	Deschampsia cespitosa	13
Potentilla aurea	21	Hieracium alpinum	13
Carex sempervirens	20	Oreochloa disticha	12
Agrostis capillaris	20	Festuca airoides	12
Agrostis rupestris	19	Trifolium pratense	12
Geum montanum	19	Hieracium pilosella	12
Juncus trifidus	17	Polygonum viviparum	12
Ligusticum mutellina	17	Calamagrostis villosa	12
Festuca rubra agg.	16	Campanula scheuchzeri	11
Avenula versicolor	16	Luzula alpinopilosa	11
Calluna vulgaris	16	Campanula alpina	11
Cetraria islandica	16	Carex caryophyllea	10
Poa alpina	15	Hypericum maculatum	10
Lotus corniculatus	15	Luzula campestris	10

E4.4 - Calcareous alpine and subalpine grassland

Origin of data (countries): AD, AT, BA, BG, CH, CZ, DE, ES, FR, HR, IT, MK, PL, RS, SI, SK, UK

List of alliances: KOB-01A - Kobresio-Dryadion Nordhagen 1943, KOB-02A - Oxytropido-Elynyon myosuroidis Br.-Bl. 1950, KOB-02B - Festucion versicoloris Krajina 1934, KOB-02C - Agrostion alpinae Jeník et al. 1980, ONO-01A - Ononidion striatae Br.-Bl. et Susplugas 1937, ONO-01B - Ononidion cristatae Royer 1991, ONO-01C - Festucion scopariae Br.-Bl. 1948, ONO-01H - Avenion sempervirentis Barbero 1968, ONO-02A - Festucion burnatii Rivas Goday et Rivas-Mart. ex Mayor et al. 1973, ONO-02B - Minuartio-Poion ligulatae O. de Bolòs 1962, SES-01A - Seslerion coeruleae Br.-Bl. in Br.-Bl. et Jenny 1926, SES-01B - Caricion austroalpinae Sutter 1962, SES-01C - Caricion ferrugineae G. Br.-Bl. et Br.-Bl. in G. Br.-Bl. 1931, SES-01D - Caricion firmae Gams 1936, SES-01E - Seslerio-Asterion alpini Hadac ex Hadac et al. 1969, SES-01F - Seslerion tatrae Pawlowski 1935 corr. Klika 1955, SES-01H - Laserpitio nestleri-Ranunculion thorae Vigo ex Molero 1981, SES-01I - Primulion intricatae Br.-Bl. ex Vigo 1972, SES-01J - Armerion cantabricae Rivas-Mart. et al. 1984, SES-02A - Seslerion tenuifoliae Horvat 1930, SES-02C - Festucion pungentis Horvat 1930, SES-02D - Festuco-Knaution longifoliae Jovanovic-Dunjic 1955, SES-02E - Seslerion apenninae Bruno et Furnari 1966, SES-03A - Oxytropidion dinaricae Lakušić 1966, SES-03B - Anthyllido-Seslerion klasterskyi Simon 1958, SES-03C - Seslerio-Festucion xanthinae Horvat in Horvat et al. 1974, SES-03E - Seslerion nitidae Horvat 1936

Additional selection rules: n/a

Implications for EUNIS classification: proposed division: E4.4a - Arctic-alpine calcareous grassland, E4.4b - Alpine and subalpine calcareous grassland of the Balkan and Apennines

Floristic composition:

Anthyllis vulneraria	38	Carlina acaulis	14
Carex sempervirens	31	Sesleria coeruleans	13
Polygonum viviparum	30	Selaginella selaginoides	13
Poa alpina	27	Helictotrichon sedenense	13
Helianthemum oelandicum	27	Leontodon hispidus	12
Phyteuma orbiculare	25	Acinos alpinus	12
Galium anisophyllum	24	Carex humilis	12
Helianthemum nummularium	24	Biscutella laevigata	12
Sesleria albicans	24	Anthoxanthum odoratum	12
Silene acaulis	24	Festuca quadriflora	12
Dryas octopetala	21	Hippocrepis comosa	12
Lotus corniculatus	21	Myosotis alpestris	11
Euphrasia salisburgensis	18	Gentiana clusii	11
Thymus praecox	18	Trifolium pratense	11
Gentiana verna	18	Parnassia palustris	11
Carex firma	18	Linum catharticum	10

Aster bellidiastrum	17	Potentilla crantzii	10
Scabiosa lucida	17	Aster alpinus	10
Bartsia alpina	17	Carduus defloratus	10
Campanula scheuchzeri	16	Thesium alpinum	10
Tortella tortuosa	16	Minuartia sedoides	10
Koeleria vallesiana	16	Festuca gautieri	10
Saxifraga paniculata	15		

E4.5 - Alpine and subalpine enriched grassland

Origin of data (countries): AT, CH, CZ, DE, ES, FR, PL, RU, SI, SK, UA, UK

List of alliances: MOL-01B - Phyteumato-Trisetion flavescens Hundt ex Passarge 1969, MOL-02A - Trisetio flavescens-Polygonion bistortae Br.-Bl. et Tx. ex Marschall 1947, MOL-02D - Poion alpinae Gams ex Oberd. 1950, MOL-02E - Poion supinae Rivas-Mart. et Géhu 1978

Additional selection rules: n/a

Implications for EUNIS classification: n/a

Floristic composition:

Trifolium pratense	56	Luzula campestris	20
Agrostis capillaris	55	Phleum pratense	20
Achillea millefolium agg.	55	Campanula patula	18
Dactylis glomerata	54	Ranunculus repens	18
Veronica chamaedrys	53	Prunella vulgaris	18
Ranunculus acris	51	Potentilla aurea	18
Anthoxanthum odoratum	50	Cynosurus cristatus	18
Rumex acetosa	48	Pimpinella major	18
Festuca rubra agg.	46	Campanula rotundifolia	17
Trifolium repens	46	Poa alpina	17
Plantago lanceolata	42	Arrhenatherum elatius	17
Alchemilla vulgaris agg.	39	Ajuga reptans	17
Trisetum flavescens	38	Carum carvi	16
Hypericum maculatum	36	Phyteuma spicatum	16
Leontodon hispidus	36	Bellis perennis	16
Cerastium fontanum subsp. vulgare	33	Crepis mollis	16
Deschampsia cespitosa	32	Nardus stricta	15
Leucanthemum vulgare agg.	30	Rhytidadelphus squarrosus	15
Vicia cracca	30	Galium mollugo agg.	15
Geranium sylvaticum	30	Cardaminopsis halleri	15
Lathyrus pratensis	30	Sanguisorba officinalis	14
Taraxacum sect. Ruderalia	29	Knautia arvensis	14
Bistorta officinalis	28	Primula elatior subsp. elatior	14
Poa trivialis	28	Silene dioica	13
Poa pratensis	26	Trollius europaeus	13
Lotus corniculatus	24	Rhinanthus minor	13
Festuca pratensis	24	Festuca nigrescens	12
Alopecurus pratensis	23	Silene vulgaris	12
Stellaria graminea	22	Lychnis flos-cuculi	11
Vicia sepium	22	Anthriscus sylvestris	11
Heracleum sphondylium	21	Aegopodium podagraria	11
Holcus lanatus	21	Avenula pubescens	11

Alchemilla vulgaris agg.	21	Campanula scheuchzeri	11
Briza media	20	Rumex alpestris	10
Potentilla erecta	20	Plantago media	10

E5.1 – Anthropogenic herb stands

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: exclude from grasslands (no grasslands)

Floristic composition:

No data

E5.2 - Thermophile woodland fringes

Origin of data (countries): AD, AT, BE, CH, CZ, DE, DK, EE, ES, FR, HU, IT, NL, NO, PL, PT, RU, SE, SI, SK, UA, UK

List of alliances: GER-01A - Trifolion medii T. Müller 1962, GER-01B - Knaution dipsacifoliae Julve ex Dengler et Boch 2008, GER-02A - Geranion sanguinei Tx. in T. Müller 1962, GER-02B - Galio litoralis-Geranion sanguinei Géhu et Géhu-Franck in de Foucault et al. 1983, GER-03A - Melampyrion pratensis Passarge 1979, GER-03B - Violo riviniana-Stellarion holostea Passarge 1994, GER-03C - Poion nemoralis Dengler et al. 2006, GER-03D - Teucrium scorodoniae de Foucault et al. 1983, GER-03E - Linarion triornithophorae Rivas-Mart. et al. 1984, GER-03F - Origanion virentis Rivas-Mart. et O. de Bolòs in Rivas-Mart. et al. 1984

Additional selection rules: n/a

Implications for EUNIS classification: proposed division: E5.2a - Thermophilous woodland fringe of base-rich soils, E5.2b - Thermophilous woodland fringe of acidic soils, E5.2c - Macaronesian thermophilous woodland fringe

Floristic composition:

Dactylis glomerata	46	Trifolium medium	13
Hypericum perforatum	36	Deschampsia flexuosa	13
Achillea millefolium agg.	35	Crataegus monogyna	12
Festuca rubra agg.	33	Brachythecium rutabulum	12
Agrostis capillaris	33	Prunus spinosa	12
Arrhenatherum elatius	29	Galium mollugo agg.	12
Brachypodium pinnatum	28	Hieracium umbellatum	12
Quercus robur	24	Sanguisorba minor	12
Plantago lanceolata	24	Vincetoxicum hirundinaria	12
Origanum vulgare	23	Medicago lupulina	11
Euphorbia cyparissias	23	Sorbus aucuparia	11
Fragaria vesca	22	Vicia cracca	11
Pimpinella saxifraga	21	Rubus caesius	11
Agrimonia eupatoria	21	Solidago virgaurea	11
Veronica chamaedrys	21	Teucrium chamaedrys	11
Knautia arvensis	20	Cornus sanguinea	11
Holcus mollis	19	Trifolium pratense	11
Clinopodium vulgare	19	Daucus carota	11
Lotus corniculatus	18	Pseudoscleropodium purum	11
Poa pratensis	18	Lathyrus pratensis	11
Coronilla varia	17	Polygonatum odoratum	11
Holcus lanatus	17	Rumex acetosella	11
Anthoxanthum odoratum	17	Festuca ovina	11
Poa angustifolia	16	Frangula alnus	10
Rumex acetosa	16	Melampyrum pratense	10

Galium verum	16	Fragaria viridis	10
Centaurea scabiosa	15	Medicago sativa subsp. falcata	10
Geranium sanguineum	14	Hieracium laevigatum	10
Galium mollugo agg.	13	Plagiomnium affine	10
Viola hirta	13	Ranunculus acris	10
Elymus repens	13		

E5.3 - Pteridium aquilinum fields

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: exclude from grasslands (no grasslands)

Floristic composition:

No data

E5.4 - Moist or wet tall-herb and fern fringes and meadows

Origin of data (countries): AT, BE, BG, CH, CZ, DE, ES, FR, HR, HU, IT, LU, MK, NL, PL, RS, SI, SK, UA, UK

List of alliances: EPI-02B - Impatienti noli-tangere-Stachyion sylvaticae Görs ex Mucina 1993, EPI-02C - Aegopodium podagrariae Tx. 1967 nom. conserv. propos., EPI-04A - Senecionion fluviatilis Tx. ex Moor 1958, EPI-04B - Archangelicion litoralis Scamoni et Passarge 1963, EPI-04D - Cynancho-Convolvulion sepium Rivas Goday et Rivas-Mart. ex Rivas-Mart. 1977, EPI-04E - Dorycnio recti-Rumicion conglomerati Gradstein et Schmittenberg 1977, MOL-04C - Filipendulo-Petasition Br.-Bl. ex Duvigneaud 1949, MOL-04D - Deschampsion cespitosae Horvatic 1930, MUL-03A - Petasition officinalis Sillinger 1933, MUL-03B - Arunco-Petasition albae Br.-Bl. et Sutter 1977, MUL-03C - Senecionion samniti Bonin 1978

Additional selection rules: n/a

Implications for EUNIS classification: proposed change of content and consequently change of name: Moist or wet tall-herb and fern fringe of the lowlands

Floristic composition:

Urtica dioica	46	Festuca rubra agg.	15
Poa trivialis	37	Lysimachia nummularia	15
Ranunculus repens	36	Iris pseudacorus	15
Filipendula ulmaria	34	Valeriana officinalis	15
Alopecurus pratensis	24	Festuca pratensis	14
Phragmites australis	24	Juncus effusus	14
Holcus lanatus	23	Aegopodium podagraria	14
Phalaris arundinacea	23	Heracleum sphondylium	13
Galium aparine	23	Caltha palustris	13
Rumex acetosa	22	Plantago lanceolata	13
Calystegia sepium	22	Epilobium hirsutum	12
Lythrum salicaria	21	Equisetum palustre	12
Ranunculus acris	20	Cirsium palustre	12
Galium palustre	20	Anthriscus sylvestris	12
Agrostis stolonifera	20	Taraxacum sect. Ruderalia	12
Dactylis glomerata	20	Eupatorium cannabinum	12
Deschampsia cespitosa	20	Carex acuta	12
Cirsium arvense	20	Cirsium oleraceum	11
Elymus repens	19	Carex acutiformis	11
Lychnis flos-cuculi	19	Anthoxanthum odoratum	11
Angelica sylvestris	19	Trifolium repens	11
Glechoma hederacea	18	Cerastium fontanum subsp. vulgare	10
Lysimachia vulgaris	17	Trifolium pratense	10
Symphytum officinale	17	Arrhenatherum elatius	10
Vicia cracca	17	Lycopus europaeus	10

Lathyrus pratensis	16	Rumex crispus	10
Cardamine pratensis	16	Lotus pedunculatus	10
Poa pratensis	15		

E5.5 - Subalpine moist or wet tall-herb and fern stands

Origin of data (countries): AD, AT, CH, CZ, DE, ES, FR, IT, MK, PL, RS, SI, SK, UK

List of alliances: MUL-01A - Adenostylion alliariae Br.-Bl. 1926 nom. conserv. propos., MUL-01C - Delphinion elati Hadac ex Hadac et al. 1969, MUL-01D - Cirsion flavispinae Quézel 1953, MUL-01E - Doronicion corsici Gamisans 1975, MUL-01F - Cirsion appendiculati Horvat et al. 1937, MUL-04A - Rumicion alpini Rübél ex Scharfetter 1938

Additional selection rules: n/a

Implications for EUNIS classification: proposed new name: Subalpine moist or wet tall-herb and fern stand

Floristic composition:

Rumex alpestris	42	Oxalis acetosella	14
Deschampsia cespitosa	38	Geum rivale	14
Adenostyles alliariae	35	Epilobium alpestre	13
Geranium sylvaticum	32	Saxifraga rotundifolia	13
Chaerophyllum hirsutum	30	Ranunculus acris	13
Urtica dioica	28	Calamagrostis villosa	13
Aconitum napellus	25	Ranunculus platanifolius	13
Hypericum maculatum	22	Luzula sylvatica	13
Viola biflora	22	Vaccinium myrtillus	12
Silene dioica	20	Milium effusum	12
Stellaria nemorum	20	Poa alpina	12
Rubus idaeus	19	Doronicum austriacum	12
Rumex alpinus	19	Homogyne alpina	11
Alchemilla vulgaris agg.	18	Crepis paludosa	11
Veratrum lobelianum	17	Thalictrum aquilegifolium	11
Athyrium filix-femina	16	Veronica chamaedrys	11
Athyrium distentifolium	16	Trollius europaeus	11
Ligusticum mutellina	15	Dryopteris filix-mas	11
Bistorta officinalis	15	Epilobium montanum	11
Cicerbita alpina	15	Heracleum sphondylium	11
Dactylis glomerata	15	Senecio nemorensis subsp. fuchsii	11
Ranunculus repens	15	Myosotis sylvatica	10
Peucedanum ostruthium	14	Agrostis capillaris	10
Veratrum album	14	Geum montanum	10

E6.1 - Mediterranean inland salt steppes

Origin of data (countries): ES, FR, IT, MK, RO, TR, UK

List of alliances: CRY-01B - *Heleochoilon schoenioidis* Br.-Bl. ex Rivas Goday 1956, FEP-01D - *Puccinellion convolutae* Micevski 1965, FEP-02A - *Halo-Artemision* Pignatti 1953, SAG-02A - *Frankenion pulverulentae* Rivas-Mart. ex Castroviejo et Porta 1976, SAG-02B - *Polypogonion subspathacei* Gamisans 1990, SAG-02C - *Gaudinio-Podospermion cani* S. Brullo et Siracusa 2000, SAL-02A - *Lygeo-Lepidion cardaminis* Rivas Goday et Rivas-Mart. ex Rivas-Mart. et Costa 1984, SAL-02B - *Lygeo sparti-Limonion furfuracei* Rigual 1972, SAL-02C - *Limonion catalaunico-viciosoi* Rivas-Mart. et Costa 1984, SAL-02E - *Limonion confusi* (Br.-Bl. 1933) Rivas-Mart. et Costa 1984, SAL-02F - *Triglochino barrelieri-Limonion glomerati* Biondi et al. 2001

Additional selection rules: n/a

Implications for EUNIS classification: proposed new name: Mediterranean inland salt steppe

Floristic composition:

<i>Plantago coronopus</i>	22	<i>Sarcocornia fruticosa</i>	14
<i>Lygeum spartum</i>	21	<i>Hordeum marinum</i>	13
<i>Halimione portulacoides</i>	20	<i>Parapholis incurva</i>	13
<i>Suaeda vera</i>	18	<i>Puccinellia maritima</i>	10
<i>Sarcocornia perennis</i>	18		

E6.2 - Continental inland salt steppes

Origin of data (countries): AT, BG, CZ, DE, HU, KZ, MK, RS, RU, SK, UA

List of alliances: CRY-01A - Cypero-Spergularion salinae Slavnic 1948, CRY-01C - Lepidion latifolii Golub et Mirkin 1986, FEP-01A - Festucion pseudovinae Soó 1933, FEP-01C - Puccinellion limosae Soó 1933, FEP-02B - Artemision maritima Micevski 1970, FEP-03A - Plantagini salsae-Artemision santonici Lysenko et Mucina in Lysenko et al. 2011, FEP-03E - Festuco valesiaca-Limonium gmelinii Mirkin in Golub et Solomakha 1988, FEP-04A - Artemisio pauciflorae-Camphorosmion monspeliaca Karpov 2001, KAL-02A - Artemisio santonica-Puccinellion fominii Shelyag-Sosonko et al. 1989

Additional selection rules: n/a

Implications for EUNIS classification: proposed new name: Continental inland salt steppe

Floristic composition:

Puccinellia distans	42	Plantago maritima	14
Festuca pseudovina	30	Cerastium dubium	12
Scorzonera cana	28	Poa bulbosa	12
Limonium gmelinii	23	Bromus hordeaceus	12
Aster tripolium subsp. pannonicus	19	Plantago lanceolata	12
Artemisia santonicum	18	Chamomilla recutita	11
Camphorosma annua	16	Elymus repens	11
Cynodon dactylon	15		

E6.3 - Temperate inland salt marsh

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: proposed as new EUNIS type within grasslands, change of position from Group D (D6.1) to Group E

Floristic composition:

No data

E7.1 - Atlantic parkland

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: exclude from grasslands (complex)

Floristic composition:

No data

E7.2 - Sub-continental parkland

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: exclude from grasslands (complex)

Floristic composition:

No data

E7.3 - Dehesa

Origin of data (countries): n/a

List of alliances: n/a

Additional selection rules: n/a

Implications for EUNIS classification: exclude from grasslands (complex)

Floristic composition:

No data

Appendix D: Revised lists of indicator species of the revised EUNIS woodland habitat types

B1.7a - Atlantic and Baltic broad-leaved coastal dune woodland

*Diagnostic species (phi coefficient * 100)*

Cynoglossum officinale	48.0	Senecio sylvaticus	38.0
Lonicera periclymenum	37.6	Aulacomnium androgynum	37.6
Moehringia trinervia	37.0	Carex arenaria	36.1
Rubus caesius	36.0	Calamagrostis epigejos	33.4
Bryonia cretica	32.0	Brachythecium rutabulum	31.5
Kindbergia praelonga	30.9	Quercus robur	29.0
Lophocolea heterophylla	28.9	Rosa rubiginosa	27.6
Crataegus monogyna	27.0	Ligustrum vulgare	26.8
Rhynchostegium megapolitanum	21.9	Euonymus europaeus	21.6
Plagiomnium affine	21.2	Pinus pinaster	21.0
Urtica dioica	20.8	Rosa canina agg.	20.6
Rosa pimpinellifolia	20.3	Bryum capillare	20.2
Cardamine hirsuta	19.7	Dicranum scoparium	19.6
Mnium hornum	19.5	Sambucus nigra	19.3
Hippophae rhamnoides	18.6	Prunus serotina	18.1
Ribes rubrum	17.9	Festuca filiformis	17.9
Geum urbanum	17.8	Hypnum cupressiforme	17.2
Hypnum jutlandicum	17.0	Rhamnus catharticus	16.4
Populus alba	16.4	Polypodium vulgare	16.2
Stellaria pallida	16.0	Senecio jacobaea	15.8
Veronica officinalis	15.5	Pseudoscleropodium purum	15.5
Polygonatum odoratum	15.4	Teucrium scorodonia	15.2
Arctium minus s.l.	15.2		

Constant species (occurrence frequencies)

Crataegus monogyna	72.0	Quercus robur	70.0
Urtica dioica	67.0	Rubus caesius	67.0
Lonicera periclymenum	66.0	Calamagrostis epigejos	64.0
Brachythecium rutabulum	60.0	Moehringia trinervia	54.0
Carex arenaria	50.0	Ligustrum vulgare	48.0
Poa pratensis	45.0	Kindbergia praelonga	43.0
Geum urbanum	40.0	Cynoglossum officinale	39.0
Dicranum scoparium	38.0	Rosa canina agg.	37.0
Hypnum cupressiforme	36.0	Euonymus europaeus	36.0
Sorbus aucuparia	33.0	Sambucus nigra	32.0
Galium aparine	32.0	Senecio jacobaea	31.0
Veronica officinalis	29.0	Senecio sylvaticus	28.0
Pseudoscleropodium purum	28.0	Plagiomnium affine	28.0
Luzula campestris	28.0	Geranium robertianum	28.0
Glechoma hederacea	24.0	Teucrium scorodonia	23.0
Polygonatum odoratum	23.0	Festuca rubra	23.0
Poa trivialis	22.0	Mnium hornum	22.0
Acer pseudoplatanus	22.0	Bryonia cretica	20.0

Agrostis capillaris	20.0	Polypodium vulgare	19.0
Lophocolea heterophylla	19.0	Aulacomnium androgynum	19.0
Solanum dulcamara	18.0	Rhamnus catharticus	18.0
Rosa rubiginosa	17.0	Hypnum jutlandicum	17.0
Holcus lanatus	17.0	Galium verum	16.0
Stellaria media	15.0	Silene dioica	15.0
Rosa pimpinellifolia	15.0	Hedera helix	15.0
Prunus serotina	14.0	Festuca filiformis	14.0
Cirsium vulgare	14.0	Betula pendula	14.0
Ajuga reptans	14.0	Viburnum opulus	13.0
Rubia peregrina	13.0	Pinus pinaster	13.0
Lophocolea bidentata	13.0	Dryopteris dilatata	13.0
Betula pubescens	13.0	Cardamine hirsuta	12.0
Bryum capillare	12.0	Taraxacum sect. Ruderalia	11.0
Ribes rubrum	11.0	Populus nigra	11.0
Polytrichastrum formosum	11.0	Hippophae rhamnoides	11.0
Galium mollugo	11.0	Berberis vulgaris	11.0
Alliaria petiolata	11.0	Ulex europaeus	10.0
Rubus fruticosus agg.	10.0	Fallopia convolvulus	10.0
Eupatorium cannabinum	10.0	Dryopteris filix-mas	10.0
Atrichum undulatum	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Quercus robur	51.0	Crataegus monogyna	15.0
Populus nigra	10.0	Quercus ilex	7.0
Calamagrostis epigejos	7.0	Quercus suber	6.0
Populus alba	6.0		

B1.7c - Baltic coniferous coastal dune woodland

*Diagnostic species (phi coefficient * 100)*

Dicranum undulatum	74.6	Empetrum nigrum	64.5
Goodyera repens	61.8	Carex arenaria	54.7
Listera cordata	51.4	Pleurozium schreberi	48.9
Pseudoscleropodium purum	47.0	Pinus sylvestris	42.8
Hylocomium splendens	42.5	Moneses uniflora	42.3
Vaccinium vitis-idaea	41.5	Melampyrum pratense	35.5
Dicranum scoparium	31.8	Deschampsia flexuosa	31.4
Cladonia chlorophaea	31.0	Cladonia portentosa	29.1
Cladonia arbuscula	27.9	Salix repens	27.8
Calluna vulgaris	27.8	Cladonia ciliata	27.4
Polypodium vulgare	27.3	Dicranum polysetum	26.6
Cladonia rangiferina	26.6	Ptilium crista-castrensis	25.7
Hypnum jutlandicum	25.4	Linnaea borealis	23.4
Betula pendula	23.0	Luzula pilosa	22.9
Trientalis europaea	22.6	Monotropa hypopitys	21.8
Peltigera polydactyla	21.4	Pyrola chlorantha	20.9
Luzula multiflora	20.6	Cladonia gracilis	20.5
Cladonia glauca	20.2	Hieracium umbellatum	19.7
Lycopodium annotinum	19.1	Brachythecium starkei	18.8

Viola tricolor subsp. maritima	18.5	Cladonia mitis	18.4
Quercus robur	17.9	Cladonia furcata	17.8
Lycopodium clavatum	17.6	Juncus balticus	17.6
Vaccinium myrtillus	17.5	Juniperus communis subsp. communis	17.5
Vaccinium uliginosum	16.2	Chimaphila umbellata	15.9
Sorbus aucuparia	15.4		
<i>Constant species (occurrence frequencies)</i>			
Pinus sylvestris	100.0	Pleurozium schreberi	93.0
Pseudoscleropodium purum	87.0	Empetrum nigrum	81.0
Carex arenaria	81.0	Deschampsia flexuosa	80.0
Vaccinium vitis-idaea	74.0	Hylocomium splendens	72.0
Calluna vulgaris	71.0	Dicranum undulatum	65.0
Dicranum scoparium	61.0	Melampyrum pratense	56.0
Betula pendula	52.0	Goodyera repens	48.0
Vaccinium myrtillus	46.0	Quercus robur	45.0
Sorbus aucuparia	40.0	Luzula multiflora	36.0
Luzula pilosa	35.0	Polypodium vulgare	33.0
Listera cordata	32.0	Juniperus communis subsp. communis	32.0
Salix repens	30.0	Hieracium umbellatum	28.0
Hypnum jutlandicum	27.0	Cladonia arbuscula	27.0
Cladonia portentosa	25.0	Trientalis europaea	24.0
Frangula alnus	24.0	Anthoxanthum odoratum	24.0
Moneses uniflora	23.0	Maianthemum bifolium	23.0
Cladonia chlorophaea	23.0	Cladonia rangiferina	22.0
Dryopteris carthusiana	21.0	Vaccinium uliginosum	20.0
Dicranum polysetum	18.0	Picea abies	17.0
Rhytidiadelphus triquetrus	16.0	Ptilium crista-castrensis	15.0
Cladonia furcata	15.0	Cladonia gracilis	14.0
Linnaea borealis	13.0	Populus tremula	11.0
Orthilia secunda	11.0	Monotropa hypopitys	11.0
Lycopodium annotinum	11.0	Cladonia ciliata	11.0
Pohlia nutans	10.0	Erica tetralix	10.0
Cladonia mitis	10.0		
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Pinus sylvestris	99.0	Pseudoscleropodium purum	58.0
Pleurozium schreberi	51.0	Empetrum nigrum	30.0
Deschampsia flexuosa	27.0	Calluna vulgaris	24.0
Vaccinium vitis-idaea	18.0	Hylocomium splendens	15.0
Vaccinium myrtillus	8.0	Carex arenaria	8.0

B1.7d - Mediterranean coniferous coastal dune woodland

*Diagnostic species (phi coefficient * 100)*

Pinus halepensis	78.9	Asparagus acutifolius	57.9
Rosmarinus officinalis	57.1	Quercus coccifera	51.6
Rubia peregrina	49.8	Juniperus oxycedrus	49.3
Phillyrea angustifolia	48.9	Staezelina dubia	48.8
Polygala rupestris	43.1	Daphne gnidium	42.9

Juniperus phoenicea	42.0	Carex hallerana	40.9
Cneorum tricoccon	40.0	Rhamnus alaternus	39.9
Brachypodium retusum	39.7	Smilax aspera	34.9
Lonicera implexa	34.4	Leuzea conifera	33.7
Ononis minutissima	33.4	Pistacia lentiscus	32.5
Fumana ericophylla	32.0	Cistus monspeliensis	31.7
Thymus vulgaris	29.9	Piptatherum miliaceum	29.7
Clematis flammula	29.4	Genista scorpius	29.1
Phillyrea latifolia	28.6	Bupleurum fruticosum	27.1
Prasium majus	26.0	Avenula bromoides	24.9
Aphyllanthes monspeliensis	24.6	Cistus incanus	23.7
Tamarix gallica	23.5	Aetheorhiza bulbosa	23.5
Pinus pinea	22.3	Argyrolobium zanonii	22.1
Ulex parviflorus	22.0	Asphodelus cerasiferus	21.4
Quercus ilex	20.2	Myoporum tenuifolium	20.1
Lavandula latifolia	20.0	Centranthus calcitrapae	19.8
Acacia cyanophylla	19.7	Myrtus communis	19.3
Helianthemum sessiliflorum	19.2	Acacia saligna	19.0
Ranunculus macrophyllus	18.4	Astragalus massiliensis	18.4
Quercus suber	18.1	Cistus salvifolius	16.7
Lavandula stoechas	16.6	Helianthemum guttatum	16.6
Helianthemum pilosum	16.4	Erica multiflora	16.3
Serapias vomeracea	15.6	Erica arborea	15.5
Globularia alypum	15.3	Geranium rotundifolium	15.1
<i>Constant species (occurrence frequencies)</i>			
Pinus halepensis	88.0	Rubia peregrina	78.0
Asparagus acutifolius	76.0	Rosmarinus officinalis	59.0
Quercus coccifera	57.0	Juniperus oxycedrus	57.0
Brachypodium retusum	49.0	Phillyrea angustifolia	45.0
Carex hallerana	43.0	Staehelina dubia	37.0
Smilax aspera	37.0	Daphne gnidium	37.0
Rhamnus alaternus	35.0	Pistacia lentiscus	35.0
Juniperus phoenicea	35.0	Thymus vulgaris	33.0
Lonicera implexa	29.0	Phillyrea latifolia	27.0
Cistus monspeliensis	24.0	Quercus ilex	22.0
Ononis minutissima	22.0	Hieracium pilosella	22.0
Genista scorpius	22.0	Fumana ericophylla	22.0
Clematis flammula	22.0	Polygala rupestris	20.0
Leuzea conifera	20.0	Aphyllanthes monspeliensis	20.0
Piptatherum miliaceum	18.0	Cneorum tricoccon	18.0
Cistus incanus	18.0	Avenula bromoides	18.0
Teucrium polium	16.0	Prasium majus	16.0
Eryngium campestre	16.0	Sanguisorba minor	14.0
Erica arborea	14.0	Cistus salvifolius	14.0
Argyrolobium zanonii	14.0	Aetheorhiza bulbosa	14.0
Ruscus aculeatus	12.0	Myrtus communis	12.0
Lavandula latifolia	12.0	Dorycnium pentaphyllum	12.0
Ulex parviflorus	10.0	Quercus suber	10.0
Lavandula stoechas	10.0	Festuca ovina	10.0
Bupleurum fruticosum	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Pinus halepensis	82.0	Juniperus oxycedrus	20.0
Brachypodium retusum	14.0	Rosmarinus officinalis	12.0
Staehelina dubia	10.0	Pinus pinea	8.0
Erica multiflora	8.0	Erica arborea	8.0
Asparagus acutifolius	8.0	Pistacia lentiscus	6.0

G1.1 - Temperate and boreal softwood riparian woodland

*Diagnostic species (phi coefficient * 100)*

Salix alba	53.1	Salix fragilis	37.5
Populus nigra	36.1	Populus alba	30.6
Rubus caesius	22.8	Humulus lupulus	22.3
Salix purpurea	20.5	Urtica dioica	20.1
Calystegia sepium	19.4	Salix triandra	19.1
Impatiens glandulifera	16.9	Symphytum officinale	16.7
Solanum dulcamara	16.5	Phalaris arundinacea	16.3
Salix viminalis	16.2	Galium aparine	16.1
Salix x rubens	15.1		

Constant species (occurrence frequencies)

Urtica dioica	69.0	Salix alba	57.0
Rubus caesius	44.0	Galium aparine	44.0
Phalaris arundinacea	34.0	Populus nigra	32.0
Glechoma hederacea	32.0	Poa trivialis	31.0
Calystegia sepium	31.0	Salix fragilis	30.0
Sambucus nigra	27.0	Humulus lupulus	27.0
Solanum dulcamara	26.0	Ranunculus repens	26.0
Cornus sanguinea	25.0	Symphytum officinale	24.0
Crataegus monogyna	22.0	Alnus glutinosa	22.0
Populus alba	21.0	Lycopus europaeus	20.0
Brachypodium sylvaticum	20.0	Aegopodium podagraria	20.0
Phragmites australis	18.0	Lythrum salicaria	18.0
Lysimachia vulgaris	18.0	Iris pseudacorus	18.0
Fraxinus excelsior	18.0	Salix purpurea	17.0
Geum urbanum	17.0	Angelica sylvestris	17.0
Agrostis stolonifera	17.0	Ulmus minor	15.0
Hedera helix	15.0	Filipendula ulmaria	15.0
Dactylis glomerata	15.0	Lysimachia nummularia	14.0
Lamium maculatum	14.0	Heracleum sphondylium	14.0
Euonymus europaeus	14.0	Anthriscus sylvestris	14.0
Alliaria petiolata	14.0	Rumex obtusifolius	13.0
Clematis vitalba	13.0	Salix triandra	12.0
Impatiens noli-tangere	12.0	Festuca gigantea	12.0
Stachys palustris	11.0	Ranunculus ficaria	11.0
Ligustrum vulgare	11.0	Galium palustre	11.0
Fraxinus angustifolia	11.0	Equisetum arvense	11.0
Stellaria media	10.0	Stachys sylvatica	10.0
Poa palustris	10.0	Myosoton aquaticum	10.0

Mentha aquatica	10.0	Impatiens glandulifera	10.0
Cirsium arvense	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Salix alba	45.0	Urtica dioica	23.0
Salix fragilis	21.0	Populus nigra	18.0
Populus alba	13.0	Rubus caesius	9.0
Phalaris arundinacea	6.0		

G1.2a - Alnus woodland on riparian and mineral soils

*Diagnostic species (phi coefficient * 100)*

Alnus glutinosa	42.9	Alnus incana	24.6
Carex remota	19.5	Stachys sylvatica	18.2
Impatiens noli-tangere	17.9	Festuca gigantea	16.8
Urtica dioica	16.5	Chrysosplenium alternifolium	16.4
Chaerophyllum hirsutum	15.9	Athyrium filix-femina	15.8
Cardamine amara	15.5	Fraxinus excelsior	15.1

Constant species (occurrence frequencies)

Alnus glutinosa	85.0	Urtica dioica	58.0
Fraxinus excelsior	47.0	Filipendula ulmaria	41.0
Athyrium filix-femina	40.0	Ranunculus repens	35.0
Deschampsia cespitosa	35.0	Geum urbanum	34.0
Stachys sylvatica	32.0	Galium aparine	30.0
Aegopodium podagraria	30.0	Lamium galeobdolon	29.0
Brachypodium sylvaticum	29.0	Sambucus nigra	28.0
Oxalis acetosella	28.0	Angelica sylvestris	28.0
Impatiens noli-tangere	27.0	Corylus avellana	26.0
Caltha palustris	26.0	Rubus idaeus	25.0
Poa trivialis	25.0	Geranium robertianum	24.0
Carex remota	24.0	Acer pseudoplatanus	24.0
Rubus fruticosus agg.	23.0	Plagiomnium undulatum	23.0
Glechoma hederacea	23.0	Circaea lutetiana	23.0
Festuca gigantea	22.0	Anemone nemorosa	22.0
Alnus incana	22.0	Ajuga reptans	22.0
Ranunculus ficaria	21.0	Lysimachia vulgaris	21.0
Chaerophyllum hirsutum	20.0	Crepis paludosa	19.0
Stellaria nemorum	18.0	Rubus caesius	18.0
Hedera helix	18.0	Cirsium oleraceum	18.0
Carex sylvatica	18.0	Galium palustre	17.0
Euonymus europaeus	17.0	Sorbus aucuparia	16.0
Senecio nemorensis	16.0	Prunus padus	16.0
Primula elatior	16.0	Dryopteris dilatata	16.0
Crataegus monogyna	16.0	Viburnum opulus	15.0
Solanum dulcamara	15.0	Poa nemoralis	15.0
Lycopus europaeus	15.0	Juncus effusus	15.0
Chrysosplenium alternifolium	15.0	Humulus lupulus	15.0
Equisetum arvense	15.0	Cornus sanguinea	15.0
Cardamine amara	15.0	Picea abies	14.0

Viola reichenbachiana	13.0	Silene dioica	13.0
Phalaris arundinacea	13.0	Lysimachia nummularia	13.0
Dryopteris filix-mas	13.0	Dryopteris carthusiana	13.0
Brachythecium rutabulum	13.0	Lysimachia nemorum	12.0
Lamium maculatum	12.0	Heracleum sphondylium	11.0
Geum rivale	11.0	Cirsium palustre	11.0
Asarum europaeum	11.0	Alliaria petiolata	11.0
Valeriana officinalis	10.0	Stellaria holostea	10.0
Scrophularia nodosa	10.0	Quercus robur	10.0
Moehringia trinervia	10.0	Milium effusum	10.0
Mercurialis perennis	10.0	Kindbergia praelonga	10.0
Iris pseudacorus	10.0	Galeopsis tetrahit	10.0
Fragaria vesca	10.0	Eupatorium cannabinum	10.0
Atrichum undulatum	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Alnus glutinosa	82.0	Alnus incana	17.0
Urtica dioica	9.0	Fraxinus excelsior	6.0
Ranunculus ficaria	5.0		

G1.2b - Temperate and boreal hardwood riparian woodland

*Diagnostic species (phi coefficient * 100)*

Ranunculus ficaria	33.0	Circaea lutetiana	33.0
Fraxinus excelsior	29.2	Geum urbanum	27.5
Stachys sylvatica	27.0	Prunus padus	26.3
Festuca gigantea	22.4	Euonymus europaeus	22.0
Carex sylvatica	20.2	Adoxa moschatellina	19.8
Rubus caesius	18.7	Rumex sanguineus	18.6
Plagiomnium undulatum	18.5	Glechoma hederacea	18.3
Anemone nemorosa	17.8	Carex remota	17.7
Ulmus minor	17.3	Alnus glutinosa	17.2
Quercus robur	17.1	Corylus avellana	17.0
Viburnum opulus	16.8	Paris quadrifolia	16.8
Eurhynchium striatum	16.8	Brachypodium sylvaticum	16.6
Urtica dioica	16.5	Deschampsia cespitosa	16.4
Aegopodium podagraria	16.4	Primula elatior	16.1
Ribes rubrum	15.8	Sambucus nigra	15.6
Arum maculatum	15.6	Milium effusum	15.5
Polygonatum multiflorum	15.4	Galium aparine	15.0

Constant species (occurrence frequencies)

Fraxinus excelsior	86.0	Geum urbanum	67.0
Urtica dioica	58.0	Circaea lutetiana	57.0
Corylus avellana	56.0	Ranunculus ficaria	55.0
Deschampsia cespitosa	54.0	Quercus robur	49.0
Stachys sylvatica	48.0	Glechoma hederacea	45.0
Brachypodium sylvaticum	45.0	Anemone nemorosa	45.0
Euonymus europaeus	43.0	Carex sylvatica	43.0
Hedera helix	42.0	Galium aparine	42.0

Lamiaeum galeobdolon	38.0	Aegopodium podagraria	38.0
Rubus caesius	37.0	Crataegus monogyna	37.0
Alnus glutinosa	37.0	Filipendula ulmaria	36.0
Acer pseudoplatanus	36.0	Viola reichenbachiana	33.0
Sambucus nigra	32.0	Polygonatum multiflorum	32.0
Prunus padus	31.0	Plagiomnium undulatum	31.0
Geranium robertianum	31.0	Festuca gigantea	31.0
Cornus sanguinea	31.0	Milium effusum	30.0
Carpinus betulus	30.0	Paris quadrifolia	29.0
Viburnum opulus	28.0	Rubus fruticosus agg.	28.0
Oxalis acetosella	27.0	Athyrium filix-femina	27.0
Acer campestre	27.0	Stellaria holostea	25.0
Primula elatior	25.0	Ajuga reptans	25.0
Ulmus minor	24.0	Fagus sylvatica	24.0
Eurhynchium striatum	24.0	Poa trivialis	23.0
Carex remota	23.0	Kindbergia praelonga	22.0
Arum maculatum	22.0	Adoxa moschatellina	22.0
Poa nemoralis	21.0	Crataegus laevigata	21.0
Moehringia trinervia	20.0	Brachythecium rutabulum	19.0
Alliaria petiolata	19.0	Scrophularia nodosa	18.0
Rumex sanguineus	18.0	Ranunculus auricomus agg.	18.0
Galium odoratum	18.0	Dryopteris filix-mas	18.0
Atrichum undulatum	18.0	Rubus idaeus	17.0
Mercurialis perennis	17.0	Impatiens noli-tangere	17.0
Angelica sylvestris	17.0	Sorbus aucuparia	16.0
Ranunculus repens	16.0	Lonicera periclymenum	16.0
Lysimachia nummularia	15.0	Fissidens taxifolius	15.0
Veronica chamaedrys	14.0	Tilia cordata	13.0
Quercus petraea	13.0	Prunus spinosa	13.0
Prunus avium	13.0	Mnium hornum	13.0
Ligustrum vulgare	13.0	Heracleum sphondylium	13.0
Veronica montana	12.0	Thuidium tamariscinum	12.0
Pulmonaria officinalis	12.0	Humulus lupulus	12.0
Fragaria vesca	12.0	Dactylis glomerata	12.0
Cardamine pratensis	12.0	Valeriana officinalis	11.0
Ribes rubrum	11.0	Pulmonaria obscura	11.0
Lonicera xylosteum	11.0	Dryopteris dilatata	11.0
Crepis paludosa	11.0	Anemone ranunculoides	11.0
Acer platanoides	11.0	Viola riviniana	10.0
Ulmus glabra	10.0	Listera ovata	10.0
Lamium maculatum	10.0	Impatiens parviflora	10.0
Galeopsis tetrahit	10.0	Dryopteris carthusiana	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Fraxinus excelsior	71.0	Quercus robur	30.0
Ranunculus ficaria	22.0	Corylus avellana	15.0
Anemone nemorosa	13.0	Aegopodium podagraria	9.0
Hedera helix	8.0	Prunus padus	7.0
Lamiaeum galeobdolon	7.0	Carpinus betulus	7.0
Urtica dioica	6.0	Ulmus minor	6.0
Rubus caesius	6.0	Mercurialis perennis	6.0

Alnus glutinosa	6.0	Acer pseudoplatanus	6.0
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G1.3 - Mediterranean and Macaronesian riparian woodland

Diagnostic species (*phi coefficient * 100*)

Platanus orientalis	70.0	Rubus sanctus	34.2
Populus alba	34.2	Salix alba	31.4
Rubus ulmifolius	31.3	Populus nigra	29.1
Nerium oleander	26.5	Ficus carica	25.8
Arum italicum	25.8	Carex pendula	24.2
Vitex agnus-castus	21.4	Melissa officinalis	21.2
Clematis vitalba	21.1	Piptatherum miliaceum	20.4
Symphytum bulbosum	19.4	Dracunculus vulgaris	19.3
Scirpoides holoschoenus	19.2	Cirsium creticum subsp. creticum	18.7
Cercis siliquastrum	18.5	Brachypodium sylvaticum	18.5
Arundo donax	18.1	Salix amplexicaulis	17.8
Juglans regia	17.6	Ulmus minor	16.5
Fraxinus angustifolia	16.5	Cardamine graeca	16.0
Vitis vinifera subsp. sylvestris	15.8	Equisetum ramosissimum	15.1

Constant species (*occurrence frequencies*)

Platanus orientalis	52.0	Rubus ulmifolius	51.0
Brachypodium sylvaticum	50.0	Hedera helix	44.0
Clematis vitalba	36.0	Salix alba	33.0
Populus nigra	26.0	Populus alba	26.0
Galium aparine	26.0	Urtica dioica	24.0
Dactylis glomerata	24.0	Crataegus monogyna	24.0
Ulmus minor	23.0	Arum italicum	22.0
Cornus sanguinea	21.0	Carex pendula	20.0
Rubia peregrina	17.0	Alnus glutinosa	17.0
Pteridium aquilinum	16.0	Tamus communis	15.0
Scirpoides holoschoenus	15.0	Phragmites australis	15.0
Rubus sanctus	14.0	Prunella vulgaris	14.0
Poa trivialis	14.0	Sambucus nigra	13.0
Rubus caesius	13.0	Piptatherum miliaceum	13.0
Mycelis muralis	13.0	Humulus lupulus	13.0
Fraxinus angustifolia	13.0	Asparagus acutifolius	13.0
Rumex conglomeratus	12.0	Smilax aspera	11.0
Origanum vulgare	11.0	Nerium oleander	11.0
Ligustrum vulgare	11.0	Juglans regia	11.0
Geranium robertianum	11.0	Ficus carica	11.0
Equisetum telmateia	11.0	Equisetum arvense	11.0
Calystegia sepium	11.0	Rosa canina agg.	10.0
Quercus coccifera	10.0	Prunus spinosa	10.0
Clinopodium vulgare	10.0		

Dominant species (*percentage frequencies of occurrences with cover > 25%*)

Platanus orientalis	48.0	Rubus ulmifolius	16.0
Populus alba	15.0	Salix alba	11.0
Populus nigra	9.0	Hedera helix	7.0

G1.4 - Broadleaved swamp woodland on non-acid peat

*Diagnostic species (phi coefficient * 100)*

Carex elongata	47.3	Alnus glutinosa	47.3
Solanum dulcamara	34.5	Thelypteris palustris	28.3
Carex acutiformis	28.0	Peucedanum palustre	27.7
Calamagrostis canescens	26.8	Lysimachia vulgaris	26.7
Lycopus europaeus	25.6	Iris pseudacorus	24.7
Ribes nigrum	24.3	Dryopteris carthusiana	23.6
Galium palustre	20.6	Mnium hornum	20.1
Carex paniculata	19.7	Scutellaria galericulata	19.6
Frangula alnus	19.5	Humulus lupulus	19.2
Carex pseudocyperus	17.4	Salix cinerea	16.8
Carex remota	16.8	Filipendula ulmaria	15.1

Constant species (occurrence frequencies)

Alnus glutinosa	100.0	Lysimachia vulgaris	65.0
Solanum dulcamara	55.0	Galium palustre	53.0
Lycopus europaeus	49.0	Dryopteris carthusiana	48.0
Frangula alnus	45.0	Urtica dioica	43.0
Iris pseudacorus	42.0	Filipendula ulmaria	42.0
Carex acutiformis	41.0	Deschampsia cespitosa	40.0
Carex elongata	38.0	Athyrium filix-femina	37.0
Juncus effusus	34.0	Peucedanum palustre	33.0
Lythrum salicaria	32.0	Caltha palustris	32.0
Fraxinus excelsior	31.0	Calamagrostis canescens	31.0
Ranunculus repens	29.0	Sorbus aucuparia	28.0
Rubus fruticosus agg.	28.0	Scutellaria galericulata	27.0
Salix cinerea	27.0	Mnium hornum	27.0
Cirsium palustre	27.0	Rubus idaeus	26.0
Poa trivialis	26.0	Betula pubescens	26.0
Thelypteris palustris	25.0	Calliergonella cuspidata	25.0
Dryopteris dilatata	24.0	Phragmites australis	23.0
Humulus lupulus	23.0	Angelica sylvestris	23.0
Viburnum opulus	22.0	Carex remota	21.0
Brachythecium rutabulum	21.0	Plagiomnium undulatum	20.0
Mentha aquatica	20.0	Eupatorium cannabinum	20.0
Quercus robur	19.0	Galium aparine	19.0
Carex paniculata	19.0	Impatiens noli-tangere	18.0
Viola palustris	17.0	Prunus padus	17.0
Plagiomnium affine	16.0	Oxalis acetosella	16.0
Lonicera periclymenum	16.0	Kindbergia praelonga	16.0
Circaea lutetiana	16.0	Scirpus sylvaticus	15.0
Ribes nigrum	15.0	Myosotis scorpioides	15.0
Equisetum fluviatile	15.0	Cirsium oleraceum	15.0
Rubus caesius	14.0	Phalaris arundinacea	14.0
Crepis paludosa	14.0	Cardamine amara	14.0
Carex pseudocyperus	13.0	Carex elata	13.0
Cardamine pratensis	13.0	Glyceria fluitans	12.0

Geranium robertianum	12.0	Festuca gigantea	12.0
Equisetum palustre	12.0	Ajuga reptans	12.0
Valeriana officinalis	11.0	Lysimachia nummularia	11.0
Glechoma hederacea	11.0	Geum urbanum	11.0
Euonymus europaeus	11.0	Corylus avellana	11.0
Anemone nemorosa	11.0	Salix aurita	10.0
Molinia caerulea agg.	10.0	Climacium dendroides	10.0
Calystegia sepium	10.0	Agrostis stolonifera	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Alnus glutinosa	100.0	Carex acutiformis	17.0
Carex elongata	7.0	Thelypteris palustris	6.0
Fraxinus excelsior	5.0	Carex paniculata	5.0

G1.5 - Broadleaved bog woodland on acid peat

*Diagnostic species (phi coefficient * 100)*

Betula pubescens	42.5	Sphagnum palustre	30.4
Sphagnum fimbriatum	28.4	Molinia caerulea agg.	24.6
Polytrichum commune	20.9	Frangula alnus	20.0
Sphagnum squarrosum	17.7	Betula pendula	17.4
Salix aurita	16.5	Aulacomnium palustre	15.8

Constant species (occurrence frequencies)

Betula pubescens	78.0	Molinia caerulea agg.	73.0
Frangula alnus	46.0	Betula pendula	44.0
Sorbus aucuparia	35.0	Quercus robur	33.0
Dryopteris carthusiana	31.0	Vaccinium myrtillus	30.0
Sphagnum palustre	30.0	Rubus fruticosus agg.	30.0
Pinus sylvestris	30.0	Polytrichum commune	27.0
Deschampsia flexuosa	25.0	Calluna vulgaris	25.0
Juncus effusus	24.0	Salix cinerea	23.0
Aulacomnium palustre	22.0	Lonicera periclymenum	20.0
Dryopteris dilatata	20.0	Potentilla erecta	19.0
Pleurozium schreberi	19.0	Lysimachia vulgaris	19.0
Alnus glutinosa	19.0	Eriophorum vaginatum	18.0
Dicranum scoparium	17.0	Agrostis canina	17.0
Sphagnum fimbriatum	16.0	Carex nigra	16.0
Vaccinium oxycoccos	15.0	Salix aurita	15.0
Picea abies	15.0	Mnium hornum	15.0
Hypnum cupressiforme	15.0	Polytrichastrum formosum	14.0
Sphagnum fallax	13.0	Pseudoscleropodium purum	13.0
Phragmites australis	13.0	Carex rostrata	13.0
Kindbergia praelonga	12.0	Holcus lanatus	12.0
Calamagrostis canescens	12.0	Vaccinium uliginosum	11.0
Sphagnum squarrosum	11.0	Quercus petraea	11.0
Pteridium aquilinum	11.0	Potentilla palustris	11.0
Hypnum jutlandicum	11.0	Galium palustre	11.0
Eriophorum angustifolium	11.0	Vaccinium vitis-idaea	10.0
Erica tetralix	10.0	Carex curta	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Betula pubescens	55.0	Molinia caerulea agg.	42.0
Betula pendula	26.0	Sphagnum palustre	11.0
Sphagnum fallax	8.0	Eriophorum vaginatum	6.0

G1.6a - Fagus woodland on non-acid soils

*Diagnostic species (phi coefficient * 100)*

Fagus sylvatica	30.2	Galium odoratum	25.9
Viola reichenbachiana	19.0	Lamiaeum galeobdolon	17.9
Mycelis muralis	16.9	Mercurialis perennis	16.9
Cardamine bulbifera	16.2	Prenanthes purpurea	15.8
Acer pseudoplatanus	15.7	Oxalis acetosella	15.0

Constant species (occurrence frequencies)

Fagus sylvatica	99.0	Galium odoratum	56.0
Viola reichenbachiana	48.0	Oxalis acetosella	43.0
Lamiaeum galeobdolon	43.0	Acer pseudoplatanus	43.0
Dryopteris filix-mas	38.0	Mercurialis perennis	37.0
Mycelis muralis	34.0	Fraxinus excelsior	34.0
Hedera helix	33.0	Athyrium filix-femina	30.0
Anemone nemorosa	30.0	Poa nemoralis	28.0
Carex sylvatica	27.0	Rubus fruticosus agg.	26.0
Prenanthes purpurea	26.0	Picea abies	26.0
Euphorbia amygdaloides	26.0	Abies alba	24.0
Sanicula europaea	23.0	Hieracium murorum	23.0
Fragaria vesca	23.0	Corylus avellana	23.0
Melica uniflora	22.0	Geranium robertianum	22.0
Sorbus aucuparia	21.0	Polygonatum multiflorum	20.0
Milium effusum	20.0	Senecio nemorensis	19.0
Hepatica nobilis	19.0	Carpinus betulus	19.0
Carex digitata	19.0	Cardamine bulbifera	19.0
Brachypodium sylvaticum	19.0	Paris quadrifolia	18.0
Solidago virgaurea	17.0	Quercus petraea	17.0
Lonicera xylosteum	17.0	Lathyrus vernus	17.0
Daphne mezereum	17.0	Rubus idaeus	16.0
Phyteuma spicatum	15.0	Crataegus monogyna	15.0
Ajuga reptans	15.0	Acer platanoides	15.0
Acer campestre	15.0	Prunus avium	14.0
Polygonatum verticillatum	14.0	Neottia nidus-avis	14.0
Epilobium montanum	14.0	Actaea spicata	14.0
Sorbus aria agg.	13.0	Luzula luzuloides	13.0
Melica nutans	12.0	Maianthemum bifolium	12.0
Circaea lutetiana	12.0	Asarum europaeum	12.0
Urtica dioica	11.0	Ulmus glabra	11.0
Sambucus nigra	11.0	Rosa arvensis	11.0
Polystichum aculeatum	11.0	Moehringia trinervia	11.0
Ilex aquifolium	11.0	Campanula trachelium	11.0
Vicia sepium	10.0	Viburnum lantana	10.0

Veronica chamaedrys	10.0	Stellaria holostea	10.0
Pulmonaria officinalis	10.0	Lilium martagon	10.0
Dryopteris dilatata	10.0	Daphne laureola	10.0
Convallaria majalis	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Fagus sylvatica	99.0	Galium odoratum	6.0
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G1.6b - Fagus woodland on acid soils

*Diagnostic species (phi coefficient * 100)*

Fagus sylvatica	29.1	Polytrichastrum formosum	19.1
Luzula luzuloides	17.7	Deschampsia flexuosa	16.8
Dicranella heteromalla	16.0	Vaccinium myrtillus	15.8

Constant species (occurrence frequencies)

Fagus sylvatica	99.0	Deschampsia flexuosa	50.0
Vaccinium myrtillus	49.0	Polytrichastrum formosum	39.0
Sorbus aucuparia	38.0	Pteridium aquilinum	34.0
Oxalis acetosella	34.0	Luzula luzuloides	33.0
Quercus petraea	30.0	Picea abies	30.0
Hieracium murorum	27.0	Ilex aquifolium	25.0
Prenanthes purpurea	24.0	Athyrium filix-femina	23.0
Abies alba	23.0	Dicranum scoparium	22.0
Rubus fruticosus agg.	21.0	Poa nemoralis	20.0
Hedera helix	20.0	Acer pseudoplatanus	20.0
Hypnum cupressiforme	19.0	Dryopteris dilatata	19.0
Maianthemum bifolium	18.0	Luzula sylvatica	18.0
Veronica officinalis	17.0	Solidago virgaurea	17.0
Lonicera periclymenum	17.0	Dryopteris filix-mas	17.0
Dicranella heteromalla	17.0	Luzula pilosa	16.0
Carex pilulifera	16.0	Rubus idaeus	14.0
Blechnum spicant	14.0	Mycelis muralis	13.0
Corylus avellana	13.0	Quercus robur	12.0
Pinus sylvestris	11.0	Mnium hornum	11.0
Fraxinus excelsior	11.0	Dryopteris carthusiana	11.0
Calamagrostis arundinacea	11.0	Betula pendula	11.0
Atrichum undulatum	11.0	Anemone nemorosa	11.0
Melampyrum pratense	10.0	Leucobryum glaucum	10.0
Castanea sativa	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Fagus sylvatica	99.0	Vaccinium myrtillus	9.0
Deschampsia flexuosa	7.0		

G1.7a - Temperate and submediterranean thermophilous deciduous woodland

*Diagnostic species (phi coefficient * 100)*

Quercus pubescens	30.5	Quercus cerris	26.6
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Fraxinus ornus	24.6	Buglossoides purpureoaeerulea	21.0
Cornus mas	20.0	Carpinus orientalis	19.7
Quercus frainetto	19.4	Crataegus monogyna	19.0
Ostrya carpinifolia	17.6	Ligustrum vulgare	16.6
Acer monspessulanum	16.2	Sorbus domestica	16.1
Tamus communis	15.6	Sorbus torminalis	15.4
Lathyrus niger	15.3	Viola alba	15.2
Tanacetum corymbosum	15.1		
<i>Constant species (occurrence frequencies)</i>			
Crataegus monogyna	58.0	Quercus pubescens	47.0
Hedera helix	35.0	Fraxinus ornus	34.0
Ligustrum vulgare	33.0	Acer campestre	33.0
Brachypodium pinnatum	31.0	Brachypodium sylvaticum	30.0
Teucrium chamaedrys	29.0	Prunus spinosa	29.0
Quercus cerris	28.0	Cornus sanguinea	28.0
Rubia peregrina	26.0	Clinopodium vulgare	26.0
Quercus petraea	25.0	Dactylis glomerata	25.0
Cornus mas	25.0	Tamus communis	24.0
Viburnum lantana	23.0	Fragaria vesca	23.0
Vincetoxicum hirundinaria	22.0	Rosa canina agg.	22.0
Sorbus torminalis	21.0	Ruscus aculeatus	21.0
Juniperus communis subsp. communis	21.0	Corylus avellana	21.0
Poa nemoralis	20.0	Tanacetum corymbosum	18.0
Stachys officinalis	18.0	Melittis melissophyllum	18.0
Veronica chamaedrys	17.0	Rubus ulmifolius	17.0
Ostrya carpinifolia	17.0	Clematis vitalba	17.0
Buglossoides purpureoaeerulea	17.0	Viola hirta	16.0
Lathyrus niger	16.0	Hippocrepis emerus	16.0
Festuca heterophylla	16.0	Euphorbia cyparissias	16.0
Carex flacca	16.0	Viola alba	15.0
Sorbus aria agg.	15.0	Carpinus betulus	15.0
Asparagus acutifolius	15.0	Rubus fruticosus agg.	14.0
Pyrus communis agg.	14.0	Prunus avium	14.0
Melica uniflora	14.0	Hieracium murorum	14.0
Geum urbanum	14.0	Euonymus europaeus	14.0
Cruciata glabra	14.0	Viola reichenbachiana	13.0
Quercus ilex	13.0	Polygonatum odoratum	13.0
Euphorbia amygdaloides	13.0	Carpinus orientalis	13.0
Rosa arvensis	12.0	Rhamnus catharticus	12.0
Pteridium aquilinum	12.0	Lonicera xylosteum	12.0
Campanula persicifolia	12.0	Quercus frainetto	11.0
Luzula forsteri	11.0	Lonicera etrusca	11.0
Hypericum perforatum	11.0	Geranium sanguineum	11.0
Genista tinctoria	11.0	Galium mollugo agg.	11.0
Fagus sylvatica	11.0	Acer monspessulanum	11.0
Sorbus domestica	10.0	Silene nutans	10.0
Primula veris	10.0	Helleborus foetidus	10.0
Acer opalus	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Quercus pubescens	29.0	Quercus cerris	14.0
Quercus petraea	13.0	Ostrya carpinifolia	8.0
Quercus frainetto	6.0	Quercus faginea	6.0
Quercus robur	5.0	Hedera helix	5.0
Carpinus orientalis	5.0	Buxus sempervirens	5.0
Brachypodium pinnatum	5.0		

G1.7b - Mediterranean thermophilous deciduous woodland

*Diagnostic species (phi coefficient * 100)*

Quercus ithaburensis	99.4	Asphodelus ramosus	55.7
Sarcopoterium spinosum	53.3	Rumex tuberosus	51.3
Theligonum cynocrambe	51.0	Briza maxima	50.7
Veronica cymbalaria	47.8	Hymenocarpus circinnatus	47.6
Tordylium apulum	46.5	Urospermum picroides	46.2
Lagoecia cuminoides	46.0	Trifolium uniflorum	42.8
Anthemis chia	41.9	Leontodon tuberosus	41.1
Trifolium stellatum	40.0	Avena barbata	40.0
Urginea maritima	39.4	Gagea graeca	38.7
Carduus pycnocephalus	37.9	Galium murale	37.7
Biscutella didyma	37.1	Origanum onites	35.4
Ornithopus compressus	34.8	Cynosurus echinatus	34.7
Geranium lucidum	33.9	Euphorbia peplus	33.9
Petrorhagia dubia	33.8	Pyrus amygdaliformis	33.5
Bromus madritensis	33.3	Hordeum bulbosum	33.1
Aetheorhiza bulbosa	33.0	Aira elegantissima	32.8
Parentucellia latifolia	32.6	Cistus incanus	32.6
Sherardia arvensis	32.3	Torilis humilis	32.1
Cerastium comatum	31.8	Anemone pavonina	31.1
Phlomis fruticosa	30.7	Calicotome villosa	30.5
Anagyris foetida	30.3	Picnomon acarna	29.5
Ballota acetabulosa	29.1	Trifolium clypeatum	28.9
Trifolium angustifolium	28.9	Trifolium physodes	28.8
Oxalis pes-caprae	28.8	Hypochaeris achyrophorus	28.4
Brachypodium distachyon	28.4	Muscari comosum	27.6
Trifolium grandiflorum	27.3	Scaligeria napiformis	27.2
Medicago disciformis	26.7	Geranium molle	26.7
Tuberaria guttata	26.6	Lagurus ovatus	26.6
Quercus trojana	26.5	Trifolium scabrum	26.4
Quercus coccifera	26.4	Myosotis incassata	26.4
Scandix pecten-veneris	26.3	Umbilicus horizontalis	26.2
Asparagus acutifolius	26.0	Piptatherum miliaceum	25.9
Lupinus angustifolius	25.8	Rubia tenuifolia	25.7
Trifolium campestre	25.6	Knautia integrifolia	25.0
Trifolium tomentosum	24.8	Fumana arabica	24.6
Selaginella denticulata	24.5	Rhagadiolus stellatus	23.9
Carlina corymbosa	23.8	Hirschfeldia incana	23.7
Rumex bucephalophorus	23.6	Vicia articulata	23.3
Bromus intermedius	23.3	Fumaria judaica	23.2
Arisarum vulgare	23.0	Hypericum triquetrifolium	22.9

Psoralea bituminosa	22.7	Desmazeria rigida	22.6
Silene cretica	22.5	Crepis hellenica	22.5
Cotoneaster nummularius	22.4	Trifolium infamia-ponertii	22.3
Centaurea raphanina	22.3	Asparagus aphyllus	22.3
Crepis multiflora	21.9	Hordeum murinum	21.8
Anthemis rigida	21.8	Phagnalon graecum	21.7
Crepis commutata	21.7	Anemone coronaria	21.5
Vulpia ciliata	21.4	Ferula communis	21.3
Crepis foetida	21.2	Cyclamen creticum	20.8
Bromus sterilis	20.6	Anagallis arvensis	20.4
Olea europaea var. sylvestris	20.0	Hypericum empetrifolium	20.0
Arabis verna	20.0	Pistacia terebinthus	19.9
Salvia tomentosa	19.7	Cyclamen graecum	19.7
Spartium junceum	19.4	Cerastium glomeratum	19.4
Euphorbia rigida	19.3	Campanula spatulata	19.2
Vicia hybrida	18.8	Dracunculus vulgaris	18.8
Satureja thymbra	18.5	Medicago polymorpha	18.3
Medicago arabica	18.2	Ziziphora capitata	17.8
Prasium majus	17.8	Viola sieheana	17.7
Asterolinon linum-stellatum	17.7	Salvia aethiopis	17.5
Plantago bellardii	17.5	Phleum subulatum	17.4
Lolium rigidum	17.3	Hedypnois cretica	17.3
Hieracium cymosum	16.9	Phleum boissieri	16.8
Orchis sancta	16.8	Lupinus albus	16.8
Cyclamen hederifolium	16.7	Anthemis wernerii	16.7
Bunium microcarpum subsp. microcarpum	16.6	Veronica bozakmanii	16.5
Gypsophila tubulosa	16.5	Globularia orientalis	16.5
Taeniatherum asperum	16.4	Salvia triloba	16.4
Galium aparine	16.4	Aegilops speltoides	16.4
Rostraria cristata	16.3	Cistus laurifolius	16.3
Verbascum lasianthum	16.2	Fumaria macrocarpa	16.2
Silene bellidifolia	16.1	Silene behen	16.1
Muscari weissii	16.1	Allium neapolitanum	16.1
Umbilicus rupestris	16.0	Genista acanthoclada	15.9
Geranium rotundifolium	15.7	Paliurus spina-christi	15.5
Micromeria cremnophila	15.5	Dianthus lydus	15.5
Ornithogalum nutans	15.2	Lathyrus laxiflorus	15.2
Dactylis glomerata subsp. glomerata	15.2	Crepis dioscoridis	15.2
Trifolium affine	15.1	Poa bulbosa	15.1
Piptatherum coerulescens	15.1		
<i>Constant species (occurrence frequencies)</i>			
Quercus ithaburensis	100.0	Dactylis glomerata	57.0
Asphodelus ramosus	54.0	Galium aparine	46.0
Briza maxima	46.0	Trifolium campestre	43.0
Sarcopoterium spinosum	37.0	Asparagus acutifolius	37.0
Sherardia arvensis	34.0	Avena barbata	34.0
Theligonum cynocrambe	31.0	Cynosurus echinatus	31.0
Urospermum picroides	29.0	Urginea maritima	29.0
Trifolium stellatum	29.0	Tordylium apulum	29.0

Rumex tuberosus	29.0	Quercus coccifera	29.0
Cistus incanus	29.0	Veronica cymbalaria	26.0
Leontodon tuberosus	26.0	Lagoecia cuminoidea	26.0
Hymenocarpus circinnatus	26.0	Anagallis arvensis	26.0
Trifolium scabrum	23.0	Trifolium angustifolium	23.0
Teucrium chamaedrys	23.0	Poa bulbosa	23.0
Ornithopus compressus	23.0	Muscari comosum	23.0
Geranium molle	23.0	Calicotome villosa	23.0
Bromus madritensis	23.0	Brachypodium distachyon	23.0
Aira elegantissima	23.0	Aetheorhiza bulbosa	23.0
Trifolium uniflorum	20.0	Pyrus amygdaliformis	20.0
Lagurus ovatus	20.0	Geranium lucidum	20.0
Galium murale	20.0	Euphorbia peplus	20.0
Desmazeria rigida	20.0	Carlina corymbosa	20.0
Carduus pycnocephalus	20.0	Bromus sterilis	20.0
Anthemis chia	20.0	Tuberaria guttata	17.0
Teucrium polium	17.0	Quercus pubescens	17.0
Pteridium aquilinum	17.0	Pistacia terebinthus	17.0
Piptatherum miliaceum	17.0	Phlomis fruticosa	17.0
Parentucellia latifolia	17.0	Hypochaeris achyrophorus	17.0
Hordeum murinum	17.0	Hordeum bulbosum	17.0
Gagea graeca	17.0	Dactylis glomerata subsp. glomerata	17.0
Biscutella didyma	17.0	Arisarum vulgare	17.0
Vulpia ciliata	14.0	Spartium junceum	14.0
Rumex bucephalophorus	14.0	Quercus cerris	14.0
Psoralea bituminosa	14.0	Petrorhagia dubia	14.0
Origanum onites	14.0	Juniperus oxycedrus	14.0
Crepis foetida	14.0	Cerastium glomeratum	14.0
Trifolium physodes	11.0	Torilis humilis	11.0
Tamus communis	11.0	Senecio vulgaris	11.0
Selaginella denticulata	11.0	Scandix pecten-veneris	11.0
Scaligeria napiformis	11.0	Rumex conglomeratus	11.0
Prasium majus	11.0	Pistacia lentiscus	11.0
Picnomon acarna	11.0	Oxalis pes-caprae	11.0
Olea europaea var. sylvestris	11.0	Hypericum perforatum	11.0
Fraxinus ornus	11.0	Falcaria vulgaris	11.0
Cyclamen hederifolium	11.0	Cerastium comatum	11.0
Brachypodium sylvaticum	11.0	Ballota acetabulosa	11.0
Asterolinon linum-stellatum	11.0	Asparagus aphyllus	11.0
Anemone pavonina	11.0	Anagyris foetida	11.0
Acer campestre	11.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Quercus ithaburensis	94.0	Phlomis fruticosa	11.0
Sarcopoterium spinosum	9.0	Asphodelus ramosus	9.0
Cistus incanus	6.0		

G1.8 - Acidophilous Quercus woodland

*Diagnostic species (phi coefficient * 100)*

Lonicera periclymenum	24.3	Quercus petraea	21.9
Pteridium aquilinum	18.8	Teucrium scorodonia	18.6
Deschampsia flexuosa	18.2	Melampyrum pratense	17.6
Polytrichastrum formosum	17.1	Castanea sativa	16.8
Ilex aquifolium	16.4	Frangula alnus	15.6
Holcus mollis	15.1		

Constant species (occurrence frequencies)

Quercus petraea	62.0	Deschampsia flexuosa	54.0
Pteridium aquilinum	49.0	Lonicera periclymenum	47.0
Sorbus aucuparia	41.0	Fagus sylvatica	38.0
Quercus robur	37.0	Vaccinium myrtillus	35.0
Polytrichastrum formosum	35.0	Frangula alnus	35.0
Rubus fruticosus agg.	31.0	Teucrium scorodonia	30.0
Melampyrum pratense	30.0	Hedera helix	30.0
Corylus avellana	29.0	Betula pendula	29.0
Ilex aquifolium	28.0	Holcus mollis	26.0
Hypnum cupressiforme	24.0	Dicranum scoparium	23.0
Castanea sativa	23.0	Molinia caerulea agg.	22.0
Calluna vulgaris	21.0	Luzula luzuloides	18.0
Carpinus betulus	18.0	Agrostis capillaris	18.0
Solidago virgaurea	16.0	Hieracium murorum	16.0
Dryopteris dilatata	16.0	Crataegus monogyna	16.0
Carex pilulifera	16.0	Betula pubescens	16.0
Veronica officinalis	15.0	Poa nemoralis	15.0
Pinus sylvestris	15.0	Mnium hornum	15.0
Thuidium tamariscinum	14.0	Anthoxanthum odoratum	14.0
Oxalis acetosella	12.0	Luzula pilosa	12.0
Leucobryum glaucum	12.0	Festuca ovina	12.0
Polypodium vulgare	11.0	Pleurozium schreberi	11.0
Maianthemum bifolium	11.0	Dryopteris carthusiana	11.0
Dicranella heteromalla	11.0	Cytisus scoparius	11.0
Blechnum spicant	11.0	Prunus avium	10.0
Fraxinus excelsior	10.0	Convallaria majalis	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Quercus petraea	56.0	Quercus robur	33.0
Deschampsia flexuosa	13.0	Vaccinium myrtillus	11.0
Pteridium aquilinum	10.0	Castanea sativa	10.0

G1.9a - Boreal-nemoral mountain Betula and Populus tremula woodland on mineral soils

*Diagnostic species (phi coefficient * 100)*

Betula pubescens subsp. carpatica	92.5	Dicranum majus	33.3
Rhytidiadelphus loreus	31.9	Vaccinium myrtillus	31.0
Betula pubescens subsp. tortuosa	28.6	Plagiothecium undulatum	26.8
Melampyrum pratense	25.2	Prunus padus subsp. borealis	24.8
Vaccinium vitis-idaea	24.7	Pleurozium schreberi	24.7
Agrostis vinealis	24.7	Hylocomium splendens	24.2
Sphagnum robustum	23.9	Salix silesiaca	23.5

Oreopteris limbosperma	23.3	Galium saxatile	23.1
Deschampsia flexuosa	22.6	Poa pratensis subsp. alpigena	22.0
Calamagrostis villosa	21.9	Pinus mugo	21.1
Blechnum spicant	21.1	Rumex alpestris	21.0
Calypogeia neesiana	20.6	Sorbus aucuparia	19.5
Ptilium crista-castrensis	19.1	Luzula sylvatica	18.9
Cerastium alpinum	18.5	Thuidium tamariscinum	18.4
Linnaea borealis	18.4	Dicranum fuscescens	18.4
Athyrium distentifolium	18.0	Dryopteris Xmantoniae	17.9
Umbilicaria hyperborea	17.5	Ptilidium pulcherrimum	17.3
Trientalis europaea	17.2	Umbilicaria hirsuta	16.8
Polytrichastrum alpinum	16.8	Laserpitium archangelica	16.8
Racomitrium microcarpon	16.7	Polytrichastrum formosum	16.5
Myosotis decumbens	16.4	Mnium hornum	16.4
Ribes petraeum	16.3	Cornus suecica	16.2
Sphagnum girgensohnii	16.1	Dryopteris oreades	15.7
Carex binervis	15.0		
<i>Constant species (occurrence frequencies)</i>			
Vaccinium myrtillus	94.0	Betula pubescens subsp. carpatica	90.0
Deschampsia flexuosa	68.0	Sorbus aucuparia	61.0
Pleurozium schreberi	52.0	Vaccinium vitis-idaea	48.0
Melampyrum pratense	45.0	Hylocomium splendens	45.0
Picea abies	39.0	Oxalis acetosella	39.0
Rhytidiadelphus loreus	35.0	Polytrichastrum formosum	35.0
Galium saxatile	35.0	Thuidium tamariscinum	29.0
Luzula sylvatica	29.0	Dicranum scoparium	29.0
Calluna vulgaris	29.0	Anthoxanthum odoratum	29.0
Potentilla erecta	26.0	Blechnum spicant	26.0
Plagiothecium undulatum	23.0	Mnium hornum	23.0
Dicranum majus	23.0	Calamagrostis villosa	23.0
Agrostis vinealis	23.0	Trientalis europaea	19.0
Dryopteris dilatata	19.0	Solidago virgaurea	16.0
Rumex alpestris	16.0	Polytrichum commune	16.0
Pinus mugo	16.0	Oreopteris limbosperma	16.0
Luzula pilosa	16.0	Luzula multiflora	16.0
Luzula luzuloides	16.0	Gymnocarpium dryopteris	16.0
Viola biflora	13.0	Sphagnum capillifolium	13.0
Silene dioica	13.0	Senecio nemorensis	13.0
Rubus idaeus	13.0	Rhytidiadelphus triquetrus	13.0
Ptilium crista-castrensis	13.0	Pseudoscleropodium purum	13.0
Fagus sylvatica	13.0	Epilobium angustifolium	13.0
Dryopteris filix-mas	13.0	Calamagrostis arundinacea	13.0
Agrostis capillaris	13.0	Acer pseudoplatanus	13.0
Abies alba	13.0	Viola riviniana	10.0
Valeriana montana	10.0	Vaccinium uliginosum	10.0
Sphagnum girgensohnii	10.0	Salix silesiaca	10.0
Rosa pendulina	10.0	Rhytidiadelphus squarrosus	10.0
Pteridium aquilinum	10.0	Prenanthes purpurea	10.0
Polytrichastrum alpinum	10.0	Polygonatum verticillatum	10.0
Pinus sylvestris	10.0	Orthilia secunda	10.0

Lycopodium annotinum	10.0	Linnaea borealis	10.0
Lamiastrum galeobdolon	10.0	Hypnum jutlandicum	10.0
Hypnum cupressiforme	10.0	Fragaria vesca	10.0
Dryopteris carthusiana	10.0	Dicranum fuscescens	10.0
Deschampsia cespitosa	10.0	Carex binervis	10.0
Carex bigelowii	10.0	Betula pubescens subsp. tortuosa	10.0
Athyrium filix-femina	10.0	Athyrium distentifolium	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Betula pubescens subsp. carpatica	84.0	Vaccinium myrtillus	35.0
Hylocomium splendens	26.0	Deschampsia flexuosa	10.0
Calamagrostis villosa	10.0	Vaccinium vitis-idaea	6.0
Rhododendron hirsutum	6.0		

G1.9b - Mediterranean mountain Betula and Populus tremula woodland on mineral soils

*Diagnostic species (phi coefficient * 100)*

Betula pubescens subsp. celtiberica	87.6	Erica arborea	42.1
Saxifraga spathularis	40.9	Crepis lampsanoides	35.6
Genista florida	30.8	Blechnum spicant	28.9
Salix atrocinerea	27.8	Daboecia cantabrica	25.4
Cytisus balansae	24.3	Dryopteris affinis	23.4
Teucrium scorodonia	22.7	Omphalodes nitida	21.1
Betula pendula subsp. fontqueri	19.8	Quercus pyrenaica	18.5
Stellaria holostea	18.3	Luzula sylvatica	18.3
Vaccinium myrtillus	18.2	Ilex aquifolium	17.2
Sorbus aucuparia	17.0	Pteridium aquilinum	16.7
Ulex gallii	15.9	Lonicera periclymenum	15.9
Euphorbia hyberna	15.7	Digitalis purpurea	15.7
Festuca elegans	15.1		

Constant species (occurrence frequencies)

Betula pubescens subsp. celtiberica	82.0	Vaccinium myrtillus	57.0
Erica arborea	55.0	Sorbus aucuparia	54.0
Pteridium aquilinum	46.0	Stellaria holostea	40.0
Deschampsia flexuosa	40.0	Teucrium scorodonia	39.0
Blechnum spicant	36.0	Lonicera periclymenum	34.0
Corylus avellana	34.0	Ilex aquifolium	31.0
Frangula alnus	30.0	Poa nemoralis	29.0
Luzula sylvatica	28.0	Quercus robur	27.0
Rubus fruticosus agg.	26.0	Melampyrum pratense	26.0
Athyrium filix-femina	26.0	Saxifraga spathularis	25.0
Holcus mollis	25.0	Hedera helix	25.0
Dryopteris filix-mas	25.0	Salix atrocinerea	24.0
Oxalis acetosella	24.0	Rubus ulmifolius	23.0
Anemone nemorosa	23.0	Crepis lampsanoides	22.0
Agrostis capillaris	21.0	Dryopteris affinis	20.0
Veronica officinalis	19.0	Fagus sylvatica	18.0
Calluna vulgaris	17.0	Sorbus aria agg.	16.0
Genista florida	16.0	Solidago virgaurea	15.0

Dryopteris dilatata	15.0	Daboecia cantabrica	15.0
Potentilla erecta	14.0	Digitalis purpurea	14.0
Castanea sativa	14.0	Betula pendula	14.0
Quercus pyrenaica	13.0	Cytisus balansae	13.0
Quercus petraea	12.0	Euphorbia dulcis	12.0
Anthoxanthum odoratum	12.0	Salix caprea	10.0
Ranunculus serpens subsp. nemorosus	10.0	Festuca rubra	10.0
Erica vagans	10.0	Acer pseudoplatanus	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Betula pubescens subsp. celtiberica	82.0	Vaccinium myrtillus	17.0
Betula pendula	13.0	Pteridium aquilinum	8.0
Rubus ulmifolius	7.0	Luzula sylvatica	6.0
Erica arborea	6.0		

G1.Aa - Carpinus and Quercus mesic deciduous woodland

*Diagnostic species (phi coefficient * 100)*

Carpinus betulus	31.2	Quercus petraea	21.0
Acer campestre	19.1	Polygonatum multiflorum	18.6
Viola reichenbachiana	17.5	Stellaria holostea	17.0
Anemone nemorosa	16.1	Poa nemoralis	15.8
Lamium galeobdolon	15.8	Prunus avium	15.3

Constant species (occurrence frequencies)

Carpinus betulus	78.0	Quercus petraea	60.0
Corylus avellana	47.0	Viola reichenbachiana	46.0
Acer campestre	43.0	Poa nemoralis	41.0
Lamium galeobdolon	40.0	Anemone nemorosa	40.0
Hedera helix	39.0	Fagus sylvatica	38.0
Polygonatum multiflorum	37.0	Crataegus monogyna	37.0
Stellaria holostea	36.0	Quercus robur	35.0
Prunus avium	32.0	Fraxinus excelsior	32.0
Galium odoratum	30.0	Fragaria vesca	29.0
Brachypodium sylvaticum	29.0	Geum urbanum	28.0
Rubus fruticosus agg.	25.0	Melica uniflora	25.0
Lathyrus vernus	25.0	Cornus sanguinea	25.0
Convallaria majalis	25.0	Ajuga reptans	25.0
Ligustrum vulgare	24.0	Carex sylvatica	24.0
Milium effusum	23.0	Acer pseudoplatanus	23.0
Euphorbia amygdaloides	22.0	Euonymus europaeus	22.0
Veronica chamaedrys	21.0	Tilia cordata	21.0
Mercurialis perennis	21.0	Dryopteris filix-mas	21.0
Asarum europaeum	21.0	Mycelis muralis	20.0
Melica nutans	20.0	Crataegus laevigata	20.0
Pulmonaria officinalis	19.0	Oxalis acetosella	19.0
Moehringia trinervia	18.0	Hieracium murorum	17.0
Geranium robertianum	17.0	Carex pilosa	17.0
Campanula trachelium	17.0	Aegopodium podagraria	17.0
Sorbus aucuparia	16.0	Maianthemum bifolium	16.0

Luzula luzuloides	16.0	Carex digitata	16.0
Glechoma hederacea	15.0	Atrichum undulatum	15.0
Acer platanoides	15.0	Urtica dioica	14.0
Symphytum tuberosum	14.0	Sorbus torminalis	14.0
Scrophularia nodosa	14.0	Sanicula europaea	14.0
Rosa arvensis	14.0	Lonicera xylosteum	14.0
Lathyrus niger	14.0	Galium schultesii	14.0
Galium aparine	14.0	Dactylis glomerata	14.0
Vicia sepium	13.0	Viburnum opulus	13.0
Sambucus nigra	13.0	Luzula pilosa	13.0
Hepatica nobilis	13.0	Galium sylvaticum	13.0
Cruciata glabra	13.0	Campanula persicifolia	13.0
Athyrium filix-femina	13.0	Melittis melissophyllum	12.0
Festuca heterophylla	12.0	Deschampsia cespitosa	12.0
Arum maculatum	12.0	Viola riviniana	11.0
Rosa canina agg.	11.0	Ranunculus auricomus agg.	11.0
Prunus spinosa	11.0	Lonicera periclymenum	11.0
Cardamine bulbifera	11.0	Campanula rapunculoides	11.0
Solidago virgaurea	10.0	Ranunculus ficaria	10.0
Pulmonaria obscura	10.0	Polytrichastrum formosum	10.0
Dactylis glomerata subsp. aschersoniana	10.0	Clinopodium vulgare	10.0
Alliaria petiolata	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Carpinus betulus	56.0	Quercus petraea	40.0
Quercus robur	23.0	Hedera helix	8.0
Anemone nemorosa	8.0	Corylus avellana	7.0

G1.Ab - Ravine woodland

*Diagnostic species (phi coefficient * 100)*

Acer pseudoplatanus	25.6	Fraxinus excelsior	25.4
Ulmus glabra	23.4	Lamiastrum galeobdolon	23.1
Mercurialis perennis	23.0	Dryopteris filix-mas	18.5
Tilia platyphyllos	17.7	Lunaria rediviva	16.9
Asplenium scolopendrium	16.3	Galium odoratum	16.0
Corylus avellana	15.9	Geranium robertianum	15.7
Actaea spicata	15.4	Sambucus nigra	15.2
Acer platanoides	15.1		

Constant species (occurrence frequencies)

Fraxinus excelsior	73.0	Acer pseudoplatanus	68.0
Lamiastrum galeobdolon	56.0	Corylus avellana	52.0
Mercurialis perennis	51.0	Dryopteris filix-mas	47.0
Fagus sylvatica	45.0	Urtica dioica	40.0
Galium odoratum	38.0	Geranium robertianum	36.0
Oxalis acetosella	35.0	Hedera helix	34.0
Ulmus glabra	33.0	Sambucus nigra	31.0
Viola reichenbachiana	30.0	Polygonatum multiflorum	29.0
Athyrium filix-femina	28.0	Aegopodium podagraria	28.0

Poa nemoralis	27.0	Geum urbanum	27.0
Carpinus betulus	27.0	Acer platanoides	27.0
Senecio nemorensis	26.0	Brachypodium sylvaticum	26.0
Tilia cordata	24.0	Anemone nemorosa	24.0
Rubus fruticosus agg.	23.0	Paris quadrifolia	23.0
Lonicera xylosteum	23.0	Asarum europaeum	22.0
Acer campestre	22.0	Picea abies	21.0
Impatiens noli-tangere	21.0	Crataegus monogyna	21.0
Carex sylvatica	21.0	Tilia platyphyllos	19.0
Mycelis muralis	19.0	Milium effusum	19.0
Sorbus aucuparia	18.0	Galium aparine	18.0
Arum maculatum	18.0	Actaea spicata	18.0
Quercus robur	17.0	Euonymus europaeus	17.0
Stellaria holostea	16.0	Stachys sylvatica	16.0
Plagiomnium undulatum	16.0	Fragaria vesca	16.0
Campanula trachelium	16.0	Rubus idaeus	15.0
Quercus petraea	15.0	Melica nutans	15.0
Cornus sanguinea	15.0	Prunus avium	14.0
Primula elatior	14.0	Polystichum aculeatum	14.0
Moehringia trinervia	14.0	Lathyrus vernus	14.0
Ajuga reptans	14.0	Abies alba	14.0
Pulmonaria officinalis	13.0	Melica uniflora	13.0
Circaea lutetiana	13.0	Asplenium scolopendrium	13.0
Pulmonaria obscura	12.0	Hepatica nobilis	12.0
Glechoma hederacea	12.0	Epilobium montanum	12.0
Daphne mezereum	12.0	Alliaria petiolata	12.0
Sanicula europaea	11.0	Prenanthes purpurea	11.0
Heracleum sphondylium	11.0	Eurhynchium striatum	11.0
Dryopteris dilatata	11.0	Carex digitata	11.0
Viburnum opulus	10.0	Stellaria nemorum	10.0
Salvia glutinosa	10.0	Phyteuma spicatum	10.0
Petasites albus	10.0	Lilium martagon	10.0
Ligustrum vulgare	10.0	Euphorbia amygdaloides	10.0
Convallaria majalis	10.0	Cardamine bulbifera	10.0
Adoxa moschatellina	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Fraxinus excelsior	41.0	Acer pseudoplatanus	35.0
Mercurialis perennis	14.0	Tilia cordata	13.0
Corylus avellana	11.0	Tilia platyphyllos	8.0
Ulmus glabra	7.0	Hedera helix	7.0
Lamiastrum galeobdolon	6.0	Fagus sylvatica	6.0

G1.Ba - Alnus cordata woodland

*Diagnostic species (phi coefficient * 100)*

Alnus cordata	98.1	Polystichum setiferum	48.9
Cyclamen repandum	41.9	Chaerophyllum temulum	41.5
Helleborus lividus subsp. corsicus	41.4	Ranunculus lanuginosus	41.3
Bryonia cretica	36.3	Lathyrus venetus	34.8

Potentilla micrantha	34.5	Pteridium aquilinum	33.4
Geranium versicolor	32.7	Castanea sativa	32.7
Anemone apennina	29.7	Acer cappadocicum	29.0
Digitalis lutea	28.9	Calystegia silvatica	28.4
Hypericum hircinum	28.3	Daphne laureola	27.7
Rumex sanguineus	27.0	Oenanthe pimpinelloides	26.9
Aremonia agrimonoides	26.4	Geranium robertianum	26.2
Festuca heterophylla	26.1	Lamium flexuosum	26.0
Allium triquetrum	25.7	Clematis vitalba	25.5
Viola alba	25.1	Brachypodium sylvaticum	25.0
Luzula forsteri	24.6	Geranium nodosum	24.4
Rubus ulmifolius	24.0	Crocus imperati	23.4
Dittrichia viscosa	22.9	Galium rotundifolium	22.5
Senecio stabianus	22.4	Crocus corsicus	22.2
Asperula taurina	22.0	Lamium bifidum	21.8
Cymbalaria hepaticifolia	21.6	Colchicum neapolitanum	21.6
Arisarum proboscideum	20.3	Lilium bulbiferum	19.2
Quercus ilex	19.1	Asperula laevigata	18.8
Carex microcarpa	18.6	Ilex aquifolium	18.5
Stachys sylvatica	18.2	Fraxinus ornus	17.9
Mycelis muralis	17.8	Clinopodium vulgare	17.5
Hedera helix	17.4	Primula vulgaris	17.3
Parentucellia viscosa	17.2	Lathyrus clymenum	17.2
Allium pendulinum	16.8	Juglans regia	16.7
Epipactis microphylla	16.3	Sanicula europaea	16.2
Bellium bellidioides	15.8	Helleborus bocconeii	15.6
Narcissus poeticus	15.5	Briza minor	15.4
Crataegus monogyna	15.2	Bellis sylvestris	15.1
<i>Constant species (occurrence frequencies)</i>			
Alnus cordata	100.0	Pteridium aquilinum	89.0
Brachypodium sylvaticum	67.0	Geranium robertianum	61.0
Polystichum setiferum	56.0	Hedera helix	56.0
Ranunculus lanuginosus	50.0	Crataegus monogyna	50.0
Castanea sativa	50.0	Clematis vitalba	44.0
Rubus ulmifolius	39.0	Rubus fruticosus agg.	39.0
Mycelis muralis	39.0	Chaerophyllum temulum	39.0
Fragaria vesca	39.0	Festuca heterophylla	39.0
Stachys sylvatica	33.0	Potentilla micrantha	33.0
Poa trivialis	33.0	Lathyrus venetus	33.0
Ilex aquifolium	33.0	Geum urbanum	33.0
Daphne laureola	33.0	Cyclamen repandum	33.0
Clinopodium vulgare	33.0	Viola reichenbachiana	28.0
Viola alba	28.0	Stellaria media	28.0
Sanicula europaea	28.0	Rumex sanguineus	28.0
Quercus ilex	28.0	Melica uniflora	28.0
Luzula forsteri	28.0	Fraxinus ornus	28.0
Bryonia cretica	28.0	Aremonia agrimonoides	28.0
Urtica dioica	22.0	Tamus communis	22.0
Primula vulgaris	22.0	Helleborus lividus subsp. corsicus	22.0
Galium rotundifolium	22.0	Galium aparine	22.0

Digitalis lutea	22.0	Circaea lutetiana	22.0
Ajuga reptans	22.0	Viola riviniana	17.0
Teucrium scorodonia	17.0	Sambucus nigra	17.0
Rosa canina agg.	17.0	Quercus pubescens	17.0
Prunus spinosa	17.0	Oenanthe pimpinelloides	17.0
Geranium versicolor	17.0	Geranium nodosum	17.0
Euphorbia amygdaloides	17.0	Dittrichia viscosa	17.0
Dactylis glomerata	17.0	Anemone apennina	17.0
Vinca minor	11.0	Veronica montana	11.0
Symphytum tuberosum	11.0	Salvia glutinosa	11.0
Ruscus aculeatus	11.0	Rubia peregrina	11.0
Rosa arvensis	11.0	Quercus cerris	11.0
Pyrus communis agg.	11.0	Prunus avium	11.0
Prunella vulgaris	11.0	Ostrya carpinifolia	11.0
Muscari comosum	11.0	Moehringia trinervia	11.0
Mercurialis perennis	11.0	Lilium bulbiferum	11.0
Lathyrus niger	11.0	Lamium flexuosum	11.0
Juglans regia	11.0	Hypericum montanum	11.0
Hypericum hircinum	11.0	Digitalis purpurea	11.0
Carex flacca	11.0	Calystegia silvatica	11.0
Asplenium onopteris	11.0	Asperula taurina	11.0
Arum italicum	11.0	Aquilegia vulgaris	11.0
Allium triquetrum	11.0	Acer cappadocicum	11.0
Acer campestre	11.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Alnus cordata	100.0	Pteridium aquilinum	28.0
Sanicula europaea	11.0	Rubus fruticosus agg.	11.0
Ranunculus lanuginosus	11.0	Brachypodium sylvaticum	11.0
Viola alba	6.0	Senecio stabianus	6.0
Rubus ulmifolius	6.0	Hedera helix	6.0
Dittrichia viscosa	6.0	Daphne laureola	6.0
Anemone apennina	6.0		

G2.1 - Mediterranean evergreen Quercus woodland

*Diagnostic species (phi coefficient * 100)*

Quercus rotundifolia	42.7	Rubia peregrina	41.6
Quercus ilex	41.0	Smilax aspera	33.8
Asplenium onopteris	31.2	Arbutus unedo	31.1
Quercus suber	30.8	Asparagus acutifolius	30.5
Phillyrea latifolia	30.2	Carex distachya	28.9
Ruscus aculeatus	28.6	Daphne gnidium	28.0
Lonicera implexa	25.4	Rhamnus alaternus	24.8
Viburnum tinus	24.7	Erica arborea	24.3
Pistacia lentiscus	21.7	Rosa sempervirens	19.9
Pistacia terebinthus	19.2	Osyris alba	19.2
Lonicera etrusca	18.8	Cistus salvifolius	18.8
Phillyrea angustifolia	18.5	Juniperus oxycedrus	18.4
Clematis flammula	18.3	Quercus coccifera	17.2

Euphorbia characias	16.9	Myrtus communis	16.7
Carex hallerana	16.7	Viola alba	16.6
Rubus ulmifolius	16.5	Brachypodium retusum	16.4
Olea europaea var. europaea	16.3	Lavandula stoechas	16.3
Cyclamen repandum	16.2	Quercus faginea	15.9
Ulex parviflorus	15.5		
<i>Constant species (occurrence frequencies)</i>			
Rubia peregrina	72.0	Quercus ilex	56.0
Smilax aspera	41.0	Ruscus aculeatus	41.0
Asparagus acutifolius	40.0	Hedera helix	35.0
Quercus rotundifolia	32.0	Phillyrea latifolia	31.0
Arbutus unedo	31.0	Crataegus monogyna	30.0
Erica arborea	27.0	Rubus ulmifolius	26.0
Pistacia lentiscus	25.0	Asplenium onopteris	25.0
Tamus communis	23.0	Quercus pubescens	23.0
Daphne gnidium	23.0	Rhamnus alaternus	22.0
Lonicera implexa	22.0	Quercus suber	21.0
Juniperus oxycedrus	21.0	Teucrium chamaedrys	20.0
Brachypodium retusum	20.0	Cistus salvifolius	18.0
Carex distachya	18.0	Viola alba	17.0
Quercus coccifera	17.0	Carex hallerana	17.0
Brachypodium sylvaticum	17.0	Viburnum tinus	16.0
Fraxinus ornus	16.0	Rosa sempervirens	15.0
Pistacia terebinthus	15.0	Phillyrea angustifolia	15.0
Lonicera etrusca	15.0	Clematis flammula	15.0
Dactylis glomerata	14.0	Osyris alba	13.0
Myrtus communis	12.0	Pteridium aquilinum	11.0
Prunus spinosa	11.0	Lavandula stoechas	11.0
Euphorbia characias	11.0	Olea europaea var. europaea	10.0
Luzula forsteri	10.0	Hippocrepis emerus	10.0
Geranium purpureum	10.0	Buxus sempervirens	10.0
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Quercus ilex	51.0	Quercus rotundifolia	30.0
Quercus suber	18.0	Hedera helix	5.0

G2.2 - Mainland laurophyllous woodland

*Diagnostic species (phi coefficient * 100)*

Laurus nobilis	90.4	Celtis australis	50.1
Ruscus aculeatus	49.1	Rhamnus alaternus	48.3
Smilax aspera	44.0	Quercus ilex	38.1
Rubus ulmifolius	37.1	Orobanche hederarum	34.8
Rosa sempervirens	33.8	Acanthus mollis	33.1
Rubia peregrina	32.9	Hedera helix	28.9
Asplenium onopteris	28.8	Tamus communis	27.5
Viburnum tinus	25.5	Prunus x fruticans	24.5
Chamaerops humilis	22.6	Arum italicum	22.3
Phillyrea latifolia	20.4	Trachycarpus excelsa	19.3

Elaeagnus pungens	19.3	Asparagus acutifolius	19.1
Ligustrum japonicum	18.7	Urtica rupestris	18.6
Ficus carica	18.4	Clematis vitalba	17.6
Hypericum androsaemum	17.5	Vinca major	17.1
Lonicera japonica	16.8	Platanus x hispanica	16.4
Osmunda regalis	16.4	Dryopteris pallida	16.4
Polystichum setiferum	15.8		
<i>Constant species (occurrence frequencies)</i>			
Laurus nobilis	100.0	Hedera helix	88.0
Ruscus aculeatus	81.0	Smilax aspera	62.0
Rubus ulmifolius	62.0	Rubia peregrina	62.0
Quercus ilex	58.0	Rhamnus alaternus	54.0
Tamus communis	46.0	Rosa sempervirens	31.0
Clematis vitalba	31.0	Celtis australis	31.0
Corylus avellana	27.0	Asplenium onopteris	27.0
Asparagus acutifolius	27.0	Phillyrea latifolia	23.0
Lonicera periclymenum	23.0	Viburnum tinus	19.0
Ulmus minor	19.0	Sambucus nigra	19.0
Quercus pubescens	19.0	Pteridium aquilinum	19.0
Prunus avium	19.0	Crataegus monogyna	19.0
Cornus sanguinea	19.0	Brachypodium sylvaticum	19.0
Arum italicum	19.0	Polystichum setiferum	15.0
Orobanche hederæ	15.0	Melica uniflora	15.0
Fraxinus ornus	15.0	Asplenium trichomanes	15.0
Acanthus mollis	15.0	Pistacia terebinthus	12.0
Chamaerops humilis	12.0	Hypericum androsaemum	12.0
Hippocrepis emerus	12.0	Fraxinus angustifolia	12.0
Carex sylvatica	12.0		
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Laurus nobilis	100.0	Hedera helix	27.0
Smilax aspera	12.0	Ruscus aculeatus	12.0
Rubus ulmifolius	8.0	Rhamnus alaternus	8.0
Clematis vitalba	8.0		

G2.3 - Macaronesian laurophyllous woodland

<i>Diagnostic species (phi coefficient * 100)</i>			
Laurus azorica	100.0	Ilex canariensis	100.0
<i>Constant species (occurrence frequencies)</i>			
Laurus azorica	100.0	Ilex canariensis	100.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

G2.5a - South-Aegean Phoenix grove

*Diagnostic species (phi coefficient * 100)*

Phoenix theophrasti	99.9	Oxalis pes-caprae	67.8
Nerium oleander	65.2	Leontodon tuberosus	62.7
Phlomis lanata	59.2	Salvia triloba	56.6
Tordylium apulum	54.8	Arisarum vulgare	53.6
Sarcopoterium spinosum	53.4	Cerantonia siliqua	52.4
Arum concinatum	49.2	Ballota pseudodictamnus	48.9
Crepis commutata	48.7	Urtica pilulifera	48.6
Urginea maritima	47.7	Anthemis chia	47.3
Satureja thymbra	46.5	Theligonum cynocrambe	44.3
Urospermum picroides	42.3	Torilis nodosa	41.4
Asparagus aphyllus	39.6	Thymbra capitata	37.3
Bromus madritensis	35.5	Centaurea redempta	35.2
Stachys spinulosa	35.0	Notobasis syriaca	35.0
Juncus heldreichianus	34.6	Arum creticum	34.6
Malcolmia flexuosa	34.2	Alcea pallida	34.2
Capparis spinosa	34.1	Scorzonera cretica	34.0
Petromarula pinnata	34.0	Lithodora hispidula	34.0
Silene sedoides	33.4	Parietaria cretica	32.9
Daucus involucratus	32.4	Crepis cretica	32.1
Centaurea idaea	31.7	Lamyropsis cynaroides	31.4
Geranium purpureum	31.2	Dracunculus vulgaris	31.2
Hymenocarpus circinnatus	31.1	Atractylis cancellata	30.9
Asphodelus ramosus	30.5	Orlaya kochii	30.4
Hirschfeldia incana	30.2	Cirsium creticum subsp. creticum	30.1
Asphodeline lutea	30.1	Bromus intermedius	29.9
Pistacia lentiscus	29.6	Anagallis arvensis	29.1
Centaurea raphanina	28.9	Scaligeria napiformis	28.8
Valantia hispida	28.7	Reichardia picroides	28.7
Rostraria cristata	28.6	Vitex agnus-castus	28.3
Plantago afra	28.3	Scandix pecten-veneris	27.9
Carduus pycnocephalus	27.6	Piptatherum coerulescens	27.3
Ficus carica	26.5	Valantia muralis	26.3
Polypogon viridis	25.8	Conyzanthus squamatus	25.8
Euphorbia peplus	23.8	Euphorbia dendroides	23.3
Allium subhirsutum	22.2	Geranium rotundifolium	21.6
Olea europaea var. sylvestris	21.5	Rumex bucephalophorus	21.1
Lotus cytisoides	21.1	Samolus valerandi	21.0
Trifolium stellatum	20.9	Psoralea bituminosa	20.3
Piptatherum miliaceum	19.8	Prasium majus	19.2
Juncus maritimus	17.9	Spartium junceum	17.1
Avena barbata	17.1	Brachypodium distachyon	16.7
Hordeum murinum	16.4	Apium nodiflorum	16.2
Muscari comosum	16.1	Scirpoides holoschoenus	16.0
Myrtus communis	15.8	Melilotus alba	15.8
Carlina corymbosa	15.5	Trifolium scabrum	15.3
<i>Constant species (occurrence frequencies)</i>			
Phoenix theophrasti	100.0	Oxalis pes-caprae	50.0
Nerium oleander	50.0	Leontodon tuberosus	50.0
Arisarum vulgare	50.0	Urginea maritima	38.0
Tordylium apulum	38.0	Sarcopoterium spinosum	38.0

Salvia triloba	38.0	Pistacia lentiscus	38.0
Phlomis lanata	38.0	Cerantonia siliqua	38.0
Anagallis arvensis	38.0	Urtica pilulifera	25.0
Urospermum picroides	25.0	Torilis nodosa	25.0
Thymbra capitata	25.0	Theligonum cynocrambe	25.0
Satureja thymbra	25.0	Reichardia picroides	25.0
Geranium purpureum	25.0	Crepis commutata	25.0
Bromus madritensis	25.0	Ballota pseudodictamnus	25.0
Asphodelus ramosus	25.0	Asparagus aphyllus	25.0
Arum concinatum	25.0	Anthemis chia	25.0
Vitex agnus-castus	12.0	Valantia muralis	12.0
Valantia hispida	12.0	Trifolium stellatum	12.0
Trifolium scabrum	12.0	Trifolium campestre	12.0
Tamus communis	12.0	Stachys spinulosa	12.0
Spartium junceum	12.0	Smilax aspera	12.0
Silene sedoides	12.0	Schoenus nigricans	12.0
Sherardia arvensis	12.0	Scorzonera cretica	12.0
Scirpoides holoschoenus	12.0	Scandix pecten-veneris	12.0
Scaligeria napiformis	12.0	Samolus valerandi	12.0
Rumex conglomeratus	12.0	Rumex bucephalophorus	12.0
Rostraria cristata	12.0	Psoralea bituminosa	12.0
Prasium majus	12.0	Polypogon viridis	12.0
Plantago afra	12.0	Piptatherum miliaceum	12.0
Piptatherum coerulescens	12.0	Phragmites australis	12.0
Petromarula pinnata	12.0	Parietaria cretica	12.0
Orlaya kochii	12.0	Olea europaea var. sylvestris	12.0
Notobasis syriaca	12.0	Myrtus communis	12.0
Muscari comosum	12.0	Melilotus alba	12.0
Malcolmia flexuosa	12.0	Lotus cytisoides	12.0
Lithodora hispidula	12.0	Lamyropsis cynaroides	12.0
Juncus maritimus	12.0	Juncus heldreichianus	12.0
Hymenocarpus circinnatus	12.0	Hordeum murinum	12.0
Hirschfeldia incana	12.0	Geranium rotundifolium	12.0
Galium aparine	12.0	Ficus carica	12.0
Euphorbia peplus	12.0	Euphorbia dendroides	12.0
Eryngium campestre	12.0	Dracunculus vulgaris	12.0
Desmazeria rigida	12.0	Daucus involucratus	12.0
Cynodon dactylon	12.0	Crepis cretica	12.0
Conyzanthus squamatus	12.0	Cirsium creticum subsp. creticum	12.0
Centaurea redempta	12.0	Centaurea raphanina	12.0
Centaurea idaea	12.0	Carlina corymbosa	12.0
Carduus pycnocephalus	12.0	Capsella bursa-pastoris	12.0
Capparis spinosa	12.0	Bromus sterilis	12.0
Bromus intermedius	12.0	Brachypodium sylvaticum	12.0
Brachypodium retusum	12.0	Brachypodium distachyon	12.0
Avena barbata	12.0	Atractylis cancellata	12.0
Asphodeline lutea	12.0	Asparagus acutifolius	12.0
Arum creticum	12.0	Apium nodiflorum	12.0
Allium subhirsutum	12.0	Alcea pallida	12.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Phoenix theophrasti	100.0	Nerium oleander	25.0
Pistacia lentiscus	12.0		

G2.6 - Ilex aquifolium woodland

Diagnostic species (*phi coefficient* * 100)

Ilex aquifolium	53.0	Lonicera periclymenum	19.6
Rosa gr. canina	18.1	Hedera helix	17.0

Constant species (*occurrence frequencies*)

Ilex aquifolium	100.0	Hedera helix	54.0
Lonicera periclymenum	41.0	Pteridium aquilinum	40.0
Rubus fruticosus agg.	31.0	Crataegus monogyna	31.0
Fagus sylvatica	30.0	Corylus avellana	26.0
Vaccinium myrtillus	21.0	Sorbus aucuparia	21.0
Quercus petraea	21.0	Deschampsia flexuosa	20.0
Oxalis acetosella	19.0	Sanicula europaea	17.0
Rubus ulmifolius	17.0	Polytrichastrum formosum	17.0
Hypnum cupressiforme	17.0	Tamus communis	16.0
Melica uniflora	16.0	Geranium robertianum	16.0
Frangula alnus	16.0	Dryopteris filix-mas	16.0
Blechnum spicant	16.0	Rosa canina agg.	14.0
Prunus spinosa	14.0	Poa nemoralis	14.0
Ruscus aculeatus	13.0	Rosa arvensis	13.0
Fraxinus excelsior	13.0	Dryopteris dilatata	13.0
Viola reichenbachiana	11.0	Urtica dioica	11.0
Stellaria holostea	11.0	Quercus robur	11.0
Mnium hornum	11.0	Leucobryum glaucum	11.0
Euphorbia amygdaloides	11.0	Carpinus betulus	11.0
Calluna vulgaris	11.0	Thuidium tamariscinum	10.0
Sambucus nigra	10.0	Holcus mollis	10.0
Daphne laureola	10.0	Anemone nemorosa	10.0
Acer campestre	10.0		

Dominant species (*percentage frequencies of occurrences with cover > 25%*)

Ilex aquifolium	100.0	Pteridium aquilinum	9.0
Hedera helix	7.0	Vaccinium myrtillus	6.0

G3.1a - Temperate mountain Picea woodland

Diagnostic species (*phi coefficient* * 100)

Melampyrum sylvaticum	39.1	Picea abies	37.0
Homogyne alpina	35.5	Luzula luzulina	30.6
Calamagrostis villosa	28.5	Hieracium murorum	27.1
Veronica urticifolia	26.7	Vaccinium myrtillus	26.1
Gymnocarpium dryopteris	25.7	Oxalis acetosella	25.4
Luzula sylvatica	25.4	Lycopodium annotinum	24.5
Prenanthes purpurea	24.2	Hylocomium splendens	24.2
Dicranum scoparium	23.4	Rhytidiadelphus triquetrus	23.3

Lonicera nigra	23.2	Larix decidua	23.0
Viola biflora	22.7	Valeriana tripteris	22.7
Sorbus aucuparia	22.5	Adenostyles alliariae	22.3
Mnium spinosum	21.0	Vaccinium vitis-idaea	20.8
Dryopteris carthusiana agg.	20.4	Polygonatum verticillatum	18.7
Listera cordata	18.7	Huperzia selago	18.5
Luzula nivea	18.1	Solidago virgaurea	17.9
Plagiochila asplenioides	17.9	Abies alba	17.9
Rosa pendulina	17.3	Maianthemum bifolium	17.3
Moneses uniflora	16.8	Adenostyles alpina	16.7
Gentiana asclepiadea	15.9	Cicerbita alpina	15.9
Polystichum lonchitis	15.7	Polytrichastrum formosum	15.6
Lonicera alpigena	15.5	Asplenium viride	15.4
Athyrium filix-femina	15.1	Knautia dipsacifolia	15.0
<i>Constant species (occurrence frequencies)</i>			
Picea abies	100.0	Vaccinium myrtillus	78.0
Oxalis acetosella	71.0	Sorbus aucuparia	69.0
Hieracium murorum	64.0	Dicranum scoparium	52.0
Solidago virgaurea	45.0	Homogyne alpina	45.0
Hylocomium splendens	44.0	Prenanthes purpurea	42.0
Deschampsia flexuosa	41.0	Vaccinium vitis-idaea	40.0
Athyrium filix-femina	39.0	Melampyrum sylvaticum	38.0
Luzula sylvatica	38.0	Abies alba	37.0
Rhytiadelphus triquetrus	35.0	Maianthemum bifolium	34.0
Fragaria vesca	34.0	Polytrichastrum formosum	33.0
Fagus sylvatica	32.0	Rubus idaeus	30.0
Gymnocarpium dryopteris	29.0	Dryopteris dilatata	29.0
Dryopteris filix-mas	28.0	Calamagrostis villosa	28.0
Veronica urticifolia	27.0	Pleurozium schreberi	27.0
Polygonatum verticillatum	25.0	Acer pseudoplatanus	25.0
Larix decidua	24.0	Viola biflora	22.0
Senecio nemorensis	22.0	Luzula luzuloides	22.0
Valeriana tripteris	21.0	Lonicera nigra	21.0
Phyteuma spicatum	19.0	Luzula luzulina	19.0
Lamiastrum galeobdolon	19.0	Adenostyles alliariae	19.0
Veronica officinalis	18.0	Paris quadrifolia	18.0
Mycelis muralis	18.0	Melica nutans	18.0
Lycopodium annotinum	18.0	Daphne mezereum	18.0
Viola reichenbachiana	17.0	Rosa pendulina	17.0
Luzula nivea	17.0	Gentiana asclepiadea	17.0
Rubus saxatilis	16.0	Plagiochila asplenioides	16.0
Orthilia secunda	16.0	Calamagrostis varia	16.0
Huperzia selago	15.0	Carex digitata	15.0
Veratrum album	14.0	Ranunculus serpens subsp. nemorosus	14.0
Petasites albus	14.0	Hypnum cupressiforme	14.0
Epilobium montanum	14.0	Adenostyles alpina	14.0
Rhytiadelphus loreus	13.0	Luzula pilosa	13.0
Lonicera alpigena	13.0	Ctenidium molluscum	13.0
Calamagrostis arundinacea	13.0	Ajuga reptans	13.0
Phegopteris connectilis	12.0	Knautia dipsacifolia	12.0

Hepatica nobilis	12.0	Geranium sylvaticum	12.0
Carex alba	12.0	Sorbus aria agg.	11.0
Potentilla erecta	11.0	Polygala chamaebuxus	11.0
Poa nemoralis	11.0	Mercurialis perennis	11.0
Deschampsia cespitosa	11.0	Blechnum spicant	11.0
Aster bellidiastrum	11.0	Asplenium viride	11.0
Tortella tortuosa	10.0	Saxifraga rotundifolia	10.0
Sanicula europaea	10.0	Primula elatior	10.0
Polystichum lonchitis	10.0	Chaerophyllum hirsutum	10.0
Corylus avellana	10.0	Aposeris foetida	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Picea abies	100.0	Vaccinium myrtillus	22.0
Hylocomium splendens	12.0	Oxalis acetosella	6.0
Rhytiadelphus triquetrus	5.0	Calamagrostis villosa	5.0

G3.1b - Temperate mountain Abies woodland

*Diagnostic species (phi coefficient * 100)*

Abies alba	48.5	Prenanthes purpurea	30.3
Lonicera nigra	29.2	Oxalis acetosella	26.4
Picea abies	21.7	Galium rotundifolium	21.0
Festuca altissima	20.0	Dryopteris filix-mas	20.0
Fagus sylvatica	19.4	Hieracium murorum	19.0
Sorbus aucuparia	18.9	Polygonatum verticillatum	18.9
Athyrium filix-femina	18.9	Luzula nivea	18.5
Senecio nemorensis	18.0	Rubus idaeus	18.0
Mycelis muralis	16.8	Dryopteris dilatata	16.7
Galium odoratum	15.5	Epilobium montanum	15.5
Sambucus racemosa	15.4	Veronica urticifolia	15.1
Rosa pendulina	15.0		

Constant species (occurrence frequencies)

Abies alba	96.0	Oxalis acetosella	73.0
Fagus sylvatica	70.0	Picea abies	60.0
Sorbus aucuparia	58.0	Prenanthes purpurea	51.0
Dryopteris filix-mas	51.0	Athyrium filix-femina	47.0
Hieracium murorum	45.0	Vaccinium myrtillus	43.0
Rubus idaeus	43.0	Viola reichenbachiana	41.0
Fragaria vesca	41.0	Acer pseudoplatanus	38.0
Galium odoratum	37.0	Mycelis muralis	36.0
Senecio nemorensis	33.0	Rubus fruticosus agg.	32.0
Lamiastrum galeobdolon	32.0	Dryopteris dilatata	32.0
Corylus avellana	32.0	Solidago virgaurea	29.0
Polytrichastrum formosum	29.0	Maianthemum bifolium	27.0
Lonicera nigra	26.0	Geranium robertianum	25.0
Deschampsia flexuosa	25.0	Polygonatum verticillatum	24.0
Epilobium montanum	24.0	Dicranum scoparium	24.0
Carex sylvatica	23.0	Paris quadrifolia	22.0
Mercurialis perennis	22.0	Hylocomium splendens	22.0

Carex digitata	22.0	Sanicula europaea	21.0
Lonicera xylosteum	20.0	Festuca altissima	20.0
Galium rotundifolium	19.0	Dryopteris carthusiana	19.0
Veronica officinalis	18.0	Phyteuma spicatum	18.0
Luzula luzuloides	18.0	Fraxinus excelsior	18.0
Ajuga reptans	18.0	Sorbus aria agg.	17.0
Sambucus racemosa	17.0	Luzula pilosa	17.0
Luzula nivea	17.0	Thuidium tamariscinum	16.0
Rhytiadelphus triquetrus	16.0	Luzula sylvatica	16.0
Gymnocarpium dryopteris	16.0	Rosa pendulina	15.0
Hypnum cupressiforme	15.0	Hepatica nobilis	15.0
Actaea spicata	15.0	Veronica urticifolia	14.0
Poa nemoralis	14.0	Melica nutans	14.0
Lathyrus vernus	14.0	Hedera helix	14.0
Eurhynchium striatum	13.0	Daphne mezereum	13.0
Calamagrostis arundinacea	13.0	Petasites albus	12.0
Moehringia trinervia	12.0	Euphorbia amygdaloides	12.0
Quercus petraea	11.0	Pteridium aquilinum	11.0
Polystichum aculeatum	11.0	Plagiomnium undulatum	11.0
Orthilia secunda	11.0	Neottia nidus-avis	11.0
Milium effusum	11.0	Impatiens noli-tangere	11.0
Brachypodium sylvaticum	11.0	Atrichum undulatum	11.0
Anemone nemorosa	11.0	Sambucus nigra	10.0
Salvia glutinosa	10.0	Rhytiadelphus loreus	10.0
Plagiomnium affine	10.0	Plagiochila asplenioides	10.0
Melica uniflora	10.0	Melampyrum sylvaticum	10.0
Lonicera alpigena	10.0	Hordelymus europaeus	10.0
Gentiana asclepiadea	10.0	Asarum europaeum	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Abies alba	96.0	Oxalis acetosella	11.0
Vaccinium myrtillus	8.0	Fagus sylvatica	8.0
Picea abies	7.0	Hylocomium splendens	5.0

G3.1c - Mediterranean mountain Abies woodland

*Diagnostic species (phi coefficient * 100)*

Abies pinsapo	79.5	Daphne latifolia	66.6
Abies cephalonica	49.3	Ononis reuteri	42.5
Geranium purpureum	42.0	Cerastium gibraltarium	41.4
Rosa sicula	41.3	Carum graecum	41.0
Hyacinthoides hispanica	39.8	Doronicum plantagineum	39.5
Hieracium pannosum	38.9	Piptatherum paradoxum	37.3
Paeonia broteroi	37.0	Berberis vulgaris	34.1
Rosa micrantha	33.0	Daphne oleoides	32.6
Helleborus foetidus	31.6	Hieracium cymosum	30.7
Quercus Xmarianica	30.0	Jurinea bocconii	30.0
Genista cupanii	30.0	Galium peloponnesiacum	30.0
Bupleurum spinosum	30.0	Atropa baetica	30.0
Amelanchier chelmea	30.0	Plantago humilis	29.9

Abies nebrodensis	29.9	Odontites bocconeii	29.7
Conopodium thalictrifolium	29.7	Asperula chlorantha	29.7
Lilium heldreichii	29.6	Juniperus drupacea	29.6
Armeria villosa	29.6	Danthoniastrum compactum	29.5
Armeria nebrodensis	29.5	Pinus nigra	29.4
Staezelina uniflorescens	29.3	Scabiosa taygetea	29.3
Hedera helix subsp. canariensis	29.2	Euphorbia deflexa	29.2
Paeonia coriacea	29.1	Lonicera arborea	29.1
Leontodon graecus	29.0	Dianthus arrostii	29.0
Ulex baeticus	28.9	Sorbus umbellata	28.8
Ferulago nodosa	28.8	Crataegus pycnoloba	28.6
Lomelosia crenata	28.5	Cirsium hypopsilum	28.4
Rosa pulverulenta	28.1	Ranunculus sprunerianus	28.1
Achillea holosericea	27.9	Quercus faginea	26.7
Thapsia garganica	26.3	Lamium garganicum	26.0
Erinacea anthyllis	26.0	Aremonia agrimonoides	25.9
Picnemon acarna	25.5	Santolina rosmarinifolia	25.1
Festuca jeanpertii	25.0	Bunium alpinum	25.0
Cistus populifolius	24.6	Cnidium silaifolium	24.2
Centaurea raphanina	23.2	Asyneuma limonifolium	23.1
Crepis fraasii	22.6	Asphodelus cerasiferus	22.5
Arabis collina	22.2	Silene italica	22.0
Bellis sylvestris	22.0	Quercus rotundifolia	21.7
Marrubium vulgare	21.6	Hypericum empetrifolium	20.9
Campanula spatulata	20.0	Rubia peregrina	19.5
Polygala nicaeensis	19.5	Geranium rotundifolium	16.5
Pulicaria odora	15.8	Hippocrepis emerus	15.4
Eryngium amethystinum	15.4	Cotoneaster tomentosus	15.4
Juniperus oxycedrus	15.3		
<i>Constant species (occurrence frequencies)</i>			
Abies pinsapo	64.0	Daphne latifolia	45.0
Rubia peregrina	36.0	Helleborus foetidus	36.0
Geranium purpureum	36.0	Berberis vulgaris	36.0
Pinus nigra	27.0	Crataegus monogyna	27.0
Aremonia agrimonoides	27.0	Abies cephalonica	27.0
Silene italica	18.0	Ruscus aculeatus	18.0
Rosa sicula	18.0	Rosa micrantha	18.0
Quercus rotundifolia	18.0	Quercus faginea	18.0
Pteridium aquilinum	18.0	Piptatherum paradoxum	18.0
Paeonia broteroi	18.0	Ononis reuteri	18.0
Juniperus oxycedrus	18.0	Juniperus communis subsp. communis	18.0
Hyacinthoides hispanica	18.0	Hippocrepis emerus	18.0
Hieracium pannosum	18.0	Hieracium cymosum	18.0
Hedera helix	18.0	Doronicum plantagineum	18.0
Daphne oleoides	18.0	Cerastium gibraltarium	18.0
Carum graecum	18.0	Brachypodium sylvaticum	18.0
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Abies pinsapo	64.0	Abies cephalonica	27.0
Pinus nigra	9.0	Juniperus communis subsp. communis	9.0

Brachypodium sylvaticum	9.0	Abies nebrodensis	9.0
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G3.2 - Temperate subalpine Larix, Pinus cembra and Pinus uncinata woodland

Diagnostic species (*phi coefficient* * 100)

Larix decidua	56.3	Rhododendron ferrugineum	52.4
Pinus cembra	48.1	Pinus uncinata	41.7
Homogyne alpina	37.6	Festuca flavescens	31.9
Calamagrostis villosa	31.4	Sorbus chamaemespilus	31.3
Melampyrum sylvaticum	30.6	Lonicera caerulea	30.6
Vaccinium vitis-idaea	28.6	Juniperus communis subsp. alpina	27.4
Valeriana tripteris	27.0	Rhododendron hirsutum	25.4
Alnus viridis	23.8	Vaccinium myrtillus	22.6
Rosa pendulina	22.6	Campanula scheuchzeri	22.6
Geranium sylvaticum	22.5	Hieracium prenanthoides	21.6
Polystichum lonchitis	21.5	Clematis alpina	21.5
Salix appendiculata	21.3	Luzula sieberi	21.1
Saxifraga cuneifolia	20.7	Rhytidiadelphus triquetrus	19.9
Hylocomium splendens	19.1	Soldanella alpina	19.0
Viola biflora	18.7	Aster bellidiastrum	18.6
Peucedanum ostruthium	18.4	Luzula nivea	18.2
Gentiana purpurea	17.8	Picea abies	17.6
Luzula sylvatica	17.5	Paederota lutea	17.4
Astrantia minor	17.4	Rhodothamnus chamaecistus	17.3
Ranunculus oreophilus	17.1	Lycopodium annotinum	17.1
Pinus mugo	16.9	Laserpitium peucedanoides	16.6
Erica herbacea	16.4	Hieracium murorum	16.1
Dicranum scoparium	15.7	Pulsatilla alpina	15.6
Gentiana punctata	15.4	Calamagrostis varia	15.2

Constant species (*occurrence frequencies*)

Vaccinium myrtillus	69.0	Larix decidua	69.0
Vaccinium vitis-idaea	55.0	Rhododendron ferrugineum	50.0
Picea abies	50.0	Homogyne alpina	49.0
Sorbus aucuparia	48.0	Deschampsia flexuosa	42.0
Hieracium murorum	40.0	Dicranum scoparium	36.0
Hylocomium splendens	35.0	Solidago virgaurea	34.0
Calamagrostis villosa	33.0	Pinus cembra	32.0
Oxalis acetosella	32.0	Rhytidiadelphus triquetrus	31.0
Melampyrum sylvaticum	31.0	Geranium sylvaticum	30.0
Pinus uncinata	29.0	Luzula sylvatica	27.0
Valeriana tripteris	26.0	Pleurozium schreberi	26.0
Juniperus communis subsp. alpina	26.0	Rosa pendulina	24.0
Campanula scheuchzeri	23.0	Sesleria caerulea	21.0
Juniperus communis subsp. communis	21.0	Vaccinium uliginosum	20.0
Aster bellidiastrum	19.0	Anthoxanthum odoratum	19.0
Viola biflora	18.0	Sorbus chamaemespilus	18.0
Luzula nivea	17.0	Lotus corniculatus	17.0
Calamagrostis varia	17.0	Rubus saxatilis	16.0
Rhododendron hirsutum	16.0	Lonicera caerulea	16.0

Rubus idaeus	15.0	Erica herbacea	15.0
Abies alba	15.0	Veratrum album	14.0
Polytrichastrum formosum	14.0	Polystichum lonchitis	14.0
Polygala chamaebuxus	14.0	Fragaria vesca	14.0
Clematis alpina	14.0	Sorbus aria agg.	13.0
Soldanella alpina	13.0	Salix appendiculata	13.0
Potentilla erecta	13.0	Lycopodium annotinum	13.0
Hepatica nobilis	13.0	Festuca flavescens	13.0
Daphne mezereum	13.0	Carex sempervirens	13.0
Alnus viridis	13.0	Tortella tortuosa	12.0
Pulsatilla alpina	12.0	Prenanthes purpurea	12.0
Poa nemoralis	12.0	Poa alpina	12.0
Pinus mugo	12.0	Chaerophyllum hirsutum	12.0
Huperzia selago	12.0	Gymnocarpium dryopteris	12.0
Saxifraga cuneifolia	11.0	Phyteuma orbiculare	11.0
Melica nutans	11.0	Maianthemum bifolium	11.0
Lonicera alpigena	11.0	Festuca rubra	11.0
Dryopteris dilatata	11.0	Valeriana montana	10.0
Peucedanum ostruthium	10.0	Orthilia secunda	10.0
Luzula sieberi	10.0	Hieracium prenanthoides	10.0
Helianthemum nummularium	10.0	Galium pumilum	10.0
Asplenium viride	10.0	Amelanchier ovalis	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Larix decidua	51.0	Vaccinium myrtillus	31.0
Pinus uncinata	24.0	Rhododendron ferrugineum	23.0
Pinus cembra	17.0	Hylocomium splendens	10.0
Calamagrostis villosa	6.0	Vaccinium vitis-idaea	5.0
Rhododendron hirsutum	5.0		

G3.4a - Temperate and continental Pinus sylvestris woodland

*Diagnostic species (phi coefficient * 100)*

Pinus sylvestris	40.2	Pleurozium schreberi	24.9
Dicranum polysetum	24.6	Betula pendula	18.6
Deschampsia flexuosa	17.6	Quercus robur	15.9
Dicranum scoparium	15.7	Vaccinium myrtillus	15.3
Frangula alnus	15.2		

Constant species (occurrence frequencies)

Pinus sylvestris	100.0	Deschampsia flexuosa	53.0
Pleurozium schreberi	50.0	Vaccinium myrtillus	48.0
Sorbus aucuparia	46.0	Betula pendula	46.0
Quercus robur	45.0	Calluna vulgaris	37.0
Frangula alnus	35.0	Dicranum scoparium	35.0
Vaccinium vitis-idaea	27.0	Picea abies	27.0
Rubus fruticosus agg.	23.0	Molinia caerulea agg.	23.0
Festuca ovina	23.0	Hypnum cupressiforme	22.0
Quercus petraea	21.0	Polytrichastrum formosum	20.0
Juniperus communis subsp. communis	19.0	Hylocomium splendens	19.0

Fagus sylvatica	19.0	Dryopteris carthusiana	19.0
Dicranum polysetum	19.0	Melampyrum pratense	18.0
Agrostis capillaris	18.0	Pteridium aquilinum	17.0
Pseudoscleropodium purum	16.0	Luzula pilosa	15.0
Fragaria vesca	15.0	Rumex acetosella	14.0
Rubus idaeus	14.0	Dryopteris dilatata	14.0
Hieracium pilosella	13.0	Hieracium murorum	13.0
Prunus serotina	12.0	Pohlia nutans	12.0
Veronica officinalis	11.0	Solidago virgaurea	11.0
Leucobryum glaucum	11.0	Hypnum jutlandicum	11.0
Betula pubescens	11.0	Anthoxanthum odoratum	11.0
Calamagrostis epigejos	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Pinus sylvestris	96.0	Pleurozium schreberi	21.0
Vaccinium myrtillus	19.0	Deschampsia flexuosa	15.0
Molinia caerulea agg.	7.0	Hylocomium splendens	5.0

G3.4b - Temperate and submediterranean montane Pinus sylvestris-nigra woodland

*Diagnostic species (phi coefficient * 100)*

Amelanchier ovalis	47.7	Polygala chamaebuxus	45.8
Epipactis atrorubens	42.0	Sorbus aria agg.	35.7
Calamagrostis varia	34.9	Erica herbacea	34.2
Berberis vulgaris	33.8	Pinus sylvestris	32.6
Juniperus communis subsp. communis	29.6	Cotoneaster tomentosus	29.6
Goodyera repens	29.2	Carex humilis	28.3
Buphthalmum salicifolium	26.4	Chamaecytisus purpureus	24.7
Arctostaphylos uva-ursi	24.2	Pinus nigra	24.1
Viscum album	23.9	Globularia cordifolia	23.8
Viburnum lantana	23.5	Anthericum ramosum	21.3
Sesleria caerulea	21.2	Lavandula angustifolia	21.0
Carduus defloratus agg.	21.0	Ononis rotundifolia	20.7
Teucrium chamaedrys	20.5	Hieracium murorum	20.5
Carex alba	20.5	Achnatherum calamagrostis	19.8
Cytisus sessilifolius	19.3	Orthilia secunda	19.2
Leontodon incanus	19.2	Pyrola chlorantha	18.5
Hieracium pictum	18.5	Gymnadenia odoratissima	18.5
Rhamnus saxatilis	18.0	Teucrium montanum	17.5
Laserpitium siler	17.0	Cyclamen purpurascens	16.8
Saponaria ocyroides	16.0	Astragalus monspessulanus	15.8
Quercus pubescens	15.7	Peucedanum oreoselinum	15.7
Daphne cneorum	15.7	Galium lucidum	15.5
Brachypodium pinnatum	15.5	Teucrium lucidum	15.3
Vincetoxicum hirundinaria	15.2		

Constant species (occurrence frequencies)

Pinus sylvestris	85.0	Sorbus aria agg.	61.0
Juniperus communis subsp. communis	60.0	Amelanchier ovalis	59.0
Polygala chamaebuxus	50.0	Hieracium murorum	49.0

Teucrium chamaedrys	48.0	Brachypodium pinnatum	44.0
Carex humilis	43.0	Epipactis atrorubens	41.0
Viburnum lantana	40.0	Calamagrostis varia	40.0
Lotus corniculatus	37.0	Picea abies	36.0
Berberis vulgaris	35.0	Erica herbacea	33.0
Euphorbia cyparissias	32.0	Sesleria caerulea	31.0
Campanula rotundifolia	30.0	Quercus pubescens	27.0
Corylus avellana	27.0	Vincetoxicum hirundinaria	26.0
Pimpinella saxifraga	26.0	Fragaria vesca	26.0
Fagus sylvatica	26.0	Bupthalmum salicifolium	26.0
Anthericum ramosum	26.0	Hippocrepis comosa	25.0
Solidago virgaurea	24.0	Teucrium montanum	23.0
Orthilia secunda	22.0	Lonicera xylosteum	22.0
Pinus nigra	21.0	Crataegus monogyna	21.0
Carex flacca	21.0	Carduus defloratus agg.	21.0
Sanguisorba minor	19.0	Globularia cordifolia	19.0
Cotoneaster tomentosus	19.0	Carex alba	19.0
Arctostaphylos uva-ursi	19.0	Hieracium pilosella	18.0
Goodyera repens	18.0	Sorbus aucuparia	17.0
Ligustrum vulgare	17.0	Hippocrepis emerus	17.0
Hepatica nobilis	17.0	Cornus sanguinea	17.0
Bromus erectus	17.0	Acer pseudoplatanus	17.0
Prunella grandiflora	16.0	Peucedanum oreoselinum	16.0
Molinia caerulea agg.	16.0	Lavandula angustifolia	16.0
Cyclamen purpurascens	16.0	Viola hirta	15.0
Galium lucidum	15.0	Fraxinus excelsior	15.0
Cytisus sessilifolius	15.0	Carlina acaulis	15.0
Helianthemum nummularium	14.0	Buxus sempervirens	14.0
Anthyllis vulneraria	14.0	Scabiosa columbaria	13.0
Polygonatum odoratum	13.0	Laserpitium latifolium	13.0
Genista pilosa	13.0	Fraxinus ornus	13.0
Festuca ovina	13.0	Asperula cynanchica	13.0
Abies alba	13.0	Tortella tortuosa	12.0
Quercus petraea	12.0	Phyteuma orbiculare	12.0
Ostrya carpinifolia	12.0	Melica nutans	12.0
Leucanthemum vulgare agg.	12.0	Cirsium acaule	12.0
Carlina vulgaris	12.0	Astragalus monspessulanus	12.0
Sesleria coerulea	11.0	Rubus saxatilis	11.0
Rhamnus saxatilis	11.0	Potentilla erecta	11.0
Platanthera bifolia	11.0	Frangula alnus	11.0
Epipactis helleborine	11.0	Cephalanthera longifolia	11.0
Carex ornithopoda	11.0	Brachypodium sylvaticum	11.0
Aster bellidiastrum	11.0	Acer opalus	11.0
Viscum album	10.0	Valeriana tripteris	10.0
Prunus mahaleb	10.0	Prunus avium	10.0
Primula veris	10.0	Potentilla tabernaemontani	10.0
Ononis spinosa	10.0	Leontodon incanus	10.0
Leontodon hispidus	10.0	Laserpitium siler	10.0
Hylocomium splendens	10.0	Centaurea scabiosa	10.0
Achnatherum calamagrostis	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Pinus sylvestris	80.0	Pinus nigra	19.0
Erica herbacea	18.0	Sesleria caerulea	9.0
Buxus sempervirens	8.0	Carex humilis	6.0
Calamagrostis varia	6.0	Brachypodium pinnatum	6.0
Arctostaphylos uva-ursi	5.0		

G3.4c - Mediterranean montane Pinus sylvestris-nigra woodland

*Diagnostic species (phi coefficient * 100)*

Festuca iberica	60.9	Pinus sylvestris	35.1
Avenula marginata	35.1	Buxus sempervirens	31.0
Cruciata glabra	28.4	Juniperus communis subsp. communis	27.1
Hepatica nobilis	26.7	Polygala calcarea	26.5
Cytisus balansae	26.4	Luzula lactea	23.4
Quercus cerrioidea	21.9	Berberis aetnensis	21.8
Vicia pyrenaica	20.8	Arctostaphylos uva-ursi	19.9
Amelanchier ovalis	19.3	Viola willkommii	18.2
Veronica officinalis	18.2	Galium rotundifolium	17.7
Ononis aragonensis	17.3	Vicia incana	16.9
Pinus nigra	16.7	Hieracium murorum	16.5
Erica vagans	16.2	Pyrola chlorantha	16.1
Sorbus aria agg.	15.9	Viola canina	15.6
Lathyrus montanus	15.6	Avenula requienii	15.6
Arenaria montana	15.5		

Constant species (occurrence frequencies)

Pinus sylvestris	92.0	Juniperus communis subsp. communis	55.0
Cruciata glabra	50.0	Festuca iberica	47.0
Hepatica nobilis	46.0	Deschampsia flexuosa	45.0
Hieracium murorum	41.0	Buxus sempervirens	39.0
Veronica officinalis	37.0	Fragaria vesca	33.0
Calluna vulgaris	30.0	Vaccinium myrtillus	29.0
Fagus sylvatica	29.0	Sorbus aria agg.	28.0
Pteridium aquilinum	26.0	Hylocomium splendens	26.0
Sorbus aucuparia	25.0	Viola canina	22.0
Avenula marginata	22.0	Amelanchier ovalis	22.0
Ilex aquifolium	21.0	Stachys officinalis	20.0
Polygala calcarea	20.0	Silene nutans	18.0
Prunella grandiflora	18.0	Lathyrus montanus	18.0
Dicranum scoparium	18.0	Anthoxanthum odoratum	18.0
Teucrium scorodonia	17.0	Poa nemoralis	17.0
Galium rotundifolium	17.0	Galium pumilum	17.0
Quercus pubescens	16.0	Primula veris	16.0
Helleborus foetidus	16.0	Festuca rubra	16.0
Brachypodium pinnatum	16.0	Avenula pratensis	16.0
Arctostaphylos uva-ursi	16.0	Abies alba	16.0
Viola riviniana	14.0	Pinus nigra	14.0
Daphne laureola	14.0	Cytisus balansae	14.0
Carex flacca	14.0	Bromus erectus	14.0

Acer opalus	14.0	Solidago virgaurea	13.0
Rubus idaeus	13.0	Rosa canina agg.	13.0
Rhytidadelphus triquetrus	13.0	Hieracium pilosella	13.0
Erica vagans	13.0	Rubus ulmifolius	12.0
Ranunculus serpens subsp. nemorosus	12.0	Polypodium vulgare	12.0
Melampyrum pratense	12.0	Lotus corniculatus	12.0
Lonicera xylosteum	12.0	Juniperus communis subsp. alpina	12.0
Galium verum	12.0	Viola reichenbachiana	11.0
Vincetoxicum hirundinaria	11.0	Vicia sepium	11.0
Viburnum lantana	11.0	Valeriana montana	11.0
Stellaria holostea	11.0	Pimpinella saxifraga	11.0
Euphorbia amygdaloides	11.0	Crataegus monogyna	11.0
Carex humilis	11.0	Campanula rotundifolia	11.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Pinus sylvestris	89.0	Buxus sempervirens	28.0
Festuca iberica	16.0	Deschampsia flexuosa	12.0
Pinus nigra	9.0	Brachypodium pinnatum	8.0
Hylocomium splendens	7.0	Cytisus balansae	5.0

G3.6 - Mediterranean and Balkan subalpine Pinus heldreichii-peuce woodland

*Diagnostic species (phi coefficient * 100)*

Pinus heldreichii	79.8	Pinus peuce	64.9
Daphne blagayana	41.0	Minuartia baldaccii	40.1
Daphne oleoides	40.0	Moehringia pendula	37.1
Sesleria robusta	33.5	Hieracium pannosum	32.7
Juniperus communis subsp. alpina	32.3	Bornmuellera tymphaea	32.3
Wulfenia carinthiaca	28.2	Thymus rechingeri	28.1
Aremonia agrimonoides	28.1	Asperula aristata	27.3
Crocus veluchensis	26.4	Lerchenfeldia flexuosa	25.9
Festuca valida	25.9	Luzula luzulina	25.1
Acinos alpinus	24.1	Geranium macrorrhizum	23.3
Verbascum nikolai	23.1	Polygala nicaeensis	22.4
Trinia frigida	22.0	Rosa myriacantha	22.0
Festuca koritnicensis	21.3	Hieracium cymosum	20.5
Chamaecytisus absinthioides	20.0	Euphorbia amygdaloides	20.0
Linum capitatum	19.8	Calamagrostis arundinacea	19.8
Luzula sylvatica	19.4	Scabiosa cinerea	19.1
Hieracium hoppeanum	18.3	Poa thessala	18.1
Bromus cappadocicus	17.9	Poa media	16.8
Potentilla ternata	16.7	Veratrum album	16.5
Thesium auriculatum	16.4	Pulsatilla halleri subsp. rhodopaea	16.4
Primula kitaibeliana	16.4	Iberis sempervirens	16.4
Festuca hercegovina	16.4	Centaurea lacerata	16.4
Bromus pindicus	16.4	Arenaria gracilis	16.4
Leotodon incanus	16.3	Cytisus agnipilus	16.3
Senecio thapsoides	16.2	Festuca pirinensis	16.2
Carum rigidulum	16.2	Amphoricarpus neumayeri	16.2
Edrianthus tenuifolius	16.1	Gentianella crispata	15.9

Daphne mezereum	15.7	Carum appuanum	15.7
Saxifraga scardica	15.5	Ferulago sylvatica	15.5
Aubrieta gracilis	15.5	Alyssum scardicum	15.5
Potentilla micrantha	15.4	Oxytropis urumovii	15.4
Dianthus integer	15.4	Knautia ambigua	15.3
Genista carinalis	15.3	Buxus sempervirens	15.3
Bornmuellera baldaccii	15.2	Staehelina uniflosculosa	15.1
<i>Constant species (occurrence frequencies)</i>			
Pinus heldreichii	65.0	Vaccinium myrtillus	46.0
Fagus sylvatica	46.0	Pinus peuce	43.0
Fragaria vesca	43.0	Euphorbia amygdaloides	41.0
Juniperus communis subsp. alpina	32.0	Calamagrostis arundinacea	32.0
Veronica chamaedrys	30.0	Picea abies	30.0
Luzula sylvatica	30.0	Aremonia agrimonoides	30.0
Abies alba	27.0	Juniperus communis subsp. communis	24.0
Hieracium murorum	24.0	Dryopteris filix-mas	24.0
Daphne oleoides	24.0	Daphne mezereum	24.0
Acinos alpinus	24.0	Festuca heterophylla	22.0
Anemone nemorosa	22.0	Thymus praecox	19.0
Oxalis acetosella	19.0	Luzula luzuloides	19.0
Daphne blagayana	19.0	Buxus sempervirens	19.0
Asperula aristata	19.0	Ajuga reptans	19.0
Veronica officinalis	16.0	Veratrum album	16.0
Rubus idaeus	16.0	Primula veris	16.0
Moehringia pendula	16.0	Minuartia baldaccii	16.0
Luzula luzulina	16.0	Homogyne alpina	16.0
Brachypodium pinnatum	16.0	Trifolium alpestre	14.0
Solidago virgaurea	14.0	Sesleria robusta	14.0
Rosa pendulina	14.0	Potentilla micrantha	14.0
Mycelis muralis	14.0	Lerchenfeldia flexuosa	14.0
Hieracium pannosum	14.0	Hieracium hoppeanum	14.0
Helianthemum nummularium	14.0	Galium rotundifolium	14.0
Dactylis glomerata	14.0	Cruciata glabra	14.0
Rubus fruticosus agg.	11.0	Polystichum aculeatum	11.0
Polygala nicaeensis	11.0	Poa nemoralis	11.0
Pinus sylvestris	11.0	Pinus nigra	11.0
Ostrya carpinifolia	11.0	Melampyrum sylvaticum	11.0
Lotus corniculatus	11.0	Lonicera xylosteum	11.0
Hypericum maculatum	11.0	Hieracium cymosum	11.0
Geranium sylvaticum	11.0	Geranium macrorrhizum	11.0
Gentiana asclepiadea	11.0	Galium lucidum	11.0
Euphorbia cyparissias	11.0	Crocus veluchensis	11.0
Clinopodium vulgare	11.0	Campanula glomerata	11.0
Brachypodium sylvaticum	11.0	Bornmuellera tymphaea	11.0
Asplenium trichomanes	11.0		
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Pinus heldreichii	65.0	Pinus peuce	35.0
Vaccinium myrtillus	22.0	Buxus sempervirens	11.0
Thymus praecox	8.0	Juniperus communis subsp. alpina	8.0

Calamagrostis arundinacea	8.0	Brachypodium sylvaticum	8.0
Brachypodium pinnatum	5.0		

G3.7 - Mediterranean lowland to submontane Pinus woodland

*Diagnostic species (phi coefficient * 100)*

Pinus halepensis	53.7	Pinus pinaster	44.1
Cistus salvifolius	30.3	Pistacia lentiscus	29.6
Pinus brutia	28.5	Juniperus oxycedrus	26.2
Quercus ilex	25.2	Phillyrea angustifolia	24.7
Arbutus unedo	24.3	Brachypodium retusum	24.1
Lonicera implexa	23.7	Smilax aspera	23.5
Quercus coccifera	23.2	Rubia peregrina	22.6
Rosmarinus officinalis	22.5	Asparagus acutifolius	21.8
Phillyrea latifolia	19.3	Myrtus communis	18.9
Pinus pinea	18.8	Cistus incanus	18.8
Dorycnium pentaphyllum	18.7	Cistus monspeliensis	18.7
Calicotome spinosa	18.3	Cistus albidus	17.9
Thymus vulgaris	17.8	Erica arborea	17.8
Staehelina dubia	17.7	Clematis flammula	17.0
Helichrysum stoechas	16.3	Avenula bromoides	16.3
Erica manipuliflora	16.2	Daphne gnidium	15.6
Erica scoparia	15.5	Ononis minutissima	15.2

Constant species (occurrence frequencies)

Pinus halepensis	53.0	Rubia peregrina	41.0
Pistacia lentiscus	37.0	Quercus ilex	36.0
Pinus pinaster	36.0	Cistus salvifolius	32.0
Juniperus oxycedrus	31.0	Brachypodium retusum	31.0
Smilax aspera	30.0	Asparagus acutifolius	30.0
Arbutus unedo	26.0	Quercus coccifera	24.0
Quercus pubescens	22.0	Phillyrea angustifolia	22.0
Lonicera implexa	22.0	Dactylis glomerata	22.0
Phillyrea latifolia	21.0	Erica arborea	21.0
Thymus vulgaris	20.0	Rosmarinus officinalis	20.0
Calluna vulgaris	19.0	Dorycnium pentaphyllum	17.0
Myrtus communis	15.0	Hedera helix	15.0
Clematis flammula	15.0	Cistus monspeliensis	15.0
Cistus incanus	15.0	Teucrium chamaedrys	14.0
Rhamnus alaternus	14.0	Pteridium aquilinum	14.0
Helichrysum stoechas	14.0	Daphne gnidium	14.0
Brachypodium phoenicoides	14.0	Teucrium polium	12.0
Ruscus aculeatus	12.0	Avenula bromoides	12.0
Sanguisorba minor	11.0	Juniperus phoenicea	11.0
Erica scoparia	11.0	Erica cinerea	11.0
Crataegus monogyna	11.0	Cistus albidus	11.0
Aphyllanthes monspeliensis	11.0	Staehelina dubia	10.0
Rubus ulmifolius	10.0	Quercus suber	10.0
Pinus brutia	10.0	Olea europaea var. europaea	10.0
Lavandula stoechas	10.0	Genista pilosa	10.0

Carex hallerana	10.0	Calicotome spinosa	10.0
Brachypodium pinnatum	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Pinus halepensis	49.0	Pinus pinaster	31.0
Pinus brutia	10.0	Calluna vulgaris	7.0
Brachypodium retusum	7.0	Pistacia lentiscus	6.0
Pinus pinea	6.0	Rosmarinus officinalis	5.0
Pteridium aquilinum	5.0	Erica arborea	5.0

G3.9a - Taxus baccata woodland

*Diagnostic species (phi coefficient * 100)*

Taxus baccata	85.0	Arenaria balearica	25.5
Cymbalaria aequitriloba	25.1	Cyclamen repandum	23.8
Ilex aquifolium	21.9	Stachys corsica	20.2
Glechoma sardoa	19.5	Hedera helix	18.4
Daphne laureola	17.3	Geranium lucidum	16.8
Acer monspessulanum	15.5	Ribes multiflorum	15.4
Geranium lanuginosum	15.4	Asplenium onopteris	15.4
Hypochaeris robertia	15.3	Rhamnus alpinus	15.1

Constant species (occurrence frequencies)

Taxus baccata	100.0	Hedera helix	58.0
Ilex aquifolium	39.0	Fagus sylvatica	35.0
Viola reichenbachiana	32.0	Mercurialis perennis	31.0
Corylus avellana	24.0	Sorbus aria agg.	23.0
Fraxinus excelsior	23.0	Quercus ilex	22.0
Mycelis muralis	20.0	Daphne laureola	20.0
Crataegus monogyna	20.0	Tamus communis	19.0
Sambucus nigra	19.0	Hepatica nobilis	16.0
Cyclamen repandum	16.0	Acer pseudoplatanus	16.0
Rubus fruticosus agg.	15.0	Hieracium murorum	15.0
Fragaria vesca	15.0	Euphorbia amygdaloides	15.0
Ruscus aculeatus	14.0	Dryopteris filix-mas	14.0
Brachypodium sylvaticum	14.0	Asplenium onopteris	14.0
Acer opalus	14.0	Sanicula europaea	12.0
Rubia peregrina	12.0	Poa nemoralis	12.0
Melica uniflora	12.0	Clematis vitalba	12.0
Asplenium trichomanes	12.0	Arum maculatum	12.0
Acer monspessulanum	12.0	Solidago virgaurea	11.0
Rubus ulmifolius	11.0	Pteridium aquilinum	11.0
Eurhynchium striatum	11.0	Cornus sanguinea	11.0
Carpinus betulus	11.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Taxus baccata	97.0	Fagus sylvatica	9.0
Hedera helix	8.0		

G3.9b - Mediterranean Cupressaceae woodland

*Diagnostic species (phi coefficient * 100)*

Cupressus sempervirens	63.4	Juniperus foetidissima	49.4
Juniperus thurifera	43.2	Quercus coccifera	36.2
Centaurea raphanina	35.1	Festuca jeanpertii	30.3
Pinus brutia	29.8	Juniperus excelsa	28.7
Astragalus creticus	28.6	Hypericum empetrifolium	28.4
Urginea maritima	27.9	Daphne oleoides	26.5
Salvia triloba	25.8	Stipa bromoides	25.6
Crepis fraasii	25.4	Ballota acetabulosa	25.2
Campanula spatulata	25.1	Juniperus drupacea	24.2
Juniperus oxycedrus	23.8	Phlomis fruticosa	23.7
Abies cephalonica	23.1	Micromeria juliana	23.0
Pteroccephalus perennis	22.7	Trifolium physodes	22.0
Cerastium brachypetalum	21.9	Lagoecia cuminooides	20.8
Lactuca viminea	20.7	Bellis longifolia	20.6
Marrubium velutinum	20.3	Aethionema saxatile	20.3
Helleborus cyclophyllus	20.2	Centaurea idaea	20.2
Cerastium candidissimum	20.1	Erysimum cephalonicum	19.9
Rhamnus lycioides	19.8	Melica ciliata	19.3
Ceterach officinarum	19.1	Leontodon tuberosus	19.0
Sideritis curvidens	18.8	Rosa pulverulenta	18.8
Olea europaea var. sylvestris	18.8	Prasium majus	18.7
Galium thymifolium	18.6	Asparagus aphyllus	18.6
Scandix australis	18.4	Koeleria lobata	18.4
Phleum montanum	18.3	Helictotrichon convolutum	18.0
Nepeta spruneri	17.3	Teucrium microphyllum	17.2
Arabis verna	17.2	Acer monspessulanum	17.2
Rubia tenuifolia	17.1	Phlomis lanata	17.1
Onobrychis ebenoides	17.1	Crepis cretica	17.1
Geranium purpureum	16.7	Medicago coronata	16.6
Orchis anatolica	16.5	Galium taygeteum	16.4
Lamyropsis cynaroides	16.3	Crupina crupinastrum	16.3
Teucrium polium	16.2	Euphorbia myrsinites	16.2
Erysimum pectinatum	16.2	Trifolium stellatum	16.0
Teucrium divaricatum	16.0	Galium murale	16.0
Polystichum woronowii	15.9	Euphorbia apios	15.9
Stipa holosericea	15.8	Scutellaria rupestris	15.8
Leontodon graecus	15.8	Calicotome villosa	15.8
Astragalus depressus	15.8	Salvia pomifera	15.7
Centaurea affinis	15.7	Hippocrepis bourgaei	15.6
Sedum amplexicaule	15.5	Eryngium amethystinum	15.4
Scorzonera cretica	15.3	Orlaya kochii	15.3
Lithodora hispidula	15.3	Galium monachinii	15.3
Biscutella didyma	15.3	Bupleurum glumaceum	15.1

Constant species (occurrence frequencies)

Dactylis glomerata	42.0	Cupressus sempervirens	42.0
Quercus coccifera	41.0	Juniperus oxycedrus	29.0
Juniperus foetidissima	26.0	Melica ciliata	23.0

Juniperus thurifera	21.0	Teucrium polium	20.0
Teucrium chamaedrys	20.0	Poa bulbosa	20.0
Urginea maritima	18.0	Centaurea raphanina	17.0
Brachypodium retusum	17.0	Asparagus acutifolius	17.0
Stipa bromoides	15.0	Pistacia lentiscus	15.0
Eryngium campestre	15.0	Cerastium brachypetalum	15.0
Trifolium campestre	14.0	Hypericum empetrifolium	14.0
Daphne oleoides	14.0	Acer monspessulanum	14.0
Prasium majus	12.0	Pinus brutia	12.0
Phlomis fruticosa	12.0	Geranium purpureum	12.0
Festuca jeanpertii	12.0	Cistus salvifolius	12.0
Ceterach officinarum	12.0	Campanula spatulata	12.0
Thymus longicaulis	11.0	Stipa pennata	11.0
Salvia triloba	11.0	Rhamnus lycioides	11.0
Quercus pubescens	11.0	Olea europaea var. sylvestris	11.0
Micromeria juliana	11.0	Koeleria vallesiana	11.0
Crepis fraasii	11.0	Carlina corymbosa	11.0
Calicotome villosa	11.0	Astragalus creticus	11.0
Asphodelus ramosus	11.0	Aethionema saxatile	11.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Cupressus sempervirens	41.0	Juniperus foetidissima	23.0
Juniperus thurifera	20.0	Pinus brutia	9.0
Juniperus oxycedrus	9.0	Juniperus excelsa	8.0
Juniperus drupacea	6.0		

G3.A - Picea taiga woodland

*Diagnostic species (phi coefficient * 100)*

Brachythecium oedipodium	72.5	Trientalis europaea	54.6
Plagiothecium curvifolium	50.2	Dicranum polysetum	46.7
Eurhynchium angustirete	44.2	Pleurozium schreberi	39.7
Hylocomium splendens	39.6	Ptilium crista-castrensis	39.3
Maianthemum bifolium	38.8	Luzula pilosa	38.7
Lycopodium annotinum	36.3	Plagiomnium affine	35.5
Lophocolea heterophylla	34.2	Tetraphis pellucida	34.1
Rubus saxatilis	32.9	Picea abies	31.5
Calamagrostis arundinacea	30.3	Dicranum majus	30.0
Picea obovata	29.1	Goodyera repens	29.0
Sorbus aucuparia	28.6	Vaccinium myrtillus	28.0
Sphagnum girgensohnii	27.7	Dryopteris carthusiana	27.1
Herzogiella seligeri	26.9	Abies sibirica	26.8
Dryopteris expansa	26.7	Vaccinium vitis-idaea	26.5
Plagiothecium laetum	26.4	Betula pubescens	25.6
Oxalis acetosella	25.4	Frangula alnus	24.9
Pinus sylvestris	24.7	Dicranum fuscescens	24.5
Aconitum septentrionale	24.4	Dicranum scoparium	23.7
Viola epipsila	23.6	Rubus idaeus	22.9
Cirriphyllum piliferum	22.9	Parmeliopsis hyperopta	22.1
Brachythecium reflexum	21.7	Usnea subfloridana	20.8

Hypogymnia tubulosa	20.4	Rhytidiadelphus triquetrus	20.2
Equisetum sylvaticum	20.1	Linnaea borealis	20.0
Vulpicidia pinastris	19.7	Rhytidiadelphus subpinnatus	19.6
Quercus robur	19.5	Pseudevernia furfuracea	19.4
Melampyrum pratense	19.4	Gymnocarpium dryopteris	18.8
Bryoria capillaris	18.7	Rhodobryum roseum	18.7
Circaea alpina	18.7	Hieracium pseuderecsum	18.6
Hypogymnia bitteri	18.2	Dicranum montanum	17.6
Brachythecium starkei	17.5	Populus tremula	17.4
Diplazium sibiricum	17.2	Sanionia uncinata	17.1
Viola selkirkii	16.8	Orthodicranum montanum	16.7
Parmelia sulcata	16.5	Evernia mesomorpha	16.5
Solidago virgaurea	16.4	Carex digitata	16.4
Calamagrostis purpurea	16.4	Mycelis muralis	16.1
Cacalia hastata	16.1	Melica nutans	15.9
Betula pendula	15.4	Parmelia saxatilis	15.3
Lepidozia reptans	15.3	Hieracium jaccardi	15.3
Phegopteris connectilis	15.2		
<i>Constant species (occurrence frequencies)</i>			
Sorbus aucuparia	87.0	Picea abies	87.0
Vaccinium myrtillus	85.0	Pleurozium schreberi	84.0
Maianthemum bifolium	76.0	Hylocomium splendens	75.0
Oxalis acetosella	72.0	Luzula pilosa	71.0
Trientalis europaea	70.0	Pinus sylvestris	65.0
Brachythecium oedipodium	64.0	Frangula alnus	58.0
Rubus idaeus	56.0	Dryopteris carthusiana	56.0
Quercus robur	55.0	Dicranum scoparium	54.0
Vaccinium vitis-idaea	52.0	Plagiomnium affine	51.0
Calamagrostis arundinacea	50.0	Betula pubescens	48.0
Rubus saxatilis	46.0	Dicranum polysetum	46.0
Solidago virgaurea	42.0	Corylus avellana	41.0
Betula pendula	39.0	Plagiothecium curvifolium	35.0
Mycelis muralis	35.0	Melampyrum pratense	35.0
Eurhynchium angustirete	34.0	Rhytidiadelphus triquetrus	31.0
Ptilium crista-castrensis	31.0	Lycopodium annotinum	31.0
Populus tremula	30.0	Fragaria vesca	30.0
Melica nutans	29.0	Polytrichastrum formosum	28.0
Lophocolea heterophylla	28.0	Carex digitata	28.0
Athyrium filix-femina	27.0	Pteridium aquilinum	26.0
Deschampsia flexuosa	24.0	Viola riviniana	23.0
Equisetum sylvaticum	23.0	Dryopteris dilatata	23.0
Gymnocarpium dryopteris	22.0	Tetraphis pellucida	21.0
Paris quadrifolia	19.0	Goodyera repens	19.0
Dicranum majus	19.0	Convallaria majalis	19.0
Cirriphyllum piliferum	19.0	Sphagnum girgensohnii	18.0
Orthilia secunda	17.0	Milium effusum	17.0
Plagiothecium laetum	16.0	Moehringia trinervia	16.0
Lysimachia vulgaris	16.0	Hypnum cupressiforme	16.0
Stellaria holostea	15.0	Lonicera xylosteum	15.0
Dryopteris filix-mas	15.0	Daphne mezereum	15.0

Stellaria nemorum	14.0	Sphagnum capillifolium	14.0
Equisetum pratense	14.0	Epilobium angustifolium	14.0
Dryopteris expansa	14.0	Dicranum fuscescens	14.0
Acer platanoides	14.0	Plagiochila asplenioides	13.0
Molinia caerulea agg.	13.0	Lamiastrum galeobdolon	13.0
Deschampsia cespitosa	13.0	Anemone nemorosa	13.0
Alnus glutinosa	13.0	Viburnum opulus	12.0
Picea obovata	12.0	Phegopteris connectilis	12.0
Lathyrus vernus	12.0	Herzogiella seligeri	12.0
Crepis paludosa	12.0	Aegopodium podagraria	12.0
Abies sibirica	12.0	Veronica officinalis	11.0
Polytrichum commune	11.0	Linnaea borealis	11.0
Geum rivale	11.0	Circaea alpina	11.0
Actaea spicata	11.0	Aconitum septentrionale	11.0
Viola epipsila	10.0	Juniperus communis subsp. communis	10.0
Carex curta	10.0	Agrostis capillaris	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Picea abies	87.0	Hylocomium splendens	26.0
Vaccinium myrtillus	25.0	Pinus sylvestris	25.0
Pleurozium schreberi	23.0	Oxalis acetosella	20.0
Picea obovata	12.0	Maianthemum bifolium	5.0

G3.B - Pinus sylvestris taiga woodland

*Diagnostic species (phi coefficient * 100)*

Empetrum nigrum subsp. hermaphroditum	51.7	Vulpicidia pinastris	46.5
Ptilidium pulcherrimum	45.4	Picea obovata	43.5
Orthodicranum montanum	43.2	Parmelia sulcata	42.9
Evernia mesomorpha	41.6	Abies sibirica	41.4
Vaccinium vitis-idaea	39.6	Hypnum pallescens	38.5
Pinus sylvestris	38.1	Hypogymnia physodes	37.5
Pseudevernia furfuracea	36.6	Seseli krylovii	34.3
Parmeliopsis hyperopta	34.0	Hypocnomyce scalaris	33.4
Betula pubescens	32.9	Ptilium crista-castrensis	31.9
Usnea subfloridana	30.4	Sanionia uncinata	29.7
Carex pediformis	29.6	Adenophora lilifolia	29.6
Cerastium pauciflorum	29.4	Imshaugia aleurites	29.0
Linnaea borealis	28.5	Rosa majalis	27.9
Parmeliopsis ambigua	27.8	Orthodicranum flagellare	27.7
Callicladium haldanianum	27.3	Hieracium onegense	26.4
Euphorbia subcordata	26.4	Usnea hirta	26.3
Pleurospermum uralense	25.2	Viola collina	24.8
Paraleucobryum longifolium	24.8	Dicranum polysetum	24.6
Lecanora allophana	24.0	Platygyrium repens	23.2
Buellia punctata	23.1	Cladonia cenotea	22.9
Rubus saxatilis	22.4	Bupleurum longifolium	21.7
Digitalis grandiflora	21.1	Graphis scripta	20.9
Hylotelephium triphyllum	20.7	Orthilia secunda	20.5

Hieracium subpellucidum	20.5	Cladonia coniocraea	20.3
Physconia detersa	20.2	Vaccinium uliginosum	19.6
Lathyrus pisiformis	19.6	Hypogymnia bitteri	19.5
Pleurozium schreberi	19.2	Geranium sylvaticum	19.2
Lecanora symmicta	19.1	Pylaisiella polyantha	19.1
Trientalis europaea	19.0	Vicia sylvatica	18.9
Calamagrostis lapponica	18.9	Cladonia fimbriata	18.7
Vaccinium myrtillus	18.3	Brachythecium reflexum	18.3
Dicranum fuscescens	18.2	Cladonia amaurocraea	18.0
Pulmonaria mollis	17.9	Calamagrostis arundinacea	17.4
Galium boreale	17.2	Hylocomium splendens	16.5
Melanelia olivacea	16.2	Cirsium helenioides	16.1
Pyrola rotundifolia	15.9	Hieracium umbellatum	15.4
Dichelyma falcatum	15.4	Bryoria furcellata	15.4
Clematis alpina	15.3	Pyrola grandiflora	15.2
Flavoparmelia soredians	15.2	Atrichum flavisetum	15.1
Caloplaca cerina	15.0	Bryoria simplicior	15.0
<i>Constant species (occurrence frequencies)</i>			
Pinus sylvestris	100.0	Vaccinium vitis-idaea	79.0
Betula pubescens	62.0	Vaccinium myrtillus	57.0
Empetrum nigrum subsp. hermaphroditum	48.0	Pleurozium schreberi	40.0
Solidago virgaurea	36.0	Deschampsia flexuosa	36.0
Rubus saxatilis	31.0	Hylocomium splendens	31.0
Vulpicidia pinastri	29.0	Hypogymnia physodes	29.0
Sorbus aucuparia	29.0	Calamagrostis arundinacea	29.0
Parmelia sulcata	26.0	Vaccinium uliginosum	26.0
Ptilidium pulcherrimum	26.0	Orthodicranum montanum	26.0
Melica nutans	26.0	Luzula pilosa	26.0
Geranium sylvaticum	26.0	Fragaria vesca	26.0
Ptilium crista-castrensis	24.0	Picea obovata	24.0
Orthilia secunda	24.0	Melampyrum pratense	24.0
Galium boreale	24.0	Evernia mesomorpha	24.0
Brachypodium pinnatum	24.0	Abies sibirica	24.0
Trientalis europaea	21.0	Lathyrus vernus	21.0
Hieracium umbellatum	21.0	Dicranum polysetum	21.0
Pseudevernia furfuracea	19.0	Viola collina	19.0
Viola canina	19.0	Succisa pratensis	19.0
Maianthemum bifolium	19.0	Hypnum pallescens	19.0
Digitalis grandiflora	19.0	Dicranum scoparium	19.0
Carex pediformis	19.0	Stellaria holostea	17.0
Stachys officinalis	17.0	Sanionia uncinata	17.0
Rosa majalis	17.0	Quercus robur	17.0
Linnaea borealis	17.0	Juniperus communis subsp. communis	17.0
Parmeliopsis hyperopta	14.0	Tilia cordata	14.0
Seseli krylovii	14.0	Potentilla erecta	14.0
Polygonatum odoratum	14.0	Aegopodium podagraria	14.0
Adenophora lilifolia	14.0	Usnea subfloridana	12.0
Parmeliopsis ambigua	12.0	Hypocenomyce scalaris	12.0
Vicia sylvatica	12.0	Veronica chamaedrys	12.0

Pulmonaria mollis	12.0	Picea abies	12.0
Paraleucobryum longifolium	12.0	Cladonia fimbriata	12.0
Cerastium pauciflorum	12.0	Usnea hirta	10.0
Imshaugia aleurites	10.0	Viola mirabilis	10.0
Pyrola rotundifolia	10.0	Poa nemoralis	10.0
Pleurospermum uralense	10.0	Orthodicranum flagellare	10.0
Lathyrus pisiformis	10.0	Chamaecytisus ruthenicus	10.0
Hylotelephium triphyllum	10.0	Festuca ovina	10.0
Euphorbia subcordata	10.0	Empetrum nigrum	10.0
Dicranum fuscescens	10.0	Clematis alpina	10.0
Cladonia coniocraea	10.0	Cladonia arbuscula	10.0
Cirsium helenioides	10.0	Callicladium haldanianum	10.0
Bupleurum longifolium	10.0	Betula pendula	10.0
Antennaria dioica	10.0	Achillea millefolium	10.0
Acer platanoides	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Pinus sylvestris	67.0	Empetrum nigrum subsp. hermaphroditum	19.0
Vaccinium vitis-idaea	17.0	Pleurozium schreberi	17.0
Vaccinium myrtillus	10.0		

G3.C - Larix sibirica taiga woodland

*Diagnostic species (phi coefficient * 100)*

Hypocenomyce scalaris	99.6	Stellaria bungeana	99.2
Larix sibirica	98.5	Valeriana wolgensis	98.2
Hieracium pseudirectum	98.0	Cladonia digitata	98.0
Cicerbita uralensis	97.8	Cacalia hastata	97.4
Hypogymnia tubulosa	96.9	Pseudevernia furfuracea	96.3
Brachythecium reflexum	96.3	Evernia mesomorpha	95.9
Vulpicidia pinastri	95.7	Abies sibirica	95.7
Orthodicranum montanum	95.1	Parmelia sulcata	95.0
Aconogonon alpinum	94.1	Sanionia uncinata	93.5
Hypogymnia physodes	88.1	Veratrum lobelianum	87.4
Mnium laevinerve	81.4	Usnea glabrata	81.3
Lecanora symmicta	80.7	Lecanora allophana	80.5
Buellia punctata	80.1	Cladonia cenotea	80.0
Hylocomiastrum pyrenaicum	79.8	Parmeliopsis hyperopta	79.5
Lathyrus gmelinii	79.5	Usnea hirta	79.4
Picea obovata	78.0	Ptilidium pulcherrimum	77.5
Aconitum septentrionale	76.8	Myosotis sylvatica	75.7
Crepis sibirica	75.6	Dryopteris expansa	74.8
Campanula latifolia	74.2	Brachythecium oedipodium	72.9
Plagiothecium laetum	70.5	Cirsium helenioides	69.9
Clematis alpina	68.7	Pulmonaria mollis	67.5
Lophocolea heterophylla	65.0	Geranium sylvaticum	63.9
Rubus saxatilis	63.4	Plagiothecium denticulatum	63.2
Cirriphyllum piliferum	62.4	Ochrolechia pallescens	57.5
Chaenotheca chrysocephala	57.5	Calicium viride	57.5

Bryoria bicolor	57.5	Cladonia corallifera	57.5
Bryoria kuemmerleana	57.5	Usnea barbata	57.4
Pertusaria amara	57.4	Buellia disciformis	57.4
Melanelia subaurifera	57.4	Cladonia bacilliformis	57.4
Physcia aipolia	57.3	Melanelia septentrionalis	57.3
Sorbus sibirica	57.1	Usnea filipendula	57.0
Melanelia exasperatula	57.0	Bryoria fuscescens	56.8
Bryoria capillaris	56.8	Calamagrostis obtusata	56.7
Calamagrostis arundinacea	56.5	Pylaisiella polyantha	56.4
Ochrolechia tartarea	56.2	Cladonia humilis	56.2
Rhytidiadelphus subpinnatus	55.7	Lophocolea minor	55.7
Usnea subfloridana	54.8	Conioselinum tataricum	54.8
Viola mirabilis	54.6	Lathyrus vernus	54.5
Brachythecium starkei	54.4	Paris quadrifolia	54.2
Cerastium pauciflorum	54.1	Hypnum pallescens	53.3
Trientalis europaea	51.9	Cladonia cornuta	51.6
Betula pubescens	51.3	Bupleurum longifolium	50.8
Paraleucobryum longifolium	50.0	Milium effusum	49.8
Primula macrocalyx	49.2	Cladonia coniocraea	49.2
Pyrola minor	46.2	Brachythecium salebrosum	45.5
Stellaria holostea	45.4	Epilobium angustifolium	44.8
Circaea alpina	43.8	Dicranum scoparium	43.7
Aegopodium podagraria	43.1	Cladonia fimbriata	42.6
Hypericum maculatum	42.0	Bistorta officinalis	41.8
Ptilium crista-castrensis	41.3	Rubus idaeus	40.9
Plagiomnium cuspidatum	40.5	Epilobium montanum	39.8
Brachytheciastrum velutinum	38.8	Dryopteris filix-mas	38.5
Filipendula ulmaria	37.0	Brachypodium pinnatum	36.9
Melica nutans	36.3	Cladonia pyxidata	36.0
Oxalis acetosella	35.3	Senecio nemorensis	35.1
Galeopsis bifida	32.7	Angelica sylvestris	29.0
Campanula glomerata	27.6	Solidago virgaurea	26.8
Athyrium filix-femina	26.3	Carex pilosa	25.9
Actaea spicata	25.9	Sorbus aucuparia	21.4
Ranunculus acris	19.0	Dactylis glomerata	15.9
<i>Constant species (occurrence frequencies)</i>			
Vulpicidia pinastris	100.0	Pseudevernia furfuracea	100.0
Parmelia sulcata	100.0	Hypogymnia tubulosa	100.0
Hypogymnia physodes	100.0	Hypocenomyce scalaris	100.0
Veratrum lobelianum	100.0	Valeriana wolgensis	100.0
Stellaria holostea	100.0	Stellaria bungeana	100.0
Sanionia uncinata	100.0	Rubus saxatilis	100.0
Rubus idaeus	100.0	Paris quadrifolia	100.0
Oxalis acetosella	100.0	Orthodicranum montanum	100.0
Myosotis sylvatica	100.0	Milium effusum	100.0
Lathyrus vernus	100.0	Larix sibirica	100.0
Hieracium pseudirectum	100.0	Geranium sylvaticum	100.0
Filipendula ulmaria	100.0	Evernia mesomorpha	100.0
Dryopteris filix-mas	100.0	Dicranum scoparium	100.0
Cladonia digitata	100.0	Cicerbita uralensis	100.0

Calamagrostis arundinacea	100.0	Cacalia hastata	100.0
Brachythecium reflexum	100.0	Brachypodium pinnatum	100.0
Betula pubescens	100.0	Aegopodium podagraria	100.0
Aconogonon alpinum	100.0	Abies sibirica	100.0
Usnea hirta	67.0	Usnea glabrata	67.0
Parmeliopsis hyperopta	67.0	Lecanora symmicta	67.0
Lecanora allophana	67.0	Viola mirabilis	67.0
Trientalis europaea	67.0	Sorbus aucuparia	67.0
Solidago virgaurea	67.0	Senecio nemorensis	67.0
Ranunculus acris	67.0	Pulmonaria mollis	67.0
Ptilidium pulcherrimum	67.0	Plagiothecium laetum	67.0
Plagiothecium denticulatum	67.0	Picea obovata	67.0
Mnium laevinerve	67.0	Melica nutans	67.0
Lophocolea heterophylla	67.0	Lathyrus gmelinii	67.0
Hypericum maculatum	67.0	Hylocomiastrum pyrenaicum	67.0
Epilobium montanum	67.0	Epilobium angustifolium	67.0
Dryopteris expansa	67.0	Dactylis glomerata	67.0
Crepis sibirica	67.0	Clematis alpina	67.0
Cladonia cenotea	67.0	Cirsium helenioides	67.0
Cirriphyllum piliferum	67.0	Campanula latifolia	67.0
Buellia punctata	67.0	Brachythecium oedipodium	67.0
Bistorta officinalis	67.0	Athyrium filix-femina	67.0
Angelica sylvestris	67.0	Aconitum septentrionale	67.0
Usnea subfloridana	33.0	Usnea filipendula	33.0
Usnea barbata	33.0	Physcia aipolia	33.0
Pertusaria amara	33.0	Ochrolechia tartarea	33.0
Ochrolechia pallescens	33.0	Chaenotheca chrysocephala	33.0
Calicium viride	33.0	Buellia disciformis	33.0
Bryoria fuscescens	33.0	Bryoria capillaris	33.0
Bryoria bicolor	33.0	Stachys sylvatica	33.0
Sorbus sibirica	33.0	Rhytidiadelphus triquetrus	33.0
Rhytidiadelphus subpinnatus	33.0	Pyrola minor	33.0
Pylaisiella polyantha	33.0	Ptilium crista-castrensis	33.0
Primula macrocalyx	33.0	Pleurozium schreberi	33.0
Plagiomnium cuspidatum	33.0	Paraleucobryum longifolium	33.0
Melanelia subaurifera	33.0	Melanelia septentrionalis	33.0
Melanelia exasperatula	33.0	Maianthemum bifolium	33.0
Luzula pilosa	33.0	Lophocolea minor	33.0
Hypnum pallescens	33.0	Geum rivale	33.0
Galeopsis bifida	33.0	Conioselinum tataricum	33.0
Cladonia pyxidata	33.0	Cladonia humilis	33.0
Cladonia fimbriata	33.0	Cladonia cornuta	33.0
Cladonia corallifera	33.0	Cladonia coniocraea	33.0
Cladonia bacilliformis	33.0	Circaea alpina	33.0
Cerastium pauciflorum	33.0	Carex pilosa	33.0
Campanula glomerata	33.0	Calamagrostis obtusata	33.0
Bupleurum longifolium	33.0	Bryoria kuemmerleana	33.0
Brachythecium starkei	33.0	Brachythecium salebrosum	33.0
Brachytheciastrum velutinum	33.0	Anthriscus sylvestris	33.0
Actaea spicata	33.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Larix sibirica	100.0	Oxalis acetosella	67.0
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G3.Da - Pinus bog woodland

*Diagnostic species (phi coefficient * 100)*

Eriophorum vaginatum	42.2	Ledum palustre	41.9
Vaccinium oxycoccos	39.5	Sphagnum magellanicum	39.4
Vaccinium uliginosum	38.2	Polytrichum strictum	36.1
Sphagnum fallax	30.2	Pinus mugo	30.2
Andromeda polifolia	29.0	Sphagnum capillifolium	28.4
Pinus sylvestris	28.0	Vaccinium vitis-idaea	24.6
Pleurozium schreberi	23.6	Aulacomnium palustre	23.4
Pinus uncinata var. rotundata	22.9	Sphagnum fuscum	21.9
Betula pubescens	21.5	Vaccinium myrtillus	20.7
Sphagnum angustifolium	20.2	Drosera rotundifolia	19.5
Calluna vulgaris	18.6	Dicranum polysetum	17.5
Sphagnum russowii	17.1	Polytrichum commune	16.7
Empetrum nigrum	16.6	Vaccinium microcarpum	15.8
Sphagnum girgensohnii	15.8	Sphagnum rubellum	15.5
Chamaedaphne calyculata	15.1		

Constant species (occurrence frequencies)

Pinus sylvestris	73.0	Vaccinium myrtillus	64.0
Eriophorum vaginatum	61.0	Vaccinium oxycoccos	54.0
Vaccinium uliginosum	52.0	Calluna vulgaris	52.0
Pleurozium schreberi	49.0	Vaccinium vitis-idaea	48.0
Sphagnum magellanicum	42.0	Molinia caerulea agg.	40.0
Betula pubescens	40.0	Picea abies	36.0
Polytrichum strictum	35.0	Andromeda polifolia	35.0
Aulacomnium palustre	33.0	Ledum palustre	32.0
Sphagnum capillifolium	29.0	Sphagnum fallax	28.0
Drosera rotundifolia	26.0	Pinus mugo	24.0
Hylocomium splendens	24.0	Betula pendula	23.0
Polytrichum commune	22.0	Frangula alnus	22.0
Dicranum scoparium	21.0	Deschampsia flexuosa	17.0
Carex nigra	17.0	Sorbus aucuparia	16.0
Melampyrum pratense	16.0	Sphagnum angustifolium	15.0
Potentilla erecta	15.0	Eriophorum angustifolium	15.0
Empetrum nigrum	15.0	Dicranum polysetum	14.0
Sphagnum fuscum	13.0	Quercus robur	12.0
Sphagnum palustre	11.0	Sphagnum rubellum	10.0
Rubus chamaemorus	10.0	Polytrichastrum formosum	10.0
Dryopteris carthusiana	10.0	Carex rostrata	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Pinus sylvestris	46.0	Vaccinium myrtillus	24.0
Pinus mugo	20.0	Sphagnum fallax	14.0
Eriophorum vaginatum	14.0	Sphagnum capillifolium	13.0
Sphagnum magellanicum	12.0	Pleurozium schreberi	10.0

Calluna vulgaris	10.0	Vaccinium uliginosum	9.0
Molinia caerulea agg.	7.0	Ledum palustre	7.0
Vaccinium oxycoccos	5.0		

G3.Db - Picea bog woodland

*Diagnostic species (phi coefficient * 100)*

Sphagnum girgensohnii	52.5	Picea abies	35.9
Bazzania trilobata	35.9	Polytrichum commune	32.9
Calamagrostis villosa	31.9	Vaccinium vitis-idaea	31.2
Vaccinium myrtillus	30.4	Lycopodium annotinum	26.1
Sphagnum magellanicum	24.3	Lepidozia reptans	23.7
Sphagnum capillifolium	23.5	Plagiothecium undulatum	22.5
Listera cordata	22.1	Sphagnum russowii	21.8
Pleurozium schreberi	21.7	Dicranodontium denudatum	21.2
Tetraphis pellucida	19.8	Eriophorum vaginatum	19.7
Dicranum scoparium	19.7	Calypogeia azurea	19.5
Calypogeia integristipula	19.1	Hylocomium splendens	19.0
Trientalis europaea	17.6	Equisetum sylvaticum	16.7
Vaccinium uliginosum	16.6	Ptilium crista-castrensis	16.5
Rhytidiadelphus loreus	15.3	Homogyne alpina	15.1
Polytrichastrum formosum	15.0		

Constant species (occurrence frequencies)

Picea abies	98.0	Vaccinium myrtillus	91.0
Vaccinium vitis-idaea	61.0	Sorbus aucuparia	45.0
Polytrichum commune	45.0	Pleurozium schreberi	45.0
Dicranum scoparium	45.0	Sphagnum girgensohnii	41.0
Deschampsia flexuosa	36.0	Hylocomium splendens	35.0
Calamagrostis villosa	33.0	Polytrichastrum formosum	32.0
Oxalis acetosella	30.0	Eriophorum vaginatum	28.0
Dryopteris dilatata	28.0	Maianthemum bifolium	26.0
Sphagnum magellanicum	24.0	Sphagnum capillifolium	24.0
Molinia caerulea agg.	24.0	Betula pubescens	24.0
Bazzania trilobata	24.0	Vaccinium uliginosum	22.0
Carex nigra	22.0	Lycopodium annotinum	21.0
Trientalis europaea	19.0	Pinus sylvestris	19.0
Homogyne alpina	19.0	Equisetum sylvaticum	19.0
Carex echinata	19.0	Abies alba	19.0
Plagiothecium undulatum	18.0	Dryopteris carthusiana	18.0
Calluna vulgaris	18.0	Vaccinium oxycoccos	16.0
Rhytidiadelphus loreus	16.0	Potentilla erecta	16.0
Luzula pilosa	16.0	Frangula alnus	16.0
Carex curta	15.0	Athyrium filix-femina	15.0
Deschampsia cespitosa	14.0	Aulacomnium palustre	14.0
Sphagnum palustre	13.0	Rhytidiadelphus triquetrus	13.0
Melampyrum pratense	13.0	Lepidozia reptans	13.0
Sphagnum russowii	12.0	Sphagnum fallax	12.0
Ptilium crista-castrensis	11.0	Luzula sylvatica	11.0
Listera cordata	11.0	Tetraphis pellucida	10.0

Rubus idaeus	10.0	Polytrichum strictum	10.0
Pohlia nutans	10.0	Plagiochila asplenioides	10.0
Melampyrum sylvaticum	10.0	Fagus sylvatica	10.0
Dicranum polysetum	10.0	Dicranodontium denudatum	10.0
Blechnum spicant	10.0	Betula pendula	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Picea abies	81.0	Vaccinium myrtillus	39.0
Sphagnum girgensohnii	26.0	Sphagnum capillifolium	13.0
Sphagnum magellanicum	10.0	Calamagrostis villosa	9.0
Polytrichum commune	7.0	Sphagnum fallax	6.0
Eriophorum vaginatum	6.0		

Appendix E: Formal definitions of heathland, scrub and tundra habitat types used in the expert system

F11a Arctic-alpine ericoid heath

(<#TC Arctic-and-Arctic-alpine-ericoid-dwarf-shrubs GR #TC Vascular EXCEPT #TC Arctic-and-Arctic-alpine-ericoid-dwarf-shrubs> OR (<#TC Lowland-to-alpine-heath-shrubs GR #TC Vascular EXCEPT #TC Lowland-to-alpine-heath-shrubs> AND ((<#TC Arctic-ericoid-dwarf-shrubs GR00> OR <#TC Arctic-acidophilous-herbs GR00>) OR (<#TC Alpine-subalpine-acidophilous-ericoid-dwarf-shrubs GR00> OR <#TC Alpine-acidophilous-herbs GR00>)))) NOT ((<#TC Sphagnum GR25> OR <#TC Arctic-alpine-bryophytes-lichens GR #T\$>) OR <#TC Trees GR05>)

F11b Betula nana scrub

(<Betula nana GR50> AND <#TC Betula nana GR #TC Vascular EXCEPT #TC Betula nana>) NOT (<#TC Sphagnum GR25> OR (<Polytrichum commune GR25> OR (<#TC Trees GR10> OR <Molinia caerulea agg. GR00>)))

F12 Moss and lichen tundra

(<#TC Arctic-alpine-bryophytes-lichens GR #T\$> AND <#02 Arctic-alpine-bryophytes-lichens>) NOT (<#TC Sphagnum GR05> OR <#TC Trees GR05>)

F21 Subarctic and alpine dwarf Salix scrub

<#TC Arctic-alpine-dwarf-willows GR15> AND <#TC Arctic-alpine-dwarf-willows GR #TC Vascular EXCEPT #TC Arctic-alpine-dwarf-willows>

F22aa Alpine and subalpine ericoid heath - acidophilous rhododendron heath

(<#TC Alpine-subalpine-acidophilous-ericoid-dwarf-shrubs GR25> AND <#TC Alpine-subalpine-acidophilous-ericoid-dwarf-shrubs GR #TC Vascular EXCEPT #TC Alpine-subalpine-acidophilous-ericoid-dwarf-shrubs>) NOT <#TC Trees GR05>

F22ab Alpine and subalpine ericoid heath - basiphilous ericoid heath (Ericion carneae and Aquilegio nigricantis-Rhododendron)

(<#TC Alpine-subalpine-basiphilous-ericoid-dwarf-shrubs GR25> AND <#TC Alpine-subalpine-basiphilous-ericoid-dwarf-shrubs GR #TC Vascular EXCEPT #TC Alpine-subalpine-basiphilous-ericoid-dwarf-shrubs>) NOT (<#TC Trees GR05> OR <Pinus mugo GR25>)

F22ac Alpine and subalpine ericoid heath - Dryas heath

<#TC Dryas GE #TC Vascular EXCEPT #TC Dryas>

F22b Alpine and subalpine Juniperus scrub
(<#TC Arctic-alpine-shrubby-junipers GR50> AND <#TC Arctic-alpine-shrubby-junipers GR #TC Shrubs EXCEPT #TC Arctic-alpine-shrubby-junipers>) NOT <#TC Trees GR05>

F22c Balkan subalpine genistoid scrub (Daphno oleoidis-Genistion radiatae)
(<Genista radiata GR25> AND <#TC Genista radiata GR #T\$>) NOT (<#TC Trees GR10> OR <#TC Shrubs GR25>)

F23a Subalpine deciduous scrub - not dominated by Salix
(<#TC Subalpine-deciduous-shrubs GR25> AND <#TC Subalpine-deciduous-shrubs GR #TC Shrubs EXCEPT #TC Subalpine-deciduous-shrubs>) NOT (<#TC Sphagnum GR25> OR <#TC Trees GR10>)

F23b Subalpine deciduous scrub - dominated by Salix
((<#TC Subalpine-shrubby-willows GR25> AND <#TC Subalpine-shrubby-willows GR #TC Shrubs EXCEPT #TC Subalpine-shrubby-willows>) OR ((<#TC Arctic-subalpine-shrubby-willows GR25> AND <#TC Arctic-subalpine-shrubby-willows GR #TC Shrubs EXCEPT #TC Arctic-subalpine-shrubby-willows>) AND <#TC Subalpine-shrubby-willows GR00>)) NOT (<#TC Sphagnum GR25> OR <#TC Trees GR10>)

F24 Subalpine Pinus mugo scrub
(<Pinus mugo GR25> AND <#TC Pinus mugo GR #TC Shrubs EXCEPT #TC Pinus mugo>) NOT ((<#TC Sphagnum GR25> OR <#TC Bog-herbs GR15>) OR <#TC Trees GR10>)

F31a Lowland to montane temperate and submediterranean Juniperus scrub
(<Juniperus communis subsp. communis GR25> AND <#TC Juniperus communis subsp. communis GR #TC Shrubs EXCEPT #TC Juniperus communis subsp. communis>) NOT <#TC Trees GR10>

F31ba Temperate Rubus scrub
(<#TC Temperate-Rubus GR50> OR <#TC Temperate-Rubus GR #T\$>) NOT <#TC Trees GR10>

F31ca Lowland to montane temperate genistoid scrub
((<#TC Temperate-genistoid-shrubs GR25> AND <#TC Temperate-genistoid-shrubs GR #TC Shrubs EXCEPT #TC Temperate-genistoid-shrubs>) AND <#TC Temperate-genistoid-shrubs GR #TC Atlantic-heath-shrubs|#TC Lowland-to-alpine-heath-shrubs>) NOT <#TC Trees GR10>

F31cb Lowland to montane Mediterranean genistoid scrub (Cytisetalia scopariostrinati and Cytiso villosi-Telinetalia monspessulanae)

(<#TC Mediterranean-genistoid-shrubs GR50> AND <#TC Mediterranean-genistoid-shrubs GR #TC Shrubs EXCEPT #TC Mediterranean-genistoid-shrubs>) NOT <#TC Trees GR10>

F31d Balkan-Anatolian montane genistoid scrub

(<Genista lydia GR25> AND <#TC Genista lydia GR #T\$>) NOT (<#TC Trees GR10> OR <#TC Shrubs GR25>)

F31ea Temperate and submediterranean thorn scrub

(<#TC Temperate-submediterranean-deciduous-shrubs GR50> AND <#TC Temperate-submediterranean-deciduous-shrubs GR #TC Shrubs EXCEPT #TC Temperate-submediterranean-deciduous-shrubs>) NOT <#TC Trees GR10>

F31eb Mediterranean Rubus scrub

(<#TC Mediterranean-Rubus GR50> OR <#TC Mediterranean-Rubus GR #T\$>) NOT <#TC Trees GR10>

F31f Low steppic scrub

(<#TC Low-steppic-shrubs GR25> AND <#TC Low-steppic-shrubs GR #TC Shrubs|#TC Dwarf-shrubs EXCEPT #TC Low-steppic-shrubs>) NOT <#TC Trees GR10>

F31g Corylus avellana scrub

(<Corylus avellana GR50> AND <#TC Corylus avellana GR #TC Shrubs EXCEPT #TC Corylus avellana>) NOT <#TC Trees GR10>

F31h Temperate forest clearing scrub (Sambuco-Salicion capreae)

<#TC Forest-clearing-trees-and-shrubs GR50> AND <#TC Forest-clearing-trees-and-shrubs GR #TC Shrubs|#TC Trees EXCEPT #TC Forest-clearing-trees-and-shrubs>

F41 Wet heath

(<Erica tetralix GR25> AND <Erica tetralix GR #TC Atlantic-heath-shrubs|#TC Lowland-to-alpine-heath-shrubs>) NOT (<#TC Trees GR10> OR <#TC Shrubs GR10>)

F42a Atlantic dry heath

((<#TC Atlantic-heath-shrubs GR50> AND (<#TC Atlantic-heath-shrubs GR #TC Shrubs EXCEPT #TC Atlantic-heath-shrubs> AND <#TC Atlantic-heath-shrubs GR #TC Temperate-genistoid-shrubs>)) OR (((<#TC Lowland-to-alpine-heath-shrubs GR50> AND <#TC Lowland-to-alpine-heath-shrubs GR #TC Shrubs EXCEPT #TC Lowland-to-alpine-heath-shrubs>))

AND (<#TC Lowland-to-alpine-heath-shrubs GR #TC Temperate-genistoid-shrubs>) AND (<#TC Atlantic-heath-shrubs GR00>)) NOT (<#TC Sphagnum GR05> OR (<#TC Wet-heath-species GR05> OR <#TC Trees GR10>))

F42ba Subcontinental dry heath with Empetrum

((<#TC Lowland-to-alpine-heath-shrubs GR50> AND <#TC Lowland-to-alpine-heath-shrubs GR #TC Shrubs|#TC Dwarf-shrubs EXCEPT #TC Lowland-to-alpine-heath-shrubs>) AND <#TC Empetrum GR #TC Lowland-to-alpine-heath-shrubs EXCEPT #TC Empetrum>) NOT (<#TC Alpine-acidophilous-herbs GR00> OR (<#TC Alpine-subalpine-acidophilous-ericoid-dwarf-shrubs GR00> OR (<#TC Arctic-alpine-acidophilous-herbs GR00> OR (<#TC Arctic-alpine-bryophytes-lichens GR00> OR (<#TC Arctic-alpine-ericoid-dwarf-shrubs GR00> OR (<#TC Arctic-acidophilous-herbs GR00> OR (<#TC Arctic-ericoid-dwarf-shrubs GR00> OR (<#TC Atlantic-heath-shrubs GR00> OR (<#TC Bog-herbs GR00> OR (<#TC Wet-heath-species GR05> OR (<Juncus squarrosus GR00> OR (<#TC Sphagnum GR05> OR (<#TC Pinus mugo GR10> OR <#TC Trees GR10>))))))))))

F42bb Subcontinental dry heath without Empetrum

(<#TC Lowland-to-alpine-heath-shrubs GR50> AND <#TC Lowland-to-alpine-heath-shrubs GR #TC Shrubs|#TC Dwarf-shrubs EXCEPT #TC Lowland-to-alpine-heath-shrubs>) NOT (<#TC Empetrum GR #TC Lowland-to-alpine-heath-shrubs EXCEPT #TC Empetrum> OR (<#TC Alpine-acidophilous-herbs GR00> OR (<#TC Alpine-subalpine-acidophilous-ericoid-dwarf-shrubs GR00> OR (<#TC Arctic-alpine-acidophilous-herbs GR00> OR (<#TC Arctic-alpine-bryophytes-lichens GR00> OR (<#TC Arctic-alpine-ericoid-dwarf-shrubs GR00> OR (<#TC Arctic-acidophilous-herbs GR00> OR (<#TC Arctic-ericoid-dwarf-shrubs GR00> OR (<#TC Atlantic-heath-shrubs GR00> OR (<#TC Bog-herbs GR00> OR (<#TC Wet-heath-species GR05> OR (<Juncus squarrosus GR00> OR (<#TC Sphagnum GR05> OR (<#TC Pinus mugo GR10> OR <#TC Trees GR10>))))))))))

F43 Macaronesian heath

(<#TC Macaronesian-dwarf-heath-shrubs GR50> AND <#TC Macaronesian-dwarf-heath-shrubs GR #TC Shrubs|#TC Dwarf-shrubs EXCEPT #TC Macaronesian-dwarf-heath-shrubs>) OR (<Calluna vulgaris GR25> AND <Huperzia dentata GR00>)

F51 Mediterranean maquis and arborescent matorral

(<#TC Mesomediterranean-maquis-shrubs GR25> AND (<#TC Mesomediterranean-maquis-shrubs GR #TC Shrubs EXCEPT #TC Mesomediterranean-maquis-shrubs> AND <#TC Mesomediterranean-maquis-

shrubs GR #TC Thermomediterranean-maquis-shrubs>)) NOT <#TC Trees GR10>

F53 Submediterranean pseudomaquis

(((<#TC Mesomediterranean-maquis-shrubs GR20> OR <#TC Sclerophyllous-tree-Quercus GR05>) AND (<#TC Submediterranean-deciduous-shrubs GR20> OR <#TC Thermophilous-oak-forest-trees GR05>)) OR (<Buxus sempervirens GR50> AND <#TC Buxus sempervirens GR #TC Shrubs EXCEPT #TC Buxus sempervirens>)) NOT <#TC Trees GR10>

F54 Spartium junceum fields

<Spartium junceum GR50> AND <#TC Spartium junceum GR #TC Shrubs EXCEPT #TC Spartium junceum>

F55 Thermo-Mediterranean scrub

(<#TC Thermomediterranean-maquis-shrubs GR25> AND ((<#TC Thermomediterranean-maquis-shrubs GR #TC Shrubs EXCEPT #TC Thermomediterranean-maquis-shrubs> AND <#TC Thermomediterranean-maquis-shrubs GR #TC Mesomediterranean-maquis-shrubs>) AND <### Thermomediterranean-maquis-shrubs GR ### Mesomediterranean-maquis-shrubs>)) NOT <#TC Trees GR10>

F61a Western basiphilous garrigue

(((<#TC W-basic-garrigue-shrubs GR25> AND <#TC W-basic-garrigue-shrubs GR #TC Garrigue-phrygana-shrubs|#TC Shrubs|#TC Graminoids EXCEPT #TC W-basic-garrigue-shrubs>) OR ((<#TC Pan-Mediterranean-basic-garrigue-shrubs GR25> AND <#TC Pan-Mediterranean-basic-garrigue-shrubs GR #TC Garrigue-phrygana-shrubs|#TC Shrubs|#TC Graminoids EXCEPT #TC Pan-Mediterranean-basic-garrigue-shrubs>) AND (<#03 W-basic-garrigue-herbs> AND <### W-basic-garrigue-herbs GR ### E-garrigue-herbs>))) NOT (<#TC Phrygana-shrubs GR00> OR <#TC Trees GR10>)

F61b Western acidophilous garrigue

(((<#TC W-acidic-garrigue-shrubs GR25> AND <#TC W-acidic-garrigue-shrubs GR #TC Garrigue-phrygana-shrubs|#TC Shrubs|#TC Graminoids EXCEPT #TC W-acidic-garrigue-shrubs>) OR ((<#TC Pan-Mediterranean-acidic-garrigue-shrubs GR25> AND <#TC Pan-Mediterranean-acidic-garrigue-shrubs GR25 GR #TC Garrigue-phrygana-shrubs|#TC Shrubs|#TC Graminoids EXCEPT #TC Pan-Mediterranean-acidic-garrigue-shrubs>) AND <#03 W-acidic-garrigue-herbs>)) NOT (<#TC Phrygana-shrubs GR00> OR <#TC Trees GR10>)

F62 Eastern garrigue

((<#TC E-garrigue-shrubs GR25> AND <#TC E-garrigue-shrubs GR #TC Garrigue-phrygana-shrubs|#TC Shrubs|#TC Graminoids EXCEPT #TC E-garrigue-shrubs>) OR
(((<#TC Pan-Mediterranean-acidic-garrigue-shrubs GR25> AND <#TC Pan-Mediterranean-acidic-garrigue-shrubs GR #TC Garrigue-phrygana-shrubs|#TC Shrubs|#TC Graminoids EXCEPT #TC Pan-Mediterranean-acidic-garrigue-shrubs>) AND <#03 E-garrigue-herbs>) OR
(((<#TC Pan-Mediterranean-basic-garrigue-shrubs GR25> AND <#TC Pan-Mediterranean-basic-garrigue-shrubs GR #TC Garrigue-phrygana-shrubs|#TC Shrubs|#TC Graminoids EXCEPT #TC Pan-Mediterranean-basic-garrigue-shrubs>) AND <#03 E-garrigue-herbs>)))
NOT <#TC Trees GR10>

F66 Supra-Mediterranean garrigue

(<#TC Supramediterranean-garrigue-shrubs GR25> AND <#TC Supramediterranean-garrigue-shrubs GR #TC Garrigue-phrygana-shrubs|#TC Mediterranean-genistoid-shrubs|#TC Shrubs|#TC Graminoids EXCEPT #TC Supramediterranean-garrigue-shrubs>) NOT <#TC Trees GR10>

F67 Mediterranean gypsum scrub

(<#TC Gypsophilous-dwarf-shrubs GR10> OR
(((<#TC W-basic-garrigue-shrubs GR25> OR <#TC Pan-Mediterranean-basic-garrigue-shrubs GR25>) AND <#03 Gypsophilous-herbs>))
NOT (<#TC Trees GR05> OR <#TC Shrubs GR05>)

F68a Mediterranean halo-nitrophilous scrub (Pegano harmalae-Salsoletea vermiculatae)

((<#TC Mediterranean-xero-halophile-scrub-species GR10> AND <#TC Mediterranean-xero-halophile-scrub-species GR #T\$>) AND (<### Mediterranean-xero-halophile-scrub-species GE ### Caspian-xero-halophile-scrub-species>)) NOT <#TC Trees GR10>

F68b Caspian halo-nitrophilous scrub (Artemisietea lerchianae)

((<#TC Caspian-xero-halophile-scrub-species GR10> AND <#TC Caspian-xero-halophile-scrub-species GR #T\$>) AND (<### Caspian-xero-halophile-scrub-species GR ### Mediterranean-xero-halophile-scrub-species>)) NOT <#TC Trees GR10>

F68c Macaronesian-African halo-nitrophilous scrub (Polycarpaeo niveae-Traganetea moquinii)

(<#TC Macaronesian-xero-halophile-scrub-species GR10> AND <#TC Macaronesian-xero-halophile-scrub-species GR #T\$>) NOT <#TC Trees GR10>

F71 Western Mediterranean spiny heath

(<#TC W-Mediterranean-coastal-spiny-shrubs GR25> AND <#TC W-Mediterranean-coastal-spiny-shrubs GR #TC Shrubs|#TC Dwarf-shrubs|#TC Garrigue-phrygana-shrubs EXCEPT #TC W-Mediterranean-coastal-spiny-shrubs>) NOT <#TC Trees GR10>

F73 Eastern Mediterranean spiny heath (phrygana)

(<#TC Phrygana-shrubs GR25> AND <#TC Phrygana-shrubs GR #TC Shrubs|#TC Dwarf-shrubs|#TC Garrigue-phrygana-shrubs EXCEPT #TC Phrygana-shrubs>) NOT <#TC Trees GR10>

F74a Western Mediterranean mountain hedgehog-heath

(<#TC W-Mediterranean-mountain-thorny-cushion-shrubs GR25> AND <#TC W-Mediterranean-mountain-thorny-cushion-shrubs GR #TC Shrubs|#TC Dwarf-shrubs|#TC Garrigue-phrygana-shrubs>) NOT <#TC Trees GR10>

F74b Central Mediterranean mountain hedgehog-heath

(<#TC C-Mediterranean-mountain-thorny-cushion-shrubs GR25> AND <#TC C-Mediterranean-mountain-thorny-cushion-shrubs GR #TC Shrubs|#TC Dwarf-shrubs|#TC Garrigue-phrygana-shrubs>) NOT <#TC Trees GR10>

F74c Eastern Mediterranean mountain hedgehog-heath

(<#TC E-Mediterranean-mountain-thorny-cushion-shrubs GR25> AND <#TC E-Mediterranean-mountain-thorny-cushion-shrubs GR #TC Shrubs|#TC Dwarf-shrubs|#TC Garrigue-phrygana-shrubs>) NOT <#TC Trees GR10>

F74d Canary mountain hedgehog-heath (Spartocytisetea supranubii)

<#TC Teide-summit-plants GR #T\$>

F81 Canary xerophytic scrub

(<#TC Canary-xerophytic-scrub-species GR20> AND <#TC Canary-xerophytic-scrub-species GR #TC Madeiran-xerophytic-scrub-species>) NOT <#TC Trees GR10>

F82 Madeiran xerophytic scrub

(<#TC Madeiran-xerophytic-scrub-species GR20> AND <#TC Madeiran-xerophytic-scrub-species GR #TC Canary-xerophytic-scrub-species>) NOT <#TC Trees GR10>

F91a Arctic, boreal and alpine riparian scrub

((<#TC Arctic-shrubby-willows GR50> AND <#TC Arctic-shrubby-willows GR #TC Shrubs EXCEPT #TC Arctic-shrubby-willows>) OR

(<#TC Arctic-subalpine-shrubby-willows GR50> AND <#TC Arctic-subalpine-shrubby-willows GR #TC Shrubs EXCEPT #TC Arctic-subalpine-shrubby-willows>))
NOT (<#TC Sphagnum GR25> OR <#TC Trees GR10>)

F91b Temperate riparian scrub

(<#TC Temperate-riparian-shrubs GR50> AND <#TC Temperate-riparian-shrubs GR #TC Shrubs EXCEPT #TC Temperate-riparian-shrubs>) NOT ((<#TC Mediterranean-riparian-shrubs GR00> OR <#TC Mediterranean-Rubus GR00>) OR <#TC Trees GR10>)

F91c Submediterranean riparian scrub

(<#TC Submediterranean-riparian-willows GR50> AND <#TC Submediterranean-riparian-willows GR #TC Shrubs EXCEPT #TC Submediterranean-riparian-willows>) NOT <#TC Trees GR10>

F92 Salix carr and fen scrub

(<#TC Temperate-fen-shrubs GR50> AND <#TC Temperate-fen-shrubs GR #TC Shrubs EXCEPT #TC Temperate-fen-shrubs>) NOT <#TC Trees GR10>

F93 Mediterranean riparian scrub

(<#TC Mediterranean-riparian-shrubs GR50> AND <#TC Mediterranean-riparian-shrubs GR #TC Shrubs EXCEPT #TC Mediterranean-riparian-shrubs>) NOT <#TC Trees GR10>

Appendix F: Lists of indicator species of the revised EUNIS heathland, scrub, and tundra habitat types

B1.5a - Atlantic and Baltic coastal Empetrum heath

*Diagnostic species (phi coefficient * 100)*

Empetrum nigrum	75.3	Carex arenaria	61.3
Salix repens	56.2	Hypnum jutlandicum	55.9
Dicranum scoparium	44.7	Cladonia portentosa	39.6
Polypodium vulgare	39.1	Carex trinervis	38.8
Hieracium umbellatum	37.3	Ammophila arenaria	36.3
Cladonia chlorophaea	32.7	Festuca filiformis	31.8
Hypogymnia physodes	31.0	Lophocolea bidentata	26.1
Cladonia furcata	25.6	Calamagrostis epigejos	24.9
Erica tetralix	24.7	Palmogloea protuberans	22.9
Calluna vulgaris	22.4	Pseudoscleropodium purum	19.6
Cladonia ramulosa	18.9	Viola canina	18.8
Rosa pimpinellifolia	18.8	Pleurozium schreberi	18.8
Vaccinium macrocarpon	17.5	Cladonia ciliata	16.8
Cladonia pocillum	15.8	Cladonia glauca	15.5

Constant species (occurrence frequencies)

Empetrum nigrum	100.0	Carex arenaria	93.0
Dicranum scoparium	88.0	Salix repens	69.0
Hypnum jutlandicum	67.0	Calluna vulgaris	58.0
Hieracium umbellatum	55.0	Ammophila arenaria	50.0
Polypodium vulgare	49.0	Calamagrostis epigejos	48.0
Cladonia portentosa	36.0	Pseudoscleropodium purum	35.0
Pleurozium schreberi	35.0	Erica tetralix	35.0
Lotus corniculatus	33.0	Lophocolea bidentata	30.0
Viola canina	27.0	Hypnum cupressiforme	27.0
Festuca filiformis	26.0	Hypochaeris radicata	25.0
Luzula campestris	24.0	Cladonia chlorophaea	24.0
Carex trinervis	24.0	Cladonia furcata	23.0
Hypogymnia physodes	22.0	Veronica officinalis	15.0
Potentilla erecta	15.0	Holcus lanatus	15.0
Festuca rubra	15.0	Rosa pimpinellifolia	14.0
Poa pratensis	14.0	Molinia caerulea agg.	14.0
Galium verum	12.0	Anthoxanthum odoratum	11.0
Lonicera periclymenum	10.0	Kindbergia praelonga	10.0
Jasione montana	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Empetrum nigrum	100.0	Hypnum jutlandicum	29.0
Dicranum scoparium	12.0	Pleurozium schreberi	8.0
Calluna vulgaris	8.0		

B1.5b - Atlantic coastal Calluna and Ulex heath

*Diagnostic species (phi coefficient * 100)*

Carex arenaria	52.9	Cladonia portentosa	51.0
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Empetrum nigrum	50.1	Hypnum jutlandicum	44.4
Dicranum scoparium	39.4	Salix repens	37.1
Festuca filiformis	34.9	Carex trinervis	34.9
Hypogymnia physodes	34.8	Calluna vulgaris	34.1
Cladonia glauca	31.6	Cladonia chlorophaea	30.0
Cladonia ciliata	27.3	Palmogloea protuberans	26.1
Genista anglica	22.8	Erica tetralix	22.3
Rosa pimpinellifolia	20.0	Erica cinerea	20.0
Pleurozium schreberi	18.6	Campylopus introflexus	18.6
Cladonia arbuscula	17.9	Cladonia floerkeana	17.7
Ammophila arenaria	17.7	Hypnum cupressiforme	16.9
Erica scoparia	16.2	Orthodontium lineare	15.8
Cladonia gracilis	15.8	Cladonia grayi	15.4
<i>Constant species (occurrence frequencies)</i>			
Calluna vulgaris	87.0	Carex arenaria	78.0
Dicranum scoparium	77.0	Empetrum nigrum	59.0
Hypnum jutlandicum	51.0	Cladonia portentosa	50.0
Salix repens	42.0	Hypnum cupressiforme	36.0
Pleurozium schreberi	34.0	Erica tetralix	31.0
Festuca filiformis	30.0	Hypogymnia physodes	25.0
Ammophila arenaria	23.0	Pseudoscleropodium purum	22.0
Cladonia chlorophaea	22.0	Carex trinervis	21.0
Calamagrostis epigejos	21.0	Erica cinerea	20.0
Luzula campestris	19.0	Hypochaeris radicata	17.0
Cladonia glauca	17.0	Potentilla erecta	16.0
Lotus corniculatus	16.0	Hieracium umbellatum	16.0
Festuca ovina	16.0	Cladonia arbuscula	16.0
Rosa pimpinellifolia	15.0	Genista anglica	15.0
Agrostis capillaris	15.0	Polypodium vulgare	14.0
Rubia peregrina	11.0	Festuca rubra	11.0
Cladonia furcata	11.0	Cladonia ciliata	11.0
Ulex europaeus	10.0	Erica scoparia	10.0
Cladonia gracilis	10.0	Campylopus introflexus	10.0
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Calluna vulgaris	74.0	Empetrum nigrum	32.0
Hypnum jutlandicum	18.0	Erica cinerea	12.0
Dicranum scoparium	12.0	Hypnum cupressiforme	11.0
Cladonia portentosa	8.0	Erica scoparia	7.0

B1.6a - Atlantic and Baltic coastal dune scrub

*Diagnostic species (phi coefficient * 100)*

Salix repens	74.0	Carex trinervis	44.9
Hippophae rhamnoides	40.4	Hydrocotyle vulgaris	35.4
Calamagrostis epigejos	33.5	Rubus caesius	28.3
Epipactis palustris	27.4	Carex arenaria	26.7
Mentha aquatica	23.2	Festuca filiformis	21.6
Liparis loeselii	19.8	Gentianella amarella	19.6
Pyrola rotundifolia	19.1	Dactylorhiza incarnata	19.0
Juncus gerardi	18.9	Juncus anceps	18.9
Euphrasia stricta	18.6	Calliergonella cuspidata	17.2

Cynoglossum officinale	16.4	Vaccinium macrocarpon	15.6
Leontodon taraxacoides	15.6	Taraxacum sect. Erythrosperma	15.5
<i>Constant species (occurrence frequencies)</i>			
Salix repens	94.0	Calamagrostis epigejos	64.0
Rubus caesius	52.0	Hydrocotyle vulgaris	48.0
Mentha aquatica	47.0	Agrostis stolonifera	43.0
Poa pratensis	40.0	Calliergonella cuspidata	39.0
Festuca rubra	38.0	Carex arenaria	36.0
Galium palustre	34.0	Lotus corniculatus	33.0
Prunella vulgaris	32.0	Juncus articulatus	32.0
Holcus lanatus	32.0	Carex flacca	31.0
Epipactis palustris	30.0	Trifolium repens	28.0
Potentilla anserina	28.0	Carex trinervis	28.0
Pseudoscleropodium purum	27.0	Hippophae rhamnoides	27.0
Luzula campestris	25.0	Galium verum	25.0
Ranunculus flammula	24.0	Hypnum cupressiforme	24.0
Cardamine pratensis	23.0	Carex nigra	22.0
Juncus gerardi	21.0	Carex panicea	21.0
Phragmites australis	20.0	Galium uliginosum	20.0
Parnassia palustris	19.0	Euphrasia stricta	19.0
Crataegus monogyna	19.0	Senecio jacobaea	18.0
Ranunculus repens	18.0	Ligustrum vulgare	18.0
Leontodon taraxacoides	18.0	Eupatorium cannabinum	18.0
Brachythecium rutabulum	18.0	Salix cinerea	17.0
Dicranum scoparium	17.0	Vicia cracca	16.0
Veronica officinalis	16.0	Festuca filiformis	16.0
Eleocharis palustris	16.0	Dactylorhiza incarnata	16.0
Linum catharticum	15.0	Urtica dioica	14.0
Potentilla erecta	14.0	Galium mollugo	14.0
Viola hirta	13.0	Thymus pulegioides	13.0
Rhamnus catharticus	13.0	Potentilla reptans	13.0
Avenula pubescens	13.0	Koeleria macrantha	12.0
Carex viridula	12.0	Viola canina	11.0
Taraxacum sect. Erythrosperma	11.0	Pyrola rotundifolia	11.0
Cirsium palustre	11.0	Cirsium arvense	11.0
Carex disticha	11.0	Polygala vulgaris	10.0
Lycopus europaeus	10.0	Cynoglossum officinale	10.0
Ceratodon purpureus	10.0		
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Salix repens	89.0	Calliergonella cuspidata	27.0
Salix cinerea	9.0	Rubus caesius	7.0
Pseudoscleropodium purum	5.0	Festuca filiformis	5.0

B1.6b - Mediterranean and Black Sea coastal dune scrub

<i>Diagnostic species (phi coefficient * 100)</i>			
Juniperus oxycedrus	59.3	Smilax aspera	54.7
Asparagus acutifolius	54.4	Spartium junceum	48.7
Phillyrea angustifolia	47.2	Rubia peregrina	46.2
Daphne gnidium	44.1	Pinus pinaster	42.5
Lonicera implexa	41.7	Rhamnus alaternus	38.8

Dorycnium hirsutum	38.4	Cistus incanus	38.1
Cutandia divaricata	36.5	Pistacia lentiscus	35.8
Ephedra fragilis	34.8	Periploca graeca	33.7
Clematis flammula	32.8	Prasium majus	32.6
Launaea fragilis	31.4	Seseli tortuosum	31.0
Centaurea sphaerocephala	28.7	Teucrium flavum	27.0
Arbutus unedo	22.7	Scrophularia trifoliata	21.4
Rosa sempervirens	20.8	Helianthemum sessiliflorum	20.8
Limonium divaricatum	20.7	Pancratium maritimum	19.4
Phillyrea latifolia	19.2	Rubus ulmifolius	18.2
Ononis natrix	17.4	Helichrysum stoechas	17.1
Carpobrotus acinaciformis	15.6	Quercus ilex	15.4
<i>Constant species (occurrence frequencies)</i>			
Juniperus oxycedrus	72.0	Rubia peregrina	71.0
Asparagus acutifolius	69.0	Smilax aspera	63.0
Phillyrea angustifolia	42.0	Spartium junceum	39.0
Pistacia lentiscus	38.0	Daphne gnidium	38.0
Lonicera implexa	36.0	Rhamnus alaternus	33.0
Pinus pinaster	32.0	Cistus incanus	32.0
Dorycnium hirsutum	27.0	Clematis flammula	25.0
Rubus ulmifolius	23.0	Prasium majus	22.0
Seseli tortuosum	20.0	Arbutus unedo	18.0
Quercus ilex	17.0	Phillyrea latifolia	17.0
Pancratium maritimum	17.0	Hedera helix	16.0
Teucrium flavum	15.0	Helichrysum stoechas	15.0
Ephedra fragilis	15.0	Cutandia divaricata	15.0
Periploca graeca	14.0	Rosa sempervirens	12.0
Ononis natrix	12.0	Launaea fragilis	12.0
Centaurea sphaerocephala	12.0	Eryngium maritimum	11.0
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Juniperus oxycedrus	59.0	Phillyrea angustifolia	28.0
Spartium junceum	18.0	Smilax aspera	17.0
Salix cinerea	8.0	Rubia peregrina	6.0

F1.1 - Shrub tundra

*Diagnostic species (phi coefficient * 100)*

Empetrum nigrum subsp. hermaphroditum	61.6	Cladonia amaurocraea	55.9
Cassiope tetragona	55.7	Cetraria nivalis	55.2
Betula nana	51.6	Aulacomnium turgidum	49.9
Pedicularis lapponica	49.5	Salix polaris	47.2
Cetraria cucullata	46.8	Vaccinium uliginosum	46.2
Thamnolia vermicularis	45.4	Stereocaulon paschale	45.0
Cetraria ericetorum	42.6	Sphaerophorus globosus	41.8
Sphenolobus minutus	39.4	Rubus chamaemorus	39.3
Carex rariflora	38.8	Cladonia arbuscula	38.3
Nephroma arcticum	37.9	Cladonia stellaris	36.7
Cladonia uncialis	36.6	Dicranum elongatum	36.4
Cladonia gracilis	35.6	Dicranum fuscescens	35.2
Cladonia mitis	35.1	Ptilidium ciliare	33.2

Polytrichum strictum	33.2	Cetraria islandica	33.1
Salix nummularia	32.9	Ochrolechia frigida	32.7
Peltigera scabrosa	32.5	Pannaria pezizoides	32.4
Cephalozia ambigua	32.4	Draba subcapitata	32.3
Bryocaulon divergens	32.2	Barbilophozia binstaedii	32.1
Arctostaphylos alpinus	31.5	Polytrichum hyperboreum	31.1
Psoroma hypnorum	30.9	Dicranum spadiceum	30.9
Cladonia ecmocyna	29.9	Peltigera leucophlebia	29.8
Poa arctica	29.7	Pohlia cruda	29.5
Barbilophozia hatcheri	29.0	Cardamine bellidifolia	28.6
Phyllodoce caerulea	28.5	Loiseleuria procumbens	28.4
Mylia anomala	27.5	Alectoria nigricans	27.5
Distichium capillaceum	26.6	Vaccinium microcarpum	25.9
Blepharostoma trichophyllum	25.9	Carex rupestris	25.6
Cladonia rangiferina	25.2	Oxyria digyna	24.9
Cornus suecica	24.5	Ledum palustre	23.8
Cnestrum glaucescens	23.5	Peltolepis quadrata	23.4
Rinodina mniaraea	23.0	Kiaeria blyttii	23.0
Platydictya jungermannioides	22.9	Peltigera lepidophora	22.9
Tetraplodon mnioides	22.8	Physconia muscigena	22.8
Orthothecium strictum	22.7	Racomitrium microcarpon	22.6
Cyrtomnium hymenophyllum	22.6	Orthocaulis kunzeanus	22.4
Leiocolea heterocolpos	22.4	Hierochloe alpina	22.4
Solorina bispora	22.3	Encalypta alpina	22.3
Tanacetum bipinnatum	22.2	Cladonia macrophylla	22.1
Encalypta rhaptocarpa	21.9	Pedicularis hirsuta	21.5
Petasites frigidus	21.4	Polygonum viviparum	21.3
Ranunculus sulphureus	21.2	Stellaria longipes	21.1
Myurella julacea	21.1	Brachythecium turgidum	21.0
Cladonia subcervicornis	20.9	Cassiope hypnoides	20.9
Icmadophila ericetorum	20.8	Hylocomium splendens	20.8
Dicranella cerviculata	20.8	Bartramia ithyphylla	20.8
Orthothecium chryseon	20.7	Cladonia verticillata	20.7
Silene acaulis	20.6	Anastrophyllum minutum	20.5
Odontoschisma elongatum	20.4	Equisetum scirpoides	20.4
Cephalozia pleniceps	20.4	Stereocaulon alpinum	20.3
Tortella fragilis	20.1	Luzula arctica	20.1
Carex fuliginosa	20.1	Lophozia wenzelii	19.9
Saxifraga oppositifolia	19.5	Saxifraga cernua	19.5
Cerastium nigrescens	19.1	Anthelia juratzkana	18.9
Cladonia coccifera	18.7	Calypogeia neesiana	18.6
Luzula confusa	18.0	Carex rotundata	18.0
Mnium marginatum	17.9	Oncophorus virens	17.1
Cladonia mediterranea	17.0	Cladonia chlorophaea	16.9
Pinguicula vulgaris	16.5	Meesia uliginosa	16.5
Polytrichum juniperinum	16.4	Cladonia deformis	16.4
Oncophorus wahlenbergii	16.3	Carex bigelowii	16.2
Tomentypnum nitens	15.9	Peltigera aphthosa	15.5
Dryas octopetala	15.3	Corallorhiza trifida	15.3
<i>Constant species (occurrence frequencies)</i>			
Vaccinium uliginosum	67.0	Empetrum nigrum subsp. hermaphroditum	61.0
Betula nana	50.0	Hylocomium splendens	39.0

Cladonia arbuscula	39.0	Cetraria nivalis	39.0
Rubus chamaemorus	33.0	Polytrichum strictum	33.0
Cladonia uncialis	33.0	Cladonia amaurocraea	33.0
Cetraria islandica	33.0	Cassiope tetragona	33.0
Vaccinium vitis-idaea	28.0	Thamnolia vermicularis	28.0
Salix polaris	28.0	Ptilidium ciliare	28.0
Polygonum viviparum	28.0	Pedicularis lapponica	28.0
Dicranum scoparium	28.0	Cladonia gracilis	28.0
Cetraria cucullata	28.0	Aulacomnium turgidum	28.0
Sphaerophorus globosus	22.0	Stereocaulon paschale	22.0
Pleurozium schreberi	22.0	Festuca ovina	22.0
Dicranum fuscescens	22.0	Cladonia rangiferina	22.0
Cladonia mitis	22.0	Cetraria ericetorum	22.0
Carex rariflora	22.0	Vaccinium microcarpum	17.0
Sphenolobus minutus	17.0	Silene acaulis	17.0
Polytrichum juniperinum	17.0	Pinguicula vulgaris	17.0
Ochrolechia frigida	17.0	Nephroma arcticum	17.0
Mylia anomala	17.0	Loiseleuria procumbens	17.0
Ledum palustre	17.0	Dicranum elongatum	17.0
Cladonia stellaris	17.0	Arctostaphylos alpinus	17.0
Andromeda polifolia	17.0	Vaccinium myrtillus	11.0
Tomentypnum nitens	11.0	Saxifraga oppositifolia	11.0
Salix nummularia	11.0	Psoroma hypnorum	11.0
Polytrichum hyperboreum	11.0	Polytrichum commune	11.0
Pohlia cruda	11.0	Poa arctica	11.0
Phyllodoce caerulea	11.0	Peltigera scabrosa	11.0
Peltigera leucophlebia	11.0	Pannaria pezizoides	11.0
Oxyria digyna	11.0	Eriophorum vaginatum	11.0
Equisetum arvense	11.0	Empetrum nigrum	11.0
Dryas octopetala	11.0	Draba subcapitata	11.0
Distichium capillaceum	11.0	Dicranum spadiceum	11.0
Cornus suecica	11.0	Cladonia chlorophaea	11.0
Cladonia ecmocyna	11.0	Cladonia coccifera	11.0
Cephalozia ambigua	11.0	Carex rupestris	11.0
Carex bigelowii	11.0	Cardamine bellidifolia	11.0
Bryocaulon divergens	11.0	Blepharostoma trichophyllum	11.0
Bartsia alpina	11.0	Barbilophozia hatcheri	11.0
Barbilophozia binstaedii	11.0	Alectoria nigricans	11.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Empetrum nigrum subsp. hermaphroditum	44.0	Pleurozium schreberi	11.0
Empetrum nigrum	11.0	Cassiope tetragona	11.0
Stereocaulon paschale	6.0	Rubus chamaemorus	6.0
Ptilidium ciliare	6.0	Ochrolechia frigida	6.0
Drepanocladus uncinatus	6.0	Cladonia arbuscula	6.0
Aulacomnium palustre	6.0	Arctostaphylos alpinus	6.0

F1.2 - Moss and lichen tundra

*Diagnostic species (phi coefficient * 100)*

Salix polaris	66.3	Dryas octopetala	59.2
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Cerastium nigrescens	47.3	Empetrum nigrum subsp. hermaphroditum	46.7
Cladonia stellaris	46.4	Cetraria cucullata	43.9
Cetraria nivalis	41.7	Orthocaulis kunzeanus	40.0
Betula nana	37.7	Saxifraga oppositifolia	36.9
Pedicularis lapponica	36.9	Luzula confusa	36.7
Dicranum elongatum	36.3	Cladonia rangiferina	35.6
Sphaerophorus globosus	35.0	Ochrolechia frigida	32.6
Carex bigelowii	32.3	Rubus chamaemorus	31.2
Ptilidium ciliare	30.4	Ranunculus affinis	28.7
Draba nivalis	28.7	Draba cinerea	28.7
Silene uralensis	28.6	Taraxacum brachyceras	28.5
Polemonium boreale	28.4	Puccinellia vahliana	28.3
Comastoma tenellum	28.2	Draba lactea	28.0
Dicranum flexicaule	27.6	Barbilophozia binstaedii	27.5
Saxifraga nivalis	27.2	Cladonia subfurcata	26.9
Stellaria longipes	26.7	Polytrichum hyperboreum	26.3
Trisetum spicatum	26.2	Equisetum scirpoides	26.1
Anastrophyllum minutum	26.1	Luzula arctica	25.8
Carex fuliginosa	25.8	Saxifraga cespitosa	25.6
Cladonia amaurocraea	25.5	Cassiope tetragona	25.4
Polygonum viviparum	25.3	Cladonia ecmocyna	25.0
Poa arctica	24.8	Vaccinium uliginosum	24.7
Alectoria ochroleuca	23.6	Alectoria nigricans	22.6
Oncophorus wahlenbergii	22.0	Carex rupestris	20.7
Carex rariflora	19.0	Cladonia arbuscula	18.2
Carex aquatilis	18.0	Salix lapponum	17.6
Polytrichum juniperinum	16.4	Linnaea borealis	16.2
Loiseleuria procumbens	16.1	Cladonia mitis	16.1
Cephalozia bicuspidata	15.7		
<i>Constant species (occurrence frequencies)</i>			
Dryas octopetala	58.0	Salix polaris	50.0
Empetrum nigrum subsp. hermaphroditum	42.0	Vaccinium uliginosum	33.0
Polygonum viviparum	33.0	Cladonia rangiferina	33.0
Betula nana	33.0	Saxifraga oppositifolia	25.0
Rubus chamaemorus	25.0	Ptilidium ciliare	25.0
Cladonia stellaris	25.0	Cetraria nivalis	25.0
Cetraria cucullata	25.0	Cerastium nigrescens	25.0
Carex bigelowii	25.0	Sphaerophorus globosus	17.0
Vaccinium vitis-idaea	17.0	Polytrichum juniperinum	17.0
Pedicularis lapponica	17.0	Orthocaulis kunzeanus	17.0
Ochrolechia frigida	17.0	Luzula confusa	17.0
Dicranum elongatum	17.0	Cladonia arbuscula	17.0
Campanula rotundifolia	17.0		
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Empetrum nigrum subsp. hermaphroditum	25.0	Cladonia stellaris	25.0
Racomitrium lanuginosum	8.0	Cetraria nivalis	8.0
Betula nana	8.0		

F2.1 - Subarctic and alpine dwarf Salix scrub

*Diagnostic species (phi coefficient * 100)*

Salix herbacea	57.5	Salix retusa	50.5
Polygonum viviparum	39.3	Gnaphalium supinum	38.4
Salix reticulata	35.7	Saxifraga androsacea	34.7
Silene acaulis	34.4	Poa alpina	33.6
Sibbaldia procumbens	32.6	Veronica alpina	31.2
Ranunculus alpestris	30.9	Pritzelago alpina	30.0
Veronica aphylla	27.1	Potentilla brauniana	26.1
Salix serpillifolia	25.8	Soldanella alpina	25.3
Myosotis alpestris	25.2	Saxifraga oppositifolia	24.5
Carex foetida	23.8	Salix polaris	23.2
Luzula alpinopilosa	23.2	Anthelia juratzkana	23.0
Conostomum tetragonum	22.0	Kiaeria starkei	21.8
Bartsia alpina	21.5	Galium noricum	21.4
Androsace carnea	20.9	Alchemilla pentaphyllea	20.7
Sedum alpestre	20.6	Gentiana verna	20.4
Festuca quadriflora	20.4	Kobresia myosuroides	20.3
Polytrichastrum sexangulare	20.1	Cardamine bellidifolia	20.0
Minuartia sedoides	19.9	Aulacomnium turgidum	19.7
Dactylina arctica	19.0	Achillea atrata	18.9
Cladonia bellidiflora	18.8	Gnaphalium hoppeanum	18.3
Moehringia ciliata	18.2	Gymnomitrium concinnum	18.1
Sanionia uncinata	17.9	Festuca glacialis	17.9
Sagina saginoides	17.8	Pedicularis verticillata	17.7
Polytrichastrum alpinum	17.6	Luzula arctica	17.5
Cerastium cerastoides	17.4	Alopecurus gerardii	17.4
Alopecurus alpinus	17.4	Oligotrichum hercynicum	17.0
Leucanthemopsis alpina	17.0	Thamnolia vermicularis	16.8
Psoroma hypnorum	16.6	Plantago alpina	16.6
Arabis bellidifolia	16.6	Taraxacum sect. Alpina	16.5
Juncus trifidus subsp. monanthos	16.3	Gentiana brachyphylla	16.1
Cetraria cucullata	16.0	Arenaria ciliata	16.0
Gentiana bavarica	15.7	Festuca violacea	15.7
Parmelia skultii	15.4	Armeria alpina	15.4
Luzula confusa	15.3	Stereocaulon rivulorum	15.2
Lophozia sudetica	15.2	Salix alpina	15.1
Dicranum spadiceum	15.1		

Constant species (occurrence frequencies)

Polygonum viviparum	53.0	Salix herbacea	50.0
Poa alpina	41.0	Salix retusa	37.0
Silene acaulis	30.0	Gnaphalium supinum	25.0
Salix reticulata	23.0	Soldanella alpina	19.0
Bartsia alpina	19.0	Veronica alpina	17.0
Sibbaldia procumbens	17.0	Ranunculus alpestris	17.0
Myosotis alpestris	17.0	Carex nigra	16.0
Saxifraga androsacea	15.0	Gentiana verna	15.0
Saxifraga oppositifolia	14.0	Pritzelago alpina	14.0
Luzula alpinopilosa	13.0	Campanula scheuchzeri	12.0
Aster bellidiasstrum	12.0	Veronica aphylla	11.0
Salix serpillifolia	11.0	Minuartia sedoides	11.0
Festuca quadriflora	11.0	Dryas octopetala	11.0

Cetraria islandica	11.0	Selaginella selaginoides	10.0
Polytrichastrum alpinum	10.0	Plantago alpina	10.0
Leucanthemopsis alpina	10.0	Homogyne alpina	10.0
Geum montanum	10.0	Carex bigelowii	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Salix herbacea	37.0	Salix retusa	31.0
Salix reticulata	11.0	Salix serpillifolia	6.0

F2.2a - Alpine and subalpine ericoid heath

*Diagnostic species (phi coefficient * 100)*

Vaccinium uliginosum	34.8	Loiseleuria procumbens	33.0
Rhododendron ferrugineum	28.0	Juncus trifidus	27.4
Cetraria islandica	25.4	Dryas octopetala	24.3
Hieracium alpinum	24.0	Homogyne alpina	22.5
Juniperus communis subsp. alpina	21.9	Festuca airoides	21.3
Empetrum nigrum subsp. hermaphroditum	20.8	Vaccinium vitis-idaea	19.7
Avenula versicolor	19.6	Vaccinium myrtillus	19.2
Rhododendron myrtifolium	16.2	Campanula alpina	16.1
Phyteuma hemisphaericum	16.0	Potentilla aurea	15.9
Agrostis rupestris	15.6	Leontodon pyrenaicus	15.5
Oreochloa disticha	15.1		

Constant species (occurrence frequencies)

Vaccinium myrtillus	59.0	Vaccinium uliginosum	47.0
Vaccinium vitis-idaea	38.0	Deschampsia flexuosa	38.0
Calluna vulgaris	30.0	Homogyne alpina	28.0
Cetraria islandica	24.0	Rhododendron ferrugineum	23.0
Juncus trifidus	21.0	Juniperus communis subsp. alpina	20.0
Loiseleuria procumbens	19.0	Nardus stricta	18.0
Dryas octopetala	18.0	Potentilla erecta	17.0
		Empetrum nigrum subsp. hermaphroditum	15.0
Hylocomium splendens	15.0	Polygonum viviparum	14.0
Potentilla aurea	14.0	Hieracium alpinum	13.0
Pleurozium schreberi	14.0	Cladonia arbuscula	13.0
Dicranum scoparium	13.0	Avenula versicolor	13.0
Carex sempervirens	13.0	Anthoxanthum odoratum	12.0
Festuca airoides	12.0	Luzula luzuloides	11.0
Solidago virgaurea	11.0	Agrostis rupestris	11.0
Cladonia rangiferina	11.0	Huperzia selago	10.0
Phyteuma hemisphaericum	10.0		
Antennaria dioica	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Vaccinium myrtillus	21.0	Vaccinium uliginosum	20.0
Calluna vulgaris	13.0	Loiseleuria procumbens	12.0
Dryas octopetala	12.0	Rhododendron ferrugineum	10.0
Empetrum nigrum subsp. hermaphroditum	10.0		

F2.2b - Alpine and subalpine Juniperus scrub

*Diagnostic species (phi coefficient * 100)*

Juniperus communis subsp. alpina	77.5	Bruckenthalia spiculifolia	25.7
Brachypodium genuense	24.7	Lerchenfeldia flexuosa	24.6
Genista depressa	23.9	Daphne oleoides	23.9
Arctostaphylos uva-ursi	22.0	Potentilla ternata	19.6
Viola eugeniae	18.3	Sesleria tenuifolia	18.3
Festuca valida	18.1	Globularia meridionalis	16.7
Viola dacica	16.0	Carlina macrocephala	15.5
Campanula epigaeae	15.1		

Constant species (occurrence frequencies)

Juniperus communis subsp. alpina	98.0	Vaccinium myrtillus	44.0
Deschampsia flexuosa	32.0	Anthoxanthum odoratum	22.0
Vaccinium uliginosum	20.0	Vaccinium vitis-idaea	19.0
Nardus stricta	18.0	Festuca rubra	18.0
Arctostaphylos uva-ursi	18.0	Thymus praecox	17.0
Helianthemum nummularium	16.0	Calluna vulgaris	15.0
Lotus corniculatus	14.0	Potentilla erecta	13.0
Agrostis capillaris	13.0	Luzula luzuloides	12.0
Lerchenfeldia flexuosa	12.0	Daphne oleoides	12.0
Bruckenthalia spiculifolia	12.0	Bromus erectus	12.0
Phyteuma orbiculare	11.0	Homogyne alpina	11.0
Cruciata glabra	11.0	Campanula scheuchzeri	11.0
Solidago virgaurea	10.0	Rubus idaeus	10.0
Genista depressa	10.0	Festuca nigrescens	10.0
Carex caryophyllea	10.0	Calamagrostis arundinacea	10.0
Brachypodium genuense	10.0	Antennaria dioica	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Juniperus communis subsp. alpina	98.0	Arctostaphylos uva-ursi	8.0
Deschampsia flexuosa	5.0		

F2.2c - Balkan subalpine genistoid scrub

*Diagnostic species (phi coefficient * 100)*

Genista radiata	98.8	Brachypodium genuense	63.3
Carex macrolepis	51.6	Stachys alopecuros	41.9
Daphne oleoides	40.6	Carduus nutans	38.9
Laserpitium siler	35.2	Galium lucidum	33.8
Avenula praetutiana	33.2	Asperula purpurea	32.9
Teucrium montanum	32.3	Chamaecytisus spinescens	32.3
Bromus erectus	31.5	Laserpitium peucedanoides	31.3
Sesleria tenuifolia	30.6	Cynoglottis barrelieri	29.6
Viola eugeniae	29.4	Rosa pendulina	27.7
Koeleria lobata	27.2	Sesleria nitida	27.0
Polygala major	26.1	Cirsium erisithales	26.1
Erica herbacea	25.7	Erysimum pseudorhaeticum	25.6
Thymus longicaulis	25.3	Euphorbia myrsinites	24.6
Globularia meridionalis	24.5	Arabis brassica	24.2
Cerastium tomentosum	24.0	Salix glabra	23.7
Salix appendiculata	23.3	Sorbus aria agg.	23.1

Crepis praemorsa	22.8	Asperula aristata	22.5
Sesleria pichiana	22.3	Festuca billyi	22.2
Anemone trifolia	22.1	Thlaspi brachypetalum	22.0
Potentilla crantzii	22.0	Cephalaria laevigata	22.0
Phleum ambiguum	21.9	Calamagrostis varia	21.8
Scabiosa banatica	21.4	Amelanchier ovalis	21.4
Eryngium alpinum	21.0	Euphorbia kernerii	20.7
Carlina acaulis	20.5	Aquilegia einseleana	20.5
Bupthalmum salicifolium	20.2	Athamanta turbith	20.2
Centaurea haynaldii	20.1	Polygala chamaebuxus	19.6
Lunaria annua	19.3	Helianthemum oelandicum	19.2
Centaurea parlatoris	19.2	Campanula witasekiana	19.2
Thesium rostratum	18.9	Thymus praecox	18.8
Festuca robustifolia	18.8	Pleurospermum austriacum	18.6
Centaurea triumphetti	18.6	Ranunculus carinthiacus	18.3
Lilium carnolicum	18.3	Leontodon incanus	18.3
Bupleurum falcatum	18.2	Scabiosa graminifolia	17.8
Seseli rigidum	17.7	Seseli libanotis	17.3
Helictotrichon sempervirens	17.2	Cotoneaster integerrimus	16.8
Centaurea ambigua	16.8	Teucrium chamaedrys	16.7
Knautia illyrica	16.6	Erysimum jugicola	16.6
Tanacetum corymbosum subsp. clusii	15.9	Sedum rupestre	15.9
Rhamnus alpinus	15.9	Phyteuma scheuchzeri	15.9
Chamaecytisus purpureus	15.8	Dianthus petraeus	15.8
<i>Constant species (occurrence frequencies)</i>			
Genista radiata	100.0	Bromus erectus	70.0
Teucrium montanum	45.0	Brachypodium genuense	45.0
Teucrium chamaedrys	40.0	Sorbus aria agg.	40.0
Galium lucidum	35.0	Thymus praecox	30.0
Stachys alopecuroides	30.0	Rosa pendulina	30.0
Carlina acaulis	30.0	Carex macrolepis	30.0
Carduus nutans	30.0	Laserpitium siler	25.0
Helianthemum nummularium	25.0	Erica herbacea	25.0
Daphne oleoides	25.0	Calamagrostis varia	25.0
Brachypodium pinnatum	25.0	Asperula purpurea	25.0
Amelanchier ovalis	25.0	Thymus longicaulis	20.0
Polygala chamaebuxus	20.0	Lotus corniculatus	20.0
Helianthemum oelandicum	20.0	Cirsium erisithales	20.0
Bupleurum falcatum	20.0	Bupthalmum salicifolium	20.0
Tanacetum corymbosum	15.0	Stachys recta	15.0
Sesleria tenuifolia	15.0	Sesleria caerulea	15.0
Seseli libanotis	15.0	Sedum rupestre	15.0
Salix appendiculata	15.0	Quercus pubescens	15.0
Potentilla crantzii	15.0	Polygala major	15.0
Laserpitium peucedanoides	15.0	Koeleria lobata	15.0
Chamaecytisus spinescens	15.0	Gymnadenia conopsea	15.0
Galium mollugo agg.	15.0	Euphorbia myrsinites	15.0
Cerastium arvense	15.0	Carduus defloratus agg.	15.0
Avenula praetutiana	15.0	Asperula aristata	15.0
Anemone trifolia	15.0	Acer opalus	15.0
Viola eugeniae	10.0	Thymus serpyllum	10.0
Silene italica	10.0	Sesleria nitida	10.0
Scabiosa columbaria	10.0	Sanguisorba minor	10.0

Salix glabra	10.0	Rubus idaeus	10.0
Rhamnus alpinus	10.0	Prunella grandiflora	10.0
Prenanthes purpurea	10.0	Polygonatum odoratum	10.0
Pinus sylvestris	10.0	Pimpinella saxifraga	10.0
Phleum ambiguum	10.0	Peucedanum oreoselinum	10.0
Molinia caerulea agg.	10.0	Mercurialis perennis	10.0
Leontodon incanus	10.0	Laserpitium latifolium	10.0
Juniperus communis subsp. alpina	10.0	Hippocrepis comosa	10.0
Globularia meridionalis	10.0	Erysimum pseudorhaeticum	10.0
Dactylis glomerata	10.0	Cynoglossis barrelieri	10.0
Cyclamen purpurascens	10.0	Crepis praemorsa	10.0
Cotoneaster integerrimus	10.0	Cerastium tomentosum	10.0
Centaurea triumphetti	10.0	Carex flacca	10.0
Asperula cynanchica	10.0	Arctostaphylos uva-ursi	10.0
Arabis brassica	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Genista radiata	100.0	Eryngium alpinum	5.0
Erica herbacea	5.0	Brachypodium genuense	5.0

F2.3 - Subalpine deciduous scrub

*Diagnostic species (phi coefficient * 100)*

Alnus viridis	68.1	Viola biflora	43.9
Peucedanum ostruthium	43.4	Adenostyles alliariae	36.4
Saxifraga rotundifolia	35.4	Salix waldsteiniana	33.5
Salix appendiculata	32.3	Rumex alpestris	32.3
Salix helvetica	29.9	Geranium sylvaticum	29.0
Athyrium distentifolium	26.6	Achillea macrophylla	26.3
Aconitum napellus	26.3	Chaerophyllum villarsii	26.2
Cicerbita alpina	26.2	Rhododendron hirsutum	25.3
Polystichum lonchitis	24.3	Epilobium alpestre	23.7
Veratrum album	23.5	Cymbalaria hepaticifolia	22.1
Agrostis agrostiflora	21.7	Salix glabra	21.6
Veratrum lobelianum	20.8	Thalictrum aquilegifolium	20.7
Rhododendron ferrugineum	20.7	Sorbus chamaemespilus	20.4
Homogyne alpina	20.4	Gentiana punctata	20.1
Valeriana montana	19.7	Soldanella alpina	19.0
Rosa pendulina	18.4	Valeriana tripteris	18.3
Aconitum lycoctonum subsp. vulparia	18.2	Hugueninia tanacetifolia	17.9
Aconitum napellus subsp. firmum	17.8	Pedicularis recutita	17.4
Salix silesiaca	16.9	Astrantia minor	16.8
Rhamnus alpinus	16.7	Asplenium viride	16.5
Rhodiola rosea	16.4	Stellaria nemorum	16.3
Carex ferruginea	16.2	Ranunculus aconitifolius	16.0
Ranunculus plataniifolius	15.7	Calamagrostis villosa	15.4
Lonicera caerulea	15.1		

Constant species (occurrence frequencies)

Alnus viridis	59.0	Viola biflora	48.0
Geranium sylvaticum	40.0	Vaccinium myrtillus	38.0
Sorbus aucuparia	38.0	Adenostyles alliariae	35.0
Rubus idaeus	34.0	Saxifraga rotundifolia	33.0

Peucedanum ostruthium	30.0	Solidago virgaurea	28.0
Rumex alpestris	27.0	Homogyne alpina	26.0
Veratrum album	23.0	Dryopteris filix-mas	23.0
Salix appendiculata	22.0	Dryopteris dilatata	22.0
Stellaria nemorum	21.0	Oxalis acetosella	21.0
Deschampsia cespitosa	20.0	Athyrium filix-femina	20.0
Rosa pendulina	19.0	Geum rivale	18.0
Valeriana tripteris	17.0	Thalictrum aquilegifolium	17.0
Senecio nemorensis	17.0	Rhododendron hirsutum	17.0
Rhododendron ferrugineum	17.0	Polystichum lonchitis	17.0
Picea abies	17.0	Chaerophyllum villarsii	17.0
Chaerophyllum hirsutum	17.0	Hypericum maculatum	17.0
Heracleum sphondylium	17.0	Cicerbita alpina	17.0
Silene vulgaris	15.0	Salix waldsteiniana	15.0
Calamagrostis villosa	15.0	Athyrium distentifolium	15.0
Aconitum napellus	15.0	Acer pseudoplatanus	15.0
Veratrum lobelianum	14.0	Valeriana montana	14.0
Soldanella alpina	14.0	Rubus saxatilis	14.0
Polygonatum verticillatum	14.0	Deschampsia flexuosa	14.0
Campanula scheuchzeri	14.0	Urtica dioica	12.0
Paris quadrifolia	12.0	Juniperus communis subsp. alpina	12.0
Carex ferruginea	12.0	Bistorta officinalis	12.0
Asplenium viride	12.0	Alchemilla vulgaris	12.0
Aconitum lycoctonum subsp. vulparia	12.0	Sorbus chamaemespilus	11.0
Ranunculus serpens subsp. nemorosus	11.0	Poa nemoralis	11.0
Poa alpina	11.0	Hylocomium splendens	11.0
Gentiana asclepiadea	11.0	Adenostyles alpina	11.0
Salix helvetica	10.0	Rhytidadelphus triquetrus	10.0
Rhamnus alpinus	10.0	Ranunculus aconitifolius	10.0
Luzula sylvatica	10.0	Ligusticum mutellina	10.0
Knautia dipsacifolia	10.0	Fragaria vesca	10.0
Daphne mezereum	10.0	Cystopteris fragilis	10.0
Calamagrostis varia	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Alnus viridis	53.0	Salix helvetica	9.0
Rhamnus alpinus	9.0	Adenostyles alliariae	9.0
Salix waldsteiniana	8.0	Salix silesiaca	6.0
Salix appendiculata	6.0		

F2.4 - Subalpine Pinus mugo scrub

*Diagnostic species (phi coefficient * 100)*

Pinus mugo	88.0	Rhododendron hirsutum	44.8
Sorbus chamaemespilus	39.2	Erica herbacea	37.4
Salix glabra	35.9	Homogyne alpina	33.6
Vaccinium vitis-idaea	32.8	Rhodothamnus chamaecistus	30.9
Lonicera caerulea	30.0	Calamagrostis villosa	28.9
Salix waldsteiniana	28.7	Juniperus communis subsp. alpina	28.6
Salix appendiculata	27.1	Laserpitium peucedanooides	26.6
Clematis alpina	25.7	Daphne striata	24.7
Valeriana montana	24.4	Vaccinium myrtillus	24.1

Rhododendron ferrugineum	24.0	Valeriana saxatilis	23.7
Lycopodium annotinum	23.6	Astrantia bavarica	23.4
Valeriana tripteris	23.3	Dryas octopetala	23.1
Viola biflora	22.9	Stachys alopecuros	22.4
Rosa pendulina	21.7	Aster bellidiastrum	21.4
Sesleria caerulea	20.5	Galium anisophyllum	19.9
Polygala chamaebuxus	19.7	Paederota lutea	19.7
Thymus alpestris	19.4	Carex ferruginea	18.5
Rubus saxatilis	18.4	Calamagrostis varia	18.2
Cetraria islandica	17.7	Globularia cordifolia	17.4
Arctostaphylos uva-ursi	17.1	Biscutella laevigata	17.0
Asplenium viride	16.9	Campanula scheuchzeri	16.4
Soldanella alpina	16.2	Huperzia selago	16.2
Gentiana pannonica	16.1	Bartsia alpina	15.6
Veratrum album	15.3	Anemone trifolia	15.3
Ranunculus hybridus	15.1	Pulsatilla alpina	15.1
<i>Constant species (occurrence frequencies)</i>			
Pinus mugo	100.0	Vaccinium myrtillus	73.0
Vaccinium vitis-idaea	64.0	Homogyne alpina	44.0
Erica herbacea	38.0	Dicranum scoparium	35.0
Rhododendron hirsutum	34.0	Sorbus aucuparia	32.0
Sesleria caerulea	31.0	Picea abies	30.0
Hieracium murorum	30.0	Calamagrostis villosa	30.0
Juniperus communis subsp. alpina	28.0	Deschampsia flexuosa	28.0
Sorbus chamaemespilus	25.0	Solidago virgaurea	25.0
Rubus saxatilis	25.0	Pleurozium schreberi	25.0
Hylocomium splendens	25.0	Viola biflora	23.0
Rosa pendulina	23.0	Valeriana tripteris	22.0
Aster bellidiastrum	22.0	Rhytidiadelphus triquetrus	20.0
Polygala chamaebuxus	20.0	Luzula sylvatica	20.0
Geranium sylvaticum	20.0	Calamagrostis varia	20.0
Vaccinium uliginosum	19.0	Rhododendron ferrugineum	19.0
Oxalis acetosella	19.0	Lycopodium annotinum	19.0
Valeriana montana	18.0	Salix appendiculata	18.0
Salix glabra	17.0	Phyteuma orbiculare	17.0
Juniperus communis subsp. communis	17.0	Dryas octopetala	17.0
Clematis alpina	17.0	Lotus corniculatus	16.0
Lonicera caerulea	16.0	Larix decidua	16.0
Galium anisophyllum	16.0	Dryopteris dilatata	16.0
Cetraria islandica	16.0	Campanula scheuchzeri	16.0
Veratrum album	15.0	Rhodothamnus chamaecistus	15.0
Potentilla erecta	15.0	Rubus idaeus	14.0
Polygonum viviparum	14.0	Huperzia selago	14.0
Globularia cordifolia	14.0	Daphne mezereum	14.0
Carex ferruginea	14.0	Biscutella laevigata	14.0
Bartsia alpina	14.0	Amelanchier ovalis	14.0
Tortella tortuosa	13.0	Tofieldia calyculata	13.0
Stachys alopecuros	13.0	Sorbus aria agg.	13.0
Polygonatum verticillatum	13.0	Asplenium viride	13.0
Arctostaphylos uva-ursi	13.0	Pulsatilla alpina	12.0
Helianthemum oelandicum	12.0	Carduus defloratus agg.	12.0
Valeriana saxatilis	11.0	Soldanella alpina	11.0

Salix waldsteiniana	11.0	Melampyrum sylvaticum	11.0
Laserpitium peucedanoides	11.0	Epipactis atrorubens	11.0
Carex sempervirens	11.0	Campanula rotundifolia	11.0
Calluna vulgaris	11.0	Gymnocarpium dryopteris	10.0
Cladonia rangiferina	10.0	Anemone trifolia	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Pinus mugo	100.0	Vaccinium myrtillus	28.0
Erica herbacea	15.0	Rhododendron hirsutum	10.0
Rhododendron ferrugineum	5.0		

F3.1a - Lowland to montane temperate and submediterranean Juniperus scrub

*Diagnostic species (phi coefficient * 100)*

Juniperus communis subsp. communis	48.2	Barbilophozia barbata	23.1
Palmogloea protuberans	22.1	Berberis aetnensis	15.4
Campylopus pyriformis	15.1		

Constant species (occurrence frequencies)

Juniperus communis subsp. communis	100.0	Calluna vulgaris	29.0
Deschampsia flexuosa	26.0	Dicranum scoparium	24.0
Brachypodium pinnatum	24.0	Pleurozium schreberi	21.0
Vaccinium myrtillus	19.0	Rosa canina agg.	18.0
Teucrium chamaedrys	17.0	Potentilla erecta	17.0
Hypnum jutlandicum	16.0	Hieracium pilosella	16.0
Festuca ovina	16.0	Agrostis capillaris	16.0
Sanguisorba minor	15.0	Pseudoscleropodium purum	15.0
Pinus sylvestris	15.0	Lotus corniculatus	15.0
Galium saxatile	15.0	Festuca rubra	15.0
Leontodon hispidus	14.0	Hypnum cupressiforme	14.0
Frangula alnus	14.0	Carex flacca	14.0
Hippocrepis comosa	13.0	Campanula rotundifolia	13.0
Lophocolea bidentata	12.0	Helianthemum nummularium	12.0
Euphorbia cyparissias	12.0	Carlina vulgaris	12.0
Briza media	12.0	Anthoxanthum odoratum	12.0
Sorbus aucuparia	11.0	Quercus robur	11.0
Prunus spinosa	11.0	Ligustrum vulgare	11.0
Hylocomium splendens	11.0	Achillea millefolium	11.0
Agrostis vinealis	11.0	Rumex acetosella	10.0
Ptilidium ciliare	10.0	Pohlia nutans	10.0
Plantago lanceolata	10.0	Linum catharticum	10.0
Asperula cynanchica	10.0	Anthyllis vulneraria	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Juniperus communis subsp. communis	100.0	Brachypodium pinnatum	10.0
Calluna vulgaris	7.0	Festuca rubra	5.0

F3.1b - Temperate Rubus scrub

*Diagnostic species (phi coefficient * 100)*

Rubus caesius 19.4

Constant species (occurrence frequencies)

Rubus fruticosus agg.	47.0	Urtica dioica	44.0
Rubus caesius	38.0	Rubus idaeus	30.0
Galium aparine	24.0	Dactylis glomerata	23.0
Cirsium arvense	22.0	Elymus repens	20.0
Arrhenatherum elatius	20.0	Poa trivialis	15.0
Calamagrostis epigejos	15.0	Agrostis capillaris	15.0
Heracleum sphondylium	14.0	Calystegia sepium	14.0
Galium mollugo agg.	13.0	Festuca rubra	13.0
Epilobium angustifolium	13.0	Sorbus aucuparia	12.0
Holcus lanatus	12.0	Poa pratensis	11.0
Equisetum arvense	11.0	Athyrium filix-femina	11.0
Artemisia vulgaris	11.0	Anthriscus sylvestris	11.0
Achillea millefolium	11.0	Senecio nemorensis	10.0
Sambucus nigra	10.0	Crataegus monogyna	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Rubus fruticosus agg.	38.0	Rubus caesius	37.0
Rubus idaeus	22.0		

F3.1c - Lowland to montane temperate and submediterranean genistoid scrub

*Diagnostic species (phi coefficient * 100)*

Ulex europaeus	43.2	Cytisus scoparius	40.3
Genista florida	24.1	Erica cinerea	15.8
Teucrium scorodonia	15.7	Genista cinerascens	15.4

Constant species (occurrence frequencies)

Cytisus scoparius	57.0	Ulex europaeus	42.0
Pteridium aquilinum	37.0	Agrostis capillaris	31.0
Teucrium scorodonia	27.0	Calluna vulgaris	27.0
Potentilla erecta	18.0	Erica cinerea	18.0
Rubus ulmifolius	17.0	Anthoxanthum odoratum	17.0
Rumex acetosella	16.0	Rubus fruticosus agg.	15.0
Holcus lanatus	14.0	Dactylis glomerata	14.0
Achillea millefolium	14.0	Hypochaeris radicata	13.0
Holcus mollis	13.0	Festuca ovina	13.0
Deschampsia flexuosa	12.0	Plantago lanceolata	11.0
Genista florida	11.0	Galium saxatile	11.0
Festuca rubra	11.0	Crataegus monogyna	11.0
Brachypodium pinnatum	11.0	Rosa canina agg.	10.0
Hypericum perforatum	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Cytisus scoparius	47.0	Ulex europaeus	38.0
Pteridium aquilinum	7.0	Genista florida	5.0
Agrostis capillaris	5.0		

F3.1d - Balkan-Anatolian submontane genistoid scrub

<i>Diagnostic species (phi coefficient * 100)</i>			
Genista lydia	98.5	Minuartia hirsuta	98.0
Allium guttatum	97.9	Centaurea grisebachii	97.7
Hypericum olympicum	96.5	Thymus sibthorpii	94.4
Koeleria lobata	93.3	Micropyrum tenellum	92.0
Asperula aristata	88.4	Rumex acetosella	43.3
<i>Constant species (occurrence frequencies)</i>			
Thymus sibthorpii	100.0	Rumex acetosella	100.0
Minuartia hirsuta	100.0	Micropyrum tenellum	100.0
Koeleria lobata	100.0	Hypericum olympicum	100.0
Genista lydia	100.0	Centaurea grisebachii	100.0
Asperula aristata	100.0	Allium guttatum	100.0
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Genista lydia	100.0		

F3.1e - Temperate and submediterranean thorn scrub

<i>Diagnostic species (phi coefficient * 100)</i>			
Prunus spinosa	27.8	Rosa canina agg.	21.3
Rubus ulmifolius	17.2	Crataegus monogyna	16.6
<i>Constant species (occurrence frequencies)</i>			
Prunus spinosa	59.0	Crataegus monogyna	53.0
Rosa canina agg.	42.0	Urtica dioica	35.0
Cornus sanguinea	35.0	Ligustrum vulgare	30.0
Galium aparine	28.0	Sambucus nigra	27.0
Rubus ulmifolius	27.0	Euonymus europaeus	23.0
Hedera helix	22.0	Rubus fruticosus agg.	17.0
Dactylis glomerata	17.0	Corylus avellana	17.0
Clematis vitalba	17.0	Rubus caesius	16.0
Glechoma hederacea	15.0	Geum urbanum	15.0
Fraxinus excelsior	14.0	Brachypodium pinnatum	14.0
Rhamnus catharticus	13.0	Galium mollugo agg.	13.0
Viburnum lantana	12.0	Poa trivialis	12.0
Acer campestre	12.0	Rubia peregrina	11.0
Lonicera periclymenum	11.0	Tamus communis	10.0
Arrhenatherum elatius	10.0		
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Prunus spinosa	34.0	Crataegus monogyna	22.0
Rubus ulmifolius	13.0	Sambucus nigra	9.0
Cornus sanguinea	9.0	Ligustrum vulgare	7.0

F3.1f - Low steppic scrub

<i>Diagnostic species (phi coefficient * 100)</i>			
Prunus fruticosa	64.7	Prunus tenella	43.2
Spiraea media	40.1	Caragana frutex	39.6
Phlomis tuberosa	25.3	Spiraea crenata	25.2

Thalictrum minus	25.0	Melica transsilvanica	23.7
Aconitum anthora	21.6	Stachys recta	21.2
Fragaria viridis	21.1	Hylotelephium maximum	19.4
Geranium sanguineum	19.4	Rosa pimpinellifolia	19.1
Artemisia sericea	18.8	Poa transbaicalica	17.3
Salvia nemorosa	17.2	Valeriana rossica	17.1
Linaria angustissima	17.0	Vincetoxicum hirundinaria	16.9
Adonis vernalis	16.7	Stipa pennata	16.3
Scutellaria alpina	16.3	Origanum vulgare	16.3
Salvia stepposa	16.2	Hieracium echinoides	16.2
Galium glaucum	16.2	Cotoneaster melanocarpus	16.0
Coronilla varia	16.0	Elymus hispidus	15.8
Medicago romanica	15.7	Verbascum lychnitis	15.5
Fumaria schleicheri	15.5	Artemisia armeniaca	15.4
Medicago falcata	15.3		
<i>Constant species (occurrence frequencies)</i>			
Prunus fruticosa	53.0	Galium verum	37.0
Teucrium chamaedrys	33.0	Vincetoxicum hirundinaria	30.0
Stachys recta	30.0	Fragaria viridis	30.0
Euphorbia cyparissias	29.0	Thalictrum minus	28.0
Elymus repens	28.0	Poa angustifolia	27.0
Origanum vulgare	27.0	Hypericum perforatum	25.0
Coronilla varia	25.0	Caragana frutex	25.0
Prunus tenella	24.0	Medicago falcata	24.0
Geranium sanguineum	23.0	Rosa canina agg.	22.0
Hylotelephium maximum	22.0	Spiraea media	19.0
Salvia pratensis	19.0	Prunus spinosa	19.0
Festuca rupicola	18.0	Centaurea scabiosa	18.0
Filipendula vulgaris	17.0	Achillea millefolium	17.0
Phlomis tuberosa	16.0	Galium mollugo agg.	16.0
Brachypodium pinnatum	16.0	Rhamnus catharticus	15.0
Bromus inermis	15.0	Asperula cynanchica	15.0
Stipa pennata	14.0	Rosa pimpinellifolia	14.0
Potentilla cinerea	14.0	Phleum phleoides	14.0
Agrimonia eupatoria	14.0	Vicia cracca	13.0
Verbascum lychnitis	13.0	Melica transsilvanica	13.0
Fallopia convolvulus	13.0	Veronica spicata	12.0
Salvia nemorosa	12.0	Falcaria vulgaris	12.0
Elymus hispidus	12.0	Scabiosa ochroleuca	11.0
Polygonatum odoratum	11.0	Pimpinella saxifraga	11.0
Galium glaucum	11.0	Festuca valesiaca	11.0
Dactylis glomerata	11.0	Bupleurum falcatum	11.0
Asparagus officinalis	11.0	Adonis vernalis	11.0
Viola hirta	10.0	Spiraea crenata	10.0
Silene latifolia subsp. alba	10.0	Sanguisorba minor	10.0
Potentilla argentea	10.0	Plantago media	10.0
Koeleria macrantha	10.0	Eryngium campestre	10.0
Dianthus carthusianorum	10.0	Carex humilis	10.0
Achillea pannonica	10.0		
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Prunus fruticosa	43.0	Prunus tenella	20.0
Spiraea media	19.0	Caragana frutex	18.0

F3.1g - *Corylus avellana* scrub

*Diagnostic species (phi coefficient * 100)*

Corylus avellana 31.9

Constant species (occurrence frequencies)

<i>Corylus avellana</i>	100.0	<i>Crataegus monogyna</i>	45.0
<i>Hedera helix</i>	43.0	<i>Prunus spinosa</i>	31.0
<i>Fragaria vesca</i>	31.0	<i>Geum urbanum</i>	30.0
<i>Geranium robertianum</i>	30.0	<i>Fraxinus excelsior</i>	28.0
<i>Oxalis acetosella</i>	27.0	<i>Cornus sanguinea</i>	27.0
<i>Lonicera periclymenum</i>	26.0	<i>Brachypodium sylvaticum</i>	26.0
<i>Stellaria holostea</i>	25.0	<i>Rubus fruticosus</i> agg.	25.0
<i>Poa nemoralis</i>	25.0	<i>Urtica dioica</i>	24.0
<i>Dryopteris filix-mas</i>	24.0	<i>Mercurialis perennis</i>	23.0
<i>Rosa canina</i> agg.	22.0	<i>Veronica chamaedrys</i>	20.0
<i>Pteridium aquilinum</i>	20.0	<i>Athyrium filix-femina</i>	20.0
<i>Viola reichenbachiana</i>	19.0	<i>Lonicera xylosteum</i>	19.0
<i>Ilex aquifolium</i>	19.0	<i>Hepatica nobilis</i>	19.0
<i>Carex sylvatica</i>	19.0	<i>Vicia sepium</i>	18.0
<i>Sanicula europaea</i>	18.0	<i>Primula vulgaris</i>	18.0
<i>Acer campestre</i>	18.0	<i>Sambucus nigra</i>	16.0
<i>Melica uniflora</i>	16.0	<i>Ligustrum vulgare</i>	16.0
<i>Galium aparine</i>	16.0	<i>Euonymus europaeus</i>	16.0
<i>Campanula trachelium</i>	16.0	<i>Anemone nemorosa</i>	16.0
<i>Lamium galeobdolon</i>	15.0	<i>Asarum europaeum</i>	15.0
<i>Thuidium tamariscinum</i>	14.0	<i>Hyacinthoides non-scripta</i>	14.0
<i>Eurhynchium striatum</i>	14.0	<i>Aegopodium podagraria</i>	14.0
<i>Viburnum lantana</i>	13.0	<i>Tamus communis</i>	13.0
<i>Sorbus aucuparia</i>	13.0	<i>Quercus petraea</i>	13.0
<i>Plagiomnium undulatum</i>	13.0	<i>Kindbergia praelonga</i>	13.0
<i>Heracleum sphondylium</i>	13.0	<i>Euphorbia amygdaloides</i>	13.0
<i>Ajuga reptans</i>	13.0	<i>Viola riviniana</i>	12.0
<i>Viburnum opulus</i>	12.0	<i>Rosa arvensis</i>	12.0
<i>Primula veris</i>	12.0	<i>Polystichum setiferum</i>	12.0
<i>Polygonatum multiflorum</i>	12.0	<i>Clematis vitalba</i>	12.0
<i>Arum maculatum</i>	12.0	<i>Glechoma hederacea</i>	11.0
<i>Conopodium majus</i>	11.0	<i>Potentilla sterilis</i>	10.0
<i>Mycelis muralis</i>	10.0	<i>Fagus sylvatica</i>	10.0
<i>Dryopteris dilatata</i>	10.0	<i>Dactylis glomerata</i>	10.0
<i>Clinopodium vulgare</i>	10.0	<i>Circaea lutetiana</i>	10.0
<i>Carpinus betulus</i>	10.0	<i>Brachypodium pinnatum</i>	10.0
<i>Acer pseudoplatanus</i>	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Corylus avellana 100.0 *Hedera helix* 11.0

F3.1h - Temperate forest clearing scrub

*Diagnostic species (phi coefficient * 100)*

Salix caprea 32.8 *Sorbus aucuparia* 22.9

Rubus idaeus	18.7		
<i>Constant species (occurrence frequencies)</i>			
Sorbus aucuparia	71.0	Rubus idaeus	46.0
Salix caprea	44.0	Oxalis acetosella	36.0
Vaccinium myrtillus	34.0	Urtica dioica	33.0
Dryopteris dilatata	30.0	Deschampsia flexuosa	30.0
Picea abies	28.0	Betula pendula	28.0
Senecio nemorensis	23.0	Rubus fruticosus agg.	23.0
Fagus sylvatica	23.0	Acer pseudoplatanus	23.0
Athyrium filix-femina	22.0	Dryopteris filix-mas	21.0
Dryopteris carthusiana	19.0	Polytrichastrum formosum	18.0
Fragaria vesca	18.0	Epilobium montanum	18.0
Epilobium angustifolium	18.0	Dicranum scoparium	18.0
Dactylis glomerata	17.0	Sambucus racemosa	16.0
Quercus robur	16.0	Prenanthes purpurea	16.0
Geranium robertianum	15.0	Agrostis capillaris	15.0
Poa nemoralis	14.0	Polygonatum verticillatum	13.0
Pinus sylvestris	13.0	Corylus avellana	13.0
Solidago virgaurea	12.0	Calamagrostis arundinacea	12.0
Betula pubescens	12.0	Abies alba	12.0
Sambucus nigra	11.0	Rosa canina agg.	11.0
Ranunculus repens	11.0	Pleurozium schreberi	11.0
Moehringia trinervia	11.0	Milium effusum	11.0
Luzula sylvatica	11.0	Hylocomium splendens	11.0
Fraxinus excelsior	11.0	Frangula alnus	11.0
Calamagrostis villosa	11.0	Luzula pilosa	10.0
Galium mollugo agg.	10.0	Galium aparine	10.0
Angelica sylvestris	10.0		
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Sorbus aucuparia	58.0	Salix caprea	38.0
Sambucus racemosa	9.0	Vaccinium myrtillus	8.0
Urtica dioica	6.0		

F4.1 - Wet heath

<i>Diagnostic species (phi coefficient * 100)</i>			
Erica tetralix	64.3	Sphagnum compactum	29.1
Trichophorum cespitosum	28.9	Calluna vulgaris	28.7
Narthecium ossifragum	28.5	Juncus squarrosus	26.4
Drosera rotundifolia	25.3	Molinia caerulea agg.	23.9
Sphagnum tenellum	23.1	Sphagnum papillosum	20.6
Drosera intermedia	20.6	Odontoschisma sphagni	20.3
Salix repens	18.2	Gentiana pneumonanthe	18.0
Hypnum jutlandicum	17.9	Cladonia portentosa	17.7
Eriophorum angustifolium	17.3	Rhynchospora alba	15.8
Rhynchospora fusca	15.0	Polygala serpyllifolia	15.0
<i>Constant species (occurrence frequencies)</i>			
Erica tetralix	100.0	Calluna vulgaris	79.0
Molinia caerulea agg.	71.0	Potentilla erecta	47.0
Trichophorum cespitosum	37.0	Eriophorum angustifolium	34.0

Drosera rotundifolia	34.0	Narthecium ossifragum	25.0
Juncus squarrosus	25.0	Hypnum jutlandicum	20.0
Sphagnum papillosum	18.0	Sphagnum compactum	17.0
Carex panicea	17.0	Salix repens	16.0
Betula pubescens	15.0	Sphagnum tenellum	14.0
Pinus sylvestris	14.0	Hypnum cupressiforme	14.0
Eriophorum vaginatum	14.0	Cladonia portentosa	14.0
Rhynchospora alba	13.0	Dicranum scoparium	13.0
Aulacomnium palustre	13.0	Sphagnum capillifolium	12.0
Polygala serpyllifolia	12.0	Pleurozium schreberi	12.0
Gentiana pneumonanthe	12.0	Drosera intermedia	12.0
Danthonia decumbens	12.0	Vaccinium oxycoccos	11.0
Carex echinata	11.0	Odontoschisma sphagni	10.0
Nardus stricta	10.0	Genista anglica	10.0
Carex nigra	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Erica tetralix	100.0	Calluna vulgaris	24.0
Molinia caerulea agg.	21.0	Sphagnum papillosum	7.0
Sphagnum compactum	5.0		

F4.2 - Dry heath

*Diagnostic species (phi coefficient * 100)*

Calluna vulgaris	30.0	Erica cinerea	29.6
Ulex gallii	16.7	Genista anglica	16.7
Hypnum jutlandicum	15.2		

Constant species (occurrence frequencies)

Calluna vulgaris	79.0	Deschampsia flexuosa	37.0
Potentilla erecta	35.0	Erica cinerea	32.0
Vaccinium myrtillus	29.0	Dicranum scoparium	27.0
Pleurozium schreberi	24.0	Molinia caerulea agg.	23.0
Festuca ovina	21.0	Agrostis capillaris	21.0
Pteridium aquilinum	19.0	Hypnum cupressiforme	18.0
Danthonia decumbens	17.0	Hypnum jutlandicum	16.0
Nardus stricta	14.0	Genista pilosa	14.0
Carex pilulifera	14.0	Vaccinium vitis-idaea	13.0
Anthoxanthum odoratum	13.0	Galium saxatile	12.0
Pinus sylvestris	11.0	Lotus corniculatus	11.0
Erica tetralix	11.0	Hylocomium splendens	10.0
Genista anglica	10.0	Festuca rubra	10.0
Erica vagans	10.0	Cytisus scoparius	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Calluna vulgaris	61.0	Vaccinium myrtillus	13.0
Erica cinerea	10.0	Pleurozium schreberi	7.0
Ulex gallii	6.0	Hypnum jutlandicum	6.0

F5.1 - Mediterranean maquis and arborescent matorral

*Diagnostic species (phi coefficient * 100)*

Pistacia lentiscus	36.1	Erica arborea	35.3
Myrtus communis	31.3	Smilax aspera	31.2
Arbutus unedo	29.9	Cistus salvifolius	26.7
Asparagus acutifolius	25.7	Phillyrea latifolia	25.4
Juniperus oxycedrus	24.9	Rubia peregrina	24.6
Calicotome villosa	24.5	Cistus monspeliensis	24.1
Phillyrea angustifolia	24.0	Rhamnus alaternus	23.6
Lonicera implexa	22.1	Brachypodium retusum	22.1
Quercus ilex	19.7	Cistus incanus	18.4
Clematis flammula	18.2	Pulicaria odora	17.7
Arisarum vulgare	17.3	Juniperus phoenicea	17.2
Prasium majus	16.7	Calicotome spinosa	16.6
Daphne gnidium	16.0		
<i>Constant species (occurrence frequencies)</i>			
Rubia peregrina	45.0	Pistacia lentiscus	45.0
Erica arborea	43.0	Smilax aspera	40.0
Asparagus acutifolius	36.0	Arbutus unedo	32.0
Juniperus oxycedrus	29.0	Quercus ilex	28.0
Phillyrea latifolia	28.0	Cistus salvifolius	28.0
Brachypodium retusum	28.0	Myrtus communis	26.0
Rhamnus alaternus	22.0	Rubus ulmifolius	21.0
Phillyrea angustifolia	21.0	Lonicera implexa	20.0
Cistus monspeliensis	19.0	Calicotome villosa	17.0
Clematis flammula	16.0	Daphne gnidium	14.0
Cistus incanus	14.0	Pteridium aquilinum	13.0
Juniperus phoenicea	13.0	Arisarum vulgare	12.0
Dactylis glomerata	11.0	Spartium junceum	10.0
Rosmarinus officinalis	10.0	Quercus pubescens	10.0
Pulicaria odora	10.0	Prasium majus	10.0
Hedera helix	10.0		
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Erica arborea	27.0	Juniperus oxycedrus	17.0
Myrtus communis	12.0	Arbutus unedo	12.0
Calicotome villosa	8.0	Pistacia lentiscus	6.0
Phillyrea latifolia	6.0	Brachypodium retusum	5.0

F5.3 - Submediterranean pseudomaquis

<i>Diagnostic species (phi coefficient * 100)</i>			
Juniperus oxycedrus	49.9	Spartium junceum	39.2
Chamaecytisus spinescens	38.8	Paliurus spina-christi	38.5
Osyris alba	37.9	Cytisus sessilifolius	37.8
Buxus sempervirens	35.9	Pistacia terebinthus	35.5
Lonicera etrusca	34.2	Rhamnus alaternus	32.4
Asparagus acutifolius	32.2	Phillyrea latifolia	28.7
Rubia peregrina	25.1	Jasminum fruticans	24.6
Viola alba	24.2	Cephalaria leucantha	23.7
Galium flavescens	23.1	Saxifraga cuneata	23.0
Jasonia glutinosa	22.6	Clematis flammula	22.3
Stachys angustifolia	22.2	Chaenorhinum origanifolium	22.2
Rosmarinus officinalis	22.0	Rorippa thracica	22.0

Fraxinus ornus	21.5	Tordylium maximum	21.4
Fumana procumbens	21.2	Galium frutescens	21.1
Salvia lavandulifolia	21.0	Rhamnus saxatilis	20.5
Anemone hortensis	20.2	Teucrium chamaedrys	19.7
Asperula purpurea	19.5	Aristolochia pistolochia	19.5
Pyracantha coccinea	19.1	Olea europaea var. europaea	19.1
Bupleurum fruticosum	18.7	Viburnum tinus	18.5
Genista januensis	18.4	Asphodelus cerasiferus	17.9
Thymus vulgaris	17.7	Juniperus phoenicea	17.5
Amelanchier ovalis	17.3	Spiraea hypericifolia	17.0
Cistus incanus	16.7	Genista scorpius	16.6
Bupleurum frutescens	16.6	Quercus rotundifolia	16.4
Pistacia lentiscus	16.3	Rosa sempervirens	16.1
Stipa offneri	16.0	Potentilla pedata	15.8
Smilax aspera	15.4	Fumana ericoides	15.4
Arenaria grandiflora	15.2	Allium rotundum	15.2
Quercus pubescens	15.1	Helichrysum stoechas	15.1
<i>Constant species (occurrence frequencies)</i>			
Juniperus oxycedrus	67.0	Teucrium chamaedrys	47.0
Rubia peregrina	47.0	Buxus sempervirens	47.0
Asparagus acutifolius	47.0	Spartium junceum	33.0
Rhamnus alaternus	33.0	Pistacia terebinthus	33.0
Phillyrea latifolia	33.0	Osyris alba	33.0
Lonicera etrusca	33.0	Fraxinus ornus	33.0
Cytisus sessilifolius	33.0	Viola alba	27.0
Quercus pubescens	27.0	Paliurus spina-christi	27.0
Brachypodium pinnatum	27.0	Thymus vulgaris	20.0
Smilax aspera	20.0	Rosmarinus officinalis	20.0
Quercus ilex	20.0	Pistacia lentiscus	20.0
Chamaecytisus spinescens	20.0	Hedera helix	20.0
Fumana procumbens	20.0	Clematis flammula	20.0
Amelanchier ovalis	20.0	Viburnum tinus	13.0
Tanacetum corymbosum	13.0	Ruscus aculeatus	13.0
Rubus ulmifolius	13.0	Rosa sempervirens	13.0
Rosa arvensis	13.0	Rhamnus saxatilis	13.0
Quercus rotundifolia	13.0	Pteridium aquilinum	13.0
Olea europaea var. europaea	13.0	Lonicera implexa	13.0
Koeleria vallesiana	13.0	Juniperus phoenicea	13.0
Juniperus communis subsp. communis	13.0	Jasminum fruticans	13.0
Hippocrepis emerus	13.0	Helichrysum stoechas	13.0
Helianthemum nummularium	13.0	Geranium sanguineum	13.0
Genista scorpius	13.0	Erica arborea	13.0
Crataegus monogyna	13.0	Cornus mas	13.0
Cistus incanus	13.0	Cephalaria leucantha	13.0
Carex humilis	13.0	Carex flacca	13.0
Brachypodium retusum	13.0	Asperula purpurea	13.0
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Juniperus oxycedrus	40.0	Buxus sempervirens	40.0
Cytisus sessilifolius	27.0	Pistacia lentiscus	20.0
Paliurus spina-christi	13.0	Juniperus phoenicea	13.0
Hedera helix	13.0	Spartium junceum	7.0

Rhamnus alaternus	7.0	Phillyrea latifolia	7.0
Cornus mas	7.0	Brachypodium retusum	7.0
Asparagus acutifolius	7.0		

F5.4 - Spartium junceum scrub

*Diagnostic species (phi coefficient * 100)*

Spartium junceum	85.8	Rubus ulmifolius	43.8
Asparagus acutifolius	30.7	Clematis flammula	28.4
Rosa sempervirens	26.4	Dittrichia viscosa	22.6
Paliurus spina-christi	22.3	Rubia peregrina	22.1
Foeniculum vulgare	21.1	Clematis vitalba	20.7
Quercus pubescens	19.7	Pyrus amygdaliformis	19.4
Centaurea aspera	19.3	Psoralea bituminosa	18.9
Galactites elegans	18.3	Achillea ligustica	18.3
Carlina corymbosa	18.1	Fraxinus ornus	18.0
Arundo plinii	17.8	Asperula laevigata	17.4
Osyris alba	17.1	Brachypodium phoenicoides	15.1
Opopanax chironium	15.0		

Constant species (occurrence frequencies)

Spartium junceum	100.0	Rubus ulmifolius	74.0
Asparagus acutifolius	44.0	Rubia peregrina	41.0
Brachypodium pinnatum	39.0	Clematis vitalba	36.0
Quercus pubescens	34.0	Crataegus monogyna	34.0
Rosa canina agg.	28.0	Fraxinus ornus	28.0
Dactylis glomerata	26.0	Clematis flammula	26.0
Sanguisorba minor	25.0	Rosa sempervirens	23.0
Ulmus minor	21.0	Teucrium chamaedrys	21.0
Prunus spinosa	20.0	Cornus sanguinea	18.0
Hedera helix	16.0	Dittrichia viscosa	16.0
Bromus erectus	16.0	Hypericum perforatum	15.0
Hippocrepis emerus	15.0	Eryngium campestre	15.0
Carlina corymbosa	15.0	Brachypodium phoenicoides	15.0
Paliurus spina-christi	13.0	Osyris alba	13.0
Juniperus oxycedrus	13.0	Galium mollugo agg.	13.0
Rhamnus alaternus	11.0	Psoralea bituminosa	11.0
Pistacia terebinthus	11.0	Lonicera etrusca	11.0
Juniperus communis subsp. communis	11.0	Foeniculum vulgare	11.0
Erica arborea	11.0	Daucus carota	11.0
Carex flacca	11.0	Pyrus amygdaliformis	10.0
Pistacia lentiscus	10.0	Helichrysum italicum	10.0
Euonymus europaeus	10.0	Dactylis glomerata subsp. glomerata	10.0
Cistus monspeliensis	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Spartium junceum	100.0	Brachypodium pinnatum	10.0
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F5.5 - Thermomediterranean scrub

*Diagnostic species (phi coefficient * 100)*

Pistacia lentiscus	61.2	Olea europaea var. sylvestris	54.3
Euphorbia dendroides	50.5	Prasium majus	43.6
Ceratonia siliqua	41.2	Arisarum vulgare	37.2
Asphodelus ramosus	34.8	Asparagus acutifolius	28.1
Chamaerops humilis	27.6	Thymbra capitata	27.5
Smilax aspera	26.7	Asparagus albus	26.4
Juniperus phoenicea	26.3	Brachypodium retusum	25.9
Urginea maritima	25.8	Calicotome villosa	25.2
Phagnalon graecum	23.3	Hyparrhenia hirta	22.8
Ruta chalepensis	22.3	Teucrium fruticans	21.9
Asparagus aphyllus	21.0	Senecio bicolor	20.6
Teucrium flavum	20.4	Piptatherum coerulescens	19.9
Rubia peregrina	19.1	Valantia hispida	18.8
Sarcopoterium spinosum	18.8	Corema album	18.8
Aetheorhiza bulbosa	18.7	Lagoecia cuminoides	18.4
Artemisia arborescens	18.4	Bromus intermedius	18.1
Charybdis pancratium	18.0	Hypochaeris achyrophorus	17.9
Ferula communis	17.9	Piptatherum miliaceum	17.7
Urospermum picroides	17.4	Olea europaea var. europaea	16.6
Galium murale	16.6	Periploca laevigata subsp. angustifolia	16.4
Phagnalon saxatile	16.3	Parietaria cretica	16.3
Melica minuta	16.0	Euphorbia acanthothamnos	16.0
Biscutella didyma	15.6	Clematis cirrhosa	15.3
Coronilla valentina	15.2	Tordylium apulum	15.1
Ampelodesmos mauritanica	15.1		
<i>Constant species (occurrence frequencies)</i>			
Pistacia lentiscus	86.0	Olea europaea var. sylvestris	42.0
Asparagus acutifolius	40.0	Smilax aspera	35.0
Rubia peregrina	35.0	Euphorbia dendroides	35.0
Prasium majus	34.0	Brachypodium retusum	33.0
Arisarum vulgare	30.0	Asphodelus ramosus	29.0
Ceratonia siliqua	25.0	Juniperus phoenicea	21.0
Calicotome villosa	18.0	Urginea maritima	16.0
Thymbra capitata	16.0	Chamaerops humilis	15.0
Dactylis glomerata	15.0	Rhamnus alaternus	13.0
Rosmarinus officinalis	12.0	Hyparrhenia hirta	12.0
Teucrium fruticans	11.0	Teucrium flavum	11.0
Piptatherum miliaceum	11.0	Olea europaea var. europaea	11.0
Lonicera implexa	11.0	Cistus monspeliensis	11.0
Asparagus albus	11.0	Aetheorhiza bulbosa	11.0
Reichardia picroides	10.0	Hypochaeris achyrophorus	10.0
Helichrysum italicum	10.0	Dactylis glomerata subsp. hispanica	10.0
Asparagus aphyllus	10.0		
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Pistacia lentiscus	64.0	Euphorbia dendroides	20.0
Olea europaea var. sylvestris	10.0	Ceratonia siliqua	6.0
Brachypodium retusum	6.0		

F6.1a - Western basiphilous garrigue

*Diagnostic species (phi coefficient * 100)*

Genista hispanica	42.9	Genista scorpius	41.3
Thymus vulgaris	40.2	Lavandula latifolia	37.2
Aphyllanthes monspeliensis	34.5	Coronilla minima	34.0
Coris monspeliensis	32.4	Linum suffruticosum	31.1
Koeleria vallesiana	31.1	Erica vagans	29.0
Dorycnium pentaphyllum	28.6	Avenula bromoides	26.7
Argyrolobium zanonii	25.8	Teucrium pyrenaicum	25.4
Staehelina dubia	25.4	Rosmarinus officinalis	24.5
Helichrysum stoechas	24.5	Avenula mirandana	24.4
Fumana ericophylla	23.7	Helianthemum oelandicum	23.4
Thymelaea ruizii	21.7	Helictotrichon cantabricum	21.7
Leuzea conifera	20.4	Fumana thymifolia	19.9
Ononis minutissima	19.4	Lithodora fruticosa	19.4
Catananche caerulea	19.3	Fumana procumbens	19.2
Globularia bisnagarica	18.8	Atractylis humilis	18.8
Santolina chamaecyparissus	18.6	Bupleurum fruticosum	18.6
Fumana ericoides	18.3	Euphorbia flavicoma	18.2
Erica multiflora	18.2	Teucrium polium	18.0
Helianthemum apenninum	17.6	Brachypodium retusum	17.6
Onobrychis argentea	17.0	Linum narbonense	17.0
Ononis fruticosa	16.2	Carduncellus monspelliensium	16.1
Carex hallerana	15.8	Onobrychis reuteri	15.6
Helianthemum croceum	15.5	Inula montana	15.3
<i>Constant species (occurrence frequencies)</i>			
Thymus vulgaris	48.0	Genista scorpius	37.0
Genista hispanica	36.0	Coronilla minima	35.0
Koeleria vallesiana	33.0	Aphyllanthes monspeliensis	32.0
Teucrium chamaedrys	28.0	Lavandula latifolia	28.0
Brachypodium pinnatum	28.0	Dorycnium pentaphyllum	27.0
Bromus erectus	26.0	Eryngium campestre	25.0
Linum suffruticosum	24.0	Helianthemum oelandicum	24.0
Erica vagans	24.0	Teucrium polium	22.0
Rosmarinus officinalis	22.0	Helichrysum stoechas	22.0
Brachypodium retusum	22.0	Sanguisorba minor	21.0
Coris monspeliensis	20.0	Avenula bromoides	20.0
Potentilla tabernaemontani	19.0	Hieracium pilosella	19.0
Carex humilis	19.0	Fumana procumbens	18.0
Hippocrepis comosa	17.0	Helianthemum nummularium	17.0
Carex hallerana	17.0	Asperula cynanchica	17.0
Argyrolobium zanonii	17.0	Staehelina dubia	16.0
Lotus corniculatus	16.0	Teucrium pyrenaicum	15.0
Juniperus oxycedrus	15.0	Fumana ericophylla	15.0
Carex flacca	15.0	Buxus sempervirens	15.0
Scabiosa columbaria	14.0	Juniperus communis subsp. communis	14.0
Anthyllis vulneraria	14.0	Thymus praecox	13.0
Sedum sediforme	13.0	Rubia peregrina	13.0
Globularia bisnagarica	13.0	Seseli montanum	12.0
Ononis minutissima	12.0	Helianthemum apenninum	12.0
Dactylis glomerata	12.0	Catananche caerulea	12.0
Pinus halepensis	11.0	Leuzea conifera	11.0
Fumana thymifolia	11.0	Festuca rubra	11.0
Avenula mirandana	11.0	Astragalus monspessulanus	11.0

Quercus coccifera	10.0	Erica multiflora	10.0
Brachypodium phoenicoides	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Genista hispanica	29.0	Thymus vulgaris	14.0
Erica vagans	11.0	Rosmarinus officinalis	9.0
Genista scorpius	9.0	Erica multiflora	9.0

F6.1b - Western acidophilous garrigue

*Diagnostic species (phi coefficient * 100)*

Lavandula stoechas	65.5	Cistus populifolius	45.4
Cistus ladanifer	44.9	Erica australis	43.7
Thymus mastichina	42.6	Cistus salvifolius	39.4
Cistus crispus	38.8	Cytisus striatus	36.6
Halimium ocymoides	32.7	Thymus zygis	32.6
Cytisus multiflorus	31.7	Tuberaria lignosa	30.6
Cistus psilosepalus	30.4	Chamaespartium tridentatum	30.1
Polygala microphylla	29.6	Halimium halimifolium	29.4
Phillyrea angustifolia	27.5	Daphne gnidium	27.4
Cistus monspeliensis	26.9	Lavandula pedunculata	26.3
Cytinus hypocistis	24.6	Erica arborea	23.6
Erica umbellata	22.6	Stipa gigantea	21.7
Genista hystrix	21.7	Tuberaria guttata	21.1
Euphorbia broteri	21.1	Arbutus unedo	21.1
Genista corsica	20.7	Santolina rosmarinifolia	20.0
Agrostis castellana	19.4	Origanum virens	19.3
Astragalus lusitanicus	19.3	Thapsia villosa	19.2
Tolpis barbata	19.1	Linum trigynum	18.9
Halimium lasianthum	18.5	Aira caryophyllea	18.5
Briza maxima	18.2	Silene paradoxa	18.1
Genista triacanthos	18.1	Andryala integrifolia	18.1
Cistus laurifolius	17.9	Dianthus loricifolius	17.5
Avenula bromoides	17.4	Agrostis truncatula	17.3
Odontites tenuifolia	17.2	Genista tournefortii	17.2
Sedum forsterianum	16.8	Thapsia maxima	16.7
Calicotome spinosa	16.7	Hypericum linarifolium	16.6
Urginea maritima	16.4	Cladonia endiviifolia	16.2
Ulex parviflorus	16.1	Carlina corymbosa	16.0
Quercus rotundifolia	15.9	Crucianella angustifolia	15.9
Teucrium marum	15.8	Andryala ragusina	15.8
Vulpia bromoides	15.6	Helichrysum italicum	15.6
Micropyrum tenellum	15.4	Erica scoparia	15.2

Constant species (occurrence frequencies)

Lavandula stoechas	68.0	Cistus salvifolius	45.0
Erica arborea	29.0	Cistus ladanifer	29.0
Thymus mastichina	26.0	Phillyrea angustifolia	26.0
Erica australis	26.0	Daphne gnidium	26.0
Cistus populifolius	24.0	Cistus monspeliensis	23.0
Arbutus unedo	23.0	Calluna vulgaris	21.0
Cytisus striatus	19.0	Cistus crispus	18.0
Brachypodium retusum	18.0	Cytisus multiflorus	16.0

Asparagus acutifolius	16.0	Thymus zygis	15.0
Halimium ocymoides	15.0	Cytisus scoparius	15.0
Aira caryophylla	15.0	Tuberaria lignosa	13.0
Tuberaria guttata	13.0	Rubia peregrina	13.0
Quercus rotundifolia	13.0	Pistacia lentiscus	13.0
Jasione montana	13.0	Chamaespartium tridentatum	13.0
Helichrysum italicum	13.0	Cistus psilosepalus	13.0
Carlina corymbosa	13.0	Briza maxima	13.0
Avenula bromoides	13.0	Agrostis castellana	13.0
Trifolium campestre	11.0	Trifolium arvense	11.0
Thymus vulgaris	11.0	Rosmarinus officinalis	11.0
Pteridium aquilinum	11.0	Lavandula pedunculata	11.0
Erica scoparia	11.0	Dorycnium pentaphyllum	11.0
Dactylis glomerata subsp. hispanica	11.0	Dactylis glomerata	11.0
Vulpia bromoides	10.0	Urginea maritima	10.0
Polygala microphylla	10.0	Linum trigynum	10.0
Juniperus oxycedrus	10.0	Hypochaeris radicata	10.0
Helichrysum stoechas	10.0	Halimium halimifolium	10.0
Eryngium campestre	10.0	Erica cinerea	10.0
Cytinus hypocistis	10.0	Corynephorus canescens	10.0
Calicotome spinosa	10.0	Asphodelus ramosus	10.0
Andryala integrifolia	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Lavandula stoechas	27.0	Cistus populifolius	21.0
Cistus crispus	15.0	Halimium halimifolium	10.0
Cistus ladanifer	8.0	Thymus mastichina	6.0

F6.2 - Eastern garrigue

*Diagnostic species (phi coefficient * 100)*

Phlomis fruticosa	68.0	Erica manipuliflora	57.6
Micromeria juliana	53.6	Tordylium apulum	46.4
Salvia officinalis	38.5	Urginea maritima	37.5
Cistus incanus	35.5	Quercus coccifera	34.2
Convolvulus althaeoides	32.7	Thymbra capitata	31.8
Desmazeria rigida	30.7	Satureja thymbra	29.8
Genista acanthoclada	29.6	Asphodeline lutea	29.0
Briza maxima	28.4	Crepis rubra	27.3
Carlina corymbosa	27.2	Cynosurus echinatus	27.1
Fumana ericoides	26.7	Leontodon tuberosus	25.7
Brachypodium retusum	25.7	Asparagus acutifolius	25.7
Urospermum picroides	25.1	Paliurus spina-christi	24.9
Eryngium creticum	24.5	Trifolium stellatum	24.4
Asperula scutellaris	24.3	Genista sylvestris	24.2
Avena sterilis	24.1	Campanula ramosissima	23.7
Calicotome villosa	23.5	Stipa bromoides	23.0
Acanthus spinosus	23.0	Koeleria splendens	22.6
Hypericum empetrifolium	22.6	Allium rubrovittatum	22.4
Fumana thymifolia	22.3	Anthyllis hermanniae	22.1
Nigella damascena	21.9	Cistus salvifolius	21.9
Valantia hispida	21.8	Polygogon monspeliensis	21.7
Sideritis romana	21.4	Pistorinia hispanica	21.2

Hieracium heterogynum	21.1	Crepis zacintha	20.9
Hymenocarpus circinnatus	20.8	Phillyrea latifolia	20.7
Thesium bergeri	20.2	Consolida ajacis	20.2
Cistus parviflorus	20.1	Pyrus amygdaliformis	19.7
Lathyrus cicera	19.7	Euphorbia acanthothamnos	19.5
Asperula rigida	19.4	Anagallis foemina	19.3
Teucrium polium	19.1	Securigera securidaca	18.9
Muscari spreitzenhoferi	18.8	Aegilops geniculata	18.6
Teucrium microphyllum	18.4	Ceterach officinarum	18.4
Dasypyrum villosum	18.3	Trifolium scabrum	18.2
Muscari tenuiflorum	18.2	Genista sericea	18.2
Phagnalon graecum	18.1	Tordylium maximum	17.7
Crupina crupinastrum	17.6	Saponaria calabrica	17.5
Linum arboreum	17.5	Euphorbia spinosa	17.4
Euphorbia dimorphocaulon	17.4	Carex illegitima	17.4
Centaurea glaberrima	17.3	Arceuthobium oxycedri	17.3
Arbutus unedo	17.3	Galium murale	17.2
Bromus fasciculatus	17.2	Plantago bellardii	17.1
Helictotrichon agropyroides	17.1	Biscutella didyma	16.4
Andropogon distachyos	16.4	Centaureum erythraea	16.1
Onopordum illyricum	15.9	Bromus intermedius	15.9
Helictotrichon convolutum	15.6	Edraianthus tenuifolius	15.6
Tanacetum cinerariifolium	15.5	Pallenis spinosa	15.5
Scorpiurus muricatus	15.4	Sarcopoterium spinosum	15.4
Micromeria graeca	15.4	Lathyrus sphaericus	15.4
Juniperus oxycedrus	15.4	Iris unguicularis	15.4
Galium parisiense	15.4	Frangula rupestris	15.4
Filago aegaea	15.3		
<i>Constant species (occurrence frequencies)</i>			
Phlomis fruticosa	57.0	Dactylis glomerata	45.0
Erica manipuliflora	40.0	Quercus coccifera	38.0
Micromeria juliana	37.0	Asparagus acutifolius	37.0
Brachypodium retusum	33.0	Cistus incanus	32.0
Tordylium apulum	28.0	Desmazeria rigida	28.0
Urginea maritima	27.0	Teucrium polium	23.0
Phillyrea latifolia	23.0	Cynosurus echinatus	23.0
Cistus salvifolius	23.0	Carlina corymbosa	23.0
Briza maxima	22.0	Thymbra capitata	20.0
Salvia officinalis	20.0	Convolvulus althaeoides	20.0
Trifolium campestre	18.0	Juniperus oxycedrus	18.0
Arbutus unedo	18.0	Teucrium chamaedrys	17.0
Pistacia lentiscus	17.0	Calicotome villosa	17.0
Trifolium stellatum	15.0	Trifolium scabrum	15.0
Poa bulbosa	15.0	Paliurus spina-christi	15.0
Melica ciliata	15.0	Centaureum erythraea	15.0
Anthyllis vulneraria	15.0	Anthoxanthum odoratum	15.0
Stipa bromoides	13.0	Sherardia arvensis	13.0
Leontodon tuberosus	13.0	Koeleria splendens	13.0
Genista acanthoclada	13.0	Fumana thymifolia	13.0
Fumana ericoides	13.0	Anagallis arvensis	13.0
Urospermum picroides	12.0	Satureja thymbra	12.0
Sanguisorba minor	12.0	Pistacia terebinthus	12.0
Dasypyrum villosum	12.0	Ceterach officinarum	12.0

Avena sterilis	12.0	Asphodeline lutea	12.0
Spartium junceum	10.0	Pyrus amygdaliformis	10.0
Polypogon monspeliensis	10.0	Pinus halepensis	10.0
Lotus corniculatus	10.0	Linum strictum	10.0
Hypericum empetrifolium	10.0	Hippocrepis comosa	10.0
Geranium molle	10.0	Eryngium campestre	10.0
Avena fatua	10.0	Avena barbata	10.0
Asphodelus ramosus	10.0	Arenaria leptocladus	10.0
Anthyllis hermanniae	10.0	Aegilops geniculata	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Phlomis fruticosa	57.0	Erica manipuliflora	37.0
Urginea maritima	7.0	Cistus salvifolius	5.0
Cistus incanus	5.0	Brachypodium retusum	5.0

F6.6 - Supramediterranean garrigue

*Diagnostic species (phi coefficient * 100)*

Genista cinerea	55.7	Lavandula angustifolia	52.4
Genista lobelii	49.4	Anthyllis montana	44.8
Helianthemum oelandicum	35.8	Linum suffruticosum	35.7
Thymus vulgaris	33.5	Thymus herba-barona	31.8
Carex hallerana	30.9	Carlina acanthifolia	30.7
Erysimum rhaeticum	29.0	Koeleria vallesiana	28.8
Laserpitium gallicum	28.3	Galium corrudifolium	27.9
Inula montana	27.5	Galium corsicum	27.0
Teucrium montanum	26.5	Thesium divaricatum	26.4
Coronilla minima	26.1	Aphyllanthes monspeliensis	25.7
Cerastium stenopetalum	25.6	Leuzea conifera	25.5
Satureja montana	25.2	Serratula nudicaulis	24.6
Achnatherum calamagrostis	23.2	Leucanthemum graminifolium	23.0
Iberis saxatilis	22.8	Anthyllis hermanniae	22.8
Valeriana tuberosa	22.7	Bellium bellidioides	22.2
Fumana procumbens	21.9	Ononis striata	21.8
Stachys corsica	21.7	Crocus corsicus	21.6
Sedum ochroleucum	21.5	Astragalus monspessulanus	21.0
Teucrium polium	20.5	Arenaria aggregata	20.5
Astragalus purpureus	20.2	Avenula bromoides	19.5
Santolina chamaecyparissus	19.4	Onobrychis supina	19.4
Erysimum jugicola	19.2	Crepis albida	19.2
Brimeura fastigiata	18.8	Hypochaeris robertia	18.5
Dianthus caryophyllus	18.2	Artemisia alba	18.0
Seseli montanum	17.8	Carex humilis	17.8
Carduncellus monspelliensium	17.8	Knautia purpurea	17.7
Globularia repens	17.6	Fumana ericophylla	17.5
Echinops ritro	17.4	Helianthemum pilosum	17.2
Carlina macrocephala	17.2	Centaurea paniculata	17.1
Thymus dolomiticus	16.9	Thymus serpyllum	16.8
Teucrium chamaedrys	16.6	Odontites lanceolata	16.6
Berberis aetnensis	16.5	Trinia glauca	16.4
Sagina pilifera	16.2	Helianthemum canum	16.2
Sesleria coerulans	15.7	Bupleurum ranunculoides	15.2

Constant species (occurrence frequencies)

Lavandula angustifolia	49.0	Genista cinerea	43.0
Thymus vulgaris	40.0	Teucrium chamaedrys	40.0
Helianthemum oelandicum	40.0	Teucrium montanum	36.0
Carex hallerana	34.0	Anthyllis montana	34.0
Koeleria vallesiana	31.0	Linum suffruticosum	29.0
Carex humilis	28.0	Coronilla minima	27.0
Bromus erectus	27.0	Hieracium pilosella	26.0
Genista lobelii	26.0	Teucrium polium	25.0
Sanguisorba minor	23.0	Galium corrudifolium	23.0
Aphyllanthes monspeliensis	23.0	Anthyllis vulneraria	23.0
Thymus serpyllum	22.0	Asperula cynanchica	22.0
Satureja montana	21.0	Fumana procumbens	21.0
Festuca rubra	21.0	Brachypodium pinnatum	21.0
Carlina acanthifolia	19.0	Seseli montanum	18.0
Inula montana	18.0	Potentilla tabernaemontani	17.0
Juniperus communis subsp. communis	17.0	Hippocrepis comosa	17.0
Thesium divaricatum	16.0	Sesleria coerulans	16.0
Scabiosa columbaria	16.0	Lotus corniculatus	16.0
Leuzea conifera	16.0	Erysimum rhaeticum	16.0
Cerastium arvense	16.0	Astragalus monspessulanus	16.0
Amelanchier ovalis	16.0	Quercus pubescens	15.0
Pinus sylvestris	15.0	Laserpitium gallicum	15.0
Festuca ovina	15.0	Buxus sempervirens	15.0
Avenula bromoides	15.0	Sedum ochroleucum	14.0
Eryngium campestre	14.0	Vincetoxicum hirundinaria	13.0
Echinops ritro	13.0	Carlina vulgaris	13.0
Achnatherum calamagrostis	13.0	Thymus herba-barona	12.0
Genista pilosa	12.0	Trinia glauca	11.0
Ononis striata	11.0	Helianthemum nummularium	11.0
Helianthemum canum	11.0	Fumana ericophylla	11.0
Stachys recta	10.0	Prunus mahaleb	10.0
Petrorhagia saxifraga	10.0	Hieracium murorum	10.0
Globularia cordifolia	10.0	Euphorbia cyparissias	10.0
Dactylis glomerata	10.0	Artemisia alba	10.0
Anthyllis hermanniae	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Genista cinerea	41.0	Anthyllis montana	26.0
Genista lobelii	25.0	Lavandula angustifolia	6.0

F6.7 - Mediterranean gypsum scrub

*Diagnostic species (phi coefficient * 100)*

Herniaria fruticosa	88.4	Helianthemum syriacum	88.2
Ononis tridentata	81.3	Helianthemum squamatatum	81.2
Launaea pumila	64.0	Atractylis humilis	61.2
Fumana ericoides	60.6	Plantago albicans	57.2
Thymus vulgaris	56.9	Helichrysum stoechas	53.7
Genista scorpius	53.5	Koeleria vallesiana	51.8
Rosmarinus officinalis	50.7	Brachypodium retusum	50.2
Santolina chamaecyparissus	50.0	Lepidium subulatum	49.7

Stipa parviflora	48.2	Lygeum spartum	47.4
Coris monspeliensis	45.5	Linum suffruticosum	42.9
Artemisia herba-alba	42.4	Teucrium polium	41.3
Gypsophila struthium subsp. hispanica	40.2	Bromus rubens	37.3
Matthiola fruticulosa	37.1	Fumana hispidula	35.1
Reseda stricta	34.9	Thymus loscosii	34.6
Odontites longiflora	33.9	Fumana thymifolia	31.7
Sedum sediforme	31.0	Helianthemum cinereum	30.3
Boleum asperum	28.7	Limonium viciosoi	27.7
Mercurialis tomentosa	27.5	Cistus clusii	26.6
Sideritis scordioides	26.3	Stipa offneri	26.1
Helianthemum violaceum	25.4	Euphorbia serrata	24.9
Astragalus incanus	24.5	Launaea resedifolia	24.2
Lithodora fruticosa	22.0	Dipcadi serotinum	21.6
Senecio auricula	20.1	Helianthemum oelandicum	20.0
Teucrium aragonense	19.6	Schismus barbatus	19.5
Crucianella patula	19.4	Asterolinon linum-stellatum	19.1
Helianthemum asperum	19.0	Bombycilaena discolor	18.4
Ephedra major	17.6	Dianthus furcatus	17.5
Thymelaea tinctoria	17.4	Centaurea linifolia	17.2
Euphorbia minuta	17.1	Eruca vesicaria	16.9
Salsola vermiculata	16.8	Echinops ritro	16.8
Avenula bromoides	16.8	Arrhenatherum album	16.4
Centaurea melitensis	15.7	Salvia lavandulifolia	15.1
<i>Constant species (occurrence frequencies)</i>			
Herniaria fruticosa	79.0	Helianthemum syriacum	79.0
Thymus vulgaris	75.0	Brachypodium retusum	71.0
Ononis tridentata	67.0	Helianthemum squamatum	67.0
Koeleria vallesiana	62.0	Helichrysum stoechas	58.0
Teucrium polium	54.0	Rosmarinus officinalis	54.0
Genista scorpius	54.0	Fumana ericoides	46.0
Launaea pumila	42.0	Atractylis humilis	42.0
Plantago albicans	38.0	Linum suffruticosum	38.0
Santolina chamaecyparissus	33.0	Coris monspeliensis	33.0
Sedum sediforme	29.0	Stipa parviflora	25.0
Lygeum spartum	25.0	Lepidium subulatum	25.0
Helianthemum oelandicum	21.0	Fumana thymifolia	21.0
Eryngium campestre	21.0	Bromus rubens	21.0
Artemisia herba-alba	21.0	Matthiola fruticulosa	17.0
Gypsophila struthium subsp. hispanica	17.0	Thymus loscosii	12.0
Stipa offneri	12.0	Reseda stricta	12.0
Odontites longiflora	12.0	Helianthemum cinereum	12.0
Fumana hispidula	12.0	Euphorbia serrata	12.0
Echinops ritro	12.0	Avenula bromoides	12.0
Asterolinon linum-stellatum	12.0		
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Rosmarinus officinalis	33.0	Brachypodium retusum	12.0

F6.8a - Mediterranean halo-nitrophilous scrub

*Diagnostic species (phi coefficient * 100)*

Atriplex halimus	58.2	Artemisia arborescens	46.7
Artemisia herba-alba	46.2	Salsola vermiculata	44.3
Santolina chamaecyparissus	33.9	Bromus rubens	32.5
Piptatherum miliaceum	32.3	Suaeda braun-blanquetii	30.0
Ptilostemon casabonae	25.2	Herniaria cinerea	25.1
Foeniculum vulgare	24.9	Suaeda vera	24.8
Dittrichia viscosa	24.8	Anacyclus clavatus	24.8
Asphodelus fistulosus	24.0	Sonchus tenerrimus	23.3
Plantago lagopus	23.3	Lygeum spartum	22.6
Anagyris foetida	22.6	Centaurea melitensis	22.5
Euphorbia pithyusa	22.3	Camphorosma monspeliaca	21.7
Santolina rosmarinifolia	21.3	Opuntia ficus-indica	21.3
Malva parviflora	21.1	Malva arborea	20.4
Sisymbrium irio	20.3	Hordeum murinum	19.9
Lycium schweinfurthii	19.8	Bupleurum semicompositum	19.8
Dactylis glomerata subsp. hispanica	19.5	Lophochloa cristata	19.4
Galactites elegans	19.4	Ruta graveolens	19.3
Dipsacus ferox	19.3	Salsola oppositifolia	19.1
Diplotaxis virgata	19.0	Carduus tenuiflorus	18.6
Marrubium vulgare	17.9	Scrophularia canina	17.6
Carlina corymbosa	17.4	Eruca vesicaria	17.1
Plantago albicans	16.8	Filago pyramidata	16.8
Marrubium alysson	16.6	Scorzonera laciniata	16.1
Moricandia arvensis	16.0	Arisarum vulgare	15.9
Papaver hybridum	15.4	Helichrysum italicum	15.3

Constant species (occurrence frequencies)

Atriplex halimus	37.0	Daucus carota	27.0
Artemisia herba-alba	24.0	Artemisia arborescens	24.0
Piptatherum miliaceum	23.0	Salsola vermiculata	21.0
Asparagus acutifolius	20.0	Santolina chamaecyparissus	18.0
Dittrichia viscosa	18.0	Eryngium campestre	17.0
Bromus rubens	17.0	Hordeum murinum	15.0
Dactylis glomerata subsp. hispanica	15.0	Pistacia lentiscus	14.0
Foeniculum vulgare	14.0	Carlina corymbosa	14.0
Sonchus oleraceus	13.0	Helichrysum italicum	13.0
Suaeda braun-blanquetii	11.0	Plantago lagopus	11.0
Camphorosma monspeliaca	11.0	Arisarum vulgare	11.0
Sonchus tenerrimus	10.0	Plantago lanceolata	10.0
Filago pyramidata	10.0	Desmazeria rigida	10.0
Anacyclus clavatus	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Atriplex halimus	25.0	Artemisia arborescens	20.0
Santolina chamaecyparissus	18.0	Salsola vermiculata	11.0
Artemisia herba-alba	7.0	Santolina rosmarinifolia	6.0

F6.8b - Caspian halo-nitrophilous scrub

*Diagnostic species (phi coefficient * 100)*

Artemisia lerchiana	74.3	Trigonella orthoceras	55.4
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Artemisia tschernieviana	49.8	Alyssum linifolium	48.3
Alyssum turkestanicum	47.0	Ceratocarpus arenarius	46.6
Alhagi pseudalhagi	46.6	Eremopyrum orientale	45.3
Eremopyrum triticeum	40.3	Leymus ramosus	36.8
Neotorularia contortuplicata	35.4	Ceratocephala testiculata	34.0
Centaurea arenaria	32.5	Senecio noeanus	29.6
Salsola kali subsp. tragus	29.1	Xanthoparmelia ryssolea	28.5
Bromus tectorum	27.7	Bromus squarrosus	27.2
Holosteum umbellatum	26.8	Xanthoria parietina	26.2
Leymus racemosus	25.8	Anabasis aphylla	25.0
Carduus uncinatus	24.9	Xanthoria polycarpa	24.0
Astragalus dolichophyllus	23.7	Rinodina exigua	23.3
Lappula semiglabra	23.1	Matricaria parviflora	22.7
Erodium hoefftianum	22.7	Festuca beckeri	22.6
Tragopogon dubius	22.3	Agropyron fragile	22.3
Artemisia taurica	21.8	Ranunculus oxyspermus	21.6
Cachrys odontalgica	21.6	Filago arvensis	20.7
Bassia prostrata	20.7	Agropyron desertorum	20.5
Tulipa sylvestris	20.2	Ferula caspica	20.0
Descurainia sophia	19.9	Bassia sedoides	19.7
Poa bulbosa	19.5	Buglossoides arvensis	19.5
Androsace maxima	19.4	Artemisia scoparia	17.9
Camphorosma monspeliaca	17.7	Atriplex aucheri	17.3
Ephedra distachya	17.2	Medicago kotovii	17.0
Tribulus terrestris	16.7	Seiophora lacunosa	16.6
Salsola pontica	16.4	Carduus pycnocephallus	16.2
Iris scariosa	16.1	Helichrysum graveolens	16.1
Trisetum loeflingianum	16.0	Senecio vernalis	16.0
Fumaria schleicheri	15.6	Carex ligerica	15.6
Crambe maritima	15.4	Hordeum brevisubulatum	15.3
Tragopogon ruber	15.1	Carex diluta	15.1
<i>Constant species (occurrence frequencies)</i>			
Artemisia lerchiana	68.0	Alyssum turkestanicum	41.0
Trigonella orthoceras	35.0	Poa bulbosa	29.0
Eremopyrum triticeum	29.0	Eremopyrum orientale	29.0
Ceratocarpus arenarius	29.0	Artemisia tschernieviana	29.0
Alyssum linifolium	29.0	Alhagi pseudalhagi	29.0
Bromus tectorum	26.0	Bromus squarrosus	26.0
Leymus ramosus	18.0	Holosteum umbellatum	18.0
Centaurea arenaria	18.0	Tragopogon dubius	15.0
Salsola kali subsp. tragus	15.0	Neotorularia contortuplicata	15.0
Leymus racemosus	15.0	Filago arvensis	15.0
Descurainia sophia	15.0	Ceratocephala testiculata	15.0
Senecio noeanus	12.0	Festuca valesiaca	12.0
Eryngium maritimum	12.0	Carduus uncinatus	12.0
Buglossoides arvensis	12.0	Bassia prostrata	12.0
Artemisia austriaca	12.0		
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Artemisia lerchiana	32.0	Artemisia tschernieviana	21.0

F7.1 - Western Mediterranean spiny heath

*Diagnostic species (phi coefficient * 100)*

Genista corsica	74.1	Helichrysum italicum	60.5
Astragalus massiliensis	54.7	Cistus monspeliensis	44.8
Stachys glutinosa	41.0	Teucrium marum	39.5
Rosmarinus officinalis	38.6	Euphorbia pithyusa	38.3
Reichardia picroides	37.7	Carlina corymbosa	37.7
Genista sardoa	33.8	Pallenis maritima	31.4
Cistus salvifolius	31.2	Lagurus ovatus	29.9
Armeria pungens	27.7	Pistacia lentiscus	27.5
Brachypodium retusum	26.6	Calicotome villosa	26.4
Anchusa crispa	26.3	Silene sedoides	25.4
Lotus cytisoides	25.1	Rumex bucephalophorus	25.0
Senecio bicolor	24.9	Lavandula stoechas	24.6
Thymelaea tartonraira	24.4	Juniperus phoenicea	24.2
Ptilostemon casabonae	23.6	Dactylis glomerata subsp. hispanica	23.6
Hirschfeldia incana	22.0	Camphorosma monspeliaca	22.0
Lobularia maritima	21.7	Asparagus acutifolius	21.7
Ephedra distachya	21.5	Phillyrea angustifolia	21.1
Plantago subulata	20.9	Senecio leucanthemifolius	20.5
Asphodelus ramosus	20.2	Asparagus albus	19.5
Teucrium polium	18.9	Centranthus calcitrapae	18.9
Centaurea horrida	18.9	Aetheorhiza bulbosa	18.9
Lotus drepanocarpus	18.8	Limonium acutifolium	18.7
Parapholis incurva	18.4	Valantia muralis	18.2
Lathyrus articulatus	17.8	Matthiola sinuata	16.9
Medicago praecox	16.8	Chamaerops humilis	16.2
Desmazeria marina	16.0	Plantago coronopus	15.8
Umbilicus horizontalis	15.7	Linaria arvensis	15.5
Convolvulus althaeoides	15.1		

Constant species (occurrence frequencies)

Helichrysum italicum	65.0	Genista corsica	58.0
Cistus monspeliensis	42.0	Rosmarinus officinalis	38.0
Reichardia picroides	35.0	Pistacia lentiscus	35.0
Cistus salvifolius	35.0	Carlina corymbosa	35.0
Brachypodium retusum	35.0	Astragalus massiliensis	31.0
Asparagus acutifolius	31.0	Rubia peregrina	27.0
Daucus carota	27.0	Teucrium polium	23.0
Lagurus ovatus	23.0	Dactylis glomerata	23.0
Teucrium marum	19.0	Stachys glutinosa	19.0
Phillyrea angustifolia	19.0	Lavandula stoechas	19.0
Juniperus phoenicea	19.0	Euphorbia pithyusa	19.0
Dactylis glomerata subsp. hispanica	19.0	Calicotome villosa	19.0
Rumex bucephalophorus	15.0	Plantago coronopus	15.0
Lotus cytisoides	15.0	Erica arborea	15.0
Asphodelus ramosus	15.0	Senecio bicolor	12.0
Plantago subulata	12.0	Pallenis maritima	12.0
Lobularia maritima	12.0	Helichrysum stoechas	12.0
Genista sardoa	12.0	Ephedra distachya	12.0
Cistus incanus	12.0	Camphorosma monspeliaca	12.0
Armeria pungens	12.0	Aetheorhiza bulbosa	12.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Genista corsica	58.0	Astragalus massiliensis	31.0
Genista sardoa	12.0	Armeria pungens	12.0
Rosmarinus officinalis	8.0		

F7.3 - Eastern Mediterranean spiny heath (phrygana)

*Diagnostic species (phi coefficient * 100)*

Thymbra capitata	72.5	Sarcopoterium spinosum	66.2
Genista acanthoclada	54.1	Leontodon tuberosus	46.6
Hypochaeris achyrophorus	39.9	Phagnalon graecum	36.2
Satureja thymbra	35.4	Valantia hispida	35.0
Crepis cretica	34.8	Carlina corymbosa	34.4
Paronychia macrosepala	33.3	Bromus intermedius	32.6
Euphorbia acanthothamnus	32.4	Centaurea raphanina	31.5
Allium rubrovittatum	31.3	Phagnalon rupestre	30.8
Urginea maritima	30.7	Medicago coronata	30.5
Phlomis fruticosa	30.2	Filago aegaea	30.2
Lagoecia cuminoides	30.0	Galium murale	30.0
Bromus fasciculatus	30.0	Asperula rigida	29.9
Gastridium phleoides	29.7	Rostraria cristata	29.4
Daucus involucratus	29.1	Teucrium microphyllum	29.0
Hyparrhenia hirta	29.0	Crucianella latifolia	29.0
Asphodelus ramosus	28.7	Convolvulus althaeoides	28.6
Fumana arabica	27.8	Linum strictum	27.6
Ononis reclinata	26.8	Calicotome villosa	26.5
Polygala venulosa	26.2	Bupleurum gracile	25.9
Sideritis curvidens	25.8	Lagurus ovatus	25.8
Brachypodium retusum	25.7	Erica manipuliflora	25.6
Urospermum picroides	25.0	Biscutella didyma	24.8
Aegilops dichasians	24.4	Scorpiurus muricatus	23.9
Lotus edulis	23.8	Centaurea idaea	23.6
Thesium bergeri	23.5	Trifolium stellatum	23.3
Scaligeria napiformis	23.1	Centaurium tenuiflorum	22.6
Anthyllis hermanniae	22.5	Pyrus amygdaliformis	22.1
Muscari spreitzenhoferi	22.1	Micromeria nervosa	22.1
Desmazeria rigida	21.9	Ranunculus paludosus	21.6
Fumana thymifolia	21.6	Lotus ornithopodioides	21.4
Helictotrichon convolutum	21.4	Cichorium spinosum	21.2
Trifolium infamia-ponertii	21.1	Arisarum vulgare	21.0
Teucrium alpestre	20.9	Hypericum empetrifolium	20.8
Hyoseris scabra	20.8	Valantia muralis	20.7
Aira elegantissima	20.5	Micromeria juliana	20.3
Hymenocarpus circinnatus	20.3	Plantago afra	20.2
Iris unguicularis	20.2	Festuca jeanpertii	19.9
Prasium majus	19.7	Mandragora autumnalis	19.7
Galium setaceum	19.6	Trigonella spinosa	19.4
Filago eriocephala	19.4	Centaurea spinosa	19.3
Asphodeline lutea	19.3	Thymelaea hirsuta	18.8
Trifolium scabrum	18.6	Tordylium apulum	18.6
Teucrium fruticans	18.6	Gagea graeca	18.6
Echium humile	18.6	Micromeria graeca	18.4
Convolvulus oleifolius	18.4	Asparagus aphyllus	18.4
Trigonella monspeliaca	18.3	Plantago bellardii	18.3

Olea europaea var. sylvestris	18.3	Euphorbia peplus	18.3
Crepis tybakiensis	18.3	Cardopatum corymbosum	18.2
Verbascum spinosum	18.0	Salvia triloba	18.0
Asterolinon linum-stellatum	17.9	Linum trigynum	17.8
Lamyropsis cynaroides	17.8	Cuscuta palaestina	17.8
Trifolium tomentosum	17.7	Cistus incanus	17.6
Avena barbata	17.5	Petrorrhagia dubia	17.4
Lotus halophilus	17.4	Helianthemum stipulatum	17.2
Aegilops biuncialis	17.2	Tremastelma palaestinum	17.1
Quercus coccifera	17.1	Cistus parviflorus	17.1
Ballota acetabulosa	17.0	Vicia cretica	16.9
Prospero autumnale	16.7	Briza maxima	16.5
Scandix australis	16.3	Gynandriris sisyrinchium	16.2
Carlina lanata	16.1	Avellinia michelii	16.1
Trifolium uniflorum	16.0	Lotus cytisoides	16.0
Reichardia picroides	15.9	Nigella stricta	15.9
Teucrium polium	15.8	Hedypnois cretica	15.8
Cerastium scaposum	15.4	Tragopogon porrifolius	15.3
Hippocrepis unisiliquosa	15.2	Aetheorhiza bulbosa	15.2
Psilurus incurvus	15.1	Pallenis spinosa	15.1
Biarum davisii	15.1	Dianthus crinitus	15.0
<i>Constant species (occurrence frequencies)</i>			
Thymbra capitata	67.0	Sarcopoterium spinosum	53.0
Genista acanthoclada	35.0	Brachypodium retusum	33.0
Leontodon tuberosus	31.0	Carlina corymbosa	31.0
Hypochaeris achyrophorus	27.0	Asphodelus ramosus	23.0
Linum strictum	22.0	Dactylis glomerata	22.0
Urginea maritima	21.0	Asparagus acutifolius	21.0
Teucrium polium	19.0	Lagurus ovatus	19.0
Desmazeria rigida	19.0	Calicotome villosa	19.0
Trifolium campestre	18.0	Quercus coccifera	18.0
Pistacia lentiscus	18.0	Phagnalon graecum	18.0
Anagallis arvensis	18.0	Valantia hispida	17.0
Phlomis fruticosa	17.0	Hyparrhenia hirta	17.0
Convolvulus althaeoides	17.0	Trifolium scabrum	15.0
Satureja thymbra	15.0	Poa bulbosa	15.0
Arisarum vulgare	15.0	Trifolium stellatum	14.0
Galium murale	14.0	Euphorbia acanthothamnus	14.0
Crepis cretica	14.0	Cistus incanus	14.0
Centaurea raphanina	14.0	Bromus intermedius	14.0
Rostraria cristata	13.0	Reichardia picroides	13.0
Prasium majus	13.0	Paronychia macrosepala	13.0
Lagoecia cuminoides	13.0	Fumana thymifolia	13.0
Crucianella latifolia	13.0	Avena barbata	13.0
Aira elegantissima	13.0	Urospermum picroides	12.0
Sherardia arvensis	12.0	Scorpiurus muricatus	12.0
Pyrus amygdaliformis	12.0	Phagnalon rupestre	12.0
Ononis reclinata	12.0	Medicago coronata	12.0
Helichrysum stoechas	12.0	Erica manipuliflora	12.0
Bromus fasciculatus	12.0	Briza maxima	12.0
Asterolinon linum-stellatum	12.0	Allium rubrovittatum	12.0
Teucrium microphyllum	10.0	Olea europaea var. sylvestris	10.0
Micromeria graeca	10.0	Gastridium phleoides	10.0

Fumana arabica	10.0	Filago aegaea	10.0
Daucus involucratus	10.0	Asperula rigida	10.0
Anthyllis hermanniae	10.0		
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Thymbra capitata	40.0	Sarcopoterium spinosum	27.0
Genista acanthoclada	24.0	Euphorbia acanthothamnos	6.0

F7.4a - Western Mediterranean mountain hedgehog-heath

*Diagnostic species (phi coefficient * 100)*

Cytisus balansae	90.6	Genista cinerascens	44.8
Senecio adonidifolius	31.2	Festuca summilusitana	29.7
Arenaria querioides	27.6	Carduus carpetanus	27.2
Luzula lactea	25.3	Echinopartum lusitanicum	23.7
Orobanche rapum-genistae	23.4	Festuca eskia	23.3
Echinopartum ibericum	23.3	Festuca elegans	23.0
Jasione crispa	22.6	Ornithogalum concinnum	22.1
Linaria repens	21.4	Koeleria crassipes	20.0
Anarrhinum bellidifolium	19.9	Stipa gigantea	18.8
Santolina rosmarinifolia	18.8	Avenula marginata	17.9
Agrostis delicatula	17.8	Agrostis castellana	17.8
Thymus zygis	17.5	Lactuca viminea	17.5
Genista florida	16.9	Deschampsia flexuosa	15.8
Gentiana lutea	15.7	Linaria nivea	15.6
Veronica fruticulosa	15.5	Plantago subulata	15.5
Leucanthemopsis pulverulenta	15.3	Molopospermum peloponnesiacum	15.2
Leucanthemopsis pallida	15.1		

Constant species (occurrence frequencies)

Cytisus balansae	92.0	Deschampsia flexuosa	49.0
Calluna vulgaris	35.0	Genista cinerascens	23.0
Teucrium scorodonia	22.0	Cytisus scoparius	20.0
Agrostis capillaris	20.0	Rumex acetosella	18.0
Rubus idaeus	18.0	Pteridium aquilinum	17.0
Jasione montana	16.0	Senecio adonidifolius	15.0
Juniperus communis subsp. communis	15.0	Arrhenatherum elatius	15.0
Vaccinium myrtillus	14.0	Thymus praecox	14.0
Gentiana lutea	13.0	Thymus pulegioides	12.0
Linaria repens	12.0	Juniperus communis subsp. alpina	12.0
Jasione crispa	12.0	Genista pilosa	12.0
Festuca eskia	12.0	Conopodium majus	12.0
Achillea millefolium	12.0	Agrostis castellana	12.0
Galium verum	11.0	Festuca rubra	11.0
Festuca ovina	11.0	Anthoxanthum odoratum	11.0
Veronica officinalis	10.0	Solidago virgaurea	10.0
Festuca summilusitana	10.0	Epilobium angustifolium	10.0
Crataegus monogyna	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Cytisus balansae	91.0	Echinopartum ibericum	6.0
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F7.4b - Central Mediterranean mountain hedgehog-heath

*Diagnostic species (phi coefficient * 100)*

Chamaecytisus spinescens	69.3	Armeria brutia	54.9
Centaurea sarfattiana	54.8	Astragalus calabrus	54.8
Festuca circummediterranea	51.0	Anthemis cretica	49.7
Thymus longicaulis	49.3	Sesleria tenuifolia	48.8
Phleum ambiguum	47.8	Genista michelii	47.7
Genista desoleana	47.7	Hypericum calabricum	47.2
Bromopsis caprina	47.1	Festuca curvula	46.0
Koeleria lobata	45.4	Erysimum pseudorhaeticum	43.3
Avenula praetutiana	43.3	Globularia meridionalis	42.3
Plantago maritima subsp. serpentina	40.8	Viola corsica	38.3
Herniaria glabra subsp. nebrodensis	37.7	Alyssoides utriculata	37.7
Tolpis virgata	35.5	Centaurea rupestris	35.5
Bunium alpinum	34.8	Koeleria splendens	34.6
Dianthus sylvestris	34.3	Petrorhagia saxifraga	34.1
Eryngium amethystinum	33.3	Valeriana tuberosa	31.6
Sedum amplexicaule	31.0	Globularia bisnagarica	30.4
Galium lucidum	30.2	Helianthemum oelandicum	28.5
Teucrium montanum	28.0	Knautia purpurea	27.9
Poa perligularis	27.6	Satureja montana	27.5
Festuca gamisansii subsp. aethaliae	27.5	Festuca centro-apenninica	27.5
Orchis spitzelii	27.4	Silene italica	27.1
Sempervivum tectorum	26.9	Orchis italica	26.9
Colchicum alpinum	26.8	Anthyllis montana atropurpurea	26.8
Alyssum diffusum	26.7	Silene tyrrhenia	26.6
Cephalaria leucantha	26.5	Ranunculus monspeliacus	26.4
Helichrysum italicum	26.3	Erysimum majellense	26.2
Anthemis triumfetti	25.9	Allium pallens subsp. tenuiflorum	25.9
Pedicularis elegans	25.8	Carlina nebrodensis	25.6
Helianthemum nummularium	25.5	Myosotis ambigens	24.9
Ligusticum lucidum	24.9	Artemisia alba	24.9
Thesium humifusum	24.3	Alyssum montanum	24.3
Silene paradoxa	24.2	Festuca inops	24.2
Armeria majellensis	24.2	Potentilla detommasii	23.9
Trinia dalechampii	23.8	Muscari neglectum	23.1
Sesleria nitida	22.8	Centaurea ambigua	22.7
Serratula nudicaulis	22.5	Anthyllis vulneraria	22.5
Onobrychis alba	22.3	Poa molinerii	22.1
Asperula purpurea	22.0	Allium guttatum	21.9
Ranunculus gramineus	21.1	Brachypodium genuense	20.9
Bromus erectus	20.7	Galactites elegans	20.6
Paronychia kapela	20.5	Thlaspi praecox	20.1
Cerastium tomentosum	19.8	Osyris alba	19.7
Althaea hirsuta	19.5	Carlina corymbosa	18.8
Reichardia picroides	18.7	Crepis leontodontoides	18.7
Brachypodium retusum	18.1	Xeranthemum cylindraceum	17.4
Fumana ericoides	17.3	Fumana procumbens	16.6
Alyssum simplex	16.6	Bunium bulbocastanum	16.4
Sedum rupestre	16.3	Sedum hispanicum	15.7
Silene conica	15.6	Scabiosa argentea	15.4
Seseli montanum	15.2	Teucrium flavum	15.1

Polygala major	15.0		
<i>Constant species (occurrence frequencies)</i>			
Chamaecytisus spinescens	54.0	Helianthemum nummularium	54.0
Thymus longicaulis	46.0	Bromus erectus	46.0
Anthyllis vulneraria	46.0	Teucrium montanum	38.0
Festuca circummediterranea	38.0	Teucrium chamaedrys	31.0
Sesleria tenuifolia	31.0	Plantago maritima subsp. serpentina	31.0
Phleum ambiguum	31.0	Petrorhagia saxifraga	31.0
Koeleria lobata	31.0	Helianthemum oelandicum	31.0
Galium lucidum	31.0	Dianthus sylvestris	31.0
Centaurea sarfattiana	31.0	Astragalus calabrus	31.0
Armeria brutia	31.0	Anthemis cretica	31.0
Silene italica	23.0	Satureja montana	23.0
Koeleria splendens	23.0	Hypericum calabricum	23.0
Helichrysum italicum	23.0	Globularia meridionalis	23.0
Globularia bisnagarica	23.0	Genista michelii	23.0
Genista desoleana	23.0	Festuca curvula	23.0
Erysimum pseudorhaeticum	23.0	Eryngium amethystinum	23.0
Bromopsis caprina	23.0	Brachypodium retusum	23.0
Brachypodium pinnatum	23.0	Avenula praetutiana	23.0
Anthoxanthum odoratum	23.0	Viola corsica	15.0
Valeriana tuberosa	15.0	Tolpis virgata	15.0
Thesium humifusum	15.0	Silene vulgaris	15.0
Seseli montanum	15.0	Sempervivum tectorum	15.0
Sedum rupestre	15.0	Sedum amplexicaule	15.0
Sedum acre	15.0	Reichardia picroides	15.0
Plantago lanceolata	15.0	Osyris alba	15.0
Muscari neglectum	15.0	Knautia purpurea	15.0
Jasione montana	15.0	Hieracium pilosella	15.0
Herniaria glabra subsp. nebrodensis	15.0	Fumana procumbens	15.0
Deschampsia flexuosa	15.0	Cerastium arvense	15.0
Cephalaria leucantha	15.0	Centaurea rupestris	15.0
Carlina corymbosa	15.0	Bunium alpinum	15.0
Asperula purpurea	15.0	Artemisia alba	15.0
Alyssum montanum	15.0	Alyssoides utriculata	15.0
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Astragalus calabrus	31.0	Plantago maritima subsp. serpentina	23.0
Chamaecytisus spinescens	23.0	Genista michelii	23.0
Genista desoleana	23.0	Festuca circummediterranea	15.0
Thymus longicaulis	8.0	Teucrium montanum	8.0
Silene italica	8.0	Potentilla cinerea	8.0
Phleum ambiguum	8.0	Globularia meridionalis	8.0
Fumana procumbens	8.0	Brachypodium retusum	8.0

F7.4c - Eastern Mediterranean mountain hedgehog-heath

<i>Diagnostic species (phi coefficient * 100)</i>			
Astragalus angustifolius	73.5	Astragalus creticus	72.2
Marrubium velutinum	65.5	Daphne oleoides	65.2
Eryngium amethystinum	63.5	Poa thessala	55.1
Carduus tmoleus	55.0	Asyneuma limonifolium	53.2

<i>Cerastium candidissimum</i>	50.9	<i>Festuca varia</i>	47.5
<i>Phleum montanum</i>	44.0	<i>Cirsium hypopsilum</i>	42.5
<i>Prunus prostrata</i>	41.1	<i>Campanula spatulata</i>	40.3
<i>Centaurea affinis</i>	39.9	<i>Festuca polita</i>	39.3
<i>Lepidium hirtum</i>	39.2	<i>Galium thymifolium</i>	39.2
<i>Koeleria lobata</i>	38.2	<i>Bromus cappadocicus</i>	37.0
<i>Geranium macrostylum</i>	36.4	<i>Morina persica</i>	35.0
<i>Ptilostemon afer</i>	34.8	<i>Dianthus biflorus</i>	33.7
<i>Acantholimon androsaceum</i>	33.3	<i>Herniaria parnassica</i>	33.2
<i>Malcolmia graeca</i>	33.0	<i>Rosa pulverulenta</i>	32.8
<i>Minuartia verna</i>	32.4	<i>Cerastium brachypetalum</i>	31.8
<i>Thymus longicaulis</i>	31.7	<i>Berberis cretica</i>	31.3
<i>Trifolium parnassi</i>	30.3	<i>Verbascum epixanthinum</i>	29.9
<i>Acantholimon ulicinum</i>	29.9	<i>Marrubium cylleneum</i>	29.7
<i>Melica ciliata</i>	29.4	<i>Sesleria vaginalis</i>	29.1
<i>Crocus sieberi</i>	29.1	<i>Taraxacum sect. Scariosa</i>	28.9
<i>Veronica thymifolia</i>	28.7	<i>Stipa pennata</i>	28.2
<i>Senecio squalidus</i>	27.5	<i>Pimpinella tragium</i>	27.5
<i>Aubrieta deltoidea</i>	27.4	<i>Armeria canescens</i>	26.7
<i>Corydalis uniflora</i>	26.3	<i>Allium frigidum</i>	26.1
<i>Rosa heckeliana</i>	26.0	<i>Myosotis refracta</i>	26.0
<i>Galium taygeteum</i>	26.0	<i>Festuca jeanpertii</i>	25.9
<i>Scilla nana</i>	25.8	<i>Anchusa cespitosa</i>	25.6
<i>Erysimum cephalonicum</i>	25.5	<i>Achillea fraasii</i>	25.2
<i>Thymus leucotrichus</i>	25.1	<i>Lactuca alpestris</i>	24.9
<i>Asperula idaea</i>	24.6	<i>Crupina crupinastrum</i>	22.9
<i>Silene radicata</i>	22.6	<i>Sideritis syriaca</i>	22.1
<i>Sedum amplexicaule</i>	22.0	<i>Salvia argentea</i>	21.8
<i>Paronychia albanica subsp. graeca</i>	21.6	<i>Leontodon crispus</i>	21.4
<i>Linaria peloponnesiaca</i>	21.3	<i>Marrubium thessalum</i>	21.1
<i>Colchicum cretense</i>	21.1	<i>Astragalus thracicus subsp. cylleneus</i>	21.0
<i>Hyacinthella leucophaea</i>	20.8	<i>Erysimum pectinatum</i>	20.8
<i>Cirsium candelabrum</i>	20.8	<i>Buglossoides incrassata</i>	20.8
<i>Alyssum fragillimum</i>	20.8	<i>Scandix australis</i>	20.6
<i>Cirsium heldreichii</i>	20.6	<i>Minuartia juniperina</i>	20.2
<i>Astragalus sirinicus</i>	20.2	<i>Bromus tomentellus</i>	20.1
<i>Thymus striatus</i>	20.0	<i>Lamium bifidum</i>	20.0
<i>Crataegus pycnoloba</i>	20.0	<i>Euphorbia herniariifolia</i>	19.8
<i>Pterocephalus perennis</i>	19.7	<i>Telephium imperati</i>	19.3
<i>Acinos alpinus</i>	19.3	<i>Prunus cocomilia</i>	19.0
<i>Juniperus foetidissima</i>	18.6	<i>Anthemis cretica</i>	18.6
<i>Achillea ageratifolia</i>	18.6	<i>Poa timoleontis</i>	17.4
<i>Nepeta nuda</i>	17.4	<i>Euphorbia myrsinites</i>	16.8
<i>Agropyron cristatum</i>	16.5	<i>Hypericum rumeliacum</i>	16.3
<i>Astragalus depressus</i>	16.3	<i>Alyssum montanum</i>	16.2
<i>Ballota acetabulosa</i>	16.0	<i>Alyssum minutum</i>	15.9
<i>Trifolium physodes</i>	15.8	<i>Poa bulbosa</i>	15.7
<i>Galium verticillatum</i>	15.6	<i>Allium guttatum</i>	15.6
<i>Asphodeline lutea</i>	15.5	<i>Hieracium parnassi</i>	15.4
<i>Draba lasiocarpa</i>	15.4	<i>Centaurea pinardii</i>	15.4
<i>Aethionema carlsbergii</i>	15.4	<i>Viola rauliniana</i>	15.2
<i>Thlaspi graecum</i>	15.2	<i>Senecio fruticosus</i>	15.2
<i>Muscari neglectum</i>	15.2	<i>Galium absurdum</i>	15.2
<i>Enarthrocarpus arcuatus</i>	15.2	<i>Silene melzheimeri</i>	15.1

Peucedanum alpinum	15.1	Galium incanum	15.1
Campanula radicata	15.1	Astragalus erinaceus	15.1
Astragalus apollineus	15.1	Asperula aristata	15.1
Allium phthioticum	15.1	Acantholimon graecum	15.1
Thymus leucospermus	15.0	Reseda saadae	15.0
Ranunculus subhomophyllus	15.0	Geranium cinereum	15.0
Gagea chrysantha	15.0	Erysimum mutabile	15.0
Drabopsis nuda	15.0	Astragalus thracicus subsp. parnassi	15.0
		Aethionema speciosum subsp. compactum	15.0
Asperula oetaea	15.0		
<i>Constant species (occurrence frequencies)</i>			
Astragalus angustifolius	60.0	Eryngium amethystinum	57.0
Astragalus creticus	55.0	Daphne oleoides	52.0
Marrubium velutinum	45.0	Dactylis glomerata	45.0
Melica ciliata	36.0	Poa thessala	33.0
Carduus tmoleus	33.0	Asyneuma limonifolium	33.0
Festuca varia	31.0	Sanguisorba minor	29.0
Minuartia verna	29.0	Cerastium candidissimum	29.0
Thymus longicaulis	26.0	Stipa pennata	26.0
Phleum montanum	26.0	Poa bulbosa	24.0
Koeleria lobata	24.0	Cerastium brachypetalum	24.0
Campanula spatulata	24.0	Prunus prostrata	19.0
Leontodon crispus	19.0	Cirsium hypopsilum	19.0
Centaurea affinis	19.0	Acinos alpinus	19.0
Lepidium hirtum	17.0	Galium thymifolium	17.0
Festuca polita	17.0	Eryngium campestre	17.0
Bromus cappadocicus	17.0	Teucrium chamaedrys	14.0
Sedum album	14.0	Ptilostemon afer	14.0
Pimpinella tragium	14.0	Morina persica	14.0
Geranium macrostylum	14.0	Thymus striatus	12.0
Rosa pulverulenta	12.0	Malcolmia graeca	12.0
Juniperus oxycedrus	12.0	Herniaria parnassica	12.0
Erophila verna	12.0	Dianthus biflorus	12.0
Cynosurus echinatus	12.0	Bromus squarrosus	12.0
Berberis cretica	12.0	Armeria canescens	12.0
Arenaria serpyllifolia	12.0	Acantholimon androsaceum	12.0
Veronica thymifolia	10.0	Verbascum epixanthinum	10.0
Trisetum flavescens	10.0	Trifolium parnassi	10.0
Teucrium polium	10.0	Teucrium montanum	10.0
Taraxacum sect. Scariosa	10.0	Sesleria vaginalis	10.0
Senecio squalidus	10.0	Sedum amplexicaule	10.0
Phleum alpinum agg.	10.0	Myosotis sylvatica	10.0
Muscari neglectum	10.0	Medicago lupulina	10.0
Marrubium cylleneum	10.0	Hypericum rumeliacum	10.0
Festuca jeanpertia	10.0	Euphorbia myrsinites	10.0
Crupina crupinastrum	10.0	Crocus sieberi	10.0
Crepis sancta	10.0	Aubrieta deltoidea	10.0
Astragalus onobrychis	10.0	Asperula aristata	10.0
Alyssum montanum	10.0	Acantholimon ulicinum	10.0
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Astragalus creticus	52.0	Astragalus angustifolius	36.0

F9.1a - Arctic, boreal and alpine riparian scrub

*Diagnostic species (phi coefficient * 100)*

Salix lapponum	69.2	Salix phylicifolia	55.8
Salix lanata	41.6	Salix glauca	38.2
Stellaria borealis	36.8	Betula nana	35.7
Trientalis europaea	34.8	Carex bigelowii	31.5
Polygonum viviparum	31.0	Lophozia longiflora	31.0
Salix hastata	30.3	Rhodiola rosea	27.9
Pedicularis lapponica	27.7	Rubus chamaemorus	26.7
Salix borealis	25.9	Cerastium alpinum	25.9
Saussurea alpina	25.6	Epilobium anagallidifolium	25.5
Harpanthus flotovianus	25.1	Cerastium glabratum	25.0
Alchemilla alpina	25.0	Calamagrostis purpurea	24.7
Rhizomnium pseudopunctatum	24.4	Viola epipsila	23.9
Pedicularis sceptrum-carolinum	22.4	Stellaria crassifolia	22.2
Sphagnum girgensohnii	21.8	Carex vaginata	21.2
Drepanocladus uncinatus	20.6	Carex brunnescens	19.2
Empetrum nigrum subsp. hermaphroditum	18.9	Tritomaria quinqueidentata	18.3
Jungermannia pumila	18.3	Angelica archangelica	18.3
Thalictrum alpinum	18.0	Salix nummularia	17.9
Cephaloziella spinigera	17.9	Lobaria linita	17.7
Epilobium hornemannii	17.4	Marchantia polymorpha	17.3
Primula nutans	17.2	Nephroma expallidum	17.2
Diplophyllum taxifolium	17.2	Alchemilla glomerulans	17.1
Plagiothecium platyphyllum	16.8	Calamagrostis stricta	16.8
Salix herbacea	16.4	Sibbaldia procumbens	15.7
Carex aquatilis	15.5	Galium trifidum	15.3
Veronica alpina	15.2	Agrostis mertensii	15.2
Psoroma hypnorum	15.1	Betula pubescens subsp. tortuosa	15.1
Equisetum scirpoides	15.0		

Constant species (occurrence frequencies)

Salix lapponum	59.0	Deschampsia cespitosa	48.0
Trientalis europaea	41.0	Polygonum viviparum	41.0
Salix phylicifolia	38.0	Deschampsia flexuosa	38.0
Rumex acetosa	34.0	Ranunculus acris	31.0
Betula nana	31.0	Solidago virgaurea	28.0
Anthoxanthum odoratum	28.0	Vaccinium myrtillus	24.0
Carex bigelowii	24.0	Caltha palustris	24.0
Salix lanata	21.0	Salix glauca	21.0
Rubus chamaemorus	21.0	Potentilla palustris	21.0
Filipendula ulmaria	21.0	Viola palustris	17.0
Geum rivale	17.0	Alchemilla alpina	17.0
Vaccinium vitis-idaea	14.0	Stellaria borealis	14.0
Sphagnum girgensohnii	14.0	Saussurea alpina	14.0
Salix hastata	14.0	Rhodiola rosea	14.0
Rhizomnium punctatum	14.0	Luzula sylvatica	14.0
Chaerophyllum hirsutum	14.0	Geranium sylvaticum	14.0
Festuca rubra	14.0	Festuca ovina	14.0
Empetrum nigrum subsp. hermaphroditum	14.0	Crepis paludosa	14.0

Carex rostrata	14.0	Aulacomnium palustre	14.0
Viola epipsila	10.0	Viola biflora	10.0
Vaccinium uliginosum	10.0	Thalictrum alpinum	10.0
Sphagnum warnstorffii	10.0	Salix herbacea	10.0
Rhizomnium pseudopunctatum	10.0	Ptilidium ciliare	10.0
Phleum alpinum agg.	10.0	Pedicularis lapponica	10.0
Oxalis acetosella	10.0	Marchantia polymorpha	10.0
Lophozia longiflora	10.0	Hylocomium splendens	10.0
Eriophorum vaginatum	10.0	Equisetum sylvaticum	10.0
Equisetum palustre	10.0	Equisetum fluviatile	10.0
Equisetum arvense	10.0	Epilobium palustre	10.0
Epilobium anagallidifolium	10.0	Drepanocladus uncinatus	10.0
Cerastium alpinum	10.0	Carex vaginata	10.0
Cardamine pratensis	10.0	Calamagrostis stricta	10.0
Calamagrostis purpurea	10.0	Bistorta officinalis	10.0
Betula pubescens	10.0	Alchemilla vulgaris	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Salix lapponum	59.0	Salix phylicifolia	24.0
Salix glauca	17.0	Salix lanata	10.0
Betula nana	10.0	Salix hastata	7.0
Rumex acetosa	7.0	Deschampsia flexuosa	7.0

F9.1b - Temperate riparian scrub

*Diagnostic species (phi coefficient * 100)*

Salix purpurea	49.1	Salix triandra	44.5
Salix viminalis	35.5	Hippophae rhamnoides	34.0
Salix elaeagnos	33.0	Solanum dulcamara	21.5
Rubus caesius	19.9	Calystegia sepium	17.0
Urtica dioica	15.9	Salix fragilis	15.0

Constant species (occurrence frequencies)

Urtica dioica	57.0	Salix purpurea	48.0
Rubus caesius	39.0	Solanum dulcamara	35.0
Salix triandra	34.0	Phalaris arundinacea	30.0
Galium aparine	29.0	Calystegia sepium	28.0
Poa trivialis	25.0	Salix viminalis	23.0
Ranunculus repens	23.0	Salix elaeagnos	22.0
Agrostis stolonifera	22.0	Hippophae rhamnoides	21.0
Glechoma hederacea	20.0	Angelica sylvestris	20.0
Lythrum salicaria	18.0	Symphytum officinale	15.0
Sambucus nigra	15.0	Lysimachia vulgaris	15.0
Equisetum arvense	15.0	Dactylis glomerata	15.0
Aegopodium podagraria	15.0	Salix alba	13.0
Lycopus europaeus	13.0	Galium mollugo agg.	13.0
Tussilago farfara	12.0	Mentha aquatica	12.0
Heracleum sphondylium	12.0	Salix fragilis	11.0
Rumex obtusifolius	11.0	Rorippa amphibia	11.0
Phragmites australis	11.0	Galium palustre	11.0
Filipendula ulmaria	11.0	Elymus caninus	11.0
Cirsium arvense	11.0	Brachythecium rutabulum	11.0
Brachypodium sylvaticum	11.0	Scrophularia nodosa	10.0

Mentha longifolia	10.0	Lysimachia nummularia	10.0
Iris pseudacorus	10.0	Fraxinus excelsior	10.0
Eupatorium cannabinum	10.0	Cornus sanguinea	10.0
Calamagrostis epigejos	10.0		

Dominant species (percentage frequencies of occurrences with cover > 25%)

Salix purpurea	32.0	Salix triandra	23.0
Hippophae rhamnoides	21.0	Salix viminalis	15.0
Salix elaeagnos	15.0	Urtica dioica	11.0

F9.2 - Salix fen scrub

*Diagnostic species (phi coefficient * 100)*

Salix cinerea	37.0	Salix repens	17.6
Solanum dulcamara	17.3	Salix atrocinerea	17.0
Myrica gale	17.0	Calamagrostis canescens	15.0

Constant species (occurrence frequencies)

Salix cinerea	59.0	Lysimachia vulgaris	34.0
Galium palustre	33.0	Solanum dulcamara	28.0
Urtica dioica	26.0	Phragmites australis	26.0
Lycopus europaeus	23.0	Iris pseudacorus	21.0
Molinia caerulea agg.	20.0	Frangula alnus	19.0
Filipendula ulmaria	19.0	Lythrum salicaria	18.0
Juncus effusus	18.0	Calamagrostis canescens	18.0
Mentha aquatica	17.0	Cirsium palustre	17.0
Calliergonella cuspidata	17.0	Salix repens	15.0
Poa trivialis	15.0	Angelica sylvestris	15.0
Holcus lanatus	14.0	Salix aurita	13.0
Salix atrocinerea	13.0	Alnus glutinosa	13.0
Agrostis stolonifera	13.0	Rubus fruticosus agg.	12.0
Ranunculus repens	12.0	Potentilla palustris	12.0
Potentilla erecta	12.0	Peucedanum palustre	12.0
Myrica gale	12.0	Hydrocotyle vulgaris	12.0
Dryopteris carthusiana	12.0	Caltha palustris	12.0
Betula pubescens	12.0	Cardamine pratensis	11.0
Scutellaria galericulata	10.0	Galium aparine	10.0
Equisetum fluviatile	10.0	Deschampsia cespitosa	10.0
Carex elata	10.0	Carex acutiformis	10.0

Dominant species (percentage frequencies of occurrences with cover > 25%)

Salix cinerea	54.0	Salix repens	13.0
Salix atrocinerea	12.0	Myrica gale	10.0
Salix aurita	7.0	Molinia caerulea agg.	6.0
Frangula alnus	6.0		

F9.3 - Mediterranean riparian scrub

*Diagnostic species (phi coefficient * 100)*

Nerium oleander	53.8	Vitex agnus-castus	51.1
Tamarix gallica	43.9	Tamarix africana	41.0
Tamarix canariensis	32.3	Oxalis pes-caprae	24.7

Juncus acutus	24.5	Tamarix hampeana	23.8
Suaeda braun-blanquetii	21.3	Atriplex halimus	20.7
Piptatherum miliaceum	20.6	Rubus sanctus	20.0
Hypericum hircinum	20.0	Parietaria cretica	18.7
Dracunculus vulgaris	18.1	Arisarum vulgare	17.4
Rubus ulmifolius	16.4	Sarcopoterium spinosum	16.3
Phlomis lanata	16.2	Limonium vulgare agg.	16.0
Hordeum marinum	15.5	Carex microcarpa	15.3
<i>Constant species (occurrence frequencies)</i>			
Nerium oleander	35.0	Vitex agnus-castus	31.0
Rubus ulmifolius	26.0	Tamarix gallica	23.0
Tamarix africana	18.0	Galium aparine	18.0
Smilax aspera	15.0	Solanum dulcamara	14.0
Asparagus acutifolius	14.0	Pistacia lentiscus	13.0
Piptatherum miliaceum	13.0	Phragmites australis	12.0
Juncus acutus	12.0	Arisarum vulgare	12.0
Tamarix canariensis	11.0	Atriplex prostrata	10.0
<i>Dominant species (percentage frequencies of occurrences with cover > 25%)</i>			
Nerium oleander	29.0	Tamarix gallica	22.0
Vitex agnus-castus	19.0	Tamarix africana	13.0
Tamarix canariensis	10.0	Tamarix hampeana	9.0

Appendix G: Descriptions of EUNIS heathland, scrub and tundra habitattypes

In the following text, the EUNIS F Heath, scrub and tundra habitats, and similar vegetation occurring on B1 & B2 coastal heaths and scrub, have been given their original text description (Davies et al. 2004), then the proposed revised description. Where there has been a name change, the proposed name is given first, then the original EUNIS name in brackets. Green text indicates those habitats where Schaminée et al. (2014) recommended some revision, either splitting of habitats or fusion of adjacent habitats and splitting, a note of which is then provided, together with descriptions for each new habitat. In almost all cases, the recommended changes were adopted for the DG(Env) Red List of European Habitats project but, where further splits or changes of name were proposed for the Red List project, these are highlighted in red and this project recommends to align with the Red List proposals.

B1.5 Coastal dune heaths

Original description: Stable dunes with a leached surface and vegetation dominated by *Calluna vulgaris*, *Empetrum nigrum* or *Erica* spp.

Proposed split into two sub-types according to the dominant species:

B1.5a Atlantic and Baltic coastal *Empetrum* heath

Heath on stable, decalcified dune sands along the cooler north Atlantic and Baltic coasts of Europe, dominated by *Empetrum nigrum*, with or without *Calluna vulgaris*, or occurring in dune slacks when *Erica tetralix* may also be abundant or even replace *Empetrum* with the same suite of associates. Persistent where wind-exposure or light grazing prevent succession to scrub or woodland.

B1.5b Atlantic coastal *Calluna* and *Ulex* heath

Heath on stable, decalcified, sharply-draining dune sands along the warmer, more humid Atlantic coast of Europe, dominated by *Calluna vulgaris*, *Erica* spp. and/or *Ulex* spp and other low spiny legumes often with a strong contingent of grasses and sedges. Persistent where wind-exposure or light grazing prevent succession to scrub or woodland.

B1.6 Coastal dune scrub

Original description: Stable dunes with scrub, e.g. *Hippophae rhamnoides*, *Salix repens* in the north, or *Juniperus* spp. or sclerophyllous shrubs in the south.

Proposed split into two types on the basis of geographical location:

B1.6a Atlantic and Baltic coastal dune scrub

Scrub dominated by a wide diversity of low to tall shrubs on stabilised dry dune sands and in dune slacks along the Atlantic and Baltic coasts, the composition varying according to regional climate and ground conditions. Fen vegetation with low *Salix repens* or grassland with *Rosa spinosissima* are not included.

B1.6b Mediterranean and Black Sea coastal dune scrub

Scrub dominated by a wide diversity of low to tall shrubs on stabilised dry dune sands along the Mediterranean and Black sea coasts, often grading to dune grassland or woodland, the associated herb flora showing elements from these neighbouring vegetation types or mosaics.

The Red List project added a further sub-type

B1.6c Macaronesian coastal dune scrub.

Often sparse scrub on coastal dune sands in the arid Mediterranean climate in parts of the Canarian archipelago.

B2.5 Shingle and gravel beaches with scrub

Original description: Coastal gravel banks with scrub. Included are dense thermo-mediterranean brushes on gravel banks beside the Mediterranean and heaths on shingle in the nemoral zone.

Proposed merger with other habitat types on shingle and gravel beaches.

F1.1 Shrub tundra

Original description: Tundras of the southernmost tundra belt, characterized by an abundance of medium small and small shrubs, including 1-2 m tall *Alnus fruticosa*, 0.5-0.8 m tall *Salix lanata*, *Betula nana*, *Betula exilis*, *Salix reptans*, *Salix pulchra*, and of dwarf shrubs, in particular, *Vaccinium uliginosum*, *Vaccinium vitis-idaea*, *Ledum decumbens*, *Rubus chamaemorus*, *Empetrum hermaphroditum*, *Empetrum nigrum*, *Arctostaphylos alpina*. They extend south to the wooded taiga belt.

Tundra with a usually extensive cover of sub-shrubs or low shrubs over herbs, mosses and lichens on sporadically permafrost soils of the southern arctic and subarctic zones, often grazed into grassy mosaics.

F1.2 Moss and lichen tundra

Original description: Tundras of the middle tundra belt, characterized by a thick cover of mosses, formed notably by *Hylocomium splendens*, *Aulacomnium turgidum*, *Tomentypnum nitens*, *Ptilidium ciliare*, with dwarf shrubs, particularly *Dryas octopetala*, *Cassiope tetragona*, *Salix reptans*, *Vaccinium vitis-idaea*, sedges, among which the often dominant *Carex ensifolia*. Drier stands alternate in mosaic fashion with wetter areas dominated by sedges, in particular, *Carex stans*, *Eriophorum angustifolium*, *Eriophorum scheuchzeri*, and grasses, notably *Arctophila fulva*, *Dupontia fischeri*.

Tundra of the middle and northern high arctic zone where permafrost soils, often occurring in patterned ground, support a frequently sparse cover of mosses, lichens and low herbs.

F2.1 Subarctic and alpine dwarf Salix scrub (Subarctic and alpine dwarf willow scrub)

Original description: Salix scrub composed of species that rarely exceed 1.5 m in height. Dwarf willow scrub is well developed in boreal and arctic mountains and in subarctic lowlands. In mountains of the nemoral and warm-temperate zones, stands of dwarf willow scrub are of much smaller extent and are characteristic of late-lying snow patches. They occur in the Alps, Pyrenees, Carpathians and Caucasus, and very locally to the south in the Paeonian mountains, Sierra Nevada, Cordillera Central, Monti Sibillini and Abruzzi. They occur locally in the Scottish Highlands and in the Sudeten.

Salix-dominated dwarf scrub, often with abundant bryophytes and lichens, on skeletal calcareous or siliceous soils in late snow beds with a short growing-season, occurring in the subarctic north of the woodland zone and in the high mountains of nemoral Europe, increasingly local and fragmentary to the south.

F2.2 Evergreen alpine and subalpine heath and scrub

Original description: Small, dwarf or prostrate shrub formations of the alpine and subalpine zones of mountains, dominated by ericaceous species, *Dryas octopetala*, dwarf junipers, brooms or greenweeds; *Dryas* heaths of the British Isles.

Proposed split into three types on the basis of dominant growth form:

F2.2a Alpine and subalpine ericoid heath

Dwarf-shrub vegetation dominated by ericoids and other woody species (not *Juniperus* or genistoids) occurring in high mountains throughout Europe, varying in dominants and associates according to regional climate, degree of exposure and snow lie, soil reaction, soil depth and moisture.

F2.2b Alpine and subalpine Juniperus scrub

Juniper-dominated vegetation of the montane to sub-alpine belts of European mountains, occurring as primary vegetation tolerant of both high exposure and snow-lie, but also a secondary derivative of deforested, long-grazed and eroded ground at high altitudes.

F2.2c Balkan subalpine genistoid scrub

Genistoid heath and scrub of high mountains in the Balkans, often in primary grassy mosaics at higher altitudes, but also extending below the timberline where wood-cutting and grazing open up the woodland cover and sustain the vegetation as an anthropogenic replacement.

F2.3 Subalpine deciduous scrub

Original description: Subalpine scrubs of *Alnus*, *Betula*, *Salix* and *Rosaceae* (*Amelanchier*, *Potentilla*, *Rubus*, *Sorbus*), less than 5 m tall, often accompanied by tall herbs that in the absence of scrub would be classified as E5.5. Excludes dwarf *Salix* scrub (F2.1), which is composed of species that rarely exceed 1.5 m in height, and scrub on waterlogged soils (F9.2).

Low scrub, including *krummholz*, dominated by various deciduous trees and shrubs, on moist but free-draining, sometimes quite fertile, soils on high mountain slopes throughout Europe, often with long snow-lie and prone to natural disturbance due to avalanche and scree slides, after which it is well able to recover and recolonise. The associated flora can be rich in tall mountain herbs. It can also be found as a secondary succession stage in abandoned subalpine pastures and meadows.

F2.4 Subalpine *Pinus mugo* scrub (Conifer scrub close to the tree limit)

Original description: Scrubland with dwarf conifers (*krummholz*), often with incomplete canopy cover, close to the tree limit. At the arctic tree limit, the trees are of species that can grow to large stature under favourable conditions. However *Pinus mugo* of central and southern Europe is often genetically fixed as a shrub. Excluded are stands of forest conifers with height > 3 m (G3).

Pinus mugo krummholz on mineral soils with long snow-lie above the tree line through the mountains of central and eastern Europe. Woody and herbaceous associates and the sometimes abundant bryophyte layer vary according to the base-richness of the soils and ground moisture.

F3.1 Temperate thickets and scrub

Original description: Successional and plagioclimax scrub, mostly deciduous, of Atlantic, sub-Atlantic or subcontinental affinities, characteristic of the nemoral zone, but also colonizing cool, moist or disturbed stations of the Mediterranean evergreen forest zone. Included are thickets of *Buxus sempervirens*, *Corylus avellana*, *Cytisus scoparius*, *Juniperus communis*, *Prunus spinosa*, *Rubus fruticosus* and *Ulex europaeus*.

F3.2 Submediterranean deciduous thickets and brushes

Original description: Successional and plagioclimax scrub, mostly deciduous, of the submediterranean and supramediterranean zones, but also colonizing cool, moist or disturbed stations of the mediterranean evergreen forest zone. Included are some non-leafy brushes, for example *Cytisus purgans* and *Genista aetnensis*.

Proposed merger of F3.1 and F3.2 with a split into six types of the basis of dominant growth form. To this were added two further habitats in the Red List habitat typology, with a shift of one code, giving a total of 8 new sub-types:

F3.1a Lowland to montane temperate and submediterranean *Juniperus* scrub

Juniperus communis scrub on nutrient-poor sandy and calcareous soils through the temperate and submediterranean lowlands and foothills of Europe. The juniper can be very patchy in occurrence, often related to past land-use, and with a striking variety of growth forms, the associated flora being very diverse according to soil base-status, sharing much in common, where the scrub is open, with local calcicolous grasslands or heath.

F3.1b Temperate *Rubus* scrub

Low *Rubus*-dominated scrub, deciduous or sometimes evergreen, of successions and ecotones in a wide variety of semi-natural landscapes through

the Atlantic zone and elsewhere in sub-montane Europe where a locally moist climate prevails. *Rubus* is an enormously diverse genus of often apomictic and endemic taxa with associated floras related to soil base-status and moisture.

F3.1c Lowland to montane temperate and submediterranean genistoid scrub

Low scrub dominated by various woody legumes on mostly sharply-draining, nutrient-poor acidic soils through the temperate and submediterranean lowlands and mediterranean foothills of Europe. To the north the vegetation is usually found in successions or ecotones within pastoral landscapes and is often rather species-poor; further south, the scrub can occur as a more persistent or repeatedly renewed habitat among rocky or unstable hill-slopes with richer associated floras.

F3.1d Balkan-Anatolian submontane genistoid scrub

Open scrub, dominated by *Genista rumelica/lydia* endemic to steep rocky slopes and scree, and also degraded woodland, in the lowlands and foothills of the south-eastern Balkans, on various soils but especially rich on limey substrates where calcicolous grassland species figure strongly among the associated flora.

F3.1e Temperate and submediterranean thorn scrub

Scrub dominated by a diversity of mostly thorny shrubs, small trees and saplings, in successions and ecotones on mesic soils in a wide variety of semi-natural landscapes through the temperate and submediterranean lowlands of Europe but sometimes extending to higher altitudes, as with the Balkan *šibljak*. The dominants and associated floras vary widely with differences in regional climate and soils.

F3.1f Low steppic scrub

Low scrub, dominated by various, often clonal, shrubs frequently forming patches in locally mesic and sheltered situations within the dry grasslands of the steppe zone of central and eastern Europe. It can form a persistent natural landscape element or develop after abandonment of pasturing.

F3.1g *Corylus avellana* scrub

Low scrub dominated by *Corylus avellana*, permanently maintained by exposure to winds and on shallow soils along the north Atlantic coast and locally on rocky slopes and cliffs through the Continental region.

F3.1h Temperate woodland clearing scrub

Often dense scrub of shrubs and small trees invading after natural or anthropogenic clearance in woodlands of the temperate zone.

F4.1 Wet heath (Wet heaths)

Original description: Wet or humid ericoid-shrub dominated heaths of the Atlantic and sub-Atlantic zones, developed on peaty or semipeaty soils, waterlogged for at least part of the year, sometimes temporarily inundated, and usually moist even in summer.

Heath with prominent *Erica tetralix* on shallow, acid, nutrient-poor peats and peaty mineral soils, kept moist for much of the year and often seasonally waterlogged, through the Atlantic and sub-Atlantic lowlands and foothills of Europe. Typically occurring in wet depressions and seepage areas within dry heaths or as a marginal zone around bogs where drainage of deeper peats can increase its extent. In milder oceanic climates, other *Erica* and *Ulex* spp. occur in richer humid heath. Frequently influenced by grazing and sod-cutting.

F4.2 Dry heath (Dry heaths)

Original description: Heaths on siliceous, podsollic, rarely- or never-waterlogged soils in moist Atlantic and sub-Atlantic climates of the plains and low mountains of Western and Central Europe.

Heath dominated by various ericaceous sub-shrubs on free-draining, nutrient-poor, acid sands and siliceous soils through the lowlands and foothills of western and central Europe, extending northwards in more oceanic situations and into continental regions at higher rainier altitudes. Very often influenced by grazing and burning and frequently a secondary vegetation type derived by clearance of acidophilous woodland and maintained anthropogenically.

F4.3 Macaronesian heath (Macaronesian heaths)

Original description: Heaths of the Canary Islands, Azores and Madeira.

Shrubby vegetation on thin soils in the Azores, Madeira and Canary Islands, colonising pyroclastic debris, lava, rock outcrops and landslips, sometimes cyclically renewed by further disturbance or seral to woodland. Floristically diverse between and within the archipelagoes.

F5.1 Arborescent matorral

Original description: Successional and plagioclimax evergreen sclerophyllous or lauriphyllous vegetation of mediterranean or warm-temperate humid affinities with a more or less dense, broken or low arborescent cover and with a usually thick, high evergreen shrub stratum. Arborescent matorral derives mostly from degradation or regrowth of broad-leaved evergreen forests (G2) or is intermediate between them and maquis (F5.2); some derives from thermophilous deciduous (G1.7) or conifer (G3.7) forests.

F5.2 Maquis

Original description: Evergreen sclerophyllous or lauriphyllous shrub vegetation, with a more or less closed canopy structure, and with few annuals, some geophytes and often scattered trees, some of which may be in shrub form. Unlike arborescent matorral, maquis is typically dominated by species that do not have the potential to grow into tall trees. In high maquis these may be *Arbutus* spp., *Erica arborea*, *Erica scoparia*, *Juniperus oxycedrus*, *Phillyria* spp. In low maquis, *Cistus* spp., *Erica* spp., *Genista* spp., *Lavandula* spp. may predominate.

Proposed merger of these two habitats into a single type

F5.1 Mediterranean maquis and arborescent matorral

Evergreen sclerophyllous or lauriphyllous shrub vegetation forming a dense closed canopy, with or without low emergent trees, on a wide variety of substrates and soils through the thermo- to meso-Mediterranean belts. May be permanent primary vegetation on xeric sites but is usually derived by degradation of evergreen deciduous or coniferous woodland and much influenced in structure and composition by grazing and fire.

F5.3 Submediterranean pseudomaquis (Pseudomaquis)

Original description: Mixed sclerophyllous evergreen and deciduous shrub thickets of the periphery of the range of Mediterranean sclerophyllous scrublands. They include, in particular, shrub formations of the Balkan and Italian peninsulas intermediate between Mediterranean maquis and schibljak, resulting from the degradation of thermophilous deciduous woodland G1.7, with a mixture of evergreen and deciduous bushes including *Quercus coccifera*, *Juniperus oxycedrus*, *Quercus trojana*, *Carpinus orientalis*, *Ostrya carpinifolia*, *Pistacia terebinthus*, *Buxus sempervirens*, *Berberis cretica*, *Paliurus spinachristi*, *Pyrus spinosa*, *Rosa* spp., similar Iberian formations with *Amelanchier ovalis*, *Prunus lusitanica*, *Ilex aquifolium*, French and Italian formations with *Quercus pubescens* and *Quercus ilex*, formations of Mediterranean Asia Minor and the Levant dominated by mixed deciduous and evergreen shrubs or small trees, in particular, *Quercus coccifera* (*Quercus calliprinos*) and *Pistacia palaestina*.

Mixed deciduous and evergreen scrub of shallow, rocky, mostly calcareous soils in the lowlands and foothills of southern Europe, particularly the east. Usually derived by woodland degradation and much affected in structure and composition by grazing, fire and logging.

F5.4 Spartium junceum scrub (Spartium junceum fields)

Original description: Thickets and brushes of Spanish broom, *Spartium junceum*, widespread in mediterranean and submediterranean areas of western Europe.

Scrub dominated by *Spartium junceum*, typical of disturbed, open, sunny situations on a wide variety of soils through the Mediterranean and sub-Mediterranean, where its rapid establishment is favoured by post-fire seed germination, aggressive rooting, nitrogen-fixation and unpalatability.

F5.5 Thermomediterranean scrub

Original description: Shrub formations characteristic of the thermo-Mediterranean zone. Included here are those formations, for the most part indifferent to the siliceous or calcareous nature of the substrate, that reach their greatest extent or optimal development in the thermo-Mediterranean zone, typically with abundant *Pistacia lentiscus*, *Myrtus communis*, *Phillyrea* spp., *Erica manipuliflora*, *Styrax officinalis*, *Genista fasselata*, *Euphorbia dendroides*, *Calicotome villosa* and *Sarcopoterium spinosum*. Also included are the numerous, strongly characterized, thermophile formations endemic to the south of the Iberian peninsula, mostly thermo-Mediterranean but

sometimes meso-Mediterranean; in their great local diversity they are a western counterpart of, and sometimes approach in appearance, the mostly eastern Mediterranean phrygas F7.

Scrub with a usually low and rather open cover of shrubs with sub-shrubs, dwarf shrubs and herbs between, on dry soils of varied composition through the thermomediterranean zone, and of very diverse local composition. Primary and

permanent in more arid and exposed situations, but can be successional to woodland and often much affected by grazing.

F6.1 Western garrigues

Original description: Shrubby formations, often low, on mostly calcareous soils of the meso-mediterranean zone of the Iberian peninsula, France, Italy and the large western Mediterranean islands, notably the Balearics, Corsica, Sardinia, Sicily and Malta. Included here are those formations that reach their optimal development within the mesomediterranean zone although they often enter the thermo- or supra-mediterranean levels.

Proposed split into two types on the basis of soil characteristics:

F6.1a Western basiphilous garrigue

Sub-shrub vegetation dominated by nanophanerophytes and chamaephytes on thin, base-rich soils through the western thermo- to mesomediterranean belts, very diverse in composition with differences in local climate and soils. In rockier situations, it can be a permanent coloniser but is often derived from woodland clearance and is much affected by grazing and fire.

F6.1b Western acidophilous garrigue.

Sub-shrub vegetation dominated by nanophanerophytes on thin acidic soils, both hard silicate and soft sands, through the western thermo- to lower supramediterranean belts, very diverse in composition with differences in local climate and soils. In rockier situations, it can be a permanent coloniser but is often derived from woodland clearance or abandonment of farm fields and is much affected by grazing and fire.

F6.2 Eastern non-Illyrian garrigues

Original description: Shrubby formations, often low, of the meso-, thermo- and occasionally supramediterranean zones of Greece, southern Albania, Cyprus and southern Anatolia. Included here are all sclerophyllous formations, regardless of substrate, except those with conspicuous spiny cushion structure (F7), those with abundant thermo-Mediterranean scrub species (F5.5) and high maquis with *Erica arborea* and *Arbutus* spp. (F5.2).

F6.3 Illyrian garrigues

Original description: Shrubby formations, often low, of the meso- and occasionally supra-Mediterranean zones of the Adriatic lowlands of the Balkan peninsula from Istria to southern Albania. Included here are all sclerophyllous formations, regardless of substrate, except high maquis (F5.2) with *Erica arborea* and *Arbutus* spp.

F6.4 Black Sea garrigues

Original description: Shrubby formations of the Mediterranean enclaves of the Black Sea coasts, in Crimea, southern Bulgaria, Turkey-in-Europe and northern Anatolia, as well as of the Mediterraneo-steppic zone of southern Thrace. Included here are all sclerophyllous formations, regardless of substrate, except high maquis (F5.2) with *Erica arborea* and *Arbutus* spp. and *Phrygnas* (F7).

Proposed merger of these three into a single type:

F6.2 Eastern garrigue

Low, mostly evergreen sclerophyllous scrub on diverse soils through the eastern meso-, thermo- and occasionally supramediterranean belts, including around the Black Sea, where deciduous species can prevail. Derived by woodland degradation and usually maintained by grazing and fire, their structure and composition vary greatly with local climate and human impacts.

F6.5 Macaronesian garrigues

Original description: Low shrub vegetation with an open canopy, of the Canary Islands, Azores and Madeira.

Proposed merger with other B Coastal habitats characteristic of shingle and gravel beaches.

F6.6 Supramediterranean garrigue (Supra-Mediterranean garrigues)

Original description: Low shrub formations with pronounced Mediterranean affinities formed as a degradation stage of thermophilous deciduous woodland (G1.7) or sometimes of evergreen *Quercus* woodland (G2.1) in the supra-Mediterranean belt of the Mediterranean region. Included here are only those formations that are characteristic of the supra-Mediterranean level; formations, particularly of the lower supra-Mediterranean, that are closely related to meso-Mediterranean communities have been included under F6.1, F6.2, F6.3 or F6.4.

Open low scrub of calcareous soils through the western and central supramediterranean belt. Derived originally by woodland clearance and long maintained by grazing, abandonment is now allowing widespread reversion.

F6.7 Mediterranean gypsum scrub (Mediterranean gypsum scrubs)

Original description: Garrigues occupying gypsum-rich soils of the Iberian peninsula, usually very open and floristically characterised by the presence of numerous gypsophilous species, among which *Gypsophila struthium*, *Gypsophila hispanica*, *Centaurea hyssopifolia*, *Teucrium libanitis*, *Ononis tridentata*, *Lepidium subulatum*, *Herniaria fruticosa*, *Reseda stricta*, *Helianthemum squamatum*. They are often rich in thymes (*Thymus*), germanders (*Teucrium*), rockroses (*Helianthemum*), composites (*Centaurea*, *Jurinea*, *Santolina*), *Frankenia*.

Open chamaephyte scrub with a lichen crust and rainy-spring annual herb flora, on gypsum-rich substrates in areas with a dry to semi-arid mediterranean climate in the Iberian peninsula. The extreme climatic and edaphic conditions maintain the habitat as naturally stable but it can bear some light grazing.

F6.8 Xero-halophile scrub

Original description: Salt-tolerant shrub formations of dry ground in low-precipitation areas of the mediterranean zone, in particular, the Iberian peninsula and Sicily, and of the Macaronesian Islands.

Proposed split into two types on the basis of geographical variation:

F6.8a Mediterranean halo-nitrophilous scrubs

Perennial scrubby vegetation with nitrophilous and salt-tolerant associates in often artificially-disturbed places through the semi-arid thermo- and inframediterranean belts where the dry climate slows the decomposition of litter and aids precipitation of salt from the soil.

F6.8b Caspian Sea halo-nitrophilous scrub. This habitat was not included in the Red List project since it does not occur within the boundaries of the EU28+ countries.

Perennial scrubby vegetation with nitrophilous and salt-tolerant associates in often artificially-disturbed places around the Caspian Sea where the dry climate slows the decomposition of litter and aids precipitation of salt from the soil.

F7.1 West Mediterranean spiny heaths

Original description: Spiny shrublands, mainly on coastal cliffs, of the western Mediterranean region.

F7.2 Central Mediterranean spiny heaths

Original description: Spiny shrublands, mainly coastal, of the central Mediterranean region.

Proposed merger of these two habitats

F7.1 Western Mediterranean spiny heaths

Low scrub of often spiny, cushion-forming plants on thin soils on wind-exposed and spray-splashed tops of rocky cliffs on Corsica, Sardinia, Pantelleria and in the Gulf of Taranto.

F7.3 Eastern Mediterranean spiny heath/phrygana (East Mediterranean phrygana)

Original description: Spiny shrublands, widespread at low and middle altitudes in the eastern Mediterranean and Anatolian regions. *Sarcopoterium spinosum* is a common dominant in the Aegean region.

Low scrub dominated by thorny hemispherical chamaephytes on various base-rich and acidic substrates in the thermo-, meso- and supramediterranean belts of mainland Greece, Anatolia, the Aegean and Ionian islands, Crete, Cyprus and the north-east Mediterranean coast. Can be of primary origin or result from clearance of evergreen sclerophyll woodland.

F7.4 Hedgehog-heaths

Original description: Primary cushion heaths of the high, dry mountains of the Mediterranean region and Anatolia, with low, cushion-forming, often spiny shrubs, in particular of genera *Acantholimon*, *Astragalus*, *Erinacea*, *Vella*, *Bupleurum*, *Ptilotrichum*, *Genista*, *Echinopartum*, *Anthyllis*, and various composites and labiates; secondary, zoogenic cushion heaths of the same regions, either downslope extensions of the high-altitude formations, and dominated by the same species, or specifically montane or steppic, often *Genista*-dominated in the Mediterranean region. Excluded are cushion-heaths of thermo-Mediterranean lowlands (F7.1, F7.2 and F7.3).

Proposed split into four types on the basis of geographical variation:

F7.4a Western Mediterranean mountain hedgehog-heath

Heath of often spiny hedgehog sub-shrubs on base-rich and acidic soils in the cold and droughty upper supra- and oromediterranean belts of the Iberian Peninsula, historically sustaining transhumance pastoralism but often extending down from crests and steep slopes due to grazing and burning.

F7.4b Central Mediterranean mountain hedgehog-heath

Heath of often spiny hedgehog sub-shrubs on base-rich and acidic soils in windy and sunny situations in the supra- and oromediterranean belts of Corsica, Sardinia, Elba, Sicily and the southern mainland Mountains of Italy. Downslope expansion below the timberline can follow clearance and grazing.

F7.4c Eastern Mediterranean mountain hedgehog-heath

Heath of often spiny hedgehog sub-shrubs on mostly base-rich soils in dry mountains of the supra- and oromediterranean belts of the east Mediterranean. Downslope expansion below the timberline can follow clearance and grazing.

F7.4d Canarian mountain hedgehog-heath

Heath of hedgehog sub-shrubs on screes and volcanic soils in the subalpine semi-desert belt of Tenerife and la Palma.

F8.1 Canarian xerophytic scrub (Canary Island xerophytic scrub)

Original Description: Xerophytic scrub of the Canary Islands. Varied types include stem succulents, leaf succulents and woody sclerophyllous shrubs.

Open scrub of sclerophyllous shrubs and succulent herbs on rocky substrates with skeletal soils in the arid lowlands and on deeper soils in the moister foothills of the Canary Islands.

F8.2 Madeiran xerophytic scrub

Original description: Xerophytic scrub of Madeira.

Diverse scrub of sclerophyllous shrubs, small trees and succulent herbs on usually thin soils of rocky outcrops, cliffs and abandoned fields in the arid lowlands of Madeira.

F9.1 Riverine scrub

Original description: Scrub of broad-leaved willows, e.g. *Salix aurita*, *Salix cinerea*, *Salix pentandra*, beside rivers. Scrub of *Alnus* spp. and narrow-leaved willows, e.g. *Salix eleagnos*, where these are less than 5 m tall. Riverside scrub of *Hippophae rhamnoides* and *Myricaria germanica*. Excludes riversides dominated by taller narrow-leaved willows *Salix alba*, *Salix purpurea*, *Salix viminalis* (G1.1).

Proposed split into two units based on climatic differences.

F9.1a Arctic, boreal and alpine riparian scrub

Scrub of *Salix* spp. and *Myricaria germanica* establishing on unsorted mineral sediments deposited in turbulent seasonal streams and flood-prone permanent rivers through the uplands of the arctic, boreal and alpine zones. More or less permanent where kept wet, re-establishing after seasonal flooding or succeeding to thorn scrub where the sediments stabilise.

F9.1b Temperate riparian scrub

Scrub of *Salix* spp developed on the mineral sediments of shoals and banks of lowland rivers through the temperate zone, re-establishing after seasonal flooding or succeeding to riparian and gallery woodland where the sediments stabilise.

F9.2 Salix fen scrub (Willow carr and fen scrub; Scientific name: Salix carr and fen scrub)

Original description: Low woods and scrubs colonizing fens, marshy floodplains and fringes of lakes and ponds, dominated by large or medium sized shrubby willows, generally *Salix aurita*, *Salix cinerea*, *Salix atrocinerea*, *Salix pentandra*, alone or in association with *Frangula alnus*, *Rhamnus cathartica*, *Alnus glutinosa* or *Betula pubescens*, any of which may dominate the upper canopy. In boreal regions and on cold subboreal plateaux, small shrubs may dominate, e.g. dwarf *Salix* spp. associated with *Betula humilis* or *Betula nana*. Excludes boreal and subalpine lakeside scrub on well drained soils (F2).

Scrub dominated by various *Salix* spp. on peaty and mineral soils maintained in a permanently waterlogged state by high ground water in floodplain backwaters, around lakes and ponds, among mires and dunes, and in abandoned wet meadows and pastures, occurring through the lowlands of atlantic, boreal and continental Europe and extending into the mediterranean region at higher altitudes. Associated floras vary according to the base status of the ground waters and soils.

F9.3 Mediterranean riparian scrub (Southern riparian galleries and thickets)

Original description: Tamarisk, oleander, chaste tree galleries and thickets and similar low woody vegetation of permanent or temporary streams and wetlands of the thermo-Mediterranean zone and southwestern Iberia.

Usually open scrub of *Tamarix* spp., *Nerium oleander*, *Vitex agnus-castus* and similar shrubs and small trees on seasonally droughted and irregularly flooded riverbeds, streamsides and depressions through the thermo- and mesomediterranean belts.

Appendix H: List of data providers

Country/Region	Database name	Custodian	Deputy custodian
Austria	Austrian Vegetation Database	Wolfgang Willner	
Balkans	Balkan Dry Grasslands Database	Kiril Vassilev	
	Balkan Vegetation Database	Kiril Vassilev	Hristo Pedashenko
	Beech Forest Database of SE Balkans	Aleksander Marinšek	
	SE Europe Forest Database	Andraž Čarni	
Belgium	INBOVEG	Els De Bie	
Britain	UK National Vegetation Classification Database	John S. Rodwell	
Bulgaria	Bulgarian Vegetation Database	Iva Apostolova	Desislava Sopotlieva
Croatia	Phytosociological Database of Non-Forest Vegetation in Croatia	Zvezdana Stančić	
	Croatian Vegetation Database	Željko Škvorc	Daniel Krstonošić
Czechia	Czech National Phytosociological Database	Milan Chytrý	Dana Michalcová
Denmark	Danish Vegetation Database	Jesper Erenskjold Moeslund	Rasmus Ejrnæs
Europe	Vegetation Database Mulgedio-Aconitetea and Related Vegetation Types	Thomas Michl	
	Juncetea trifidi Database	Jozef Šibík	
	European Coastal Vegetation Database	John Janssen	
	European Mire Vegetation Database	Tomáš Peterka	Martin Jiroušek
	Private data	Tomáš Peterka	Martin Jiroušek
	Violetea	Thomas Becker	
France	Private data	Gilles Thebaud	
	SOPHY	Henry Brisse	
Germany	German Vegetation Reference Database (GVRD)	Ute Jandt	Gunnar Seidler
	VegetWeb	Jörg Ewald	Martin Kleikamp
	VegMV	Florian Jansen	Christian Berg
Greece	Hellenic Natura 2000 Database	Panayotis Dimopoulos	Ioannis Tsiripidis
Hungary	CoenoDat Hungarian Phytosociological Database	János Csiky	Zoltán Botta-Dukát
Ireland	Irish Vegetation Database	Úna FitzPatrick	Lynda Weekes

Italy	Italian National Vegetation Database (BVN/ISPRA)	Laura Casella	Pierangela Angelini
	Georeferenced Vegetation Database - Sapienza University of Roma	Emiliano Agrillo	Fabio Attorre
	VegItaly	Roberto Venanzoni	Flavia Landucci
Latvia	Semi-natural Grassland Vegetation Database of Latvia	Solvita Rūsiņa	
Lithuania	Lithuanian vegetation Database	Valerius Rašomavičius	Domas Uogintas
Macedonia	Vegetation Database of the Republic of Macedonia	Renata Čušterevska	
Mediterranean	Mediterranean Ammophiletea database	Corrado Marcenò	Borja Jiménez-Alfaro
Netherlands	Dutch National Vegetation Database	Joop H.J. Schaminée	Stephan M. Hennekens
Nordic countries	The Nordic Vegetation Database	Jonathan Lenoir	Jens-Christian Svenning
	Nordic-Baltic Grassland Vegetation Database (NBGVD)	Jürgen Dengler	Solvita Rūsiņa
Poland	Polish Vegetation Database	Zygmunt Kaçki	Grzegorz Swacha
Portugal	Private data	Jan Jansen	
Romania	Romanian Grassland Database	Eszter Ruprecht	Kiril Vassilev
	Romanian Forest Database	Adrian Indreica	Pavel Dan Turtureanu
Russia	Vegetation Database of the Volga and the Ural Rivers Basins	Tatiana Lysenko	
Russia	Lower Volga Valley Phytosociological Database	Valentin Golub	
	Database Meadows and Steppes of Southern Ural + Database of South Ural Order Galietalia veri + Database of South Ural Order Arrhenatheretalia	Sergey Yamalov	
Serbia	Vegetation Database Grassland Vegetation of Serbia	Svetlana Aćić	Zora Dajić Stevanović
	Database of Forest Vegetation in Republic of Serbia + Vegetation Database of Northern Part of Serbia (AP Vojvodina)	Mirjana Krstivojević Ćuk	
Slovakia	Slovak Vegetation Database	Milan Valachovič	Jozef Šibík
	Vegetation Database of Slovenia	Urban Šilc	
Spain	Vegetation-Plot Database of the University of the Basque Country (BIOVEG)	Idoia Biurrun	Itziar García-Mijangos

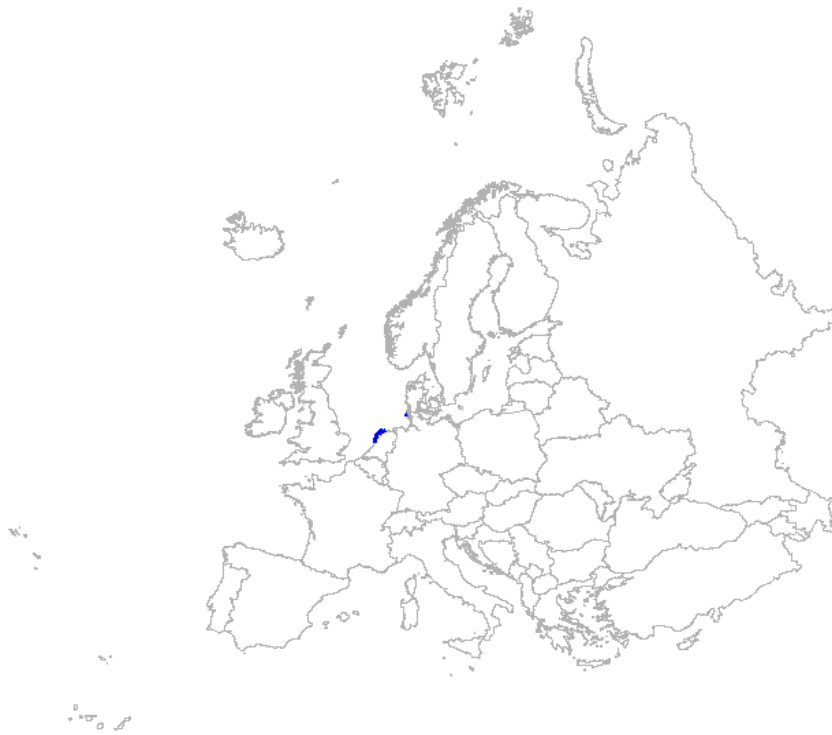
	Iberian and Macaronesian Vegetation Information System (SIVIM) - Alpine	Borja Jiménez-Alfaro	Xavier Font
	Iberian and Macaronesian Vegetation Information System (SIVIM) - Catalonia	Xavier Font	
	Iberian and Macaronesian Vegetation Information System (SIVIM) - Forests	Juan Antonio Campos	Xavier Font
	Iberian and Macaronesian Vegetation Information System (SIVIM) - Grasslands	Maria Pilar Rodríguez-Rojo	Xavier Font
	Iberian and Macaronesian Vegetation Information System (SIVIM) - Scrubs	Rosario G Gavilán	Xavier Font
	Iberian and Macaronesian Vegetation Information System (SIVIM) - Wetlands	Aaron Pérez-Haase	Xavier Font
Switzerland	Swiss Forest Vegetation Database	Thomas Wohlgemuth	
Ukraine	Vegetation Database of Ukraine and Adjacent Parts of Russia	Viktor Onyshchenko	Vitaliy Kolomyichuk
	Ukrainian Grasslands Database	Anna Kuzemko	Yulia Vashenyak

Appendix I: Distribution and suitability maps of the revised EUNIS heathland, scrub and tundra habitat types

EUNIS-3 code	EUNIS-3 habitat name	Background data pool
F1.1	Shrub tundra	Study area
F1.2	Moss and lichen tundra	No data
F2.1	Subarctic and alpine dwarf Salix scrub	Heathland, scrub, tundra
F2.2a	Alpine and subalpine ericoid heath	Study area
F2.2b	Alpine and subalpine Juniperus scrub	Study area
F2.2c	Balkan subalpine genistoid scrub	Study area
F2.3	Subalpine deciduous scrub	Heathland, scrub, tundra
F2.4	Subalpine Pinus mugo scrub	Heathland, scrub, tundra
F3.1a	Lowland to montane temperate and submediterranean Juniperus scrub	Study area
F3.1b	Temperate Rubus scrub	Study area
F3.1c	Lowland to montane temperate and submediterranean genistoid scrub	Study area
F3.1d	Balkan-Anatolian montane genistoid scrub	Study area
F3.1e	Temperate and submediterranean thorn scrub	Study area
F3.1f	Low steppic scrub	Heathland, scrub, tundra
F3.1g	Corylus avellana scrub	Study area
F3.1h	Temperate woodland clearing scrub	Study area
F4.1	Wet heath	Study area
F4.2	Dry heath	Study area
F4.3	Macaronesian heath	No data
F5.1-2	Arborescent matorral and maquis	Heathland, scrub, tundra
F5.3	Submediterranean pseudomaquis	Study area
F5.4	Spartium junceum fields	Study area
F5.5	Thermo-Mediterranean scrub	Study area
F6.1a	Western basiphilous garrigue	Heathland, scrub, tundra
F6.1b	Western acidophilous garrigue	Heathland, scrub, tundra
F6.2	Eastern garrigue	Study area
F6.6	Supra-Mediterranean garrigue	Study area
F6.7	Mediterranean gypsum scrub	Heathland, scrub, tundra
F6.8a	Mediterranean halo-nitrophilous scrub	Heathland, scrub, tundra
F6.8b	Caspian halo-nitrophilous scrub	No data
F7.1	Western Mediterranean coastal garrigue	Heathland, scrub, tundra
F7.3	Eastern Mediterranean spiny heath (phrygana)	Study area
F7.4a	Western Mediterranean mountain hedgehog-heath	Study area

F7.4b	Central Mediterranean mountain hedgehog-heath	Study area
F7.4c	Eastern Mediterranean mountain hedgehog-heath	Study area
F7.4d	Canarian mountain hedgehog-heath	No data
F8.1	Canary Island xerophytic scrub	No data
F8.2	Madeiran xerophytic scrub	No data
F9.1a	Arctic, boreal and alpine riparian scrub	Heathland, scrub, tundra
F9.1b	Temperate riparian scrub	Study area
F9.2	Salix fen scrub	Heathland, scrub, tundra
F9.3	Mediterranean riparian scrub	Heathland, scrub, tundra
B1.5a	Atlantic and Baltic coastal Empetrum heaths	Study area
B1.5b	Atlantic coastal Calluna and Ulex heaths	Study area
B1.6a	Atlantic and Baltic coastal dune scrub	Study area
B1.6b	Mediterranean and Black Sea coastal dune scrub	Study area
B1.6c	Macaronesian coastal dune scrub	No data
B2.5	Shingle and gravel beaches with scrub	Study area

B1.5a - Atlantic and Baltic coastal Empetrum heaths



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

Coastal sand dunes and sea shores according to Bohn map (P1)

Statistics from Maxent modelling

AUC training (0-1)	0.9983
AUC test (0-1)	0.9978
Contribution variables to the Maxent model (%)	
Distance to water	65.2878
Temperature seasonality (stdev * 100)	16.8567
Precipitation of warmest quarter	9.181
pH (water)	3.1799
Volume % of coarse fragments (> 2 mm)	1.8697
Soil organic carbon content (‰)	1.6373
Mean temperature of wettest quarter	0.9176
Weight in % of silt particles (0.0002-0.05 mm)	0.4938
Weight in % of clay particles (<0.0002 mm)	0.4169
Annual precipitation	0.0401
Cation Exchange Capacity	0.0174
Solar radiation	0.0154
Weight in % of sand particles (0.05-2 mm)	0
Bulk density (kg/m ³)	0
Potential evapotranspiration	0
Precipitation seasonality (coef. of var.)	0

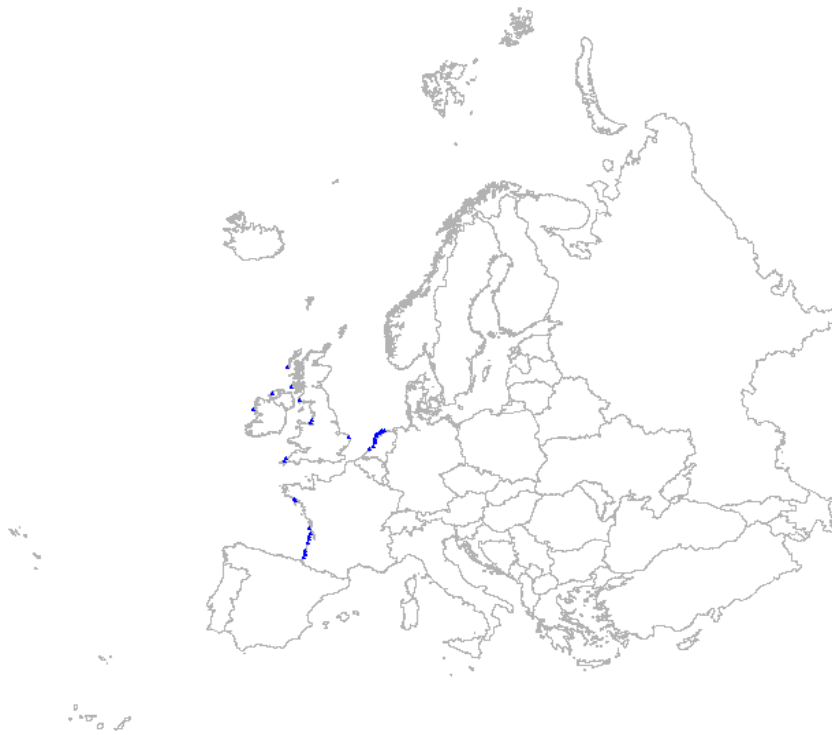
Remarks

Inland prediction should be ignored. Hardly any prediction in the Baltic region.

Coastal habitats are difficult to model and often deliver unsatisfying results.

There are various reasons for this. 1) The area in which the habitat occurs is very small, 2) Some observations do not match with all environmental layers and are therefore left out of the analysis, 3) lack of observation data in large parts of the potential area.

B1.5b - Atlantic coastal Calluna and Ulex heaths



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

Coastal sand dunes and sea shores according to Bohn map (P1)

Statistics from Maxent modelling

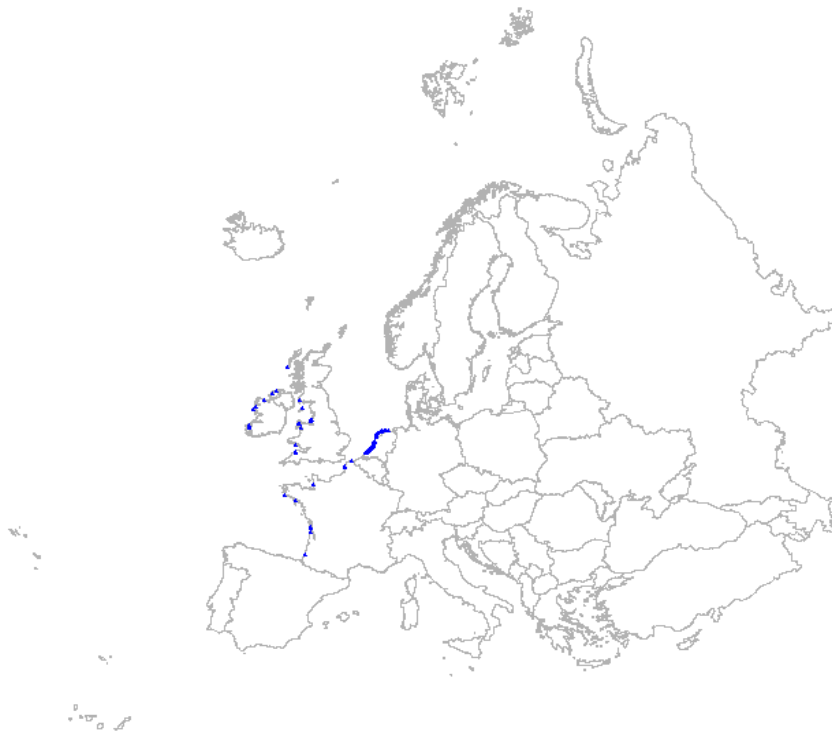
AUC training (0-1)	0.9971
AUC test (0-1)	0.9984
Contribution variables to the Maxent model (%)	
Distance to water	48.7813
Temperature seasonality (stdev * 100)	27.8413
pH (water)	7.4575
Precipitation of warmest quarter	5.0517
Mean temperature of wettest quarter	3.4666
Soil organic carbon content (‰)	3.0278
Bulk density (kg/m ³)	1.711
Weight in % of silt particles (0.0002-0.05 mm)	1.077
Precipitation seasonality (coef. of var.)	0.4732
Volume % of coarse fragments (> 2 mm)	0.3776
Annual precipitation	0.3312
Potential evapotranspiration	0.1383
Solar radiation	0.061
Weight in % of clay particles (<0.0002 mm)	0.0525
Cation Exchange Capacity	0
Weight in % of sand particles (0.05-2 mm)	0

Remarks

Inland prediction should be ignored. Hardly any prediction in the along the French coast.

Coastal habitats are difficult to model and often deliver unsatisfying results. There are various reasons for this. 1) The area in which the habitat occurs is very small, 2) Some observations do not match with all environmental layers and are therefore left out of the analysis, 3) lack of observations in large parts of the potential area.

B1.6a - Atlantic and Baltic coastal dune scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

Coastal sand dunes and sea shores according to Bohn map (P1)

Statistics from Maxent modelling

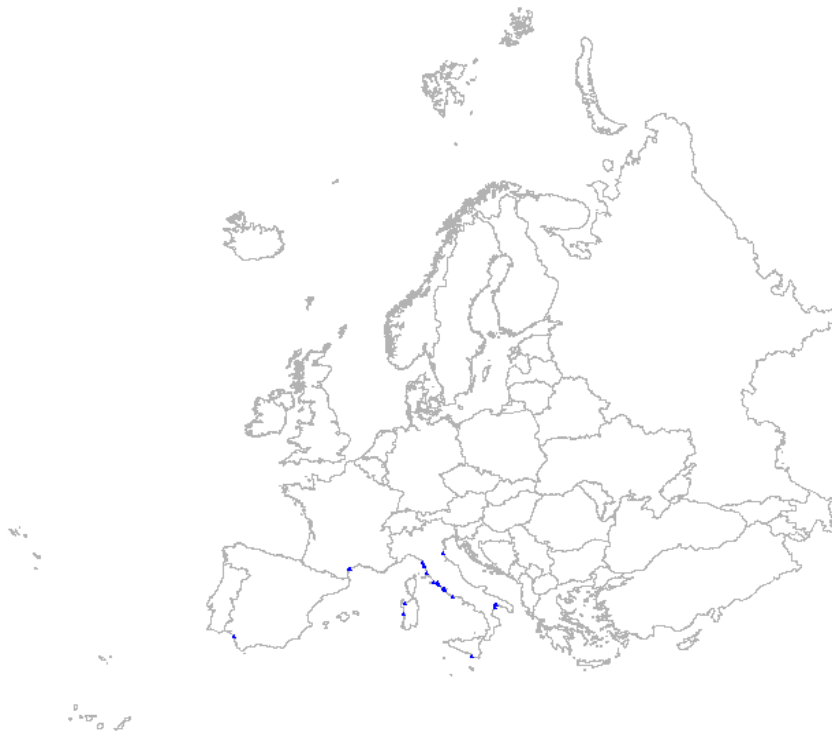
AUC training (0-1)	0.9944
AUC test (0-1)	0.9974
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	41.7572
pH (water)	23.9492
Soil organic carbon content (‰)	9.389
Volume % of coarse fragments (> 2 mm)	7.6674
Distance to water	5.2114
Precipitation seasonality (coef. of var.)	4.9242
Bulk density (kg/m ³)	2.5775
Potential evapotranspiration	2.0785
Cation Exchange Capacity	0.7106
Weight in % of silt particles (0.0002-0.05 mm)	0.5353
Weight in % of clay particles (<0.0002 mm)	0.4876
Mean temperature of wettest quarter	0.3381
Precipitation of warmest quarter	0.2755
Solar radiation	0
Weight in % of sand particles (0.05-2 mm)	0
Annual precipitation	0

Remarks

Inland prediction should be ignored. Hardly any prediction in the along the French coast.

Coastal habitats are difficult to model and often deliver unsatisfying results. There are various reasons for this. 1) The area in which the habitat occurs is very small, 2) Some observations do not match with all environmental layers and are therefore left out of the analysis, 3) lack of observations in large parts of the potential area.

B1.6b - Mediterranean and Black Sea coastal dune scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

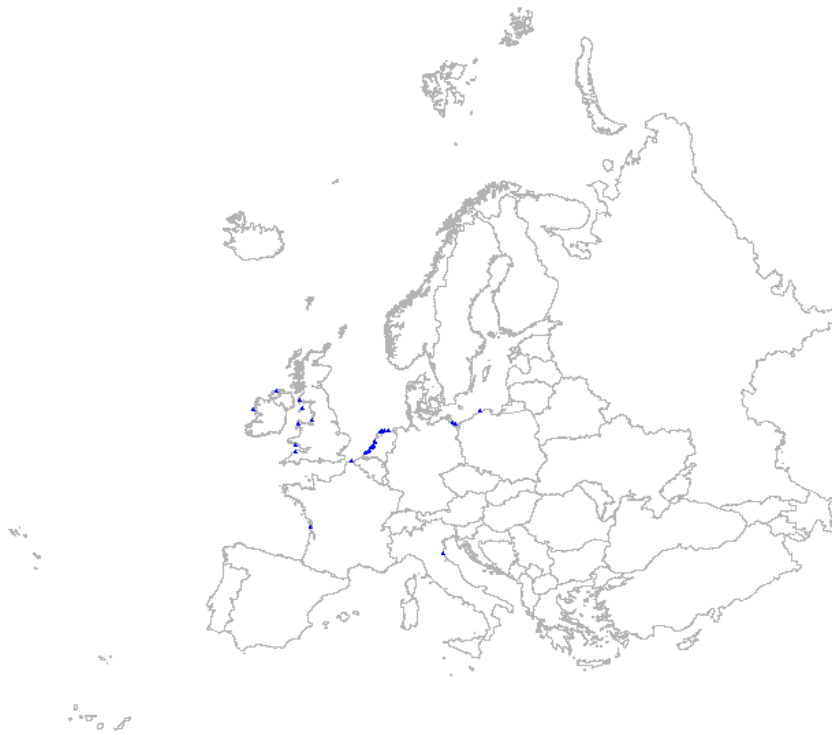
Geographic restriction distribution data

Coastal sand dunes and sea shores according to Bohn map (P1)

Remarks

Insufficient data to create a model

B2.5 - Shingle and gravel beaches with scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

Coastal sand dunes and sea shores according to Bohn map (P1)

Statistics from Maxent modelling

AUC training (0-1)	0.9905
AUC test (0-1)	0.9929
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	34.3603
pH (water)	29.8844
Soil organic carbon content (‰)	9.6488
Weight in % of silt particles (0.0002-0.05 mm)	5.8407
Distance to water	5.4668
Bulk density (kg/m ³)	5.0144
Precipitation seasonality (coef. of var.)	4.0617
Potential evapotranspiration	2.2699
Volume % of coarse fragments (> 2 mm)	0.8194
Cation Exchange Capacity	0.7953
Weight in % of clay particles (<0.0002 mm)	0.7418
Mean temperature of wettest quarter	0.47
Weight in % of sand particles (0.05-2 mm)	0.4136
Precipitation of warmest quarter	0.1644
Solar radiation	0
Annual precipitation	0

Remarks

Inland prediction should be ignored. Hardly any prediction in large parts of the potential area.

Coastal habitats are difficult to model and often deliver unsatisfying results. There are various reasons for this. 1) The area in which the habitat occurs is very small, 2) Some observations do not match with all environmental layers and are therefore left out of the analysis, 3) lack of observations in large parts of the potential area.

F1.1 - Shrub tundra



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

Arctic polar deserts and Arctic tundras according to the Bohn map (A1 & B1)

Statistics from Maxent modelling

AUC training (0-1)	0.9958
AUC test (0-1)	0.9854
Contribution variables to the Maxent model (%)	
Soil organic carbon content (‰)	67.523
Annual precipitation	14.9997
Mean temperature of wettest quarter	11.3119
Distance to water	2.3658
Solar radiation	1.9878
Weight in % of clay particles (<0.0002 mm)	1.6928
Precipitation of warmest quarter	1.0834
pH (water)	0.8214
Potential evapotranspiration	0.1833
Volume % of coarse fragments (> 2 mm)	0.0186
Weight in % of silt particles (0.0002-0.05 mm)	0
Weight in % of sand particles (0.05-2 mm)	0
Precipitation seasonality (coef. of var.)	0
Temperature seasonality (stdev * 100)	0
Cation Exchange Capacity	0
Bulk density (kg/m ³)	0

Remarks

-

F1.2 - Moss and lichen tundra



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

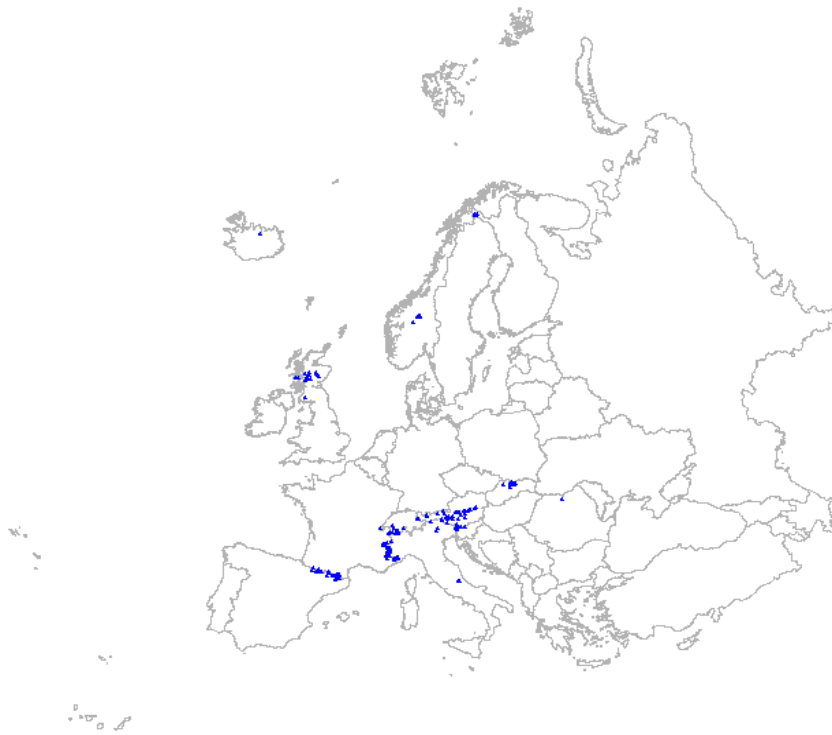
Geographic restriction distribution data

Arctic polar deserts and Arctic tundras according to the Bohn map (A1 & B1)

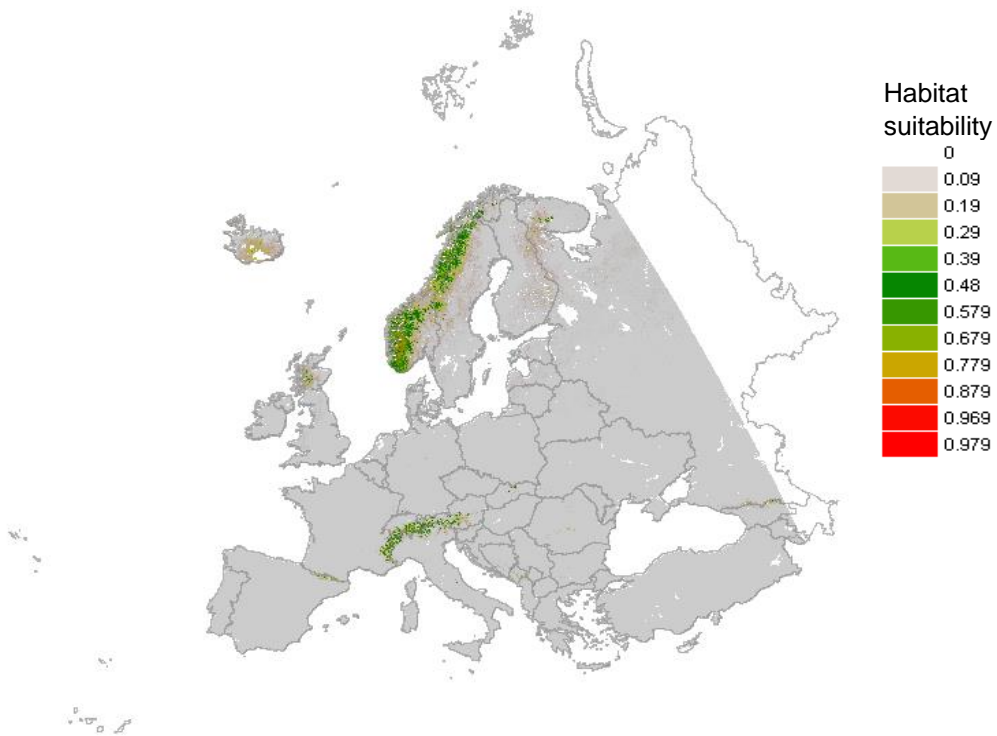
Remarks

Insufficient data to create a model

F2.1 - Subarctic and alpine dwarf Salix scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

Geographic restriction distribution data

-

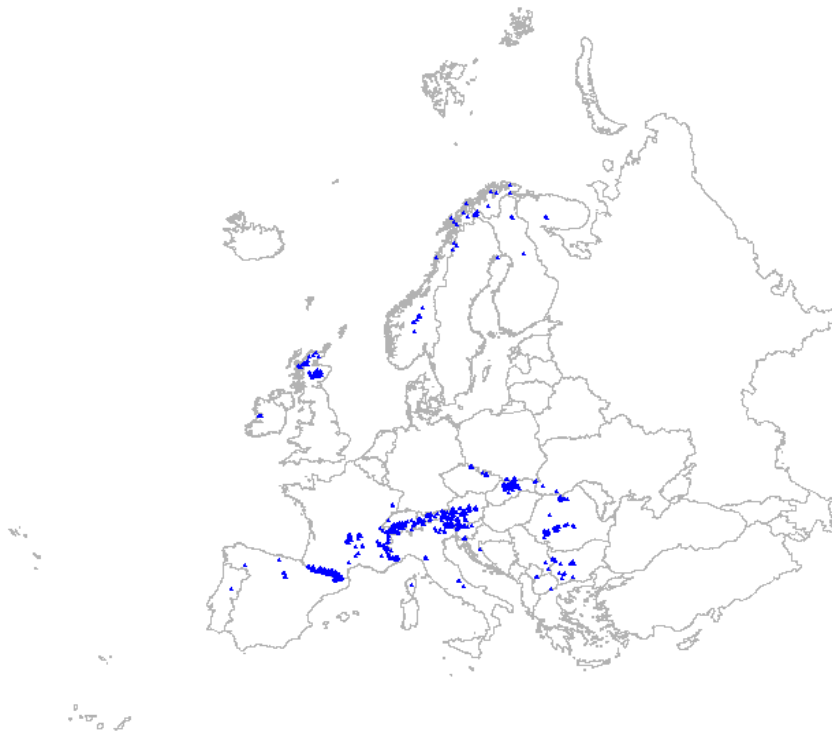
Statistics from Maxent modelling

AUC training (0-1)	0.9564
AUC test (0-1)	0.9398
Contribution variables to the Maxent model (%)	
Soil organic carbon content (‰)	63.9081
Weight in % of silt particles (0.0002-0.05 mm)	16.818
Weight in % of sand particles (0.05-2 mm)	9.0678
Precipitation of warmest quarter	7.7665
Cation Exchange Capacity	3.4397
pH (water)	1.7674
Weight in % of clay particles (<0.0002 mm)	1.2574
Volume % of coarse fragments (> 2 mm)	1.2559
Precipitation seasonality (coef. of var.)	1.1556
Solar radiation	1.0445
Annual precipitation	0.6612
Mean temperature of wettest quarter	0.5955
Temperature seasonality (stdev * 100)	0.5363
Potential evapotranspiration	0.4298
Bulk density (kg/m ³)	0.162
Distance to water	0.0459

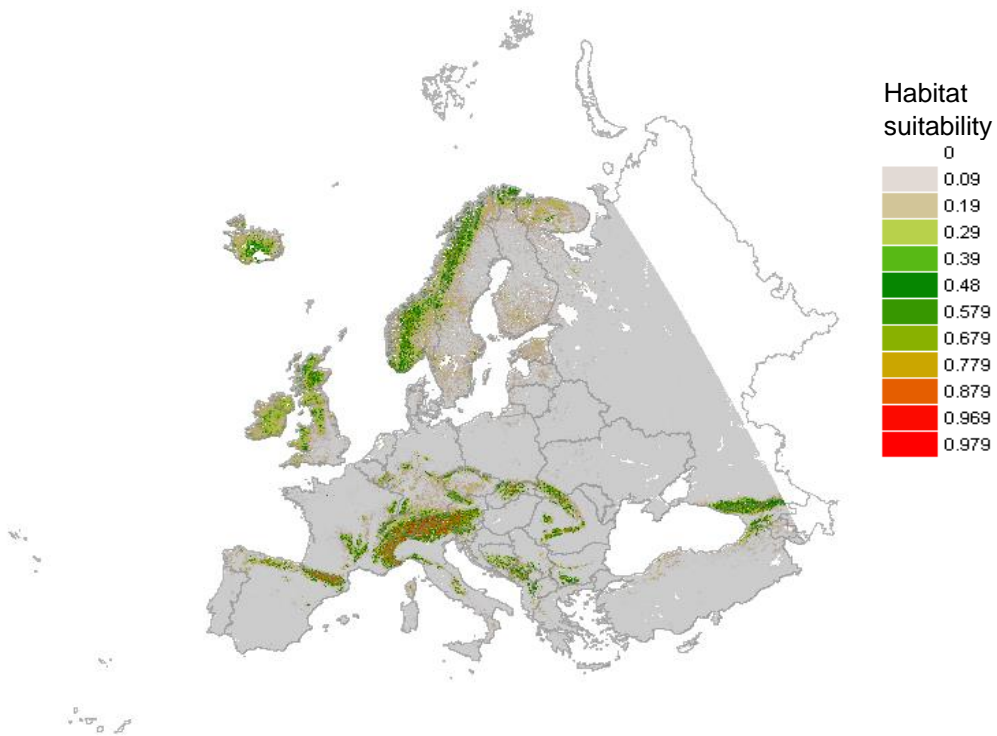
Remarks

-

F2.2a - Alpine and subalpine ericoid heath



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

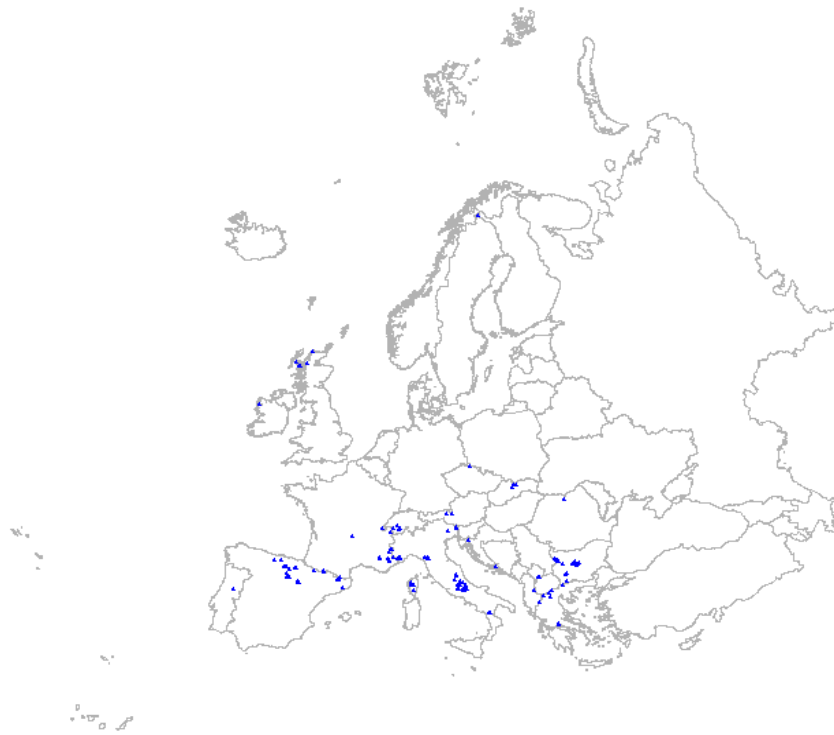
Statistics from Maxent modelling

AUC training (0-1)	0.901
AUC test (0-1)	0.8861
Contribution variables to the Maxent model (%)	
Annual precipitation	33.5265
Volume % of coarse fragments (> 2 mm)	18.1061
Weight in % of sand particles (0.05-2 mm)	14.3018
Precipitation of warmest quarter	9.6382
Soil organic carbon content (‰)	3.6068
Bulk density (kg/m ³)	2.8496
pH (water)	1.8458
Weight in % of clay particles (<0.0002 mm)	1.2887
Solar radiation	1.0794
Temperature seasonality (stdev * 100)	1.0636
Weight in % of silt particles (0.0002-0.05 mm)	0.6931
Cation Exchange Capacity	0.6751
Mean temperature of wettest quarter	0.5933
Precipitation seasonality (coef. of var.)	0.1903
Potential evapotranspiration	0.1302
Distance to water	0

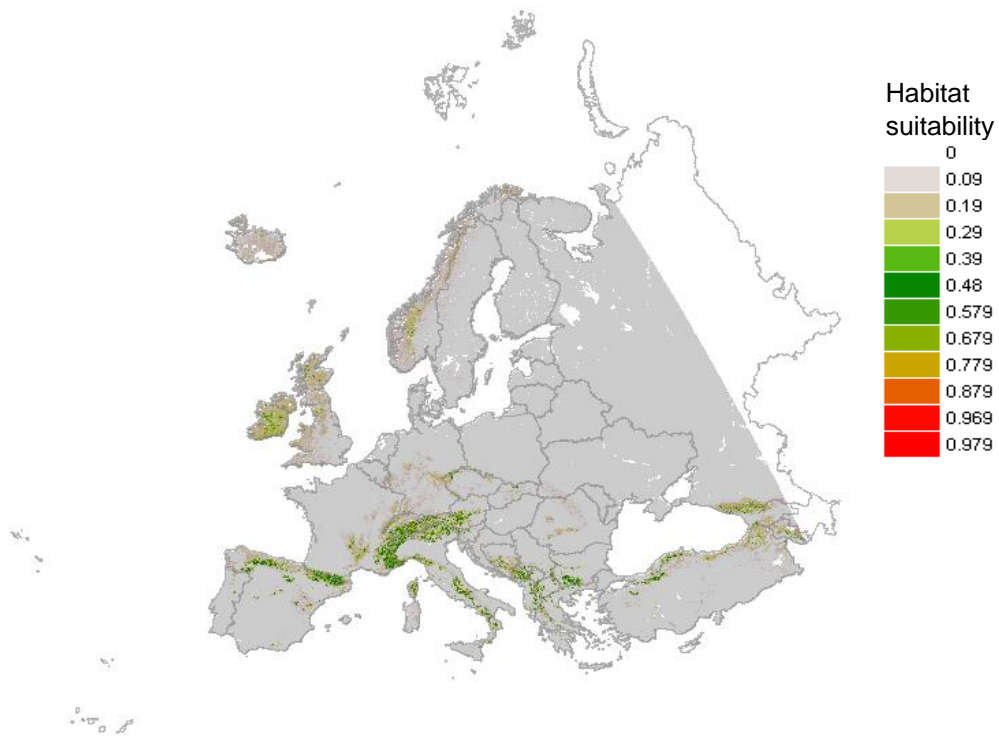
Remarks

Prediction in eastern part of Europe (Caucasus) uncertain due to lack of data for that area.

F2.2b - Alpine and subalpine *Juniperus* scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

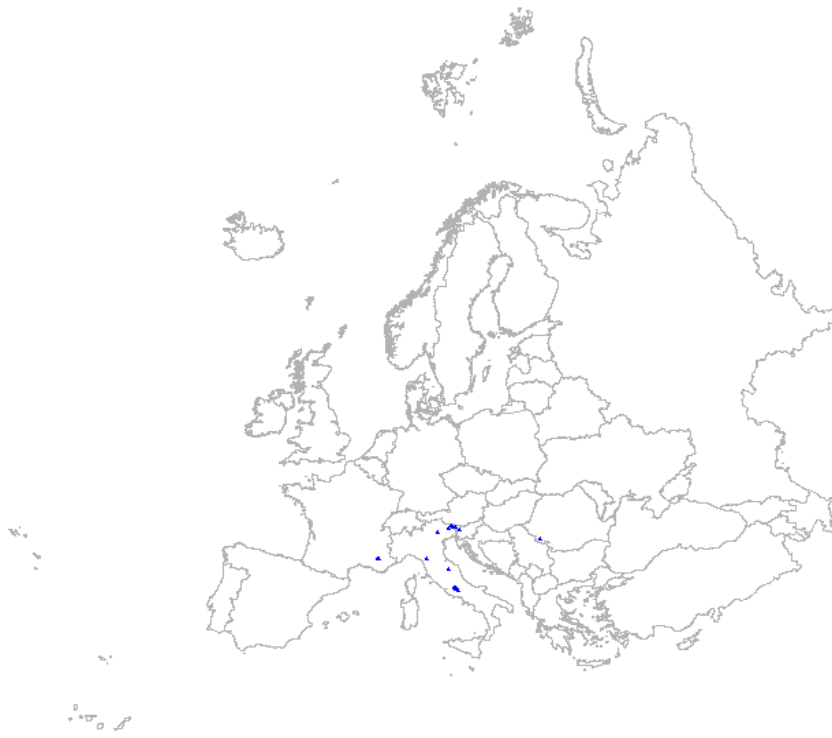
Statistics from Maxent modelling

AUC training (0-1)	0.9745
AUC test (0-1)	0.8935
Contribution variables to the Maxent model (%)	
Weight in % of sand particles (0.05-2 mm)	28.4589
Volume % of coarse fragments (> 2 mm)	19.0389
Temperature seasonality (stdev * 100)	15.818
Annual precipitation	12.8929
Bulk density (kg/m ³)	7.0208
Soil organic carbon content (‰)	5.0007
Solar radiation	4.0254
Precipitation of warmest quarter	2.9895
Cation Exchange Capacity	2.2118
Potential evapotranspiration	1.9823
Weight in % of silt particles (0.0002-0.05 mm)	1.363
Mean temperature of wettest quarter	0.9385
Weight in % of clay particles (<0.0002 mm)	0.5595
Precipitation seasonality (coef. of var.)	0.3548
pH (water)	0.0419
Distance to water	0.004

Remarks

Prediction in eastern part of Europe (Caucasus, Turkey) uncertain due to lack of data for that area.

F2.2c - Balkan subalpine genistoid scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

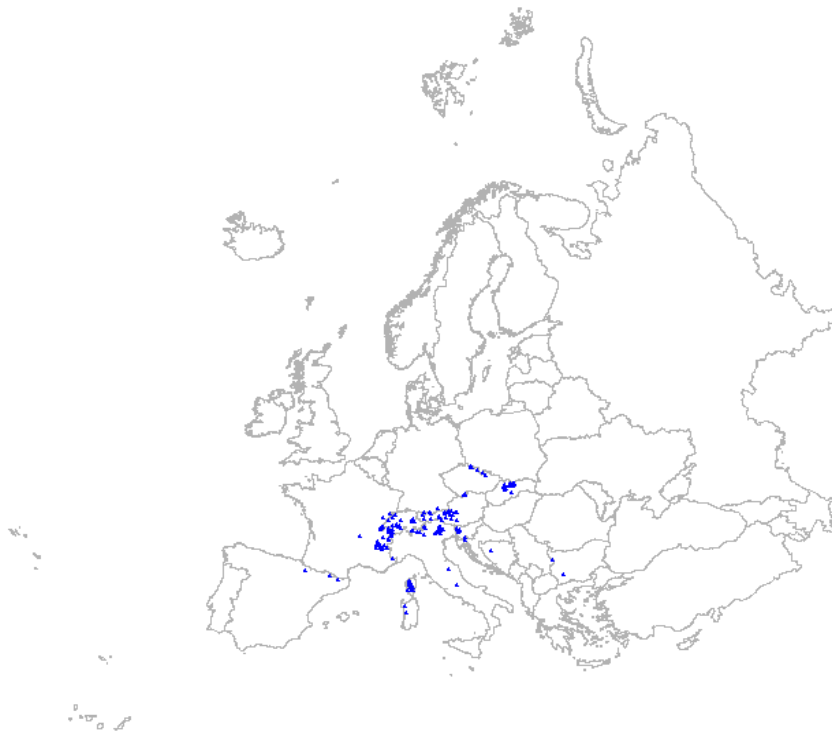
Geographic restriction distribution data

Balkan region

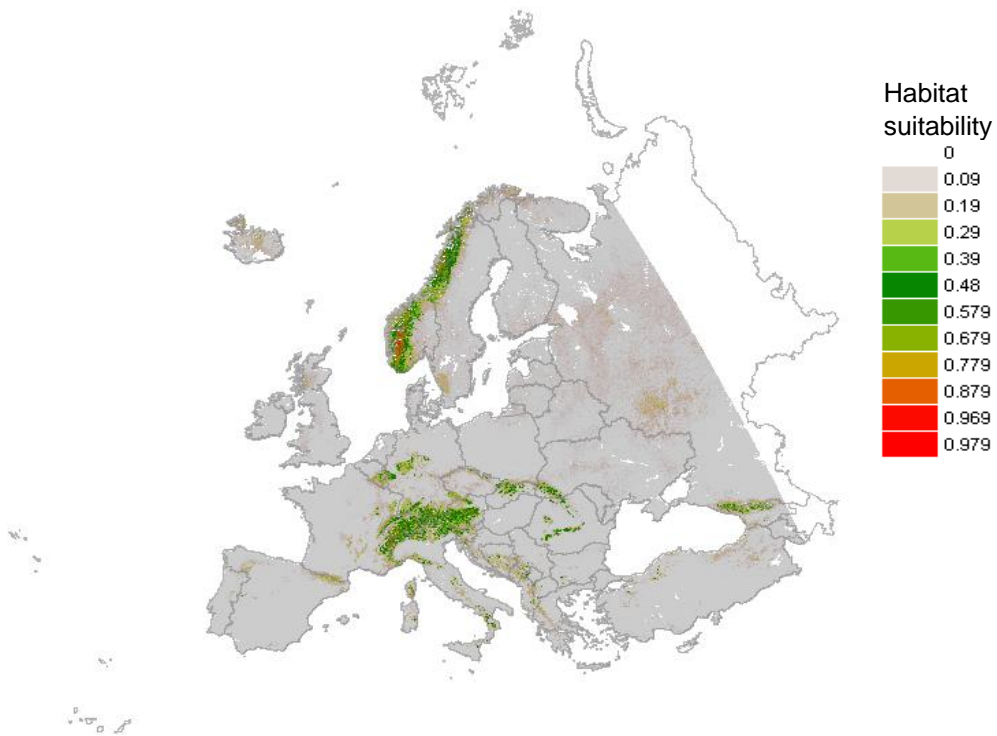
Remarks

Insufficient data to create a model

F2.3 - Subalpine deciduous scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

Geographic restriction distribution data

-

Statistics from Maxent modelling

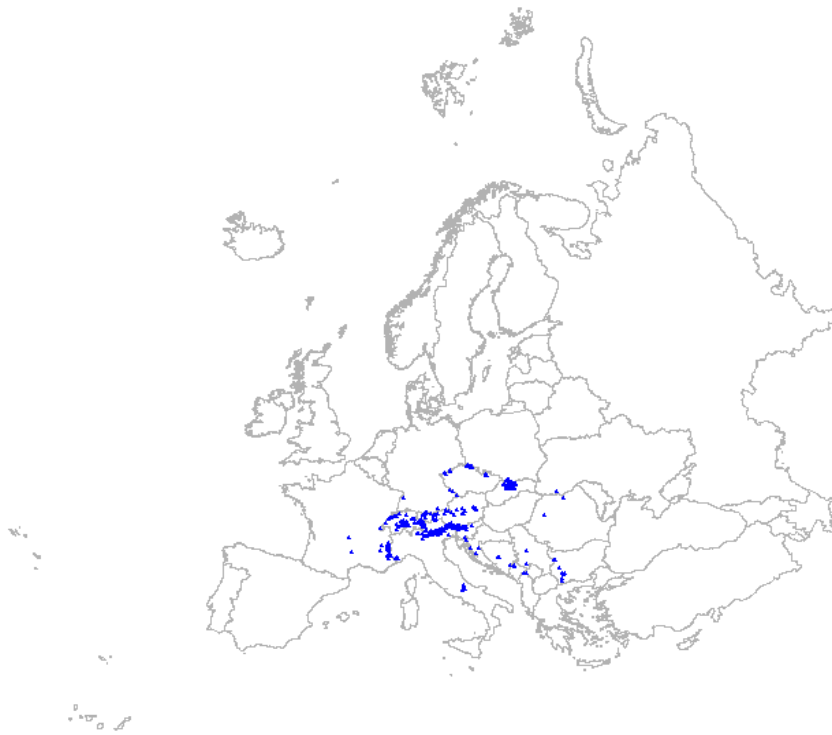
AUC training (0-1)	0.9336
AUC test (0-1)	0.9223
Contribution variables to the Maxent model (%)	
Precipitation of warmest quarter	24.867
Weight in % of sand particles (0.05-2 mm)	17.4469
Annual precipitation	16.9077
Temperature seasonality (stdev * 100)	13.9288
Soil organic carbon content (‰)	8.9444
Solar radiation	5.4636
Precipitation seasonality (coef. of var.)	4.0239
Cation Exchange Capacity	3.7884
Mean temperature of wettest quarter	2.2471
Potential evapotranspiration	1.591
Volume % of coarse fragments (> 2 mm)	1.1602
Weight in % of silt particles (0.0002-0.05 mm)	1.0955
Distance to water	0.6474
Bulk density (kg/m ³)	0.6196
pH (water)	0.5388
Weight in % of clay particles (<0.0002 mm)	0.4739

Remarks

Prediction in Germany should be ignored.

Prediction in eastern part of Europe (Caucasus) uncertain due to lack of data for that area.

F2.4 - Subalpine *Pinus mugo* scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

Geographic restriction distribution data

-

Statistics from Maxent modelling

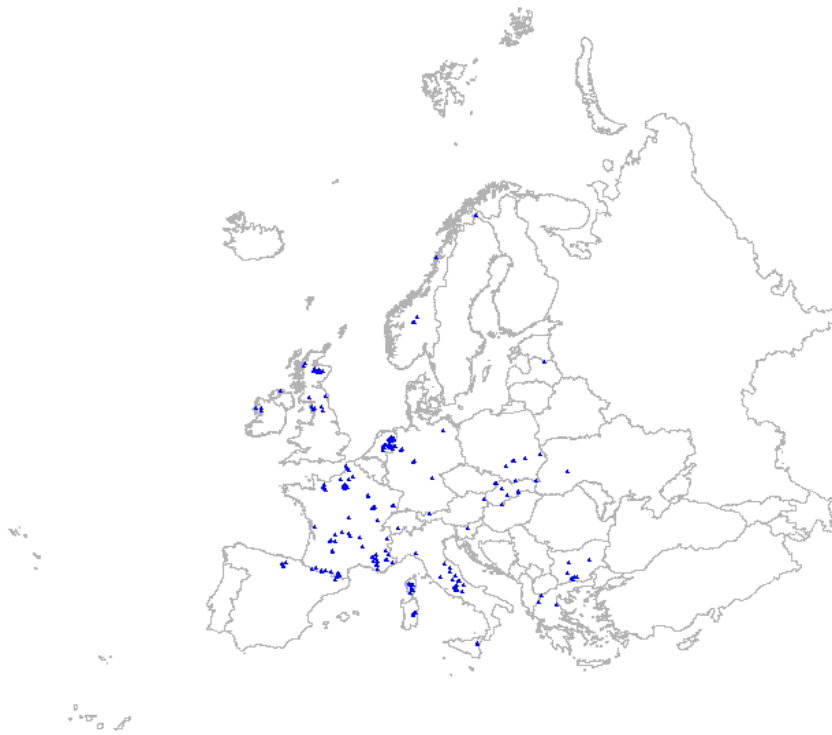
AUC training (0-1)	0.9143
AUC test (0-1)	0.9149
Contribution variables to the Maxent model (%)	
Precipitation of warmest quarter	43.9529
Temperature seasonality (stdev * 100)	13.1648
Weight in % of sand particles (0.05-2 mm)	11.1987
Volume % of coarse fragments (> 2 mm)	9.3161
Bulk density (kg/m ³)	7.3518
Potential evapotranspiration	2.9277
Annual precipitation	2.7221
Precipitation seasonality (coef. of var.)	2.6403
Soil organic carbon content (‰)	1.8856
Mean temperature of wettest quarter	1.5025
Weight in % of silt particles (0.0002-0.05 mm)	1.415
Solar radiation	0.952
Cation Exchange Capacity	0.9019
Distance to water	0.7246
Weight in % of clay particles (<0.0002 mm)	0.3665
pH (water)	0.069

Remarks

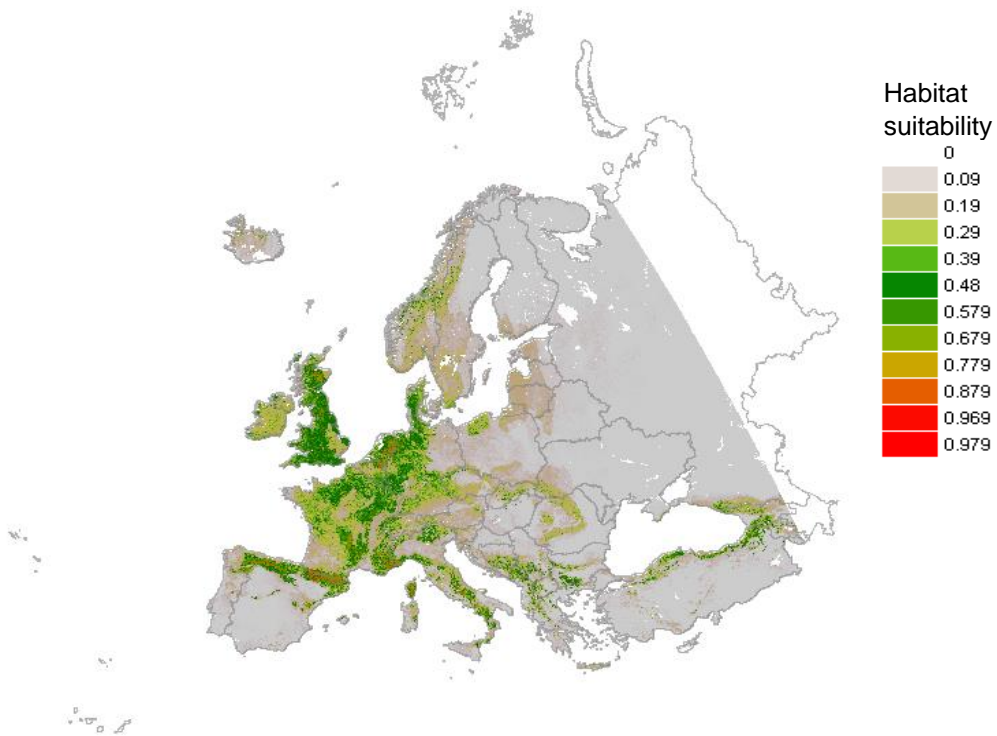
Pinus mugo does not occur in Scandinavia and therefore the prediction in this area should be ignored.

Prediction in eastern part of Europe (Caucasus) uncertain due to lack of data for that area.

F3.1a - Lowland to montane temperate and submediterranean *Juniperus* scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

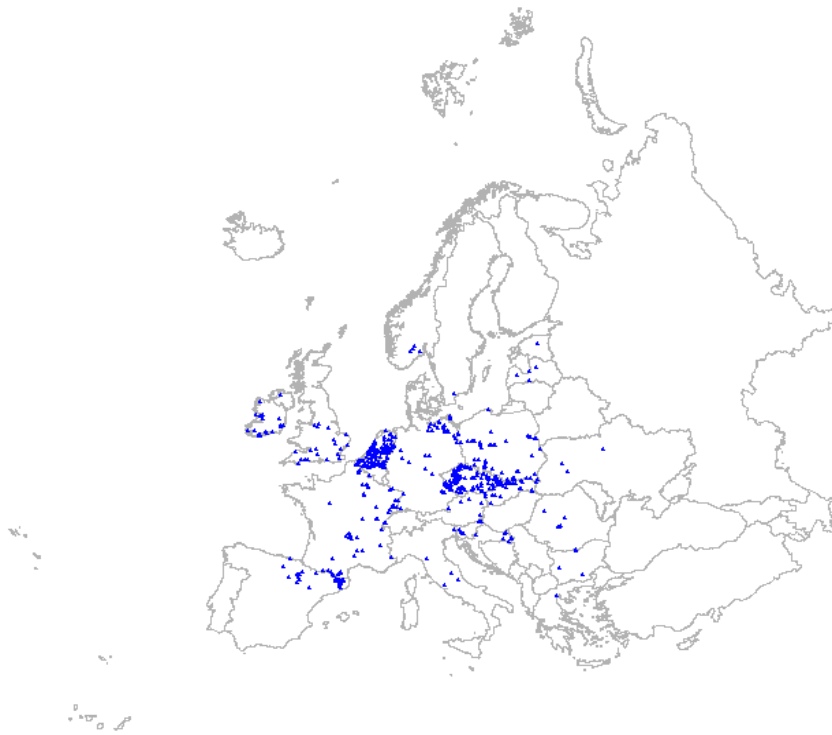
Statistics from Maxent modelling

AUC training (0-1)	0.9294
AUC test (0-1)	0.9168
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	47.2878
Annual precipitation	16.9278
Soil organic carbon content (‰)	11.6802
Solar radiation	11.098
Weight in % of sand particles (0.05-2 mm)	6.1532
Volume % of coarse fragments (> 2 mm)	4.1454
Precipitation of warmest quarter	3.0896
Bulk density (kg/m ³)	2.8954
Weight in % of silt particles (0.0002-0.05 mm)	2.8708
Precipitation seasonality (coef. of var.)	1.7383
Mean temperature of wettest quarter	1.1727
pH (water)	0.4748
Potential evapotranspiration	0.3306
Weight in % of clay particles (<0.0002 mm)	0.2259
Cation Exchange Capacity	0.1047
Distance to water	0.0476

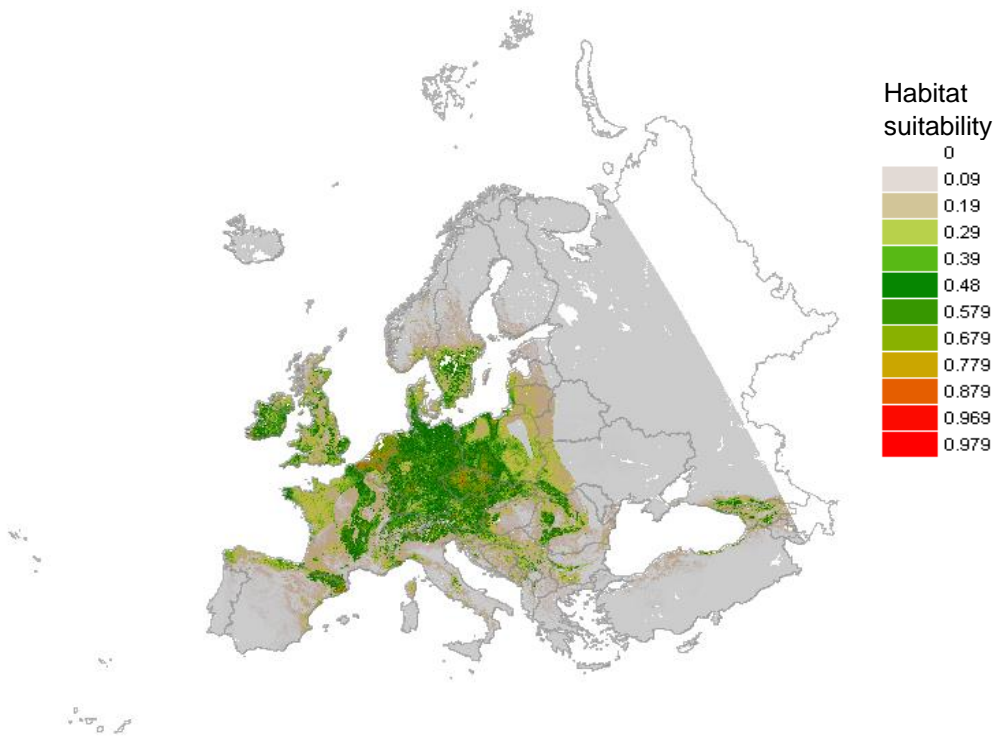
Remarks

-Prediction in eastern part of Europe (Caucasus, Turkey) uncertain due to lack of data for that area.

F3.1b - Temperate Rubus scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

Statistics from Maxent modelling

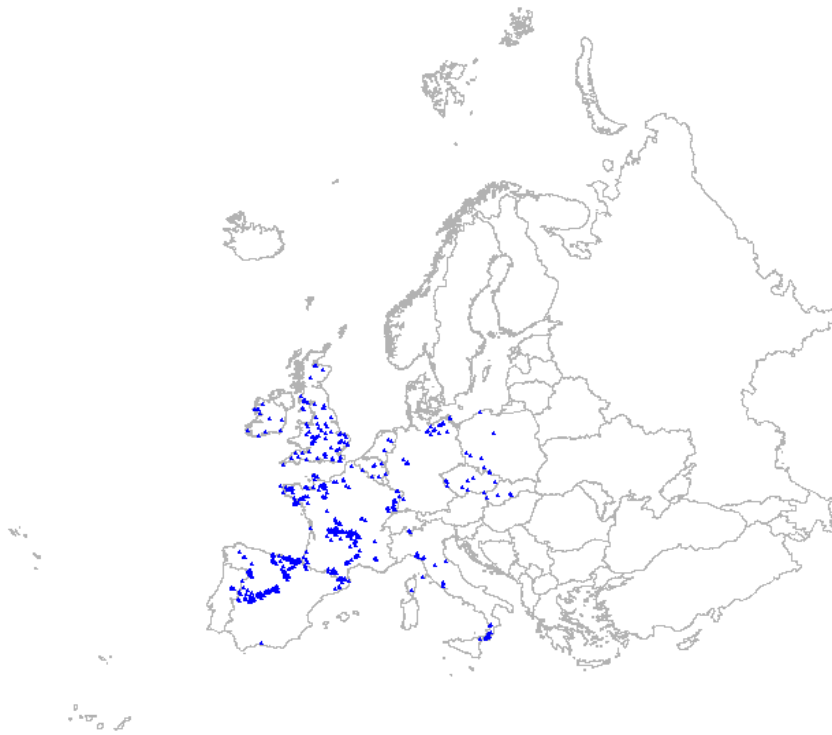
AUC training (0-1)	0.9025
AUC test (0-1)	0.8724
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	45.0235
Soil organic carbon content (‰)	22.8131
Precipitation of warmest quarter	16.3224
Mean temperature of wettest quarter	4.7928
Cation Exchange Capacity	3.1905
Precipitation seasonality (coef. of var.)	2.4142
Solar radiation	1.4328
Weight in % of silt particles (0.0002-0.05 mm)	0.9949
Bulk density (kg/m ³)	0.9704
Weight in % of clay particles (<0.0002 mm)	0.8803
Annual precipitation	0.8323
Volume % of coarse fragments (> 2 mm)	0.4803
Distance to water	0.4007
Potential evapotranspiration	0.2595
pH (water)	0.2441
Weight in % of sand particles (0.05-2 mm)	0.1634

Remarks

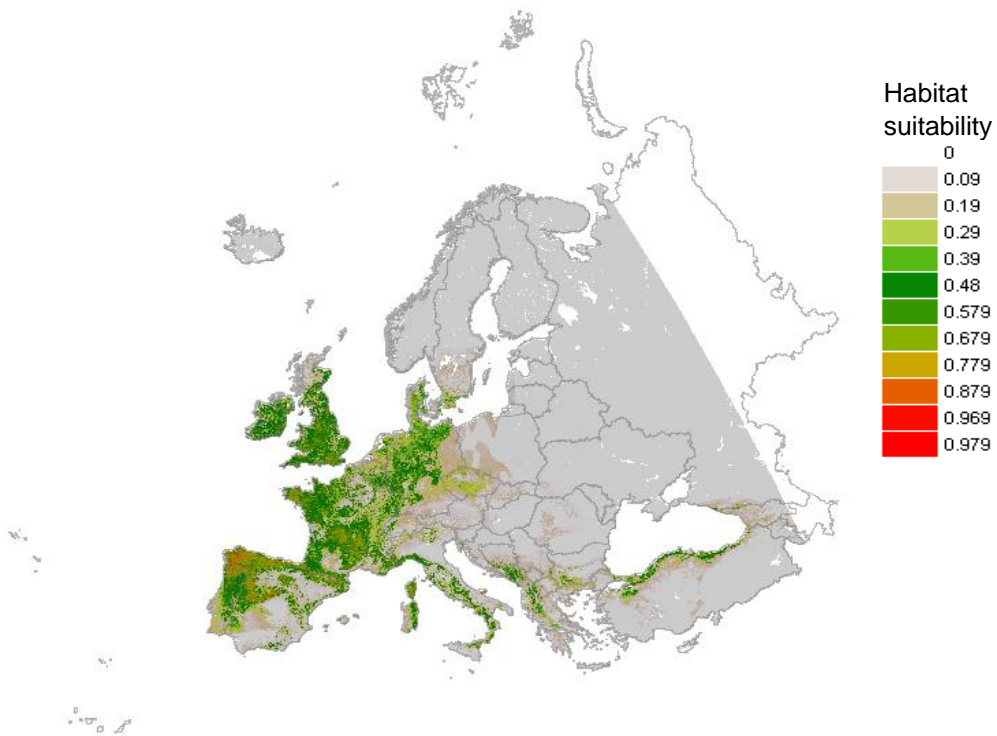
Poor model, too much affected by the distribution of input data with a high concentration in NL and CZ.

Prediction in eastern part of Europe (Caucasus, Turkey) uncertain due to lack of data for that area.

F3.1c - Lowland to montane temperate and submediterranean genistoid scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

Statistics from Maxent modelling

AUC training (0-1)	0.9059
AUC test (0-1)	0.8732
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	66.1064
Potential evapotranspiration	9.5905
Soil organic carbon content (‰)	6.821
Bulk density (kg/m ³)	4.9566
Precipitation seasonality (coef. of var.)	2.9731
Precipitation of warmest quarter	2.3412
Solar radiation	2.3055
Volume % of coarse fragments (> 2 mm)	2.1861
Weight in % of silt particles (0.0002-0.05 mm)	1.6297
Mean temperature of wettest quarter	1.2798
Weight in % of clay particles (<0.0002 mm)	1.1946
Annual precipitation	0.4269
Weight in % of sand particles (0.05-2 mm)	0.2346
pH (water)	0.0545
Cation Exchange Capacity	0.0476
Distance to water	0.0257

Remarks

Prediction in eastern part of Europe (Turkey) uncertain due to lack of data for that area.

F3.1d - Balkan-Anatolian montane genistoid scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

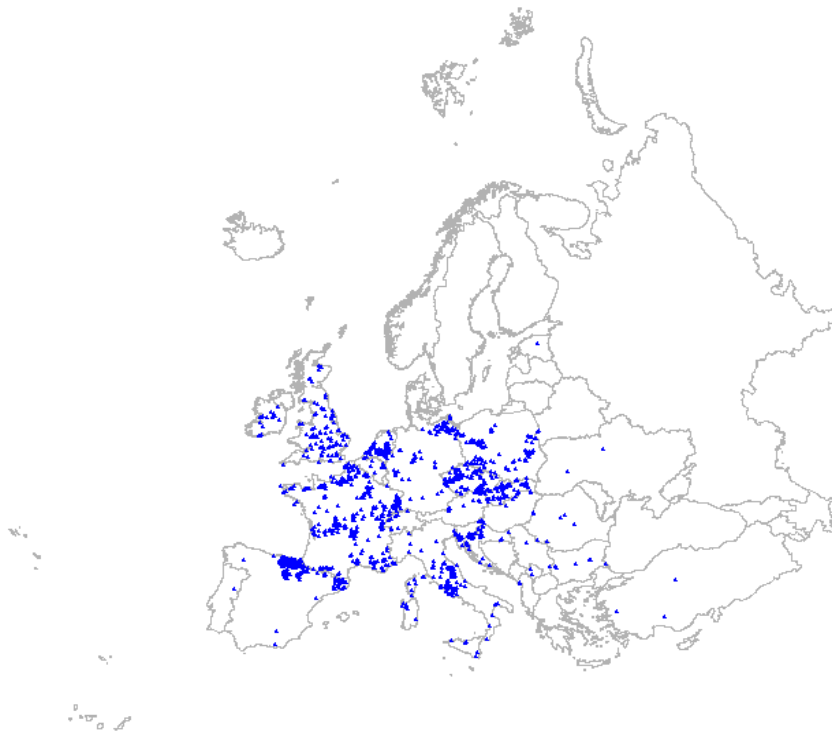
Geographic restriction distribution data

-

Remarks

Insufficient data to create a model

F3.1e - Temperate and submediterranean thorn scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

Statistics from Maxent modelling

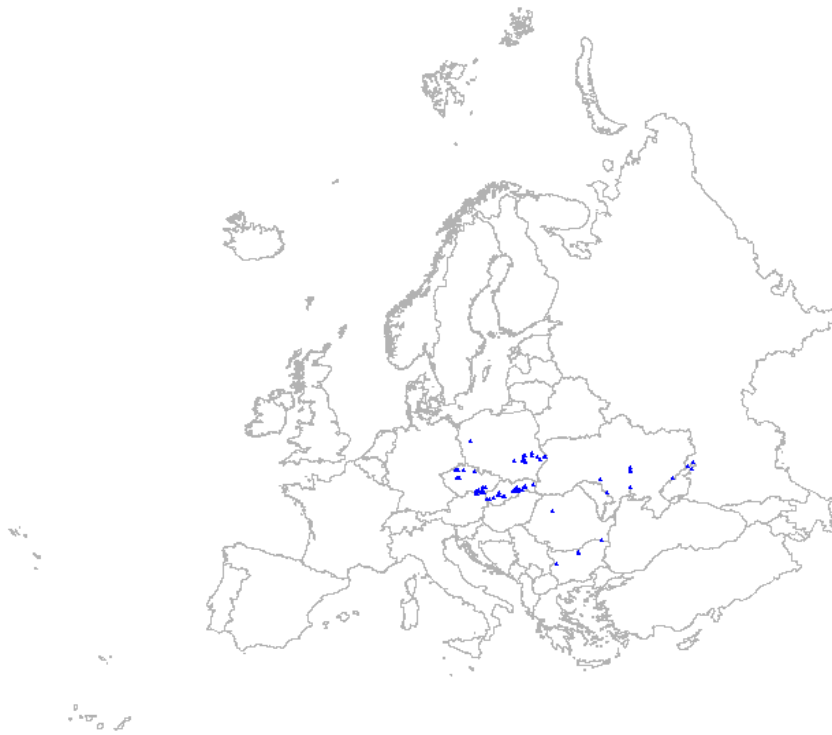
AUC training (0-1)	0.8197
AUC test (0-1)	0.8155
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	56.5248
Precipitation of warmest quarter	11.9079
Soil organic carbon content (‰)	11.7472
Bulk density (kg/m ³)	5.5983
Solar radiation	4.3068
Cation Exchange Capacity	4.2608
Annual precipitation	3.2244
Potential evapotranspiration	1.965
Weight in % of sand particles (0.05-2 mm)	1.0066
Mean temperature of wettest quarter	0.9434
Precipitation seasonality (coef. of var.)	0.8685
Distance to water	0.7498
Weight in % of clay particles (<0.0002 mm)	0.5767
pH (water)	0.2574
Volume % of coarse fragments (> 2 mm)	0.112
Weight in % of silt particles (0.0002-0.05 mm)	0.0726

Remarks

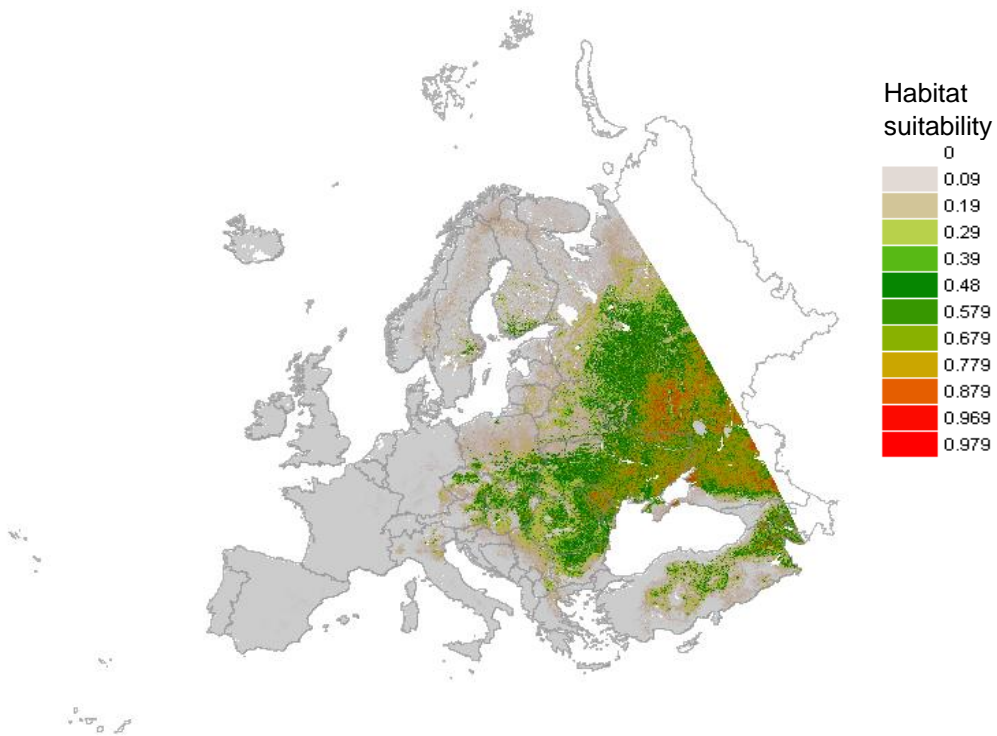
Poor model, too much affected by the distribution of input data with a high concentration in NL and CZ.

Prediction in eastern part of Europe (Caucasus, Turkey) uncertain due to lack of data for that area.

F3.1f - Low steppic scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

Geographic restriction distribution data

-

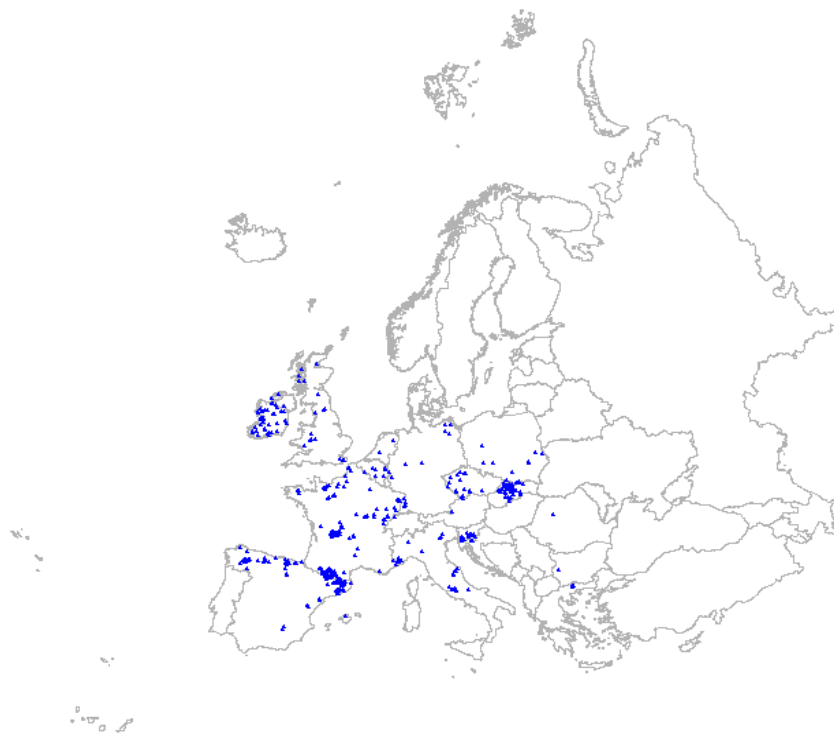
Statistics from Maxent modelling

AUC training (0-1)	0.9839
AUC test (0-1)	0.9817
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	70.2836
Weight in % of sand particles (0.05-2 mm)	11.889
Annual precipitation	6.7421
pH (water)	6.1524
Mean temperature of wettest quarter	5.0984
Potential evapotranspiration	4.5709
Soil organic carbon content (‰)	2.3728
Weight in % of clay particles (<0.0002 mm)	1.4129
Volume % of coarse fragments (> 2 mm)	0.8514
Weight in % of silt particles (0.0002-0.05 mm)	0.6615
Precipitation of warmest quarter	0.4852
Precipitation seasonality (coef. of var.)	0.3781
Distance to water	0.3029
Bulk density (kg/m ³)	0.2286
Cation Exchange Capacity	0.1622
Solar radiation	0.0496

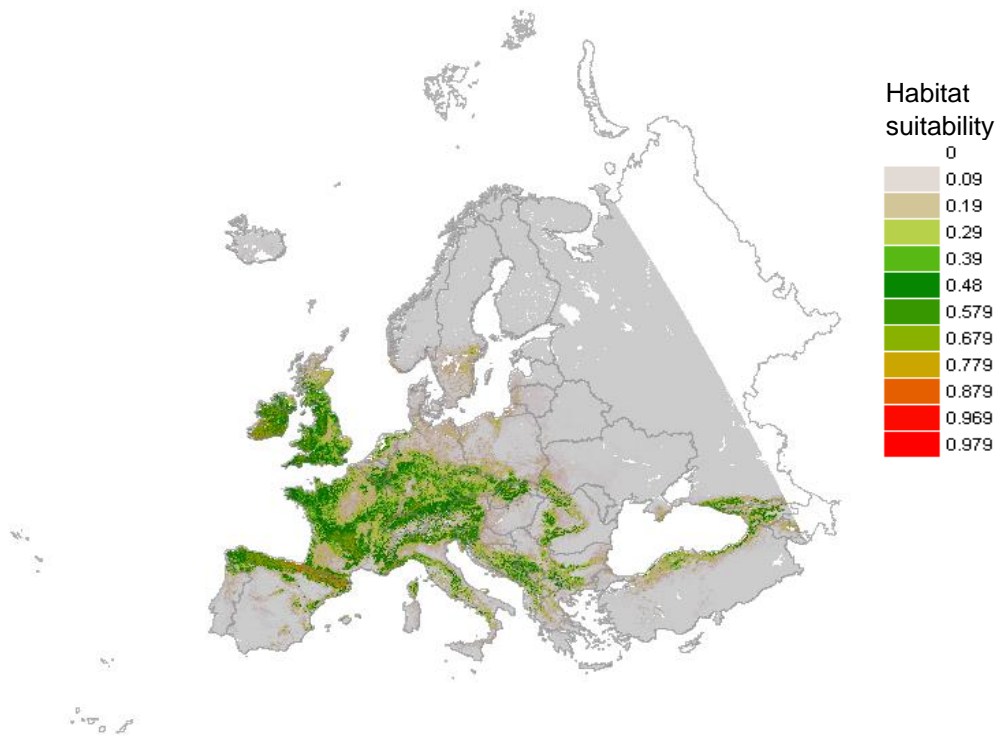
Remarks

Prediction in eastern part of Europe uncertain due to lack of data for that area.

F3.1g - *Corylus avellana* scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

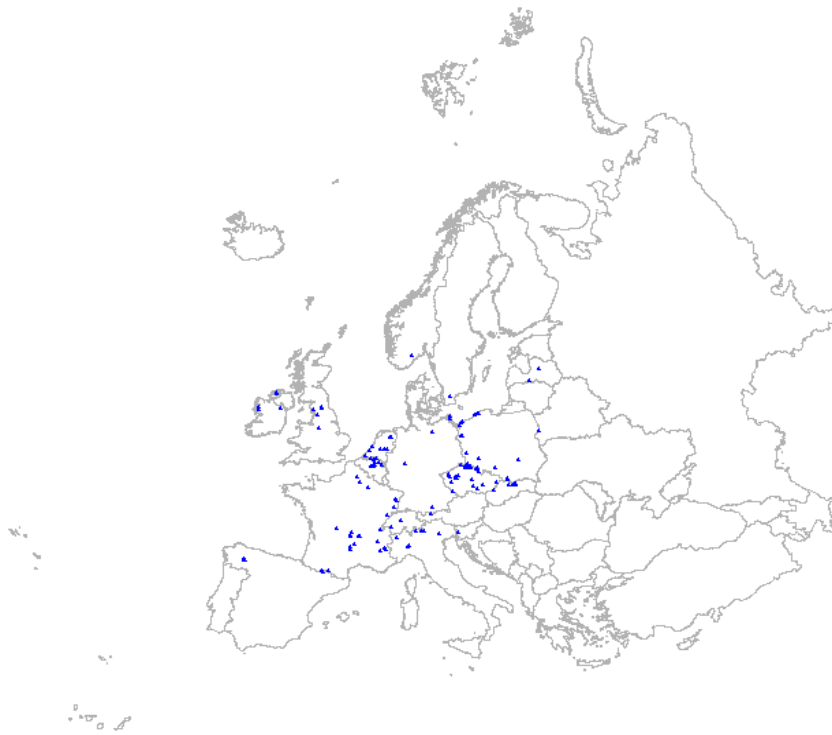
Statistics from Maxent modelling

AUC training (0-1)	0.9214
AUC test (0-1)	0.9127
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	38.4785
Annual precipitation	21.3753
Soil organic carbon content (‰)	13.4663
Bulk density (kg/m ³)	6.9894
Weight in % of clay particles (<0.0002 mm)	6.0154
Volume % of coarse fragments (> 2 mm)	4.1324
Precipitation of warmest quarter	3.8228
Solar radiation	2.1368
Cation Exchange Capacity	1.5709
Precipitation seasonality (coef. of var.)	1.4767
Mean temperature of wettest quarter	0.5229
Weight in % of silt particles (0.0002-0.05 mm)	0.4396
Distance to water	0.3184
Potential evapotranspiration	0.2333
pH (water)	0.1342
Weight in % of sand particles (0.05-2 mm)	0.0344

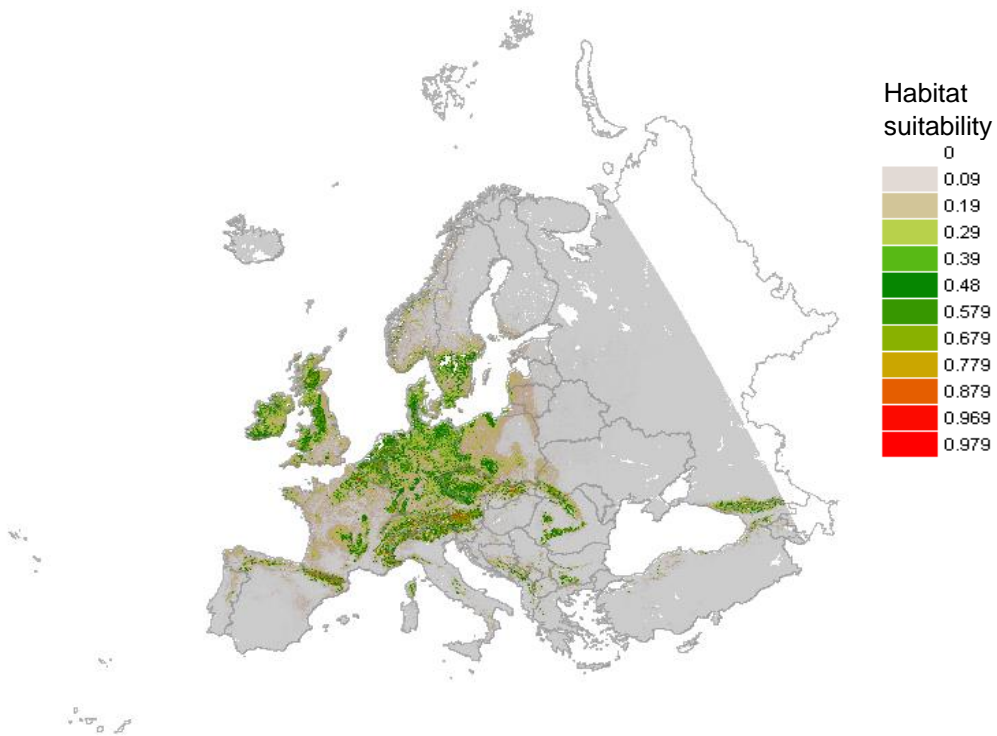
Remarks

Prediction in eastern part of Europe uncertain due to lack of data for that area.

F3.1h - Temperate forest clearing scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

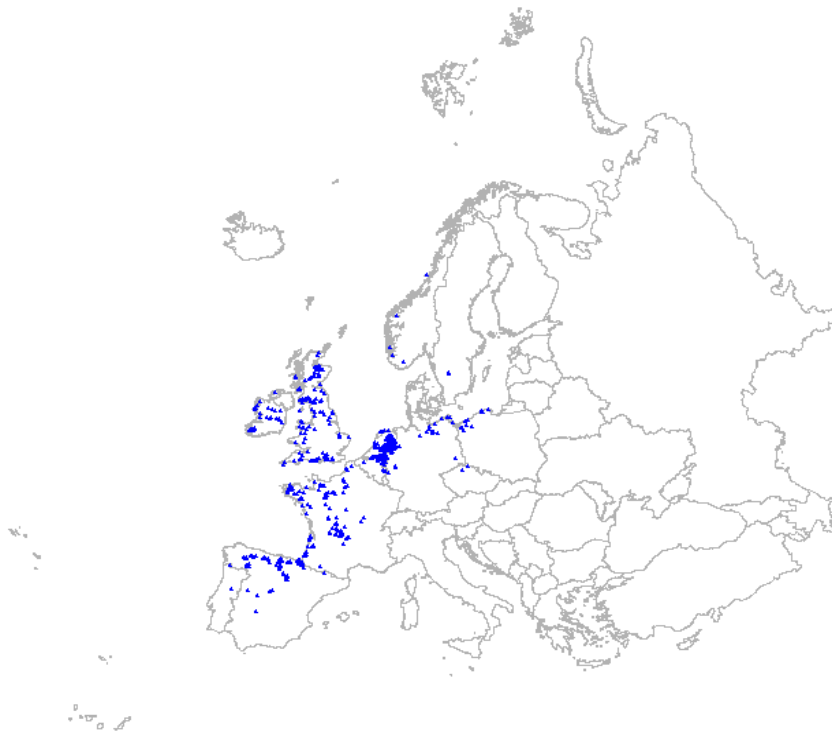
Statistics from Maxent modelling

AUC training (0-1)	0.9574
AUC test (0-1)	0.9256
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	42.3336
Soil organic carbon content (‰)	25.6775
Precipitation of warmest quarter	6.175
Potential evapotranspiration	6.1546
Volume % of coarse fragments (> 2 mm)	5.506
Weight in % of silt particles (0.0002-0.05 mm)	5.051
Weight in % of clay particles (<0.0002 mm)	2.7162
Weight in % of sand particles (0.05-2 mm)	1.2624
Solar radiation	1.1384
Bulk density (kg/m ³)	1.0246
Precipitation seasonality (coef. of var.)	0.954
Annual precipitation	0.7647
pH (water)	0.6205
Cation Exchange Capacity	0.4204
Mean temperature of wettest quarter	0.1205
Distance to water	0.0265

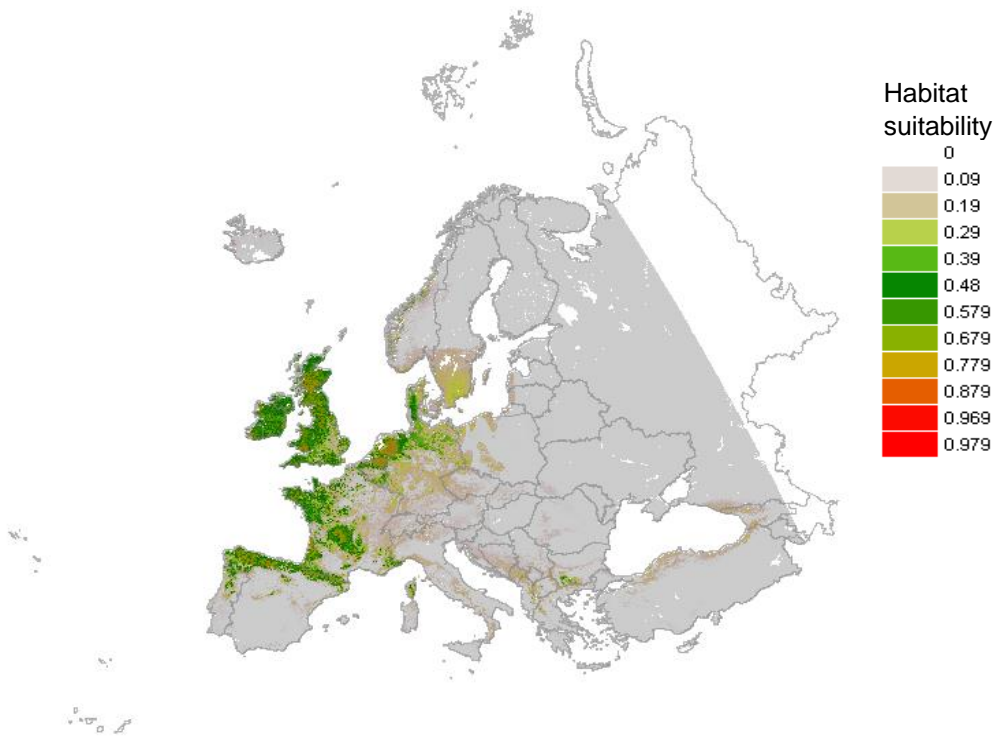
Remarks

Prediction in eastern part of Europe uncertain due to lack of data for that area.

F4.1 - Wet heath



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

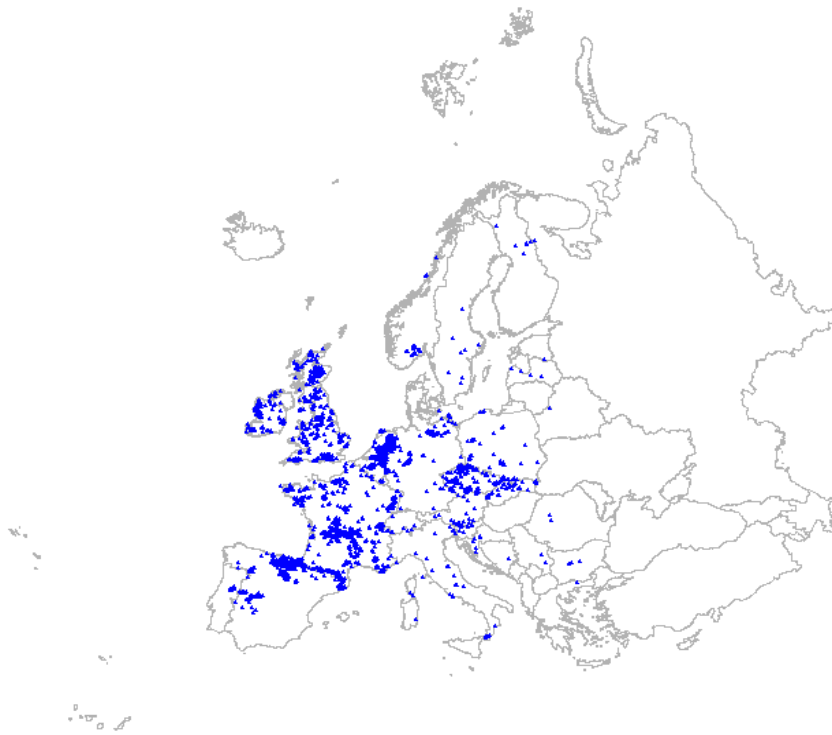
Statistics from Maxent modelling

AUC training (0-1)	0.9118
AUC test (0-1)	0.9158
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	74.6549
Potential evapotranspiration	6.5263
Soil organic carbon content (‰)	5.217
Bulk density (kg/m ³)	4.9738
pH (water)	4.9587
Weight in % of silt particles (0.0002-0.05 mm)	1.1275
Precipitation seasonality (coef. of var.)	0.6302
Weight in % of clay particles (<0.0002 mm)	0.6261
Solar radiation	0.5099
Precipitation of warmest quarter	0.3854
Mean temperature of wettest quarter	0.3431
Weight in % of sand particles (0.05-2 mm)	0.2921
Annual precipitation	0.1603
Distance to water	0.0314
Cation Exchange Capacity	0.0011
Volume % of coarse fragments (> 2 mm)	0.001

Remarks

-

F4.2 - Dry heath



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

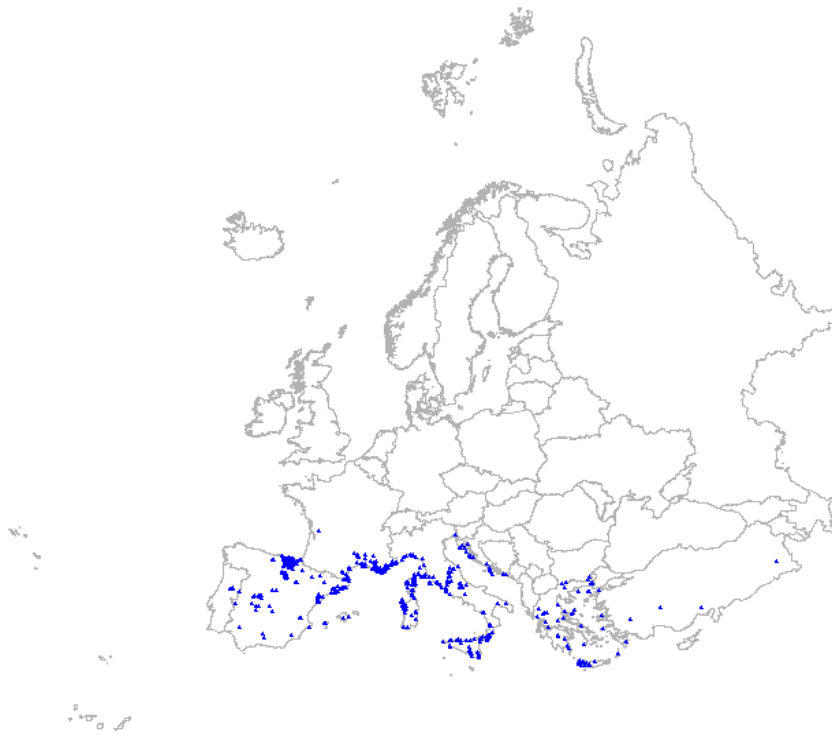
Statistics from Maxent modelling

AUC training (0-1)	0.7839
AUC test (0-1)	0.7792
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	72.1137
Potential evapotranspiration	11.3945
Soil organic carbon content (‰)	9.17
Annual precipitation	3.1502
Precipitation seasonality (coef. of var.)	1.5042
Weight in % of clay particles (<0.0002 mm)	0.4387
Volume % of coarse fragments (> 2 mm)	0.432
Weight in % of silt particles (0.0002-0.05 mm)	0.3866
Bulk density (kg/m ³)	0.3832
Weight in % of sand particles (0.05-2 mm)	0.303
pH (water)	0.2384
Precipitation of warmest quarter	0.1225
Solar radiation	0.117
Distance to water	0.0888
Cation Exchange Capacity	0.0446
Mean temperature of wettest quarter	0.0238

Remarks

Prediction in eastern part of Europe uncertain due to lack of data for that area.

F5.1-2 - Arborescent matorral and maquis



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

Geographic restriction distribution data

-

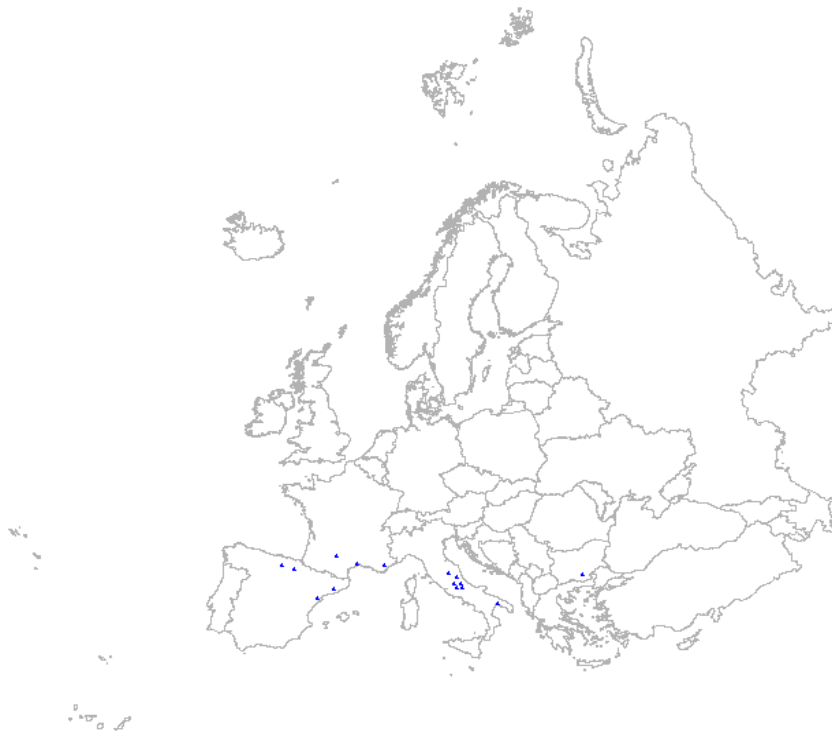
Statistics from Maxent modelling

AUC training (0-1)	0.896
AUC test (0-1)	0.8916
Contribution variables to the Maxent model (%)	
Precipitation of warmest quarter	43.1301
Soil organic carbon content (‰)	19.0313
Weight in % of clay particles (<0.0002 mm)	15.6443
Solar radiation	12.6142
Precipitation seasonality (coef. of var.)	7.0148
Potential evapotranspiration	5.0247
Temperature seasonality (stdev * 100)	2.3359
Cation Exchange Capacity	2.3304
Weight in % of sand particles (0.05-2 mm)	2.1861
Distance to water	1.3011
Mean temperature of wettest quarter	1.0568
Annual precipitation	0.7252
Bulk density (kg/m ³)	0.7121
pH (water)	0.3943
Weight in % of silt particles (0.0002-0.05 mm)	0.1041
Volume % of coarse fragments (> 2 mm)	0.1013

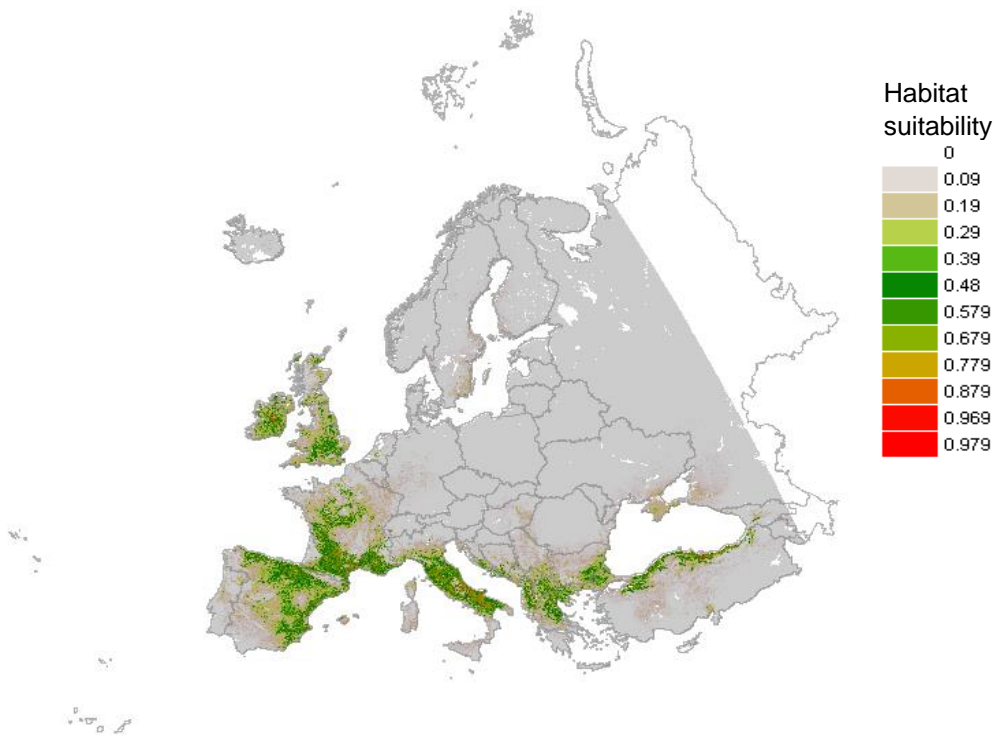
Remarks

Prediction in eastern part of Europe (Turkey) uncertain due to lack of data for that area.

F5.3 - Submediterranean pseudomaquis



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

Statistics from Maxent modelling

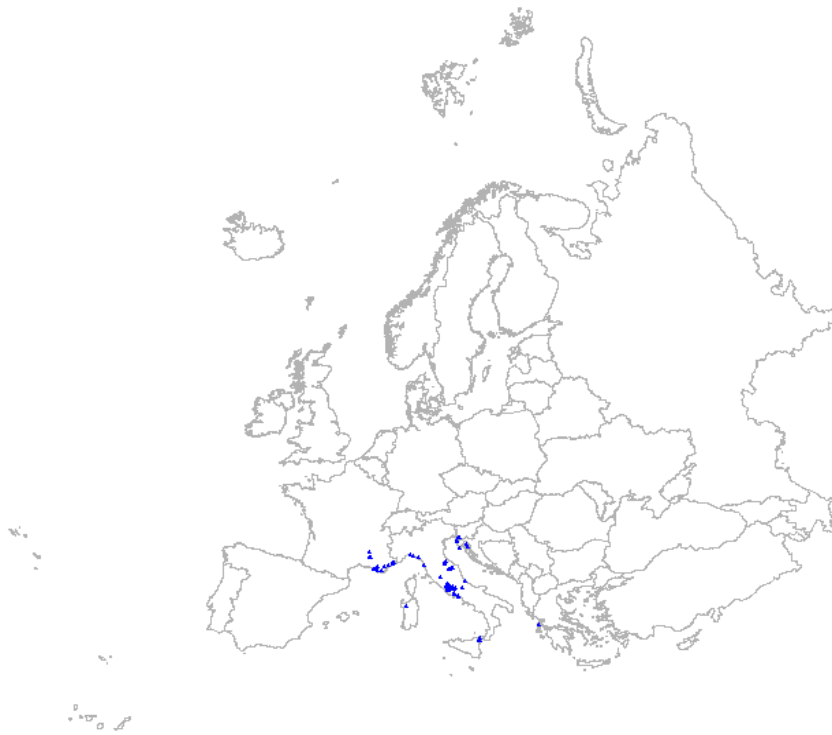
AUC training (0-1)	0.9786
AUC test (0-1)	0.9577
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	27.2165
Precipitation seasonality (coef. of var.)	13.3498
Potential evapotranspiration	11.8113
Weight in % of silt particles (0.0002-0.05 mm)	11.1609
Volume % of coarse fragments (> 2 mm)	10.1288
pH (water)	8.4849
Soil organic carbon content (‰)	6.334
Precipitation of warmest quarter	5.0467
Weight in % of sand particles (0.05-2 mm)	3.2053
Weight in % of clay particles (<0.0002 mm)	2.2254
Solar radiation	1.046
Annual precipitation	0.7049
Cation Exchange Capacity	0.3314
Mean temperature of wettest quarter	0
Bulk density (kg/m ³)	0
Distance to water	0

Remarks

Bad model, because of prediction in Ireland, England, and Hungary. The reason for for this is that this habitat type has a poor relation to climatic factors.

Prediction in eastern part of Europe (Turkey) uncertain due to lack of data for that area.

F5.4 - *Spartium junceum* fields



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

Statistics from Maxent modelling

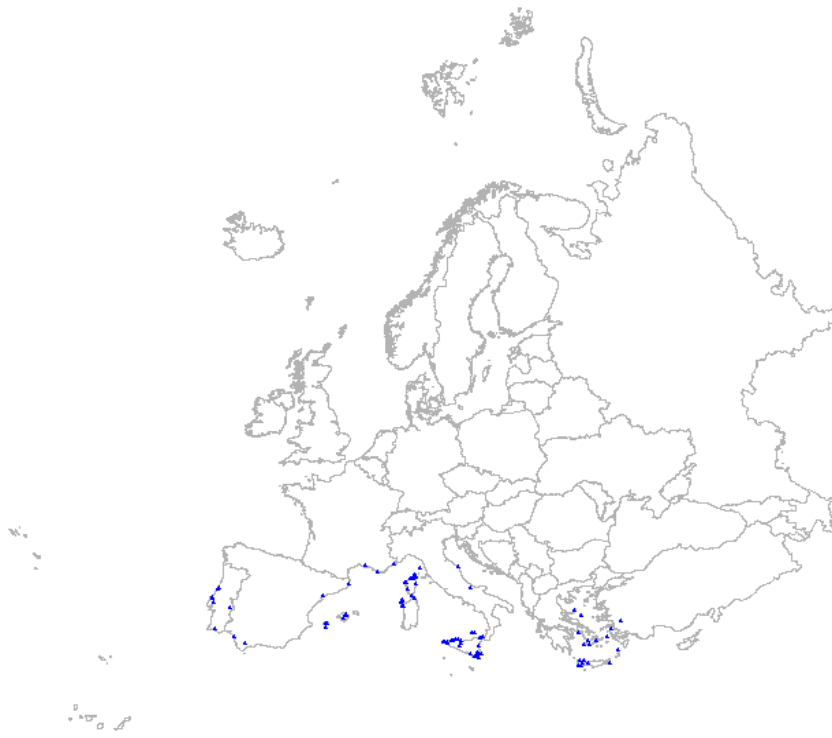
AUC training (0-1)	0.9873
AUC test (0-1)	0.9804
Contribution variables to the Maxent model (%)	
Weight in % of clay particles (<0.0002 mm)	26.3259
Temperature seasonality (stdev * 100)	22.7849
Solar radiation	20.5001
Annual precipitation	18.9034
Potential evapotranspiration	13.4566
Mean temperature of wettest quarter	6.4925
Precipitation seasonality (coef. of var.)	3.7847
pH (water)	2.8043
Precipitation of warmest quarter	2.6968
Bulk density (kg/m ³)	1.4665
Volume % of coarse fragments (> 2 mm)	0.7765
Soil organic carbon content (‰)	0.0964
Distance to water	0.0908
Cation Exchange Capacity	0.0768
Weight in % of silt particles (0.0002-0.05 mm)	0.0555
Weight in % of sand particles (0.05-2 mm)	0.0156

Remarks

Due to lack of data there is a poor prediction for Spain. *Spartium junceum* occurs throughout that country.

Prediction in eastern part of Europe (Turkey) uncertain due to lack of data for that area.

F5.5 - Thermo-Mediterranean scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

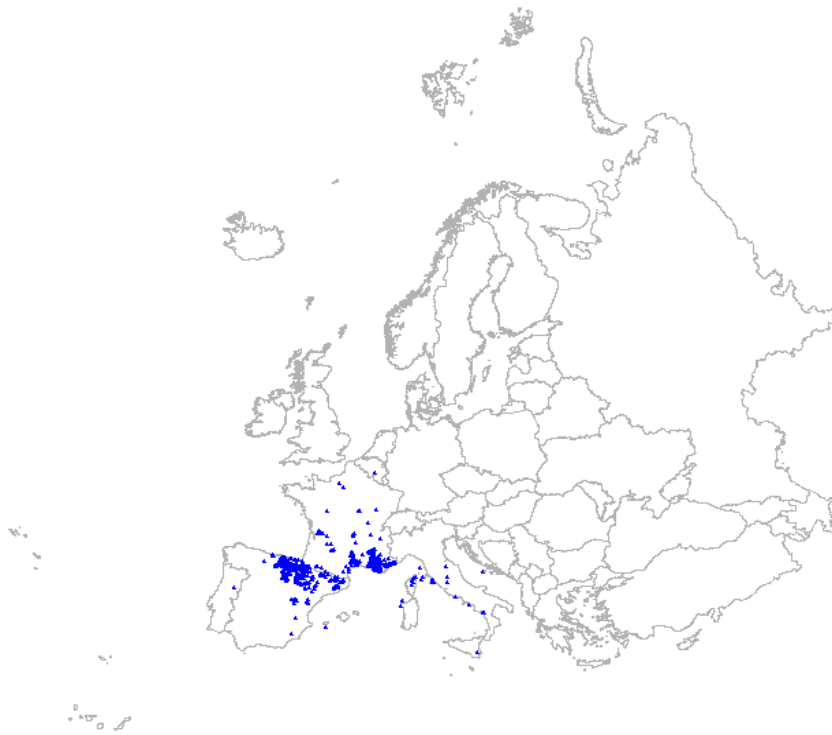
Statistics from Maxent modelling

AUC training (0-1)	0.9874
AUC test (0-1)	0.9814
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	38.2369
Precipitation of warmest quarter	28.1046
Precipitation seasonality (coef. of var.)	11.8497
Mean temperature of wettest quarter	7.9066
Weight in % of clay particles (<0.0002 mm)	3.5663
Soil organic carbon content (‰)	2.799
pH (water)	2.5521
Potential evapotranspiration	2.0164
Weight in % of silt particles (0.0002-0.05 mm)	0.7747
Volume % of coarse fragments (> 2 mm)	0.7313
Weight in % of sand particles (0.05-2 mm)	0.655
Bulk density (kg/m ³)	0.3056
Solar radiation	0.2875
Annual precipitation	0.0773
Distance to water	0.0443
Cation Exchange Capacity	0

Remarks

-

F6.1a - Western basiphilous garrigue



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

Geographic restriction distribution data

-

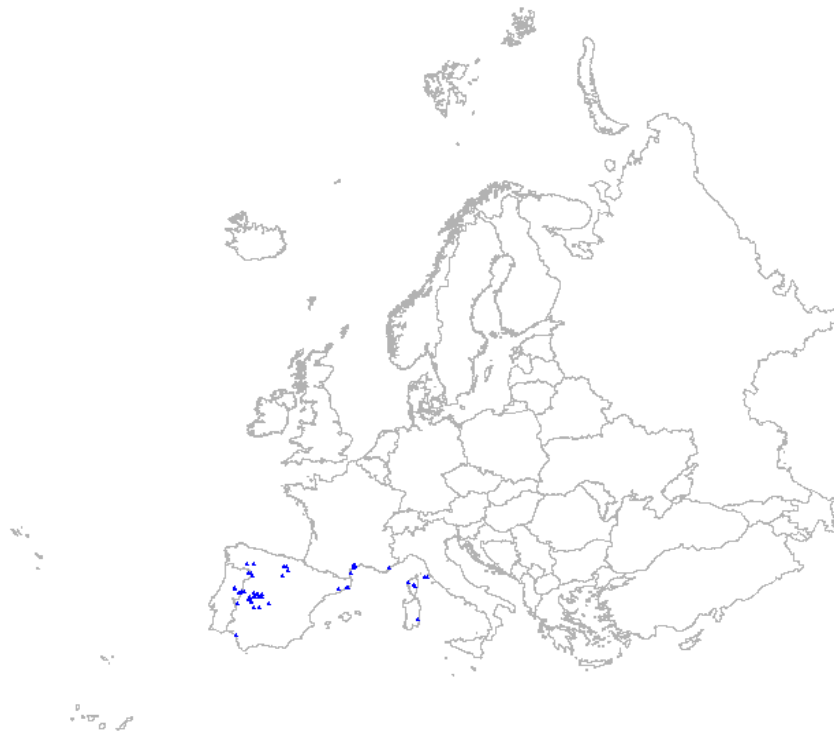
Statistics from Maxent modelling

AUC training (0-1)	0.9066
AUC test (0-1)	0.8951
Contribution variables to the Maxent model (%)	
Soil organic carbon content (‰)	40.1732
pH (water)	14.1712
Solar radiation	13.2695
Temperature seasonality (stdev * 100)	13.2573
Weight in % of clay particles (<0.0002 mm)	8.9195
Precipitation seasonality (coef. of var.)	6.7018
Volume % of coarse fragments (> 2 mm)	6.6706
Precipitation of warmest quarter	4.066
Bulk density (kg/m ³)	3.7736
Weight in % of sand particles (0.05-2 mm)	0.7942
Potential evapotranspiration	0.7076
Distance to water	0.4612
Cation Exchange Capacity	0.3458
Mean temperature of wettest quarter	0.3284
Annual precipitation	0.2318
Weight in % of silt particles (0.0002-0.05 mm)	0.077

Remarks

Prediction in eastern part of Europe (Turkey) uncertain due to lack of data for that area.

F6.1b - Western acidophilous garrigue



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

Geographic restriction distribution data

-

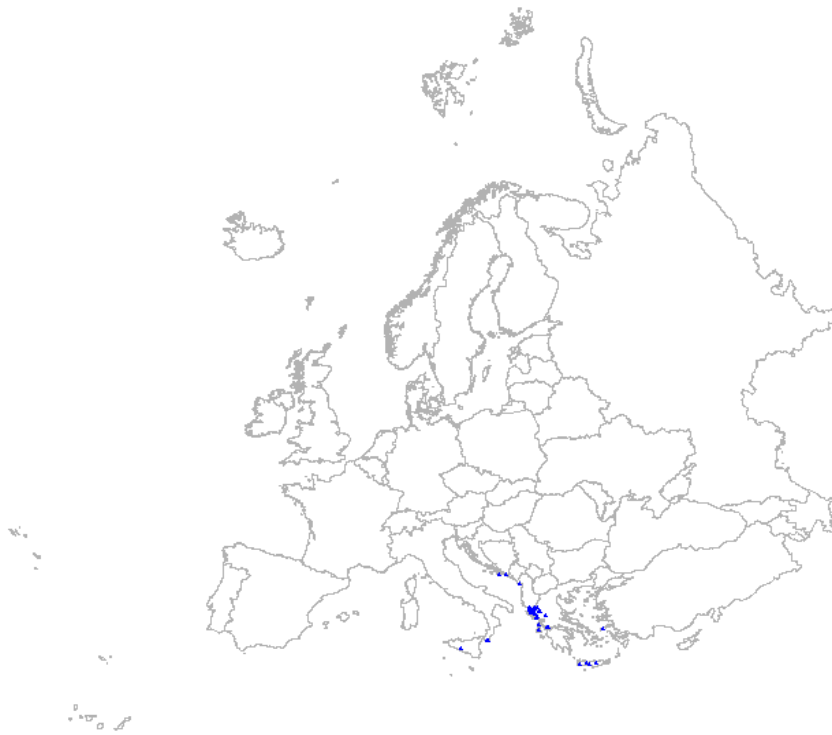
Statistics from Maxent modelling

AUC training (0-1)	0.9756
AUC test (0-1)	0.9415
Contribution variables to the Maxent model (%)	
Precipitation of warmest quarter	49.1645
Soil organic carbon content (‰)	16.0585
Precipitation seasonality (coef. of var.)	13.5536
Weight in % of clay particles (<0.0002 mm)	6.2395
Solar radiation	5.8264
Bulk density (kg/m ³)	5.8124
Weight in % of sand particles (0.05-2 mm)	3.5449
Mean temperature of wettest quarter	2.3443
Temperature seasonality (stdev * 100)	2.1301
Volume % of coarse fragments (> 2 mm)	1.9674
Weight in % of silt particles (0.0002-0.05 mm)	0.8768
Annual precipitation	0.8398
pH (water)	0.4292
Potential evapotranspiration	0.3234
Cation Exchange Capacity	0.14
Distance to water	0.0443

Remarks

Predictions in the east Mediterranean area should be ignored.

F6.2 - Eastern garrigue



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

Statistics from Maxent modelling

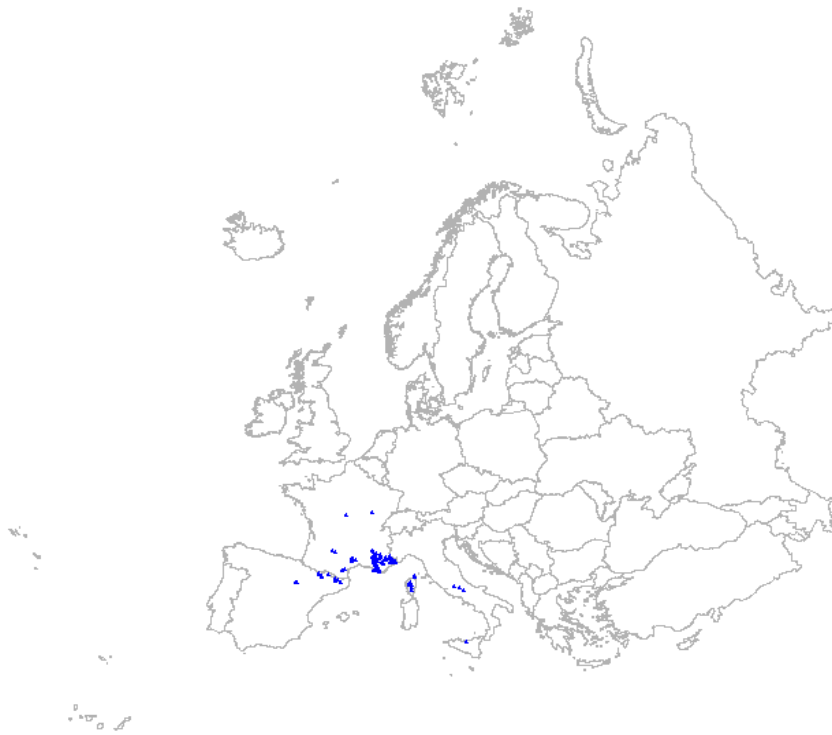
AUC training (0-1)	0.9923
AUC test (0-1)	0.9916
Contribution variables to the Maxent model (%)	
Annual precipitation	39.9468
Precipitation seasonality (coef. of var.)	37.2821
Solar radiation	13.9163
Potential evapotranspiration	11.4396
Temperature seasonality (stdev * 100)	3.8421
Precipitation of warmest quarter	2.5152
Weight in % of clay particles (<0.0002 mm)	1.8396
Weight in % of silt particles (0.0002-0.05 mm)	0.7661
Soil organic carbon content (‰)	0.633
Distance to water	0.4519
Volume % of coarse fragments (> 2 mm)	0.0504
Cation Exchange Capacity	0.0256
pH (water)	0.0137
Mean temperature of wettest quarter	0.0112
Weight in % of sand particles (0.05-2 mm)	0.0046
Bulk density (kg/m ³)	0

Remarks

Prediction in the Iberian Peninsula should be ignored.

Prediction in eastern part of Europe (Turkey) uncertain due to lack of data for that area.

F6.6 - Supra-Mediterranean garrigue



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

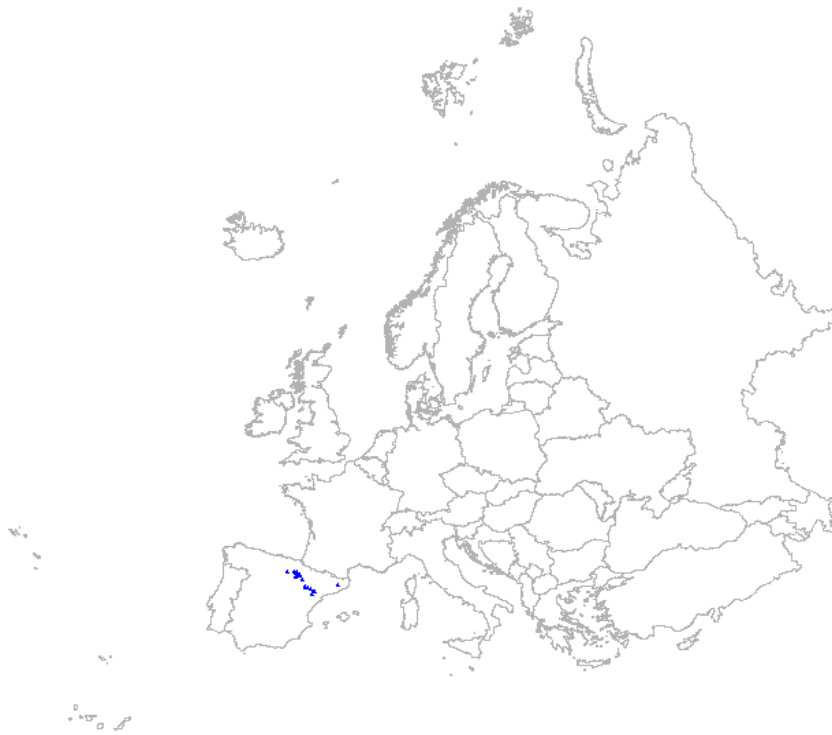
Statistics from Maxent modelling

AUC training (0-1)	0.982
AUC test (0-1)	0.9828
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	35.5355
Volume % of coarse fragments (> 2 mm)	22.2539
Annual precipitation	8.7275
Weight in % of sand particles (0.05-2 mm)	7.5503
Bulk density (kg/m ³)	5.5881
Precipitation seasonality (coef. of var.)	4.2175
Potential evapotranspiration	3.9178
Soil organic carbon content (‰)	3.5513
Mean temperature of wettest quarter	2.6417
Precipitation of warmest quarter	2.4728
Solar radiation	2.2173
Cation Exchange Capacity	2.1144
pH (water)	1.0109
Weight in % of silt particles (0.0002-0.05 mm)	0.0835
Weight in % of clay particles (<0.0002 mm)	0.0665
Distance to water	0.0067

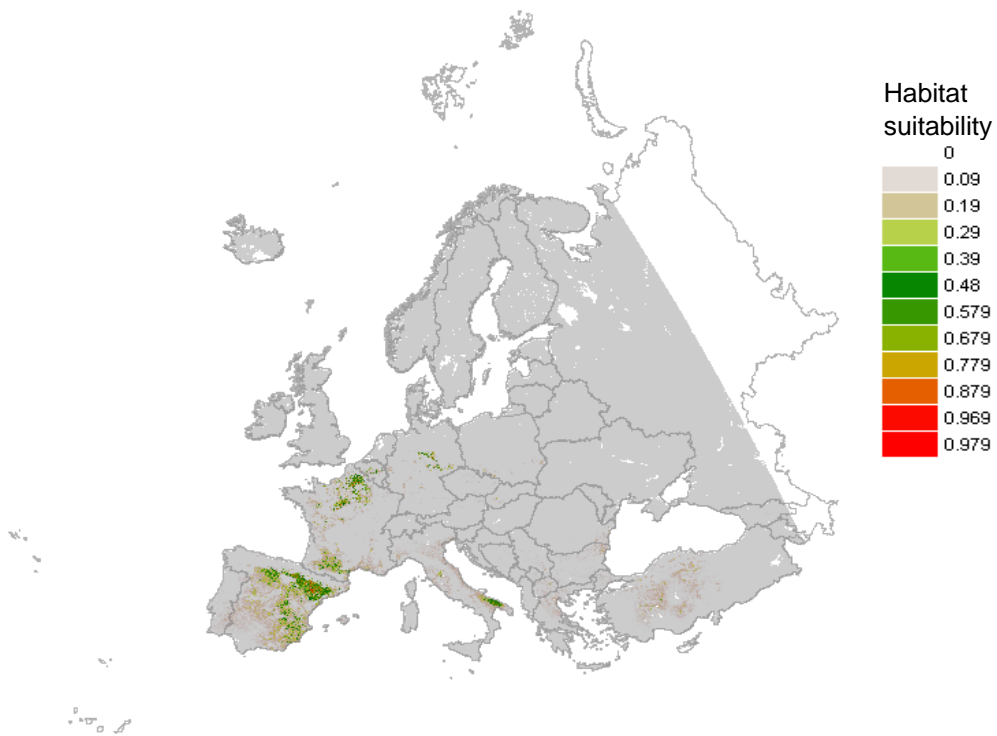
Remarks

-

F6.7 - Mediterranean gypsum scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

Geographic restriction distribution data

-

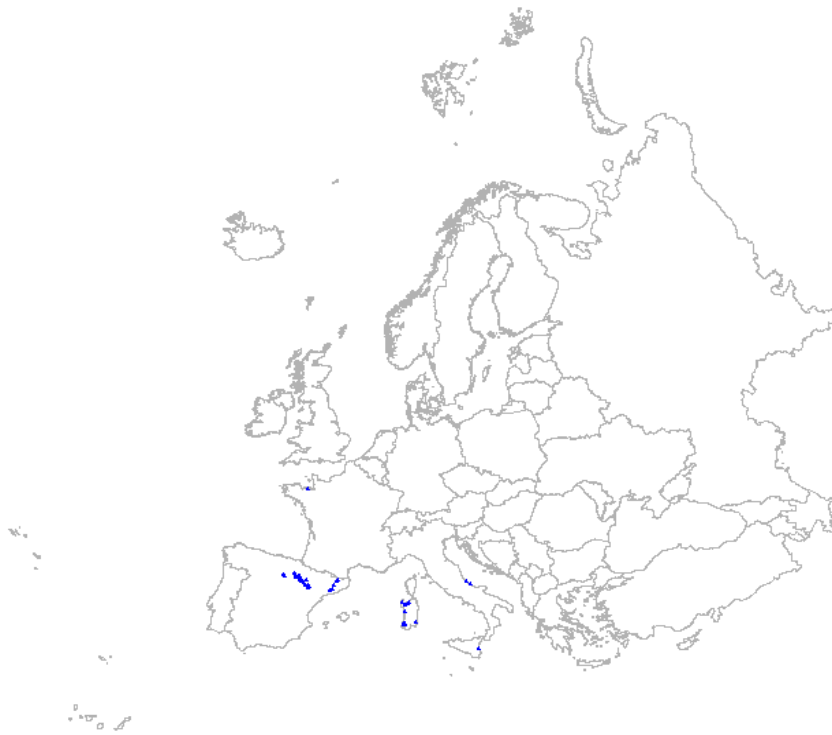
Statistics from Maxent modelling

AUC training (0-1)	0.9961
AUC test (0-1)	0.9968
Contribution variables to the Maxent model (%)	
Potential evapotranspiration	21.1382
Bulk density (kg/m ³)	17.2713
Soil organic carbon content (‰)	15.4644
Annual precipitation	3.5452
Distance to water	2.2883
Weight in % of sand particles (0.05-2 mm)	2.0027
Precipitation seasonality (coef. of var.)	1.9717
Temperature seasonality (stdev * 100)	1.3211
Solar radiation	1.063
Cation Exchange Capacity	0.3305
Volume % of coarse fragments (> 2 mm)	0.3214
Weight in % of silt particles (0.0002-0.05 mm)	0.2797
Precipitation of warmest quarter	0.0221
Mean temperature of wettest quarter	0
Weight in % of clay particles (<0.0002 mm)	0
pH (water)	0

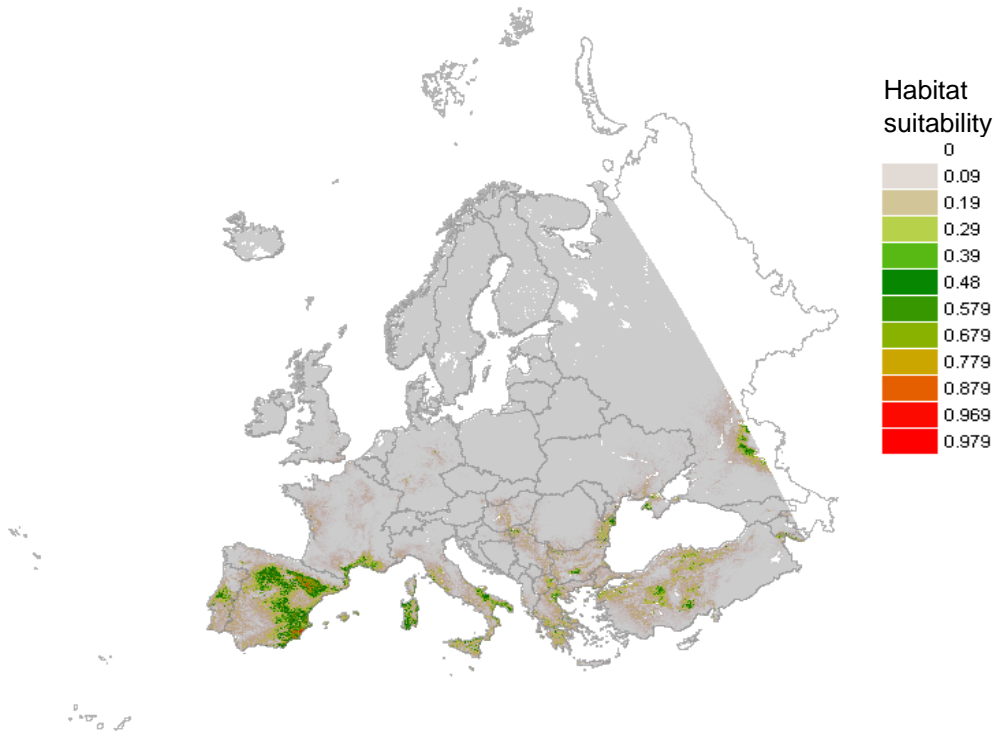
Remarks

-

F6.8a - Mediterranean halo-nitrophilous scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

Geographic restriction distribution data

-

Statistics from Maxent modelling

AUC training (0-1)	0.9759
AUC test (0-1)	0.911
Contribution variables to the Maxent model (%)	
Soil organic carbon content (‰)	39.1685
Precipitation of warmest quarter	16.0861
Weight in % of clay particles (<0.0002 mm)	9.1065
Annual precipitation	6.3801
Solar radiation	4.6929
Bulk density (kg/m ³)	3.8742
Temperature seasonality (stdev * 100)	3.4085
Precipitation seasonality (coef. of var.)	3.2556
Mean temperature of wettest quarter	2.8701
Weight in % of sand particles (0.05-2 mm)	1.4553
Distance to water	0.5444
Cation Exchange Capacity	0.3583
Potential evapotranspiration	0.3013
pH (water)	0.2237
Volume % of coarse fragments (> 2 mm)	0.0369
Weight in % of silt particles (0.0002-0.05 mm)	0

Remarks

Prediction in eastern part of Europe uncertain due to lack of data for that area.

F6.8b - Caspian halo-nitrophilous scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

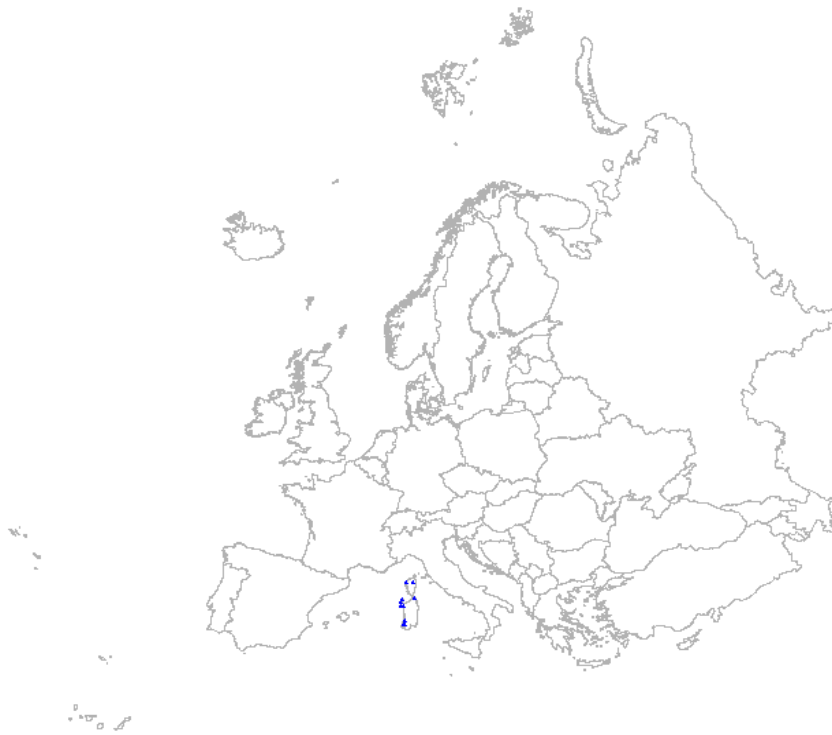
Geographic restriction distribution data

-

Remarks

Insufficient data to create a model

F7.1 - Western Mediterranean coastal garrigue



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

Geographic restriction distribution data

-

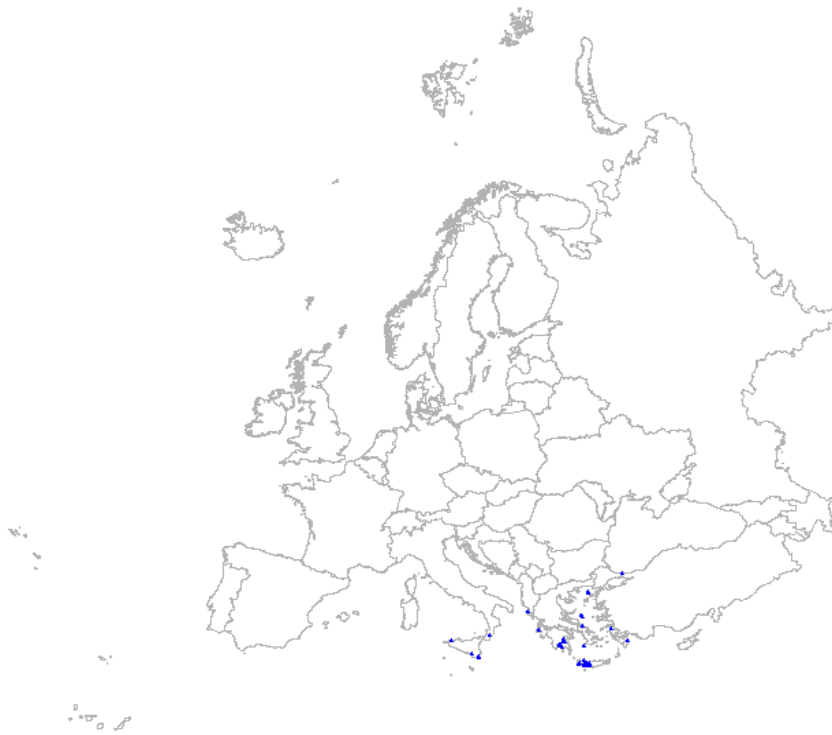
Statistics from Maxent modelling

AUC training (0-1)	0.9931
AUC test (0-1)	0.9766
Contribution variables to the Maxent model (%)	
Precipitation of warmest quarter	50.9292
Precipitation seasonality (coef. of var.)	20.7746
pH (water)	8.6147
Temperature seasonality (stdev * 100)	7.3093
Annual precipitation	5.8502
Solar radiation	2.5222
Weight in % of clay particles (<0.0002 mm)	2.1209
Potential evapotranspiration	0.5715
Weight in % of silt particles (0.0002-0.05 mm)	0.5677
Distance to water	0.5286
Soil organic carbon content (‰)	0.1832
Bulk density (kg/m ³)	0.0243
Cation Exchange Capacity	0.0036
Weight in % of sand particles (0.05-2 mm)	0
Mean temperature of wettest quarter	0
Volume % of coarse fragments (> 2 mm)	0

Remarks

-

F7.3 - Eastern Mediterranean spiny heath (phrygana)



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

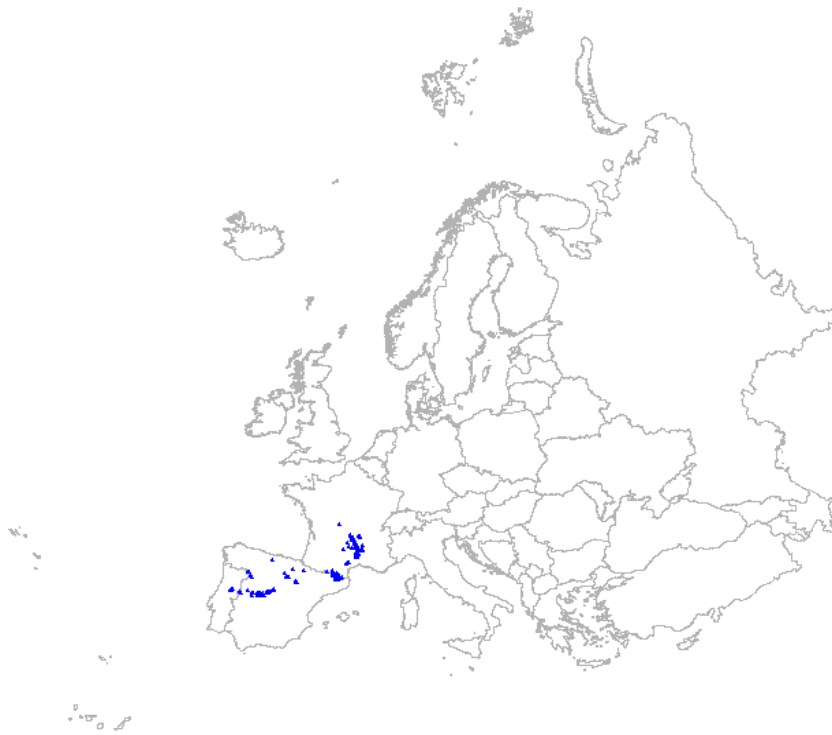
Statistics from Maxent modelling

AUC training (0-1)	0.9935
AUC test (0-1)	0.9902
Contribution variables to the Maxent model (%)	
Precipitation seasonality (coef. of var.)	49.1531
Precipitation of warmest quarter	23.7552
Temperature seasonality (stdev * 100)	13.0809
Soil organic carbon content (‰)	10.193
Weight in % of clay particles (<0.0002 mm)	1.3448
Potential evapotranspiration	0.6572
Volume % of coarse fragments (> 2 mm)	0.2328
Bulk density (kg/m ³)	0.1621
Mean temperature of wettest quarter	0.1344
Weight in % of sand particles (0.05-2 mm)	0.1124
Weight in % of silt particles (0.0002-0.05 mm)	0.0856
Cation Exchange Capacity	0.0163
pH (water)	0.0147
Distance to water	0.0032
Solar radiation	0
Annual precipitation	0

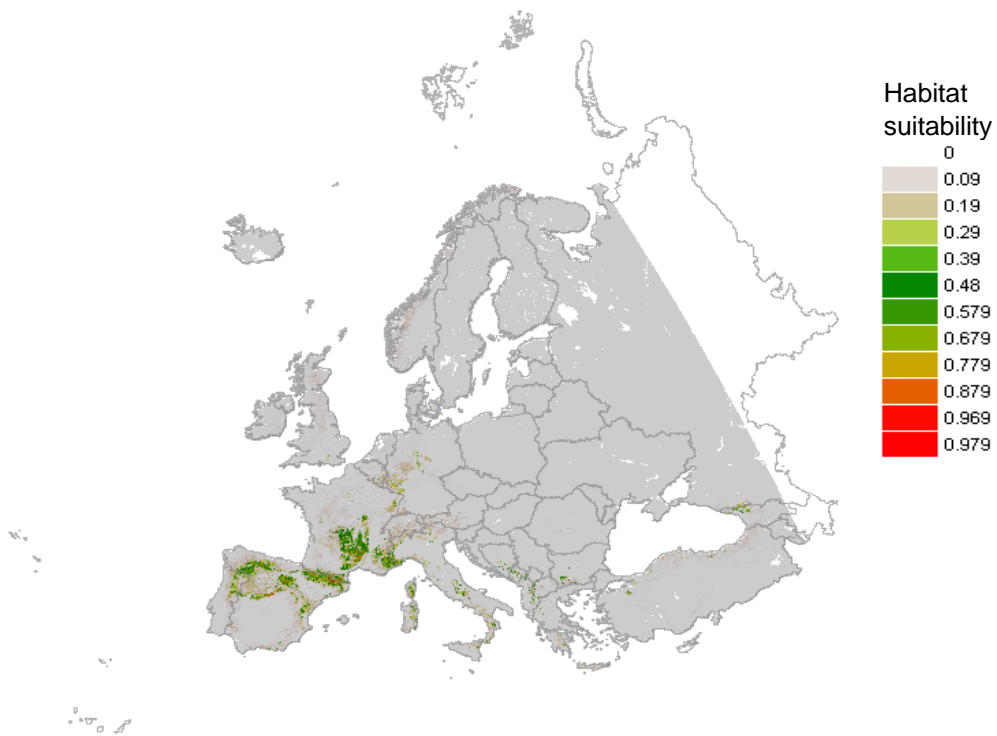
Remarks

Prediction in the Iberian Peninsula should be ignored.

F7.4a - Western Mediterranean mountain hedgehog-heath



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

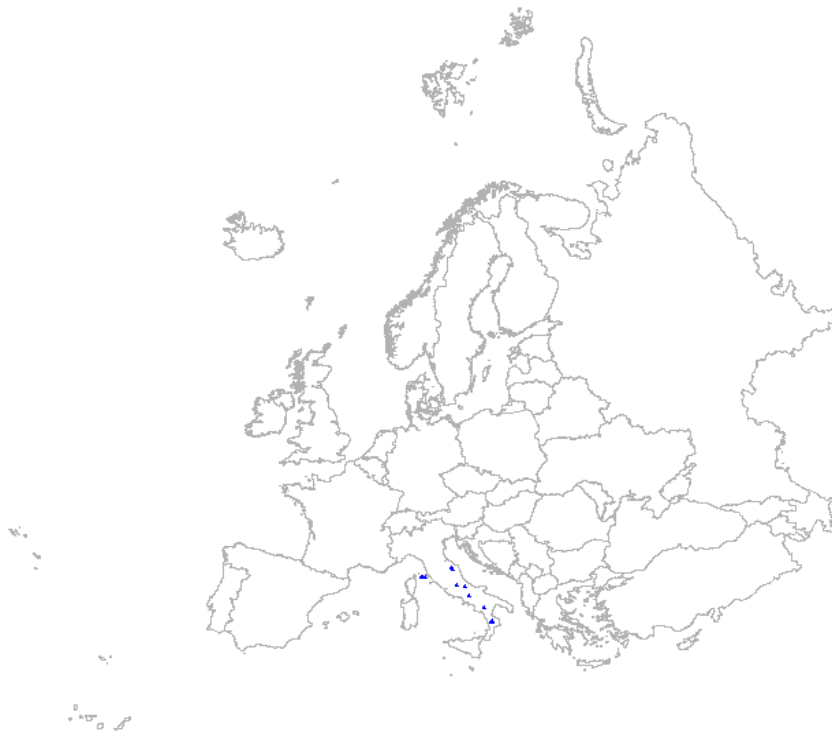
Statistics from Maxent modelling

AUC training (0-1)	0.978
AUC test (0-1)	0.9749
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	44.1131
Weight in % of sand particles (0.05-2 mm)	23.9843
Volume % of coarse fragments (> 2 mm)	11.4203
Weight in % of silt particles (0.0002-0.05 mm)	6.6428
Bulk density (kg/m ³)	4.8498
Soil organic carbon content (‰)	4.481
Precipitation of warmest quarter	1.9568
Weight in % of clay particles (<0.0002 mm)	1.069
Precipitation seasonality (coef. of var.)	0.4649
Potential evapotranspiration	0.4291
Solar radiation	0.3837
Mean temperature of wettest quarter	0.1845
pH (water)	0.17
Distance to water	0.1268
Annual precipitation	0.0604
Cation Exchange Capacity	0.0109

Remarks

Prediction in Germany should be ignored.

F7.4b - Central Mediterranean mountain hedgehog-heath



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

Statistics from Maxent modelling

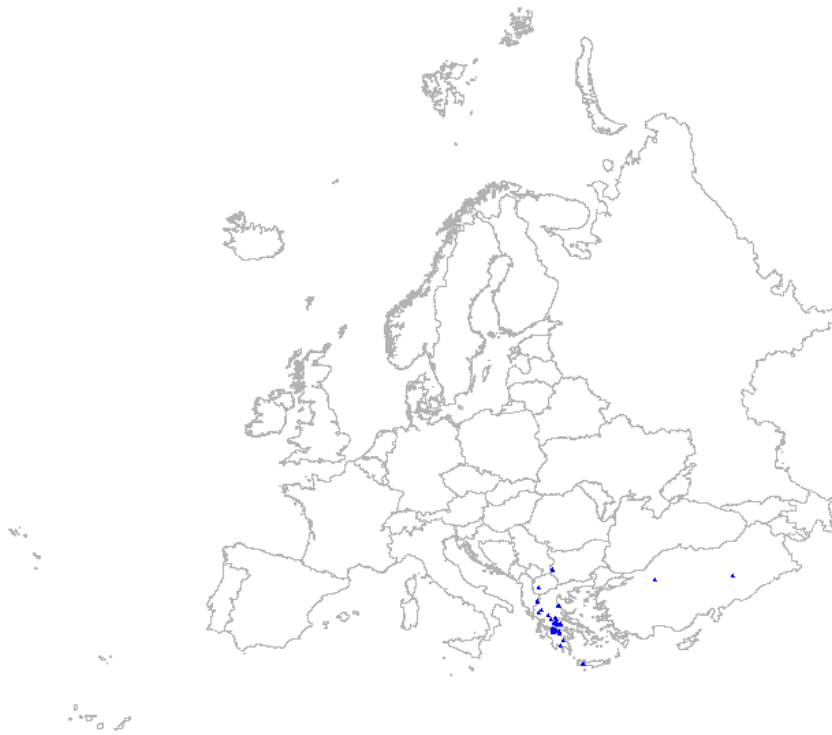
AUC training (0-1)	0.9961
AUC test (0-1)	0.9995
Contribution variables to the Maxent model (%)	
Distance to water	31.3163
Volume % of coarse fragments (> 2 mm)	19.27
Temperature seasonality (stdev * 100)	13.3294
Precipitation of warmest quarter	11.3689
Weight in % of clay particles (<0.0002 mm)	10.3818
Soil organic carbon content (‰)	5.9573
Cation Exchange Capacity	2.2802
Annual precipitation	1.9425
Solar radiation	1.9071
Precipitation seasonality (coef. of var.)	0.6398
Mean temperature of wettest quarter	0.5679
pH (water)	0.2645
Potential evapotranspiration	0.2598
Weight in % of sand particles (0.05-2 mm)	0.204
Bulk density (kg/m ³)	0
Weight in % of silt particles (0.0002-0.05 mm)	0

Remarks

Poor prediction, should be restricted to southern Europe.

Prediction in eastern part of Europe (Turkey) uncertain due to lack of data for that area.

F7.4c - Eastern Mediterranean mountain hedgehog-heath



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

Statistics from Maxent modelling

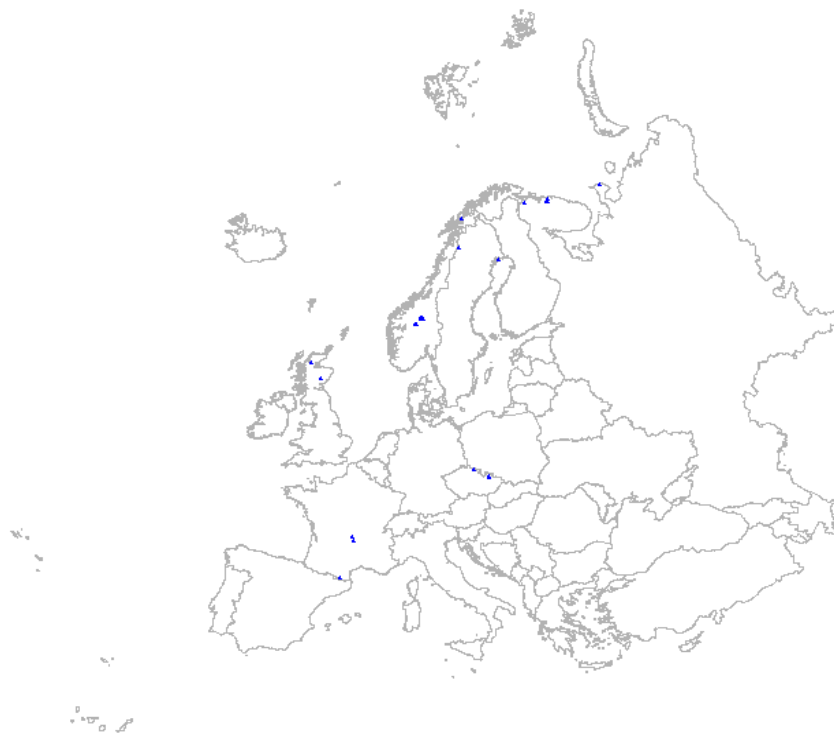
AUC training (0-1)	0.991
AUC test (0-1)	0.9575
Contribution variables to the Maxent model (%)	
Mean temperature of wettest quarter	23.2442
Volume % of coarse fragments (> 2 mm)	18.8631
Annual precipitation	15.5779
Precipitation of warmest quarter	8.5922
Weight in % of sand particles (0.05-2 mm)	7.6495
Soil organic carbon content (‰)	7.5398
Potential evapotranspiration	7.4881
Precipitation seasonality (coef. of var.)	6.2742
Solar radiation	2.1758
Bulk density (kg/m ³)	2.1347
Temperature seasonality (stdev * 100)	1.0485
Weight in % of clay particles (<0.0002 mm)	0.6099
Cation Exchange Capacity	0.3437
Distance to water	0.3099
Weight in % of silt particles (0.0002-0.05 mm)	0.2446
pH (water)	0.0592

Remarks

Prediction in the Iberian Peninsula should be ignored.

Prediction in eastern part of Europe (Turkey) uncertain due to lack of data for that area.

F9.1a - Arctic, boreal and alpine riparian scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

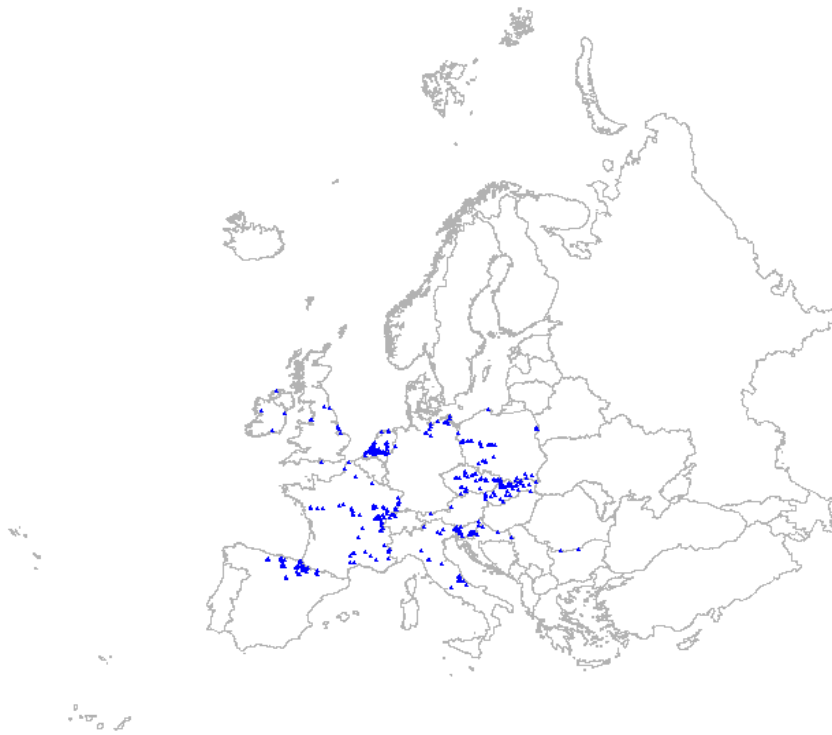
Statistics from Maxent modelling

AUC training (0-1)	0.9784
AUC test (0-1)	0.9554
Contribution variables to the Maxent model (%)	
Soil organic carbon content (‰)	39.4572
Temperature seasonality (stdev * 100)	15.7363
Mean temperature of wettest quarter	13.3716
Precipitation of warmest quarter	5.4374
Weight in % of clay particles (<0.0002 mm)	4.7988
Bulk density (kg/m ³)	3.9422
Cation Exchange Capacity	3.8722
Precipitation seasonality (coef. of var.)	2.7475
Solar radiation	2.6305
Annual precipitation	2.062
Weight in % of sand particles (0.05-2 mm)	1.6505
Distance to water	0.0549
Volume % of coarse fragments (> 2 mm)	0.0194
Potential evapotranspiration	0.0006
pH (water)	0
Weight in % of silt particles (0.0002-0.05 mm)	0

Remarks

Prediction in eastern part of Europe (Caucasus) uncertain due to lack of data for that area.

F9.1b - Temperate riparian scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from study area

Geographic restriction distribution data

-

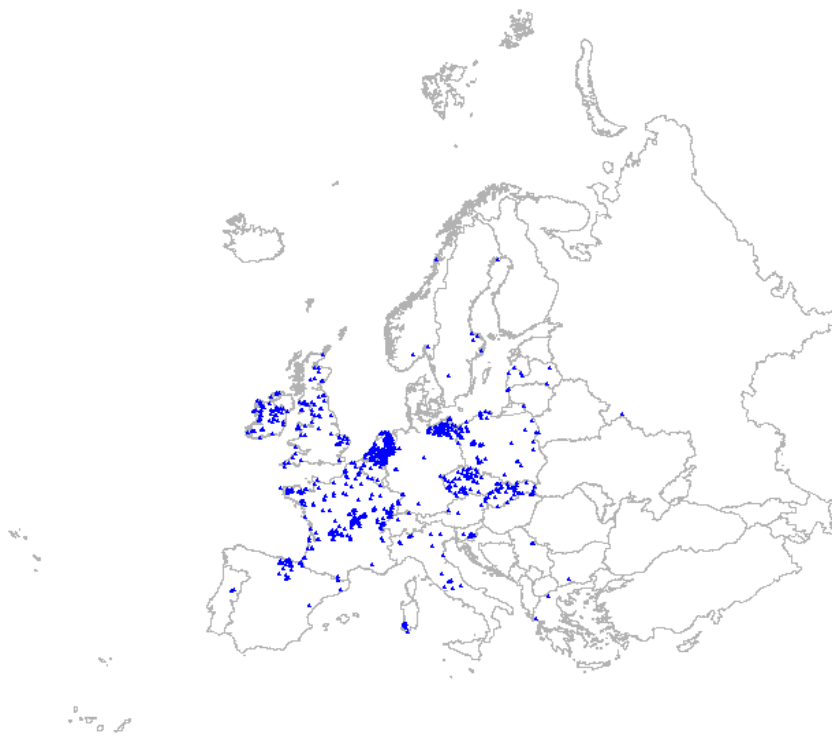
Statistics from Maxent modelling

AUC training (0-1)	0.9273
AUC test (0-1)	0.9289
Contribution variables to the Maxent model (%)	
Temperature seasonality (stdev * 100)	35.7082
Precipitation of warmest quarter	18.0478
Distance to water	16.3982
Bulk density (kg/m ³)	12.7256
Weight in % of sand particles (0.05-2 mm)	4.8341
Soil organic carbon content (‰)	4.7908
Potential evapotranspiration	2.9534
pH (water)	1.3926
Annual precipitation	0.8483
Weight in % of silt particles (0.0002-0.05 mm)	0.6835
Mean temperature of wettest quarter	0.4779
Volume % of coarse fragments (> 2 mm)	0.3478
Precipitation seasonality (coef. of var.)	0.336
Cation Exchange Capacity	0.3013
Weight in % of clay particles (<0.0002 mm)	0.1545
Solar radiation	0.0724

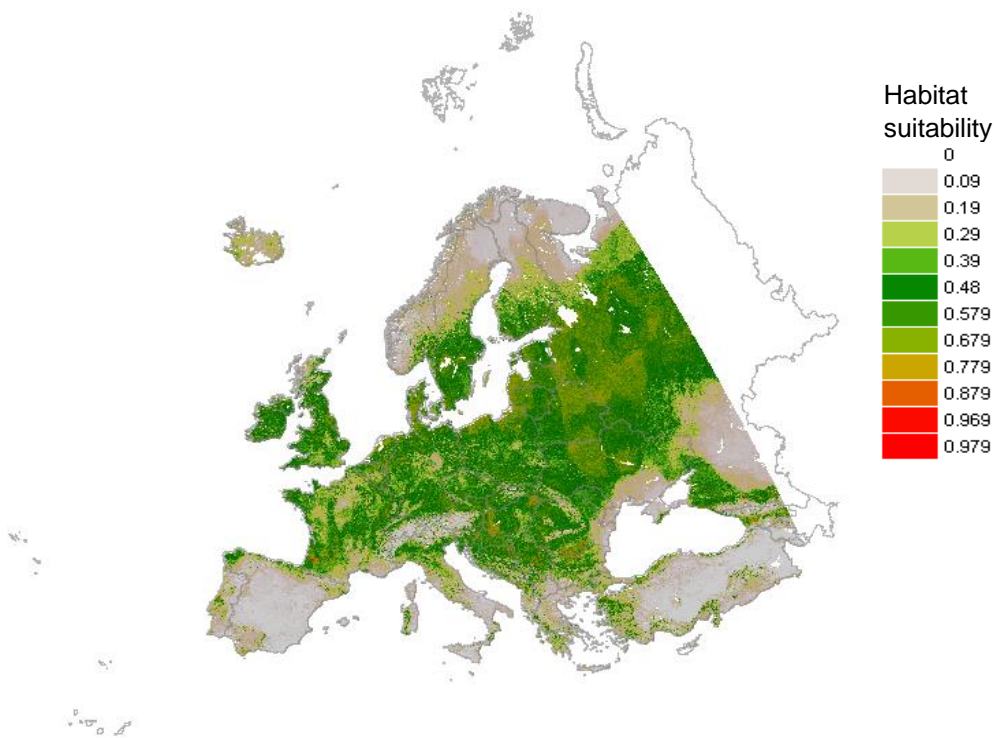
Remarks

Prediction in eastern part of Europe (Caucasus, Turkey) uncertain due to lack of data for that area.

F9.2 - Salix fen scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

Geographic restriction distribution data

-

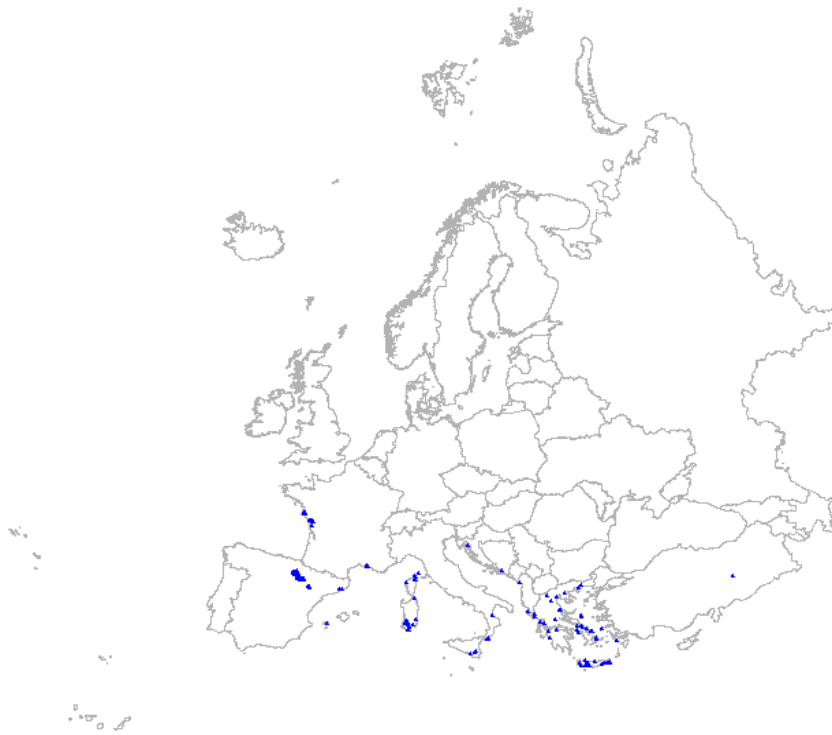
Statistics from Maxent modelling

AUC training (0-1)	0.7945
AUC test (0-1)	0.7679
Contribution variables to the Maxent model (%)	
Weight in % of silt particles (0.0002-0.05 mm)	32.1247
Volume % of coarse fragments (> 2 mm)	31.0597
Precipitation of warmest quarter	11.8177
Solar radiation	5.6519
Soil organic carbon content (‰)	5.1577
Weight in % of sand particles (0.05-2 mm)	4.558
Precipitation seasonality (coef. of var.)	3.6013
pH (water)	2.8443
Annual precipitation	2.8352
Potential evapotranspiration	2.4878
Weight in % of clay particles (<0.0002 mm)	1.8138
Bulk density (kg/m ³)	1.6898
Distance to water	1.0777
Temperature seasonality (stdev * 100)	1.0261
Mean temperature of wettest quarter	1.021
Cation Exchange Capacity	0.2901

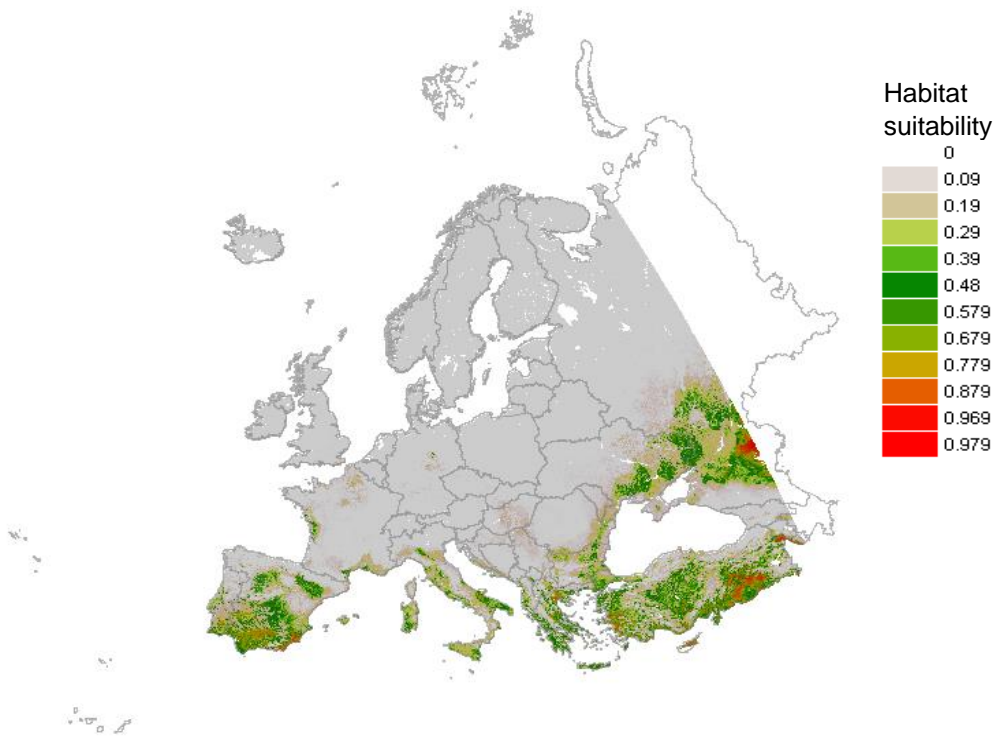
Remarks

Prediction in eastern part of Europe uncertain due to lack of data for that area.

F9.3 - Mediterranean riparian scrub



Distribution based on vegetation relevés



Model prediction. Background data randomly selected from heathland-scrub-tundra data set

Geographic restriction distribution data

-

Statistics from Maxent modelling

AUC training (0-1)	0.972
AUC test (0-1)	0.9649
Contribution variables to the Maxent model (%)	
Precipitation of warmest quarter	38.0612
Bulk density (kg/m ³)	35.2455
Soil organic carbon content (‰)	7.2959
Weight in % of clay particles (<0.0002 mm)	7.2877
Solar radiation	6.5436
Precipitation seasonality (coef. of var.)	3.1528
Weight in % of silt particles (0.0002-0.05 mm)	3.1492
Potential evapotranspiration	2.3526
pH (water)	0.8838
Mean temperature of wettest quarter	0.8456
Volume % of coarse fragments (> 2 mm)	0.5201
Annual precipitation	0.4784
Distance to water	0.1944
Temperature seasonality (stdev * 100)	0.1564
Weight in % of sand particles (0.05-2 mm)	0.0878
Cation Exchange Capacity	0.0865

Remarks

Prediction in eastern part of Europe uncertain due to lack of data for that area.