



**INTERPRETATION**

**MANUAL**

**OF**

**EUROPEAN UNION**

**HABITATS**

**25 April 1996**



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EUROPEAN COMMISSION  
DG XI - ENVIRONMENT, NUCLEAR SAFETY AND CIVIL PROTECTION  
Nature protection, coastal zones and tourism

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- \* Copies available from:

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## WHY THIS MANUAL ?

### *Historical review*

The "Habitats" Directive <sup>1</sup> is a Community legislative instrument in the field of nature conservation that establishes a common framework for the conservation of wild animal and plant species and natural habitats of Community importance; it provides for the creation of a network of special areas of conservation, called Natura 2000, to "maintain and restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest".

Animal and plant species names are clearly presented in the Directive and, despite minor misspellings or use of synonyms, no major additional work needs to be done to allow a correct interpretation of Annex II. In contrast, the development of a common agreed definition appeared to be essential for the different habitat types of Annex I.

Annex I lists 164 European natural habitat types <sup>2</sup>, including 46 priority (i.e. habitat types in danger of disappearance and whose natural range mainly falls within the territory of the European Union). Annex I is based on the hierarchical classification of European habitats developed by the CORINE Biotopes project <sup>3</sup> since that was the only existing classification at European level. A draft list of habitat types for Annex I was therefore drawn up on the basis of this classification by Professor A. Noirfalise and submitted to the national experts preparing the Directive as a working document in August 1989. Numerous discussions with the national experts then took place between 1989 and 1991, culminating in the version of Annex I published in the Official Journal in May 1992.

In December 1991, while the Directive was being adopted, a thorough revision of the CORINE classification was published <sup>4</sup>. This revision introduced numerous changes within codes and habitat types, in particular involving the division of the latter into sub-types. Definitions had been prepared for the various categories. Consequently, the Annex I codes no longer corresponded fully to the codes and descriptive content of the various categories of CORINE, resulting in considerable ambiguities in the interpretation of Annex I on the basis of the CORINE classification. The Task Force/European Environment Agency thus produced a paper establishing the correspondence between the habitat codes of Annex I and those of the 1991 version of the CORINE classification <sup>5</sup>. This paper also included the description proposed in the 1991 CORINE version for the various habitat types of Annex I.

<sup>1</sup> Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, O.J. L206, 22.07.92

<sup>2</sup> This figure corresponds only to the principal habitat types listed in Annex I; if sub-types are taken into account, this figure increases to more than 200.

<sup>3</sup> CORINE Biotopes - Technical Handbook, volume 1, p. 73-109, Corine/Biotopes/89-2.2, 19 May 1988, partially updated 14 February 1989.

<sup>4</sup> CORINE Biotopes manual, Habitats of the European Community. EUR 12587/3, Office for Official Publications of the European Communities, 1991.

<sup>5</sup> Relation between the Directive 92/43/EEC Annex I habitats and the CORINE habitat list 1991 (EUR 12587/3). Version 1 - Draft, November 1992. CEC-DG XI, Task Force Agency (EEA-TF).

## The manual

Having in mind all these difficulties of classification, the Scientific Working Group, set up by the Habitats Committee (established by Directive 92/43/EEC), expressed in May 1992 the need to prepare a manual for the interpretation of Annex I. Following a call for proposals the Commission charged Professor Thanghe from the Université Libre de Bruxelles to prepare a draft manual <sup>6</sup>.

Following several meetings of the Scientific Working Group, the Commission agreed the two following points with the national experts:

- (1) The interpretation work on Annex I should primarily focus on the priority habitat types.
- (2) The CORINE classification (1991 version) provides a basis for a description of the Annex I habitat types; where the experts feel that it is not suitable, an operational scientific description should be produced from the contributions of the national experts.

In September 1993 the Université Libre de Bruxelles finalised the study relating to the interpretation of Annex I priority habitat types. This study focused on the drafting of an eight field descriptive sheet drawn up on the basis of written and oral scientific contributions from the national experts. Each sheet gathers the information on national and regional particularities, as well as types of associated habitats. The manual for the interpretation of Annex I priority habitat types of the Council Directive 92/43/EEC was compiled by the Commission (DG XI), based on the study of the Université Libre de Bruxelles, the contributions of the national experts, and the CORINE classification (1991 version); this document was approved by the Habitats Committee in February 1994 (Doc. HABITATS 94/3 FINAL <sup>7</sup>).

Following the adoption of the priority habitats manual, the experts identified a set of 36 non priority habitat types also causing interpretation problems. An interpretation document was drafted by the Université Libre de Bruxelles, discussed in a meeting of the Scientific Working Group (December 1994) and revised accordingly <sup>8</sup>.

On April 1995 the Habitats Committee approved the EUR12 version of the 'Interpretation Manual of European Union Habitats'<sup>9</sup>, which incorporated:

- i) the descriptive sheets for priority habitats <sup>10</sup>, which establish clear, operational scientific definitions of habitat types, using pragmatic descriptive elements (e.g. characteristic plants), and taking into consideration regional variation;
- ii) the descriptive sheets of 36 non priority habitats similar to those used for priority habitats;
- iii) the CORINE Biotopes definitions <sup>3</sup> for the remaining non priority habitats; these definitions should be considered 'a minimal interpretation', not exclusive; some CORINE definitions do not take account of sub-types, regional varieties and/or do not cover all the geographical range of an habitat type - this fact should be recognised, thus allowing a certain flexibility in the interpretation of these Annex I habitat types.

<sup>6</sup> Étude relative au projet de manuel technique d'interprétation de l'Annexe I de la Directive habitats 92/43/CEE. Rapport final, September 1993. Université Libre de Bruxelles (contrat n° 4-3040(92)15504).

<sup>7</sup> Available in English, French, German, Danish, Dutch, Spanish, Portuguese, Greek and Italian.

<sup>8</sup> Étude relative au projet de manuel technique d'interprétation de l'Annexe I de la Directive habitats 92/43/CEE - Types d'habitats non prioritaires. Rapport final, Janvier 1995. Université Libre de Bruxelles (contrat n° B4-3040/94/000212/MAR/B2).

<sup>9</sup> Also available in French under the title 'Manuel d'interprétation des habitat de l'Union européenne'

<sup>10</sup> From Doc. HABITATS 94/3 FINAL

The contents of the manual did not take into account the accession of Austria, Finland and Sweden which has resulted in the inclusion of a new biogeographical region (the Boreal region) in the Directive. These new Member States have asked for the introduction in Annex I of several priority habitat types that are restricted or only apply to them. In order not to delay the distribution of the manual, the Commission has decided to publish that first version (EUR12) and envisaged the preparation of a second version (EUR15) in order to incorporate new information (mainly on distribution and regional sub-types);

## THE EUR15 VERSION

The prime objective of the present manual is to update the EUR12 version. Descriptive sheets were added for the 11 priority types attached to Annex I when Austria, Finland and Sweden joined the Union<sup>11</sup>; it further incorporates comments for other Annex I habitats occurring in those Member States, and corrects, or adds, newly acquired information.

The 1991 classification (Habitats of the European Community) was extended in 1993 to the whole Palaearctic region<sup>12</sup>, namely with the inclusion of the Nordic vegetation classification; this classification was supplemented in 1995 with text descriptions, phytosociological units and references; a computer database tool (PHYSIS<sup>13</sup>) is being developed to support this work. The EUR15 version updates the definitions of those habitat types for which the CORINE 1991 has been used, on the basis of the information contained in the PHYSIS database. Accordingly, the CORINE codes are also replaced by the Palaearctic codes'. In situations where ambiguities exist between the definitions contained in this manual and those of the Palaearctic habitats classification or PHYSIS data base, it is intended that the definitions of this manual should take precedence.

The fact that many of the habitat types of Annex I are qualified by biogeographical terms such as Mediterranean, Alpine, Medio-European, etc., meaning that they have their main occurrence in a given biogeographical region, does not exclude the possibility of finding the same habitat types in other biogeographical regions. In fact, these often isolated occurrences have a major scientific and conservation value. The users of the manual will need to employ a certain flexibility of interpretation, particularly in those areas where the habitat types are very fragmentary and influenced by human activities.

The information concerning Annex I habitat types provided by national experts since 1992 - which is listed on pages 140 and 141 - was of paramount importance for the preparation of this manual; it also constitutes an important additional source of information for understanding the habitat types listed in the Directive.

It is to be expected that, from time to time, revisions of this manual will take place to take account of scientific developments in our understanding of the habitats.

<sup>11</sup> Accession Act of Austria, Finland and Sweden (OJ L1,1.1.1995, p.135)

<sup>12</sup> Devillers, P. & Devillers-Terschuren, J. (1993). A classification of Palaearctic habitats. Strasbourg: Council of Europe

<sup>13</sup> Institut Royal des Sciences Naturelles de Belgique

## Biogeographical regions<sup>14</sup>

HOLARCTIC EMPIRE	
1 EURO-SIBERIAN REGION	
1.1 Boreal province <sup>15</sup>	= "Boreal region*"
1.2 Atlantic province	= "Atlantic region*"
1.3 Coastal province	
1.4 Middle-European province	= "Continental region*"
1.5 High mountain province (subalpine and alpine levels)	= "Alpine region*"
2 MEDITERRANEAN REGION = "Mediterranean region*"	
3 MACARONESIAN REGION = "Macaronesian region*"	

## Vegetation levels<sup>16</sup>

### Vegetation levels for the Euro-Siberian region<sup>17</sup>:

- marine and coastal level
- hill level (white oak, sessile oak, common oak, beech, Scots pine, etc.)
- montane level (beech, fir, spruce, Scots pine)
- subalpine level (fir, spruce, mountain pine, larch, arolla pine)
- alpine level (not forested by definition)
- snow level

### Vegetation levels for the Mediterranean region:

Five basic vegetation levels are distinguished which are (in order of increasing altitude):

- thermo-Mediterranean level (thermophile conifer forests, olive, carob and mastic formations in association with oaks)
- meso-Mediterranean level (forests dominated by sclerophyllous oaks)
- supra-Mediterranean level (deciduous oak forests)
- montane-Mediterranean level (montane conifer forests: cedar, black pine, etc.)
- oro-Mediterranean level (occupied at least in part by sparse, high-altitude juniper forests)

<sup>14</sup> Biogeographical regions as stipulated in Article 1 of Council Directive 92/43/EEC are identified with an asterisk (\*)

<sup>15</sup> Includes the hemiboreal region.

<sup>16</sup> Delpech, R., Dumé, G., Galmiche, P. (1985) Typologie des stations forestières - Vocabulaire. Institut pour le Développement Forestier (IDF).

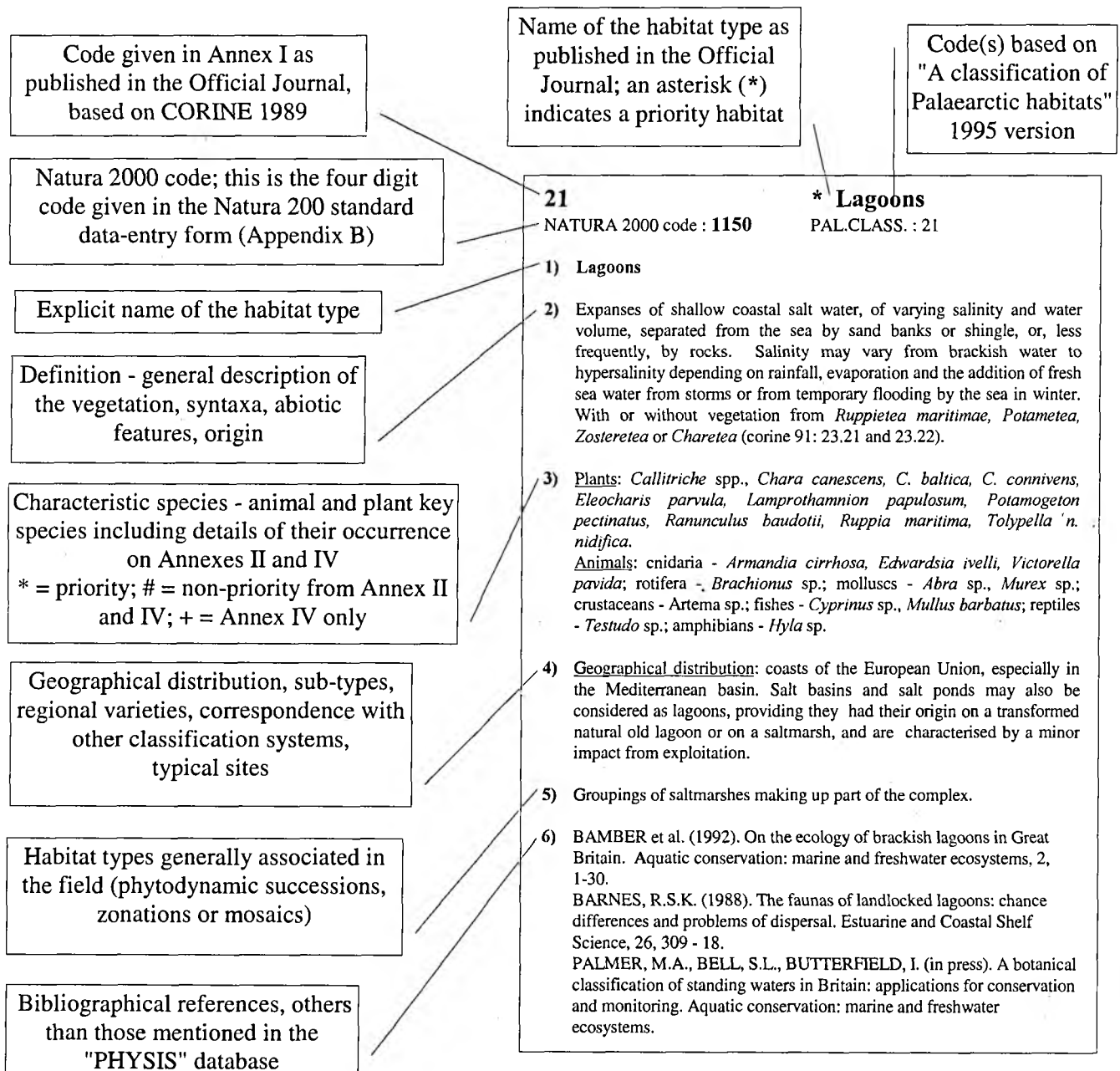
<sup>17</sup> In most of the Atlantic Region it is only possible to distinguish these vegetation levels on the basis of the overall ecological affinities of its non-woodland habitats to the habitats found in the more clearly characterised vegetation levels of the Continental and Alpine Regions.



## Explanatory Notes

○ The habitat types are grouped and sorted according to Annex I of the Directive.

○ For each priority habitat type and for some of the non-priority habitat types:



○ For the remaining non-priority habitat types, item 2) is replaced by the definition given in "A classification of Palaearctic habitats" (PHYSIS, 1995), and when relevant the sub-types are included. In some cases, specific comments from national experts are also included. Items 3) to 6) are completed with the available information, namely the documents produced during the 1995 biogeographical seminars.

## COASTAL AND HALOPHYTIC HABITATS

### *Open sea and tidal areas*

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#### 11.25 Sandbanks which are slightly covered by sea water all the time

NATURA 2000 code: **1110**

PAL.CLASS.: 11.125, 11.22, 11.31

- 1) Sandbanks which are slightly covered by sea water all the time
- 2) Sublittoral sandbanks, permanently submerged. Water depth is seldom more than 20 m below Chart Datum. Non-vegetated sandbanks or sandbanks with vegetation belonging to the *Zosteretum marinae* and *Cymodoceion nodosae*.
- 3) Plants: *Zostera marina*, free living species of the *Corallinaceae* family. In Baltic Sea also *Potamogeton pectinatus*, *Ruppia cirrhosa* and *Tolypella nidifica*.  
Animals: Important wintering habitat for many bird species, in particular *Melanitta nigra* but also *Gavia stellata* and *Gavia arctica*. Resting places for seals. Invertebrate communities of sandy sublittoral (e.g. polychaetes).
- 4) Geographical distribution: Belgium (along the Belgian coast between the coast line to 10 km in sea (Ramsar site "Vlaamse Banken" e.g.), Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands (Voordelta), Portugal, Spain (included the *Halophila decipiens* communities of Tenerife), Sweden, United Kingdom.  
Corresponding category of the German Biotoptypen: "040202a Sandbank der Ostsee (ständig wasserbedeckt)", "030202a Sandbank der Nordsee (ständig wasserbedeckt)".  
Corresponding category of Nordic vegetation types: "4411 *Zostera marina*-typ", "4412 *Ruppia maritima*-typ".
- 5) These sandbanks can be found in association with mudflats and sandflats (14).
- 6) ERICSON, L. & WALLENTINUS, H.-G. (1979). Sea-shore vegetation around the Gulf of Bothnia. Guide for the International Society for Vegetation Science, July-August 1977. *Wahlenbergia* 5:1-142.  
LAPPALAINEN, A., HÄLLFORS, G. & KANGAS, P. (1977). Littoral benthos of the northern Baltic Sea. IV. Pattern and dynamics of macrobenthos in a sandy bottom *Zostera marina* community in Tvärminne.

## 11.34 \* Posidonia beds

NATURA 2000 code : **1120**

PAL.CLASS.: 11.34

- 1) \* **Posidonia beds** (*Posidonion oceanicae*)
- 2) Beds of *Posidonia oceanica* (Linnaeus) Delile characteristic of the infralittoral zone of the Mediterranean (depth: ranging from a few dozen centimetres to 30 - 40 metres). On hard or soft substrate, these beds constitute one of the main climax communities. They can withstand relatively large variations in temperature and water movement, but are sensitive to desalination, generally requiring a salinity of between 36 and 39‰.
- 3) Plants: *Posidonia oceanica*.  
Animals: molluscs - #*Pinna nobilis*; echinoderms - *Asterina pancerii*, *Paracentrotus lividus*; fishes - *Epinephelus guaza*, *Hippocampus ramulosus*.
- 4) Geographical distribution: these beds are only present in the Mediterranean, despite doubtful references from the Portuguese and Basque coasts dating from last century.
- 6) BELSHER, T. et al (1987) in: Livre rouge des espèces menacées de France - tome 2, espèces marines et littorales menacées, Ed. F. de Beaufort. Museum National d'Histoire Naturelle - Paris.

## 13.2 Estuaries

NATURA 2000 code : **1130**

PAL.CLASS.: 13.2, 11.2

- 1) **Estuaries**
- 2) Downstream part of a river valley, subject to the tide and extending from the limit of brackish waters. River estuaries are coastal inlets where, unlike 'large shallow inlets and bays' there is generally a substantial freshwater influence. The mixing of freshwater and sea water and the reduced current flows in the shelter of the estuary lead to deposition of fine sediments, often forming extensive intertidal sand and mud flats. Where the tidal currents are faster than flood tides, most sediments deposit to form a delta at the mouth of the estuary.
- 3) Plants: Benthic algal communities, *Zostera* beds e.g. *Zostera noltii* (*Zosteretea*) or vegetation of brackish water: *Ruppia maritima* (= *R. rostellata* (*Ruppietea*)); *Spartina maritima* (*Spartinetea*); *Sarcocornia perennis* (*Arthrocnemetea*). Both species of fresh water and brackish water can be found in Baltic river mouths (*Carex* spp., *Myriophyllum* spp., *Phragmites australis*, *Potamogeton* spp., *Scirpus* spp.).  
Animals: invertebrate benthic communities; important feeding areas for many birds.
- 4) Geographical distribution: Belgium (Scheldt and Yzer estuaries), Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands (Westererschelde, Ems), Portugal, Spain, Sweden, United Kingdom. Baltic river mouths, considered as an estuary subtype, have brackish water and no tide, with large wetland vegetation (helophytic) and luxurious aquatic vegetation in shallow water areas. Corresponding category of the German Biotoptypen: "D2a Ästure (Fließgewässermündungen mit Brackwassereinfluß u./od. Tidenhub eingeschlossen werden", "050105 Brackwasserwatt des Ästure an der Nordsee", "050106 Süßwasserwatt im Tideeinfluß des Nordsee".

- 5) An estuary forms an ecological unit with the surrounding terrestrial coastal habitat types. In terms of nature conservation, these different habitat types should not be separated, and this reality must be taken into account during the selection of sites.
- 6) BRUNET, R. et al. Les mots de la géographie-dictionnaire critique. Ed. Reclus.  
GILLNER, W. (1960). Vegetations- und Standortsuntersuchungen in den Strandwiesen der schwedischen Westküste. Acta Phytogeogr. Suec. 43:1-198.

## 14 **Mudflats and sandflats not covered by seawater at low tide**

NATURA 2000 code : **1140**

PAL.CLASS.: 14

- 1) **Mudflats and sandflats not covered by seawater at low tide**
- 2) Sands and muds of the coasts of the oceans, their connected seas and associated lagoons, not covered by sea water at low tide, devoid of vascular plants, usually coated by blue algae and diatoms. They are of particular importance as feeding grounds for wildfowl and waders. The diverse intertidal communities of invertebrates and algae that occupy them can be used to define subdivisions of 11.27, eelgrass communities that may be exposed for a few hours in the course of every tide have been listed under 11.3, brackish water vegetation of permanent pools by use of those of 11.4.  
Note: Eelgrass communities (11.3) are included in this habitat type.
- 4) Geographical distribution: all the European Union, except Austria, Finland and Luxembourg.

## 21 **\* Lagoons**

NATURA 2000 code : **1150**

PAL.CLASS.: 21

- 1) **\*Coastal lagoons**
- 2) Lagoons are expanses of shallow coastal salt water, of varying salinity and water volume, wholly or partially separated from the sea by sand banks or shingle, or, less frequently, by rocks. Salinity may vary from brackish water to hypersalinity depending on rainfall, evaporation and through the addition of fresh seawater from storms, temporary flooding of the sea in winter or tidal exchange. With or without vegetation from *Ruppia maritima*, *Potamogeton*, *Zostera* or *Chara* (CORINE 91: 23.21 or 23.22).  
Flads and gloes, considered a Baltic variety of lagoons, are small, usually shallow, more or less delimited water bodies still connected to the sea or have been cut off from the sea very recently by land upheaval. Characterised by well-developed reedbeds and luxuriant submerged vegetation and having several morphological and botanical development stages in the process whereby sea becomes land.
- 3) Plants: *Callitriche* spp., *Chara canescens*, *C. baltica*, *C. connivens*, *Eleocharis parvula*, *Lamprothamnion papulosum*, *Potamogeton pectinatus*, *Ranunculus baudotii*, *Ruppia maritima*, *Tolypella n. nidifica*. In flads and gloes also *Chara* ssp. (*Chara tomentosa*), *Lemna trisulca*, *Najas marina*, *Phragmites australis*, *Potamogeton* spp., *Stratiotes aloides*, *Typha* spp.  
Animals: Cnidaria - *Edwardsia ivelli*; Polychaeta - *Armandia cirrhosa*; Bryozoa - *Victorella pavidia*; Rotifera - *Brachionus* sp.; Molluscs - *Abra* sp., *Murex* sp.; Crustaceans - *Artemia* sp.; Fishes - *Cyprinus* sp., *Mullus barbatus*; Reptiles - *Testudo* sp.; Amphibians - *Hyla* sp.

- 4) Geographical distribution: coasts of the European Union, especially in the Mediterranean basin. Salt basins and salt ponds may also be considered as lagoons, providing they had their origin on a transformed natural old lagoon or on a saltmarsh, and are characterised by a minor impact from exploitation. Flads and gloes only in Finland and Sweden.  
Corresponding category of the German Biotoptypen: "0906 Strandsee", "240601 Brackwassersee im Ostseeküstenbereich".
- 5) Groupings of saltmarshes making up part of the complex.
- 6) BAMBER et al. (1992). On the ecology of brackish lagoons in Great Britain. *Aquatic conservation: marine and freshwater ecosystems*, 2, 65-94.  
BARNES, R.S.K. (1988). The faunas of landlocked lagoons: chance differences and problems of dispersal. *Estuarine and Coastal Shelf Science*, 26, 309 - 18.  
MUNSTERHJELM, R. (1995). The aquatic macrophyte vegetation of flads and gloes, S coast of Finland. *Acta Bot. Fennica* (in print).  
PALMER, M.A., BELL, S.L., BUTTERFIELD, I. (1992). A botanical classification of standing waters: Applications for conservation and monitoring. *Aquatic conservation: marine and freshwater ecosystems*, 2, 125-143.

## Large shallow inlets and bays

NATURA 2000 code : **1160**

PAL.CLASS.: 12

- 1) **Large shallow inlets and bays**
- 2) Large indentations of the coast where, in contrast to estuaries, the influence of freshwater is generally limited. These shallow<sup>18</sup> indentations are generally sheltered from wave action and contain a great diversity of sediments and substrates with a well developed zonation of benthic communities. These communities have generally a high biodiversity. The limit of shallow water is sometimes defined by the distribution of the *Zosteretea* and *Potametea* associations.  
Several physiographic types may be included under this category providing the water is shallow over a major part of the area: embayments, fjards, rias and voes.
- 3) Plants: *Zostera* spp., *Ruppia maritima*, *Potamogeton* spp. (e.g. *P. pectinatus*, *P. praelongus*), benthic algae.  
Animals: benthic invertebrate communities.
- 4) Geographical distribution: Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands (e.g. Oosterschelde), Portugal, Spain, Sweden, United Kingdom.  
Corresponding category of the German Biotoptypen: "B31 naturnaher Boddengewässerkomplex", "B32 Boddengewässerkomplex, geringe Belastung", "A2a Flachwasserzonen der Nordsee (Meeresarme u. -buchten, incl. Seegrasswiesen)".
- 6) LUTHER, (1951). Verbreitung und Ökologie der höheren Wasserpflanzen im Brackwasser der Ekenäs-Gegend in Süd-Finnland. I. Allgemeiner Teil. ABF 49, 1-232. II Spezieller Teil. ABF 50, 1-370.

<sup>18</sup> National experts consider inappropriate to fix a maximum water depth, since the term 'shallow' may have different ecological interpretations according to the physiographic type considered and geographical location.

## Reefs

NATURA 2000 code : **1170**

PAL.CLASS.: 11.24, 11.25

- 1) **Reefs**
- 2) Submarine, or exposed at low tide, rocky substrates and biogenic concretions, which arise from the sea floor in the sublittoral zone but may extend into the littoral zone where there is an uninterrupted zonation of plant and animal communities. These reefs generally support a zonation of benthic communities of algae and animals species including concretions, encrustations and corallogenic concretions.
- 3) Plants: brown algae (species of the *Fucus*, *Laminaria* and *Cystoseira* genus, *Pilayella littoralis*), red algae (e.g. species of the *Corallinaceae*, *Ceramiceae* and *Rhodomelaceae* families), green algae. Other plant species: *Dictyota dichotoma*, *Padina pavonica*, *Halopteris scoparia*, *Laurencia obtusa*, *Hypnea musciformis*, *Dasycladus claveformis*, *Acetabularia mediterranea*.  
Animals: mussel beds (on rocky substrates), invertebrate specialists of hard marine substrates (sponges, *Bryozoa* and cirripedian *Crustacea* for example).
- 4) Geographical distribution: Baltic Sea (along chalky cliffs and rocky shores), North Sea (e.g. Kattegat), the English Channel, Irish Sea, Atlantic, Mediterranean Sea.  
In northern Baltic areas, the upper shallow water filamentous algal-zone with great annual succession is normally well developed on gently sloping shores. *Fucus vesiculosus* is submerged at depth of 0.5-6 m in the sublittoral zone. A red algae zone occur below the *Fucus* zone at depths of about 5 to 10 m.  
Corresponding category of the German Biotoptypen: 010204a Riffe der Nordsee (Benthal mit Hartsystrat, ohne Muschelbänke u. Sabellaria)", "020204a Riffe der Ostsee (Benthal mit Hartsystrat)", "030207 Miesmuschelbank des Sublitorals der Nordsee", "030208 Austernbank des Sublitorals der Nordsee", "030209 Sabellaria-Riff des Sublitorals der Nordsee".
- 5) Where an uninterrupted zonation of sublittoral and littoral communities exist, the integrity of ecological unit should be respected in the selection of sites.
- 6) KAUTSKY, N. (1974). Quantitative investigations of the red algae belt in the Askö area, Northern Baltic proper. Contrib. Askö Lab. Univ. Stockholm 3:1-29.  
RAVANKO, O. (1968). Macroscopic green, brown and red algae in the south-western archipelago of Finland. Acta Bot. Fennica 79:1-50.

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## Marine 'columns' in shallow water made by leaking gases

NATURA 2000 code : **1180**

PAL.CLASS.: 11.24

- 1) **Submarine structures made by leaking gases**
- 2) Spectacular submarine complex structures, consisting of rocks, pavements and pillars up to 4 m high. These formations are due to the aggregation of sandstone by a carbonate cement resulting from microbial oxidation, mainly methane. The methane most likely originated from the microbial decomposition of fossil plant materials. The formations are interspersed with gas vents that intermittently release gas. These formations shelter a highly diversified ecosystem with brightly coloured species.  
These formations have been well studied in shallow waters (10-12 m) along the Danish coast (reference under point 6).
- 3) Animals: Porifera - *Cliona celata*; Anthozoa - *Metridium senile*, *Tealia felina*, *Alcyonium digitatum*; Polychaeta - *Pomatoceros triqueter*, *Dodocaceria concharum*; Gastropoda - *Cingula striata*, *Alvania punctura*, *Rissoa albella*, *R. parva*; Decapoda - *Porcellana longicornis*, *Cancer pagurus*; Echinodermata - *Ophiotrix fragilis*.
- 4) Geographical distribution: Denmark, Greece (up to 100 m).
- 6) JENSEN, P. et al. (1992) - "Bubbling reef" in the Kattegat: submarine landscapes of carbonate-cemented rocks support a diverse ecosystem at methane seeps. Mar. Ecol. Prog. Ser., vol. 83:103-112.

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## Sea cliffs and shingle or stony beaches

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### 17.2 Annual vegetation of drift lines

NATURA 2000 code : **1210**

PAL.CLASS.: 17.2

- 1) **Annual vegetation of drift lines**
  - 2) Formations of annuals or, particularly in Mediterranean, representatives of annuals and perennials, occupying accumulations of drift material and gravel rich in nitrogenous organic matter (*Cakiletea maritimae* p.).
  - 3) Plants: *Cakile maritima*, *Salsola kali*, *Atriplex* spp. (particularly *A. glabriuscula*), *Polygonum* spp., *Euphorbia peplis*, *Mertensia maritima*, *Elymus repens*, *Potentilla anserina*, and, particularly in Mediterranean formations, *Glaucium flavum*, *Matthiola sinuata*, *M. tricuspidata*, *Euphorbia paralias*, *Eryngium maritimum*.
  - 4) Geographical distribution: Denmark, France, Finland, Germany, Greece, Ireland, Italy, Portugal, Spain, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "SD2 *Honkenya peploides-Cakile maritima* strandline community" and "SD3 *Matricaria maritima-Galium aparine* shingle beach community".  
Corresponding categories of the Nordic vegetation types: "4213 *Elytrigia repens*-typ", "4214 *Atriplex* spp.-*Polygonum aviculare*-typ" and "4215 *Cakile maritima*-typ".  
The corresponding association in Azores is *Caliketum edentulae* Conrad.
  - 6) OLSSON, H. (1974). Studies on South Swedish sand vegetation. Acta phytogeogr. suec. 60.
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### 17.3 Perennial vegetation of stony banks

NATURA 2000 code : **1220**

PAL.CLASS.: 17.3

- 1) **Perennial vegetation of stony banks**
- 2) Perennial vegetation of the upper beaches of great shingle banks, formed by *Crambe maritima*, *Honkenya peploides* and other perennial species. A wide range of vegetation types may be found on large shingle structures inland of the upper beach. On more mature, stable, shingle coastal forms of grassland, heath and scrub vegetation may develop. Some areas of unusual vegetation dominated by lichens and bryophytes are found on more mature shingle.
- 3) Plants: *Crambe maritima*, *Honkenya peploides*, *Leymus arenarius* (17.31), *Lathyrus japonicus* (17.32), *Crithmum maritimum* (17.33).
- 4) Geographical distribution: coasts of the Baltic, the Kattegat and the baelts (17.31 - Baltic sea kale communities: *Elymo-Crambetum*), Atlantic, North Sea, Irish Sea and Channel coasts of the United



Kingdom, and, very locally, the Channel coast of France (17.32 - Channel sea kale communities: *Lathyro-Crambetum*), Brittany, and the Cotentin peninsula (17.33 - Atlantic sea kale communities: *Crithmo-Crambetum*).

Corresponding categories of the Nordic vegetation types: 17.31 - "4112 *Crambe maritima-Elytrigia repens*-typ", "4113 *Achillea millefolium-Angelica archangelica*-typ".

Corresponding category in the United Kingdom National Vegetation Classification: " SD1 *Rumex crispus-Glaucium flavum* shingle beach community".

- 6) CRAMER, W. (1993). Dry coastal ecosystems of the northern Baltic sea. In: van der Maarel, E. (ed.) Ecosystems of the world 2A. Dry coastal ecosystems, polar regions and Europe. Elsevier, Amsterdam, pp. 95-107.
- SNEDDON, P. & RANDALL, R.E. (1993). Coastal vegetated shingle structures of Great Britain: main report. Peterborough, Joint Nature Conservation Committee.

## 18.21

## Vegetated sea cliffs of the Atlantic and Baltic coasts

NATURA 2000 code: **1230**

PAL.CLASS.: 18.21

- 1) **Vegetated sea cliffs of the Atlantic and Baltic Coasts**
- 2) Vegetated cliffs exhibit a complex pattern of variation reflecting the degree of maritime exposure, geology and geomorphology, biogeographical provenance and pattern of human management. Typically, on the most exposed cliffs there is a zonation from crevice and ledge communities of the steepest slopes beside the sea (*Crithmo-Armerietalia*, Géhu 1964) through to closed maritime grasslands on upper cliff slopes, cliff tops and cliff ledges where there is deeper accumulation of soils (*Silenion maritimae*, Malloch 1973). Further inland and on more sheltered cliffs, these grade into a complex assemblage of maritime and paramaritime types of heath, calcareous grassland, acid grassland, therophyte, tall herb, scrub and wind-pruned woodland vegetation, each enriched by floristic elements characteristic of coastal habitats. On soft coasts with much active movement, complex assemblages of maritime and non-maritime vegetation occur.
- 3) Plants: *Crithmum maritimum*, *Armeria maritima*, *Limonium* spp., *Brassica oleracea*, *Silene maritima*, *Cochlearia officinalis*, *Plantago maritima*, *Festuca rubra* ssp. *pruinosa*, *Daucus* spp., *Matricaria maritima*, *Asplenium marinum*, *Spergularia rupicola*, *Inula crithmoides*, *Sedum anglicum*, *Rhodiola rosea*, *Lavatera arborea*, *Scilla verna*.
- 4) Geographical distribution: Denmark, France, Finland, Germany, Ireland, Portugal, Spain, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: " MC1 *Crithmum maritimum-Spergularia rupicola* maritime rock crevice", "MC2 *Armeria maritima-Ligusticum scoticum* maritime rock crevice community", "MC3 *Rhodiola rosea-Armeria maritima* maritime cliff ledge community", "MC4 *Brassica oleracea* maritime cliff ledge", "MC5 *Armeria maritima-Cerastium diffusum* maritime therophyte community", "MC6 *Atriplex hastata-Beta vulgaris* ssp. *maritima* seabird cliff community", "MC7 *Stellaria media-Rumex acetosa* seabird cliff community", "MC8 *Festuca rubra-Armeria maritima* maritime grassland", "MC9 *Festuca rubra-Holcus lanatus* maritime grassland", "MC10 *Festuca rubra-Plantago* spp. maritime grassland", "M11 *Festuca rubra-Daucus carota* ssp. *gummifer* maritime grassland", "M12 *Festuca rubra-Hyacinthoides non-scripta* maritime grassland", "H6 *Erica vagans-Ulex europaeus* heath", "H7 *Calluna vulgaris-Scilla verna* heath", "H8 *Calluna vulgaris-Ulex gallii* heath".  
Corresponding category of the Nordic vegetation types: "4111 *Matricaria maritima-Silene uniflora*-typ".

- 6) ENGLUND, B. (1942). Die Pflanzenverteilung auf den Meeresufern von Gotland. Acta Bot. Fenn. 32:1-282.

## 18.22 **Vegetated sea cliffs of the Mediterranean coasts (with endemic *Limonium* spp.)**

NATURA 2000 code : **1240**

PAL.CLASS.: 18.22

- 1) **Vegetated sea cliffs of the Mediterranean coasts (with endemic *Limonium* spp.)**
- 2) Vegetated cliffs and rocky shores of the Mediterranean, of the Mediterraneo-temperate eastern Atlantic (south-western Iberia) and of the Black Sea. *Crithmo-Limonietales*
- 3) Plants: *Crithmum maritimum*, *Plantago subulata*, *Silene sedoides*, *Sedum litoreum*, *Limonium* spp., *Armeria* spp., *Euphorbia* spp., *Daucus* spp., *Asteriscus maritimus*. Many *Limonium* species, in particular, are endemic of extremely local occurrence.
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.

## 18.23 **Vegetated sea cliffs of the Macaronesian coasts (flora endemic to these coasts)**

NATURA 2000 code : **1250**

PAL.CLASS.: 18.23 and 18.24

- 1) **Vegetated sea cliffs of the Macaronesian coasts (with endemic flora)**
- 2) Aerohaline communities of the sea-cliffs of the Canaries and Madeira (*Frankenio-Astidamietalia latifoliae*); communities of the sea-cliffs of the Azores (*Festucion petraeae*) dominated by the endemic *Festuca petraea*.
- 3) Plants: 18.23 - *Crithmum maritimum*, *Astydamia latifolia*, *Schizogyna sericea*, *Andryala glutinosa*, *Plantago coronopus*, *Tolpis fruticosa*, *Aizoon canariense*, *Campylanthus salsoloides*, *Limonium pectinatum*, *Frankenia ericifolia*, *Reichardia ligulata*, *Argyranthemum frutescens*, *Lotus* spp., *Asplenium marinum*. 18.24 - *Festuca petraea*, *Plantago coronopus*, *Daucus carota* ssp. *azorica*, *Azorina vidalii*, *Euphorbia azorica*, *Lotus subbiflorus*, *Polypogon maritimus*, *Asplenium marinum*, *Frankenia* spp.
- 4) Geographical distribution: Portugal (Madeira, Azores), Spain (Canary islands).

## Atlantic and continental salt marshes and salt meadows

### 15.11 *Salicornia* and other annuals colonising mud and sand

NATURA 2000 code : **1310**

PAL.CLASS.: 15.1

- 1) *Salicornia* and other annuals colonising mud and sand
- 2) Formations composed mostly or predominantly of annuals, in particular Chenopodiaceae of the genus *Salicornia* or grasses, colonising periodically inundated muds and sands of marine or interior salt marshes. *Thero-Salicornietea*, *Frankenietea pulverulenta*, *Saginetea maritima*.
- 3) Plants: 15.11 - *Salicornia* spp., *Microcnemum coralloides*, *Suaeda maritima*; 15.12 - *Frankenia pulverulenta*, *Suaeda splendens*, *Salsola soda*, *Cressa cretica*, *Parapholis incurva*, *P. strigosa*, *Hordeum marinum*, *Sphenopus divaricatus*; 15.13 - *Sagina maritima*, *S. nodosa*, *Cochlearia danica*, *Gentiana littorale*, *Bupleurum tenuissimum*.
- 4) Geographical distribution: Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, United Kingdom.

15.11 - Glasswort swards (*Thero-Salicornietalia*): annual glasswort (*Salicornia* spp., *Microcnemum coralloides*), seablite (*Suaeda maritima*), or sometimes salwort (*Salsola* spp.) formations colonising periodically inundated muds of coastal saltmarshes and inland salt-basins.

15.12 - Mediterranean halo-nitrophilous pioneer communities (*Frankenion pulverulenta*): formations of halo-nitrophilous annuals (*Frankenia pulverulenta*, *Suaeda splendens*, *Salsola soda*, *Cressa cretica*, *Parapholis incurva*, *P. strigosa*, *Hordeum marinum*, *Sphenopus divaricatus*) colonising salt muds of the Mediterranean region, susceptible to temporary inundation and extreme drying; they are mostly characteristic of the Iberian peninsula, with irradiations notably in the Camargue, Italy, and on the Atlantic coast of France.

15.13 - Atlantic sea-pearlwort communities (*Saginion maritima*): formations of annual pioneers occupying sands subject to variable salinity and humidity, on the coasts, in the dunal systems and in the saltmarshes of the Atlantic, the North Sea and the Baltic. They are usually limited to small surfaces and best developed in the zone of contact between dune and saltmarsh.

Corresponding category in the United Kingdom National Vegetation Classification: "SM7 *Arthrocnemum perenne* stands", "SM8 Annual *Salicornia* saltmarsh", "SM9 *Suaeda maritima* saltmarsh" and "SM27 Ephemeral saltmarsh vegetation with *Sagina maritima*".

Corresponding category of the Nordic vegetation types: 15.11 - "4233 *Salicornia strictissima*-typ", "4252 *Salicornia europaea*-typ", "4253 *Spergularia salina*-typ".

- 6) ERICSON, L. & WALLENTINUS, H.-G. (1979). Sea-shore vegetation around the Gulf of Bothnia. Guide for the International Society for Vegetation Science, July-August 1977. *Wahlenbergia* 5:1-142.

## 15.12 *Spartina* swards (*Spartinion*)

NATURA 2000 code : **1320**

PAL.CLASS.: 15.2

- 1) *Spartina* swards (*Spartinion maritimi*)
- 2) Perennial pioneer grasslands of coastal salt muds, formed by *Spartina* or similar grasses. When selecting sites, preference should be given to those areas supporting rare or local *Spartina*.
- 3) Plants: 15.21 - *Spartina maritima*, *S. alterniflora*; 15.22 - *Spartina densiflora*.
- 4) Geographical distribution: Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, United Kingdom.  
The following sub-types are included:  
15.21 - Flat-leaved cordgrass swards: perennial pioneer grasslands of coastal salt muds, dominated by flat-leaved *Spartina maritima*, *S. townsendii*, *S. anglica*, *S. alterniflora*.  
  
15.22 - Rush-leaved cordgrass swards: perennial pioneer grasslands of southern Iberian coastal salt muds, dominated by the junciform-leaved *Spartina densiflora*.  
  
Corresponding category in the United Kingdom National Vegetation Classification: "SM4 *Spartina maritima* saltmarsh" and "SM5 *Spartina alterniflora* saltmarsh".

## 15.13 Atlantic salt meadows (*Glauco-Puccinellietalia*)

NATURA 2000 code : **1330**

PAL.CLASS.: 15.3

- 1) Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- 2) Salt meadows of Baltic, North Sea, English Channel and Atlantic shores. *Aster tripolium* can be present or abundant in most subdivisions.
- 3) Plants: 15.31 - *Puccinellia maritima*; 15.32 - *Halimione portulacoides*, *Halimione pedunculata*, *Aster tripolium*; 15.33 - *Armeria maritima*, *Glaux maritima*, *Plantago maritima*, *Frankenia laevis*, *Artemisia maritima*, *Festuca rubra*, *Agrostis stolonifera*, *Juncus gerardii*, *Carex extensa*, *Blysmus rufus*, *Eleocharis* spp.; 15.34 - *Spergularia marina*, *Puccinellia distans*, *P. fasciculata*, *P. retroflexa*, *P. maritima*, *Triglochin maritima*, *Potentilla anserina*, *Halimione portulacoides*; 15.35 - *Elymus pycnanthus* (= *Agropyron pungens*) or *E. repens*; 15.36 - *Atriplex littoralis*, *A. hastata*, *Beta maritima*, *Matricaria maritima*.
- 4) Geographical distribution: Belgium, Denmark, France, Germany, Ireland, Netherlands, Portugal, Spain, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "SM10 Transitional low-marsh vegetation", "SM11 *Aster tripolium* var. *discooides* saltmarsh", "SM12 Rayed *Aster tripolium* saltmarsh", "SM13 *Puccinellia maritima*-*Triglochin maritima* saltmarsh", "SM14 *Halimione portulacoides* saltmarsh", "SM15 *Juncus maritimus*-*Triglochin maritima* saltmarsh", "SM16 *Festuca rubra* saltmarsh community", "SM17 *Artemisia maritima* community", "SM18 *Juncus maritimus* community", "SM19 *Blysmus rufus* saltmarsh community" and "SM20 *Eleocharis uniglumis* community".  
Corresponding category of the Nordic vegetation types: 15.32 - "4231 *Puccinellia maritima*-typ", 15.33 - "422 Övre landstrandens vegetation".

- 6) BURD, F. (1989). The saltmarsh survey of Great Britain. Peterborough, Nature Conservancy Council. Research and survey in nature conservation, no. 17.  
 JOHANSSON, D., EKSTAM, U. & FORSHED, N. (1986). Havstrandängar. LTs förslag, Stockholm, 96 pp.
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## 15.14

\* Continental salt meadows  
 (*Puccinellietalia distantis*)

NATURA 2000 code : **1340**

PAL.CLASS.: 15.4

- 1) \* Inland salt meadows
- 2) Non-coastal natural salt basins made up of different habitat types consisting of zones of seepage of saline water, running or stagnant saline water, with typical halophilous vegetation and of reed beds at the edge of brackish waters.  
 Artificial or partly artificial sites should only be considered here in specific cases where they harbour a species listed in Annex II of the Directive, or where there are no remaining natural (primary) examples of the habitat at regional or national level.
- 3) Plants: *Aster tripolium*, *Atriplex hastata*, *Elymus atherica* (= *E. pungens*, *E. pycnanthus*), *Halimione pedunculata*, *Juncus gerardii*, *Plantago maritima*, *Puccinellia distans*, *Salicornia* spp., *Spergularia salina*, *Suaeda maritima*, *Triglochin maritima*.
- 4) Geographical distribution: France, Germany, United Kingdom.  
 Corresponding category in the United Kingdom National Vegetation Classification: "SM23 *Spergularia marina-Puccinellietalia distans* community". Corresponding category of the German Biotoptypen: "350301 naturnahe Salzrasen des Binnenlandes", "2206 Salz- oder Solquelle", "230405 Salzbach", "230602 salzhaltiges stehendes Gewässer (Binnenlandsalzstellen)".
- 5) Brackish-water reed beds, salt springs, *Salicornia* swards and, less frequently, small salt water courses.

## Mediterranean and thermo-Atlantic saltmarshes and salt meadows

### 15.15 Mediterranean salt meadows (*Juncetalia maritimi*)

NATURA 2000 code : **1410**

PAL.CLASS.: 15.5

- 1) **Mediterranean salt meadows (*Juncetalia maritimi*)**
- 2) Various mediterranean communities of the *Juncetalia maritimi*. The different associations are described under point 3) with their plant species.
- 3) Plants: 15.51 - tall rush saltmarshes dominated by *Juncus maritimus* and/or *J. acutus*, *Carex extensa*, *Aster tripolium*, *Plantago cornuti*, *Scorzonera parviflora*; 15.52 - short rush, sedge and clover saltmarshes (*Juncion maritimi*: *Hordeum nodosum*, *H. maritimum*, *Trifolium squamosum*) and humid meadows behind the littoral, rich in annual plant species and in *Fabacea* (*Trifolion squamosi*: *Trifolium squamosum*, *T. michelianum*, *Alopecurus bulbosus*, *Carex divisa*, *Ranunculus ophioglossifolius*, \**Linum maritimum*); 15.53 - mediterranean halo-psammophile meadows (*Plantaginion crassifoliae*: *Plantago crassifolia*, *Blackstonia imperfoliata*, *Centaurium tenuiflorum*, *Orchis coriophora* ssp. *fragans*; 15.54 - Iberian salt meadows (*Puccinellion fasciculatae*: *Puccinellia fasciculata*, *Aeluropus littoralis*, *Juncus gerardii*); 15.55 - halophilous marshes along the coast and the coastal lagoons (*Puccinellion festuciformis*: *Puccinellia festuciformis*; 15.57 - humid halophilous moors with the shrubby stratum dominated by *Artemisia coerulescens* (*Agropyro-Artemision coerulescentis*); 15.58 - medium-tall *Juncus subulatus* beds, often forming facies with *Arthrocnemum* scrubs.
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "SM15 -*Juncus maritimus*-*Triglochin maritima* saltmarsh" and "SM18 *Juncus maritimus* saltmarsh".

### 15.16 Mediterranean and thermo-Atlantic halophilous scrubs (*Arthrocnemetalia fruticosae*)

NATURA 2000 code : **1420**

PAL.CLASS.: 15.6

- 1) **Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)**
- 2) Perennial vegetation of marine saline muds (schorre) mainly composed of scrubs, essentially with a Mediterranean-Atlantic distribution (*Salicornia*, *Limonium vulgare*, *Suaeda* and *Atriplex* communities) and belonging to the *Sarcocornetea fruticosi* class.
- 3) Plants: *Halimione portulacoides*, *Inula critmoides*, *Suaeda vera* and shrubby *Sarcocornia*.

Vegetation of low topographic level (*Sarcocornetea*): *Sarcocornia perennis*, *S. alpini*, *S. fruticosa*, *Arthrocnemum macrostachym* (= *A. glaucum*), *Halocnemum strobilaceum*.

Vegetation of high topographic level (*Limonietalia confusi*): *Limonium virgatum*, *L. diffusum*, *L. ferulaceum*, *L. densissimum*, *L. girardianum*, *L. bellidifolium*, *L. gmelinii*, *Aeluropus litoralis*, *Aster tripolum*, *Limoniastrum monopetalum*, *Artemisia gallica*.

- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "SM 21 *Suaeda vera*-*Limonium binervosum* saltmarsh community", "SM25 *Sueda vera* saltmarsh community" and "SM7 *Arthrocnemum perenne* stands".
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## 15.17

### Iberia halo-nitrophilous scrubs (*Pegano-Salsoletea*)

NATURA 2000 code : **1430**

PAL.CLASS.: 15.72

- 1) **Halo-nitrophilous scrubs (*Pegano-Salsoletea*)**
- 2) Halo-nitrophilous scrubs (matorrals) belonging to the *Pegano-Salsoletea* class, typical of dry soils under arid climates, sometimes including taller, denser brushes. They are characteristic of the eastern Iberian peninsula.
- 3) Plants: *Peganum harmala*, *Artemisia herba-alba*, *Lycium intricatum*, *Capparis ovata*, *Salsola vermiculata*, *S. genistoides*, *S. oppositifolia*, *Suaeda pruinosa*, *Atriplex halimus*, *A. glauca*, *Camphorosma monspeliaca*, *Haloxylum articulatum*.
- 4) Geographical distribution: France (Corsica), Italy (Sicily, Sardinia), Spain, Portugal.

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## Salt and gypsum continental steppes

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### 15.18 \* Salt steppes (*Limonietalia*)

NATURA 2000 code : **1510** PAL.CLASS.: 15.8

- 1) \* **Mediterranean salt steppes (*Limonietalia*)**
  - 2) Associations rich in perennial, rosette-forming (*Limonium* spp.) or esparto grass (*Lygeum spartum*), occupying, along Mediterranean coasts and on the fringes of Iberian salt basins, soils temporarily permeated (though not inundated) by saline water and subject to extreme summer drying, with formation of salt efflorescence. Characteristic syntaxa are *Limonietalia*, *Arthrocnemetalia*, *Thero-Salicornietalia* and *Saginetalia maritimae*.
  - 3) Plants: *Halopeplis amplexicaulis*, *Hymenolobus procumbens*, \**Limonium* spp., *Lygeum spartum*, *Microcnemion coralloides*, *Salicornia patula*, *Senecio auricula*, *Sphenopus divaricatus*.
  - 4) Geographical distribution: Mediterranean coasts and Iberian peninsula.  
The following syntaxa correspond to regional varieties of this habitat type; *Arthrocnemetalia*: *Suaedion braunblanquetii* (continental Iberian peninsula), *Arthrocnemion glauci*. *Limonietalia*: *Limonium catalaunico-viciosoi* (Aragon), *Lygeo-Limonion furfuracei* (SE Iberian peninsula), *Lygeo-Lepidion cardamines* (Castilla-La-Mancha). *Thero-Salicornietalia*: *Microcnemion coralloidis* (continental Iberian peninsula), *Salicornion patulae*. *Saginetalia maritimae*: *Frankenion pulverulentae*, *Thero-Suaedion*.
  - 6) RIVAS-MARTÍNEZ, S. (1991). Sintaxonomía de la clase *Thero-Salicornietea* en Europa occidental. *Ecol.Medit.* (Marseille) 16: 359 - 364.
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### 15.19 \* Gypsum steppes (*Gypsophiletalia*)

NATURA 2000 code : **1520** PAL.CLASS.: 15.9

- 1) \* **Iberian gypsum vegetation (*Gypsophiletalia*)**
  - 2) 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*, *G. 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*). Characteristic syntaxa are *Lepidion subulati*, *Gypsophilion hispanicae* and *Thymo-Teucrium verticillati*.
  - 3) Plants: *Centaurea hyssopifolia*, *Gypsophila hispanica*, *G. struthium*, *Helianthemum squamatum*, *Herniaria fruticosa*, *Lepidium subulatum*, *Ononis tridentata*, *Reseda stricta*, *Teucrium libanitis*.
  - 4) Geographical distribution: Iberian peninsula.  
Typical sites in the central Meseta and eastern Andalusia (*Lepidion subulati*), Ebro basin and upper Turia (*Gypsophilion hispanicae*), Alicante and Murcia (*Thymo-Teucrium verticillati*).
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**15.A1****\* Pannonic salt steppes and salt marshes**NATURA 2000 code: **1530**

PAL.CLASS.: 15.A1

- 1) **\* Pannonic salt steppes and saltmarshes**
  - 2) Salt steppes, salt pans, saltmarshes and shallow salt lakes, which are highly influenced by pannonic climate with extreme temperatures and aridity in summer. The enrichment of salt in the soil is due to high evaporation of ground water during Summer. These habitat types are partly of natural origin and partly under distinct influence of cattle grazing.  
The halophytic vegetation consists of plant communities on dry salt pans and steppes, humid salt meadows and annual plant communities of periodically flooded salt lakes with typical zonation.
  - 3) Plants: *Artemisia santonicum*, *Suaeda corniculata*, *S. pannonica*, *Lepidium crassifolium*, *Puccinellia peisonis*, *Aster tripolium*, *Salicornia prostata*, *Camphorosma annua*, *Plantago tenuiflora*, *Juncus gerardii*, *Plantago maritima*, *Cyperus pannonicus*, *Pholiurus pannonicus*.  
Animals: molluscs - *\*Helicopsis striata austriaca*; insects: *\*Callimorpha quadripunctaria*, *#Lycaena dispar*; mammals: *+Microtus oeconomus mehelyi*, *#Spermophilus citellus*; birds: *Botaurus stellatus*, *Platalea leucorodia*, *Porzana parva*, *Ixobrychus minutus*, *Acrocephalus melanopogon*, *Aythya nyroca*, *Ardea purpurea*, *Panurus biarmicus*.
  - 4) Geographical distribution: Austria (eastern part).  
Most important sites are Lake Neusiedl and Seewinkel, a few sites in 'Weinviertel'.
  - 6) MUCINA, L., GRABHERR, G., ELLMAUER, T. (1993). Die Pflanzengesellschaften Österreichs, Teil 1.  
SOO, R. (1957). Systematische Übersicht pannonischer Pflanzengesellschaften, Acta Bot. Acad. Sci. Hung., Budapest, 3:317-373.  
WENDELBERGER, G. (1954). Steppen, Trockenrasen und Wälder des pannonischen Raumes. Angew. Pflanzensoziol., Wien, Festschrift Aichinger: 573-634.
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## COASTAL SAND DUNES AND CONTINENTAL DUNES

### *Sea dunes of the Atlantic, North Sea and Baltic coasts*

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#### 16.211 Embryonic shifting dunes

NATURA 2000 code : **2110** PAL.CLASS.: 16.211

- 1) **Embryonic shifting dunes**
  - 2) Formations of the coasts of the Atlantic, the North Sea, the Baltic Sea and the Mediterranean, representing the first stages of dune construction, constituted by ripples or raised sand surfaces of the upper beach or by a seaward fringe at the foot of the tall dunes.
  - 3) Plants: 16.2111 - *Elymus farctus* (*Agropyron junceum*), *Leymus arenarius*, *Honkenya peploides*; 16.2112 - *Sporobolus pungens*, *Euphorbia peplis*, *Otanthus maritimus*, *Medicago marina*, *Anthemis maritima*, *A. tomentosa*, *Eryngium maritimum*, *Pancratium maritimum*.
  - 4) Geographical distribution: Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Sweden, Portugal, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "SD4 *Elymus farctus* ssp. *boreali-atlanticus* foredune community".  
Corresponding category of the Nordic vegetation types: 16.2111 - "4121 *Elytrigia juncea*-typ".
  - 6) PETERSSON, B. (1965). Maritime sands. Acta Phytogeogr. Suec. 50:105-110.
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#### 16.212 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)

NATURA 2000 code : **2120** PAL.CLASS.: 16.212

- 1) **Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)**
- 2) Mobile dunes forming the seaward cordon or cordons of dune systems of the coasts of the North Sea, the Baltic, and the Atlantic (16.2121), the Mediterranean (16.2122) and the Canary Islands (16.2123). *Ammophilion arenariae*, *Zygophyllion fontanesii*.
- 3) Plants: 16.2121- *Ammophila arenaria*, *Eryngium maritimum*, *Euphorbia paralias*, *Calystegia soldanella*, *Otanthus maritimus*, *Leymus arenarius*; 16.2122 - *Ammophila arenaria*, *Echinophora spinosa*, *Eryngium maritimum*, *Euphorbia paralias*, *Cutandia maritima*, *Medicago marina*, *Anthemis maritima*; 16.2123 - *Zygophyllum fontanesii*, *Euphorbia paralias*, *Polycarphae nivea*, *Cyperus capitatus*, *Ononis natrix*, \**Convolvulus caput-medusae*, *Polygonum maritimum*, \**Androcymbium psammophilum*.
- 4) Geographical distribution: Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Sweden, Portugal, United Kingdom.

Corresponding category in the United Kingdom National Vegetation Classification: " SD6 *Ammophila arenaria* mobile dune community".

Corresponding category of the Nordic vegetation types: 16.2121 - "4131 *Ammophila arenaria*-*Leymus arenarius*-typ".

- 6) WILLERS, T. (1988). Die Vegetation der finnischen Küstendünen. Norden 6:41-88.

## 16.221 to 16.227 \* Fixed dunes with herbaceous vegetation (grey dunes)

NATURA 2000 code : **2130**

PAL.CLASS.: 16.221 to 16.227

### 1) \* Fixed coastal dunes with herbaceous vegetation

- 2) Fixed dunes, stabilised and colonised by more or less closed perennial grasslands and abundant carpets of lichens and mosses, from the Atlantic coasts (and the English Channel) between the Straits of Gibraltar and Cap Blanc Nez, and the shores of the North Sea and the Baltic. In the case of the thermo-Atlantic coast, it is logical to include *Euphorbio Helichryson* (code 16.222 - thermo Atlantic as far as Brittany), *Crucianellion maritimae* (code 16.223 - Strait of Gibraltar as far as the southern Atlantic near Cape Prior in Galicia).

**2131** (16.221) - Northern grey dunes: fixed dunes of the Baltic, North Sea, Channel and northern Atlantic, with grass communities and vegetation from *Galio-Koelerion albescentis* (*Koelerion albescentis*), *Corynephorion canescentis* p., *Sileno conicae-Cerastion semidecandri*.

**2132** (16.222) - Biscay grey dunes (*Euphorbio-Helichryson stoechadis*): dunes on stabilised humus soil infiltrated by dwarf bushes, of Brittany and the coast of the Bay of Biscay, with *Helichrysum stoechas*, *Artemisia campestris* and *Ephedra distachya*.

**2133** (16.223) - Thermo-Atlantic grey dunes (*Crucianellion maritimae*): suffrutescent communities on more or less stabilised soils low in humus of the thermo-Atlantic coasts of Galicia, Portugal and south-western Spain (as far as the Strait of Gibraltar), with *Crucianella maritima* and *Pancratium maritimum*.

(16.224) - Greek fixed dunes: Greek formations on various sandy sites on the coast with *Euphorbia terracina* and *Silene nicaeensis* or *Ephedra distachya* and *Silene subconica*. This habitat type does not occur on the Atlantic coast; therefore it should only be considered under category 'Sea dunes of the Mediterranean coast', page 31.

**2135** (16.225) - Atlantic dune (*Mesobromion*) grasslands: various sandy coastal sites characterised by herbaceous vegetation in the form of calcicole mesoxerocline grasslands, poor in nitrogen, corresponding to the communities of *Mesobromion* found by the sea (penetration of aero haline species); dunal grasslands composed of species characteristic of dry calcareous grasslands (34.32).

**2136** (16.226) - Atlantic dune thermophile fringes: *Trifolio-Geranietea sanguinei*: *Galio maritimi-Geranium sanguinei*, *Geranium sanguineum* formations (34.4) incorporated within grey dune systems of the British Isles and Brittany, on neutro basic soils rich in calcium and poor in nitrogen.

**2137** (16.227) - Dune fine-grass annual communities: sparse pioneer formations (35.2, 35.3) of fine grasses rich in spring-blooming therophytes characteristic of oligotrophic soils (nitrogen poor sand or very superficial soils, or on xerocline to xerophile rocks) (*Thero-Airion* p., *Nardo-Galion saxatile* p., *Tuberarion guttatae* p.)

- 3) Plants: *Aira* spp., *Anacamptis pyramidalis*, *Bromus hordeaceus*, *Carex arenaria*, *Cerastium* spp., *Corynephorus canescens*, *Erodium glutinosum*, *E. lebelii*, *Galium verum*, *Gentiana campestris*, *G. cruciata*, *Koeleria* spp., *Milium scabrum*, *Myosotis ramosissima*, *Ononis repens*, *Phleum arenarium*, *Polygala vulgaris* var. *dunensis*, *Silene conica*, *S. otites*, *Trifolium scabrum*, *Tuberaria guttata*, *Viola curtisii*, *V. rupestris* var. *arenaria*.  
Mosses - *Tortula ruraliformis*; lichens - *Cladonia* spp.
- 4) Geographical distribution: Atlantic coasts (plus the English Channel), shores of the North Sea and the Baltic.  
The vegetation may be a closed cover of grassland, sparse annual grassland on sand or dominated by mosses and lichen; the content of limestone (Ca<sup>2+</sup>) may vary greatly and is generally diminishing with age and succession towards brown dune systems (dune heathland).  
Corresponding category in the United Kingdom National Vegetation Classification: 16.221 - "SD12 *Carex arenaria-Festuca ovina-Agrostis capillaris* grassland", "SD8 *Festuca rubra-Galium verum* fixed dune grassland", "SD7 *Ammophila arenaria-Festuca rubra* semi-fixed dune community" and "SD11 *Carex arenaria-Cornicularia aculeata* dune community". 16.226 - "SD9b *Ammophila arenaria-Arrhenatherum elatius* dune grassland *Geranium sanguineum* sub-community". 16.227 - most likely, certain sub-communities of the type "SD7 *Ammophila arenaria-Festuca rubra* semi-fixed dune community" and "SD11 *Carex arenaria-Cornicularia aculeata* dune community".  
Corresponding category of the German Biotoptypen: "1003 Dünenrasen (Graudüne)", "1003a Dünenpionierrasen mit einjähr. Vegetation (Thero-Airion)", "1003b Dünenrasen mit geschlossener Narbe u. überwieg. ausdauernden Arten (Graudüne)".  
Corresponding category of the Nordic vegetation types: "4141 *Corynephorus canescens*-typ" and "4142 *Festuca rubra-Hieracium umbellatum*-typ".
- 5) There is a transition towards communities of *Mesobromion* (34.31 - 34) in the following cases: old mesophile grasslands of dune slacks and inner dunes (*Anthyllido Thesietum*), frequently in mosaic with communities of *Salix repens* and particularly developed on the west face of the dunes; grasslands with *Himantoglossum hircinum* of the dunes in the De Haan area.  
Dune scrubs (16.25) and humid dune slacks (16.3) with distinct vegetation form closely knit complexes with grey dunes devoid of ligneous vegetation.
- 6) ANDERSSON, D. (1950). The Scanian sand vegetation - a survey. Bot. Not. 1950:145-172.  
CURTIS, T.G.F. (1991). The flora and vegetation of sand dunes in Ireland. In: A Guide to the Sand Dunes of Ireland (M.B. Quigley, Ed.). 42-46. European Union for Dune Conservation and Coastal Management.  
DARGIE, T.C.D. (1993). Sand dune vegetation survey of Great Britain. Part II Scotland. JNCC, Peterborough.  
DOODY, J.P. (1991). Sand Dune Inventory of Europe. JNCC, Peterborough and EUCC.  
RIVAS-MARTÍNEZ, S.; LOUSÁ, M.; DÍAZ, T.E.; FERNÁNDEZ-GONZÁLEZ, F. & COSTA, J.C. (1990). La vegetación del sur de Portugal (Sado, Alentejo y Algarve). Itinera Geobot. 3. 5 - 126.

**16.23****\* Decalcified fixed dunes with *Empetrum nigrum***NATURA 2000 code : **2140**

PAL.CLASS.: 16.23

- 1) **\* Decalcified fixed dunes with *Empetrum nigrum***
- 2) Decalcified dunes colonised by *Empetrum nigrum* heaths, of the German, Danish, Scottish, Finnish, Swedish and Dutch (Friesian) coasts. Syntaxa associated to this habitat type: *Empetrium nigri*, *Calluno Genistion pilosae* p., *Ericion tetralicis* p.  
The term "fixed" should be taken to mean the opposite of "shifting".
- 3) Plants: *Carex arenaria*, *Empetrum nigrum*, *Genista tinctoria*, *Pyrola rotundifolia*.
- 4) Geographical distribution: Denmark, Finland, Germany, Netherlands (mainly in Fresland, on the islets of Wadden Zee), Sweden, United Kingdom (Scotland).  
Even if the habitat described under 2) does not exist in France, a psychrophilic coastal association of the Boulonnais may be attached: *Carici trinervis-Callunetum vulgaris* de Foucault & Gehu 78 belonging to the *Empetrium nigri* (Bocher 43) Schubert 60 (*Ulicetalia minoris*, *Calluno-Ulicetea*).  
Corresponding category in the United Kingdom National Vegetation Classification: "H11b *Calluna vulgaris-Carex arenaria* heath community, *Empetrum nigrum* ssp. *nigrum* sub-community".  
In Germany highly endangered coastal *Empetrum nigrum* heathland on the Geest are included.  
Corresponding category of the German Biotoptypen: "100401 Krähenbeer-Heide der Küsten".  
Corresponding category of the Nordic vegetation types: "4143 *Calluna vulgaris-Empetrum nigrum-Carex arenaria*-typ".
- 5) Humid dune slacks (16.3), grey dunes (16.22), wooded dunes (16.22, 16.25).
- 6) MC.MANUS, D. (1988). Plant community dynamics on sand dunes at Murlough National Nature Reserve, Dundrum, Co. Down, Northern Ireland. M.Phil. Thesis, University of Ulster.  
OLSSON, H. (1993). Dry coastal ecosystems of southern Sweden. In: van der Maarel, E. (ed.) Ecosystems of the world 2A. Dry coastal ecosystems, polar regions and Europe. Elsevier, Amsterdam. pp. 131-143.

**16.24****\* Eu-atlantic decalcified fixed dunes  
(*Calluno-Ulicetea*)**NATURA 2000 code : **2150**

PAL.CLASS.: 16.24

- 1) **\* Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)**
- 2) Decalcified dunes of France, Belgium and Britain, colonised by heaths of the alliances *Calluno-Genistion* or *Ulicion minoris*, and of Iberia, colonised by heaths of the alliance *Ericion umbellatae*.
- 3) Plants: *Calluna vulgaris*, *Carex arenaria*, *C. trinervis*, *Erica ciliaris*, *E. cinerea*, *E. scoparia*, *Festuca vasconensis*, *Pseudoarrhenatherum longifolium* (*Arrhenatherum thorei*), *Ulex australis*.
- 4) Geographical distribution: Belgium, France, British islands and Iberian peninsula.  
Corresponding category in the United Kingdom National Vegetation Classification: "H11a *Calluna vulgaris-Carex arenaria* heath-*Erica cinerea* sub-community" and "H11c *Calluna vulgaris-Carex arenaria* species poor sub-community" and "H1d *Calluna vulgaris-Festuca ovina* heath *Carex arenaria* sub-community".

- 5) Pioneer phase of this habitat: decalcified fixed dunes colonised by *Corynephorus canescens* and *Cladonia* spp. (64.1 x 35.2).
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## 16.25 Dunes with *Hippophae rhamnoides*

NATURA 2000 code : **2160**

PAL.CLASS.: 16.251

- 1) Dunes with *Hippophae rhamnoides*
  - 2) Sea-buckthorn formations of forest colonisation in both dry and humid dune depressions, mostly in Denmark, Germany, the Netherlands, Belgium, Britain and Ireland.
  - 3) Plants: *Hippophae rhamnoides*.
  - 4) Geographical distribution: Belgium, Denmark, France, Germany, Ireland, Netherlands, United Kingdom.
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## 16.26 Dunes with *Salix arenaria*

NATURA 2000 code : **2170**

PAL.CLASS.: 16.26

- 1) Dunes with *Salix repens* ssp. *argentea*<sup>19</sup> (*Salicion arenariae*).
- 2) *Salix repens* communities (*Salicion arenariae*), colonising wet dune slacks. Following the lowering of the ground water table or accumulation of drift sand, these communities may develop into mesophilous communities as the *Pyrolo-Salicetum* (with *Pyrola rotundifolia*, *Viola canina*, *Monotropa hypopitys*) or, into xerophilous *Salix* communities (with *Carlina vulgaris*, *Thalictrum minus*) or into *Salix repens* communities with *Mesobromion* elements.
- 3) Plant species: *Salix repens* ssp. *argentea* (i.e. *Salix arenaria*).
- 4) Geographical distribution: Belgium, Denmark, France, Germany, Ireland, Netherlands, Portugal, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "SD16 *Salix repens*-*Holcus lanatus* dune slack".  
Corresponding category of the German Biotoptypen: "1006b Kriechweiden-Teppiche der Dünen".
- 5) This habitat forms mosaics with other dune slack vegetation containing *Salix arenaria* but which is rich in bryophytes and referable to the *Caricion davallianae* (16.33), as well as mosaics with dune grasslands and with thickets with *Rosa pimpinellifolia*. This habitat is often invaded by *Hippophae rhamnoides* and *Ligustrum vulgare*.
- 6) ANON. (1977). A study of the Raven, Co. Wexford. An Foras Forbartha/Forest and Wildlife Service, Dublin.  
COTTON, J. (1974). *Pyrola rotundifolia* L. in Co. Wexford (H12). Ir. Nat. J. 18, 44-46.

<sup>19</sup> *Salix arenaria* is synonymous with *Salix repens* ssp. *argentea*.

OLSSON, H. (1993). Dry coastal ecosystems of southern Sweden. In: van der Maarel, E. (ed.) Ecosystems of the world 2A. Dry coastal ecosystems, polar regions and Europe. Elsevier, Amsterdam, pp. 131-143.

**16.29****Wooded dunes of the Atlantic coast**NATURA 2000 code : **2180**

PAL.CLASS.: 16.29

- 1) **Wooded dunes of the Atlantic, Continental and Boreal region**
- 2) Natural or semi-natural forests (long established) of the Atlantic, Continental and Boreal region coastal dunes with a well developed woodland structure and an assemblage of characteristic woodland species. It corresponds to oak groves and beech-oak groves with birch (*Quercion robori-petraeae*) on acid soils, as well as forests of the *Quercetalia pubescenti-petraeae* order. Pioneer stages are open forests with *Betula* spp. and *Crataegus monogyna*, mixed forests with *Fraxinus excelsior*, *Quercus robur*, *Ulmus minor* and *Acer pseudoplatanus* or, in wet dune slacks, pioneer forests with *Salix alba* which develop into humid mixed forests or marsh forests. On southern atlantic coasts, it mainly corresponds to mixed *Pinus pinaster-Quercus ilex* forests, forests of *Quercus suber* and *Quercus robur* or forest stage with *Quercus robur* or *Quercus pubescens*. On northern Baltic coasts also pioneer forests of *Alnus* spp. or *Pinus sylvestris*.
- 3) Plant species are highly varied and depend on local site conditions
- 4) Geographical distribution: Belgium, Denmark, Finland, France, Germany, Netherlands, Portugal, Spain, Sweden.  
Corresponding category of the German Biotoptypen: "430804 Buchenbuschwald (auf Ostseedünen)", "430801 Traubeneichen-Hainbuchenwald (küstennah, gischtbeeinflußt, F02)", "43080501 Eichen-Trockenwald lalkarmer Standorte (küstennah, gischtbeeinflußt, F02)", "440202 trockener Sandkiefernwald (küstennah, gischtbeeinflußt, F02)".
- 5) This habitat type include semi-natural forests with a typical undergrowth, spontaneously developed from old plantations. These forests are generally associated with dune scrubs (preforest stades-16.25), dune moors, grey dunes (16.22) and wet dune slacks (16.3).
- 6) KIELLAND-LUND. J. (1967). Zur Systematik der Kiefernwälder Fennoscandiensis. Mitt. Flor.-Soz. Arbeitsgem.N.F. 11/12:127-141.

**16.31 to 16.35****Humid dune slacks**NATURA 2000 code : **2190**

PAL.CLASS.: 16.3 = 16.31 to 16.35

- 1) **Humid dune slacks**
- 2) Humid depressions of the dunal systems. Humid dune-slacks are extremely rich and specialised habitats very threatened by the lowering of water tables.
- 4) Geographical distribution: Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "SD13 *Salix repens-Bryum pseudotriquetrum* dune slack community", "SD14 *Salix repens-Campylyium stellatum*

dune slack community", "SD15 *Salix repens-Calliigon cuspidatum* dune slack community", "SD16 *Salix repens-Holcus lanatus* dune slack community" and "SD17 *Potentilla anserina-Carex nigra* dune slack community".

The following sub-types are included:

**2191** (16.31) - Dune-slack pools (*Charetum tomentosae*, *Elodeetum canadense*, *Hippuridetum vulgare*, *Hottonietum palustris*, *Potametum pectinati*): fresh-water aquatic communities (cf. 22.4) of permanent dune-slack water bodies.

**2192** (16.32) - Dune-slack pioneer swards (*Juncenion bufonii* p.: *Gentiano-Erythraeetum littoralis*, *Hydrocotylo-Baldellion*): pioneer formations of humid sands and dune pool fringes, on soils with low salinity.

**2193** (16.33) - Dune-slack fens: calcareous and, occasionally, acidic fen formations (cf. 54.2, 54.4, in particular 54.21, 54.2H, 54.49), often invaded by creeping willow, occupying the wettest parts of dune-slacks.

**2194** (16.34) - Dune-slack grasslands: humid grasslands and rushbeds (see 37.31, 37.4) of dune-slacks, also often with creeping willows (*Salix rosmarinifolia*, *S. arenaria*).

**2195** (16.35) - Dune-slack reedbeds, sedgebeds and canebeds: reedbeds, tall-sedge communities and canebeds (cf. 53.1, 53.2, 53.3) of dune-slacks.

- 6) OLSSON, H. (1993). Dry coastal ecosystems of southern Sweden. In: van der Maarel, E. (ed.) Ecosystems of the world 2A. Dry coastal ecosystems, polar regions and Europe. Elsevier, Amsterdam, pp. 131-143.

## 1A Machairs (\* in Ireland)

NATURA 2000 code: **21A0**

PAL.CLASS.: 1A

- 1) **Machairs (\* in Ireland)**
- 2) Complex habitat comprised of a sandy coastal plain resulting partially from grazing and/or rotational cultivation, in an oceanic location with a cool, moist climate. The wind blown sand has a significant percentage of shell derived material, forming a lime rich soil with pH values normally greater than 7. Vegetation is herbaceous, with a low frequency of sand binding species.
- 3) Plants: *Cochlearia scotica*, *Dactylorhiza fuchsii* ssp. *hebridensis*, *Euphrasia marshallii*, *Festuca rubra*, *Galium verum*, *Lotus corniculatus*, *Plantago lanceolata*, *Poa pratensis*, *Trifolium repens*.
- 4) Geographical distribution: Ireland and United Kingdom. Only the machairs present in Ireland are priority, where they are found principally between Galway Bay and Malin Head (Co. Donegal).
- 5) Lakes (ponds and small lakes in Scotland) of widely varying salinity, pH and chemical composition, transitions to saltmarsh and blanket bog are associated habitats. In the United Kingdom, twelve different types of vegetation under the National Vegetation Classification can be identified.
- 6) BASSETT, A. & CURTIS, T.G.F. (1985). The nature and occurrence of sand-dune machair in Ireland. Proceedings of the Royal Irish Academy. 85B: 1 - 20.  
CURTIS, T.G.F. (1991). The flora and vegetation of sand dunes in Ireland. In: A Guide to the Sand Dunes of Ireland (M.B. Quigley, Ed.). 42-46. European Union for Dune Conservation and Coastal Management.  
RITCHIE, W. (1975). The meaning and definition of machair. Transactions of the Botanical Society of Edinburgh, 42, 431-440.



## Sea dunes of the Mediterranean coast

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### 16.223 *Crucianellion maritimae* fixed beach dunes

NATURA 2000 code : **2210**

PAL.CLASS.: 16.223

- 1) *Crucianellion maritimae* fixed beach dunes
  - 2) Fixed dunes of the western and central Mediterranean, of the Adriatic, of the Ionian Sea and North Africa with *Crucianella maritima*, *Pancratium maritimum*.
  - 3) Plants: *Crucianella maritima*, *Pancratium maritimum*.
  - 4) Geographical distribution: France, Greece, Italy, Spain.
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### 16.224 Dunes with *Euphorbia terracina*

NATURA 2000 code : **2220**

PAL.CLASS.: 16.224

- 1) Dunes with *Euphorbia terracina*
  - 2) Coastal dune grassland communities of the Aegean and Levantine Sea, with, among others, *Euphorbia terracina*, *Silene nicaeensis*, *Ephedra distachya* and *Silene subconica*.
  - 3) Plants: *Euphorbia terracina*, *Ephedra distachya*, *Silene nicaeensis*, *S. subconica*.
  - 4) Geographical distribution: Greece.
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### 16.228 *Malcolmietalia* dune grasslands

NATURA 2000 code : **2230**

PAL.CLASS.: 16.228

- 1) *Malcolmietalia* dune grasslands
- 2) Associations with many small annuals and often abundant ephemeral spring bloom, with *Malcolmia lacera*, *M. ramosissima*, *Evax astericiflora*, *E. lusitanica*, *Anthyllis hamosa*, *Linaria pedunculata*, of deep sands in dry interdunal depressions of the Mediterranean coasts of Iberia, southern France, Italy and of the Atlantic coasts of southern Iberia. They are dunal representatives of 35.4.
- 3) Plants: *Malcolmia lacera*, *M. ramosissima*, *Evax astericiflora*, *E. lusitanica*, *Anthyllis hamosa*, *Linaria pedunculata*.
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain

**16.229*****Brachypodietalia* dune grasslands with annuals**NATURA 2000 code: **2240**

PAL.CLASS.: 16.229

- 1) ***Brachypodietalia* dune grasslands with annuals**
- 2) Dunal formations of 34.5 - Mediterranean xeric grasslands (*Thero-Brachypodietea*) : Meso- and thermo-Mediterranean xerophile, mostly open, short-grass perennial grasslands rich in therophytes; therophyte communities of oligotrophic soils on base-rich, often calcareous substrates.
- 3) Plants: *Brachypodium* spp.
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.

**16.27****\* Dune juniper thickets (*Juniperus* spp.)**NATURA 2000 code: **2250**

PAL.CLASS.: 16.27 and 64.613

- 1) **\* Coastal dunes with junipers (*Juniperus* spp.)**
- 2) Juniper formations [*Juniperus turbinata* ssp. *turbinata* (= *J. lycia*, *J. phoenicea* ssp. *lycia*), *J. macrocarpa*, *J. navicularis* (= *J. transtagana*, *J. oxycedrus* ssp. *transtagana*), *J. communis*] of Mediterranean and thermo-Atlantic coastal dune slacks and slopes (*Juniperion lyciae*). *Juniperus communis* formations of calcareous Jutland dunes.
- 3) Plants: *Juniperus turbinata* ssp. *turbinata*, *J. macrocarpa*, *J. navicularis*, *J. communis*, *J. oxycedrus*.
- 4) Geographical distribution: Mediterranean coasts, Iberian peninsula, Denmark and United Kingdom. This habitat type includes the communities of *J. communis* from the calcareous dunes of Jutland and the communities of *J. phoenicea* ssp. *lycia* in Rièges woods in Camargue.
- 5) In the Mediterranean and Atlantic coasts of the Iberian peninsula this habitat type is associated with dune scrubs of *Corema album* (*Rubio-Coremion albi*) and substitution matorral of the *Halimium halimifolium* dune scrubs (*Stauracantha-Halimietalia*)
- 6) FRANCO, A.J. (1986). *Juniperus* L. In: Flora Iberica 1: 181 - 188. Madrid  
RIVAS-MARTÍNEZ, S.; LOUSÁ, M.; DÍAZ, T.E.; FERNÁNDEZ-GONZÁLEZ, F. & COSTA, J.C. (1990). La vegetación del sur de Portugal (Sado, Alentejo y Algarve). *Itinera Geobot.* 3. 5 - 126.  
RIVAS-MARTÍNEZ, S.; WILDPRET, W. & PÉREZ DE PAZ, P.L. (1993). Datos sobre *Juniperus phoenicea* aggr. (Cupressaceae). *Itinera Geobot.* 7: 509 - 512.

**16.28** **Dune sclerophyllous scrubs**  
(*Cisto-Lavenduletalia*)

NATURA 2000 code : **2260**

PAL.CLASS.: 16.28

- 1) **Dune sclerophyllous scrubs (*Cisto-Lavenduletalia*)**
- 2) Sclerophyllous or lauriphyllous scrubs established on dunes of the Mediterranean and Warm-Temperate Humid regions. Codes of 32 may be used in addition to 16.28 to precise the habitat.
- 3) Plants:
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.

**16.29 x 42.8** **\* Wooded dunes with *Pinus pinea* and/or**  
***Pinus pinaster***

NATURA 2000 code : **2270**

PAL.CLASS.: 16.29 x 42.8

- 1) **\* Wooded dunes with *Pinus pinea* and/or *Pinus pinaster***
- 2) Coastal dunes colonised by Mediterranean and Atlantic thermophilous pines, corresponding to the substitution facies or in some stations climax formations of evergreen oak of artificial origin (*Quercetalia ilicis* or *Ceratonio-Rhamnetalia*).
- 3) Plants: *Pinus pinea*, *P. pinaster*, *P. halepensis*, *Juniperus macrocarpa*, *J. turbinata* ssp. *turbinata*.
- 4) Geographical distribution: Greece, southern and western Iberian peninsula, southern France, Italy. Long-established plantations of these pines, within their natural area of occurrence, and with an undergrowth basically similar to that of paraclimatic formations, are included in this habitat type.

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## Continental dunes, old and decalcified

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64.1 x 31.223

Dry sand heaths with *Calluna* and *Genista*

NATURA 2000 code : 2310

PAL.CLASS.: 64.1 x 31.223

- 1) **Dry sand heaths with *Calluna* and *Genista***
  - 2) Dunes of the North Sea and Baltic plains, formed of quartzic sands originating in redeposited and reworked glacial drift and outwash. They are highly siliceous in the Netherlands, northern Belgium and north-western Germany, progressively slightly less oligotrophic and with a more continental cortège in north-eastern Germany, Poland and eastern Baltic plain. The dune systems, particularly the large ones, harbour a unique ensemble of interacting communities and harbour many specialised and restricted organisms. They have considerably regressed and the remaining examples are fragile and often threatened. Vegetation is dominated by heaths with *Calluna* and *Genista*.
  - 3) Plants: *Calluna vulgaris*, *Genista anglica*, *G. pilosa*.
  - 4) Geographical distribution: Belgium, Denmark, France, Germany, Netherlands, Sweden.  
Corresponding category of the Nordic vegetation types: "5114 *Genista* spp.-*Calluna vulgaris*-typ", "5115 *Calluna vulgaris*-typ".
  - 6) MALMER, N. (1965). The south-western dwarf shrub heaths. Acta Phytogeogr. Suec. 50:123-130.
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64.1 x 31.227

Dry sand heaths with *Calluna* and  
*Empetrum nigrum*

NATURA 2000 code : 2320

PAL.CLASS.: 64.1 x 31.227

- 1) **Dry sand heaths with *Calluna* and *Empetrum nigrum***
- 2) Coastal non-dunal *Calluna vulgaris* and *Empetrum nigrum* heaths of the North Sea and the Baltic, formed on quartzic sands originating in redeposited and reworked glacial drift and outwash..
- 3) Plants: *Calluna vulgaris*, *Empetrum nigrum*.
- 4) Geographical distribution: Denmark, Finland, Germany, Netherlands, Sweden.  
Corresponding category of the Nordic vegetation types: "4143 *Calluna vulgaris*-*Empetrum nigrum*-*Carex arenaria*-typ".
- 6) MALMER, N. (1965). The south-western dwarf shrub heaths. Acta Phytogeogr. Suec. 50:123-130.

**64.1 x 35.2****Open grassland with *Corynephorus* and *Agrostis* of continental dunes**NATURA 2000 code: **2330**

PAL.CLASS.: (64.11 or 64.12) x 35.2

- 1) **Open grassland with *Corynephorus* and *Agrostis* of continental dunes**
- 2) Open formations found on inland dunes with dry siliceous soils, of Atlantic, sub-Atlantic and Mediterraneo-montane distribution, often species-poor and with a strong representation of annuals. It includes formations of unstable Germano-Baltic fluvio-glacial inland sands with *Corynephorus canescens*, *Carex arenaria*, *Spergula morisonii*, *Teesdalia nudicaulis* and carpets of fruticose lichens (*Cladonia*, *Cetraria*) (64.11) and other grasslands of more stabilised Germano-Baltic fluvio-glacial inland dune systems with *Agrostis* spp. and *Corynephorus canescens* or other acidophilous grasses (64.12).
- 3) Plants: 64.11 - *Corynephorus canescens*, *Carex arenaria*, *Spergula morisonii*, *Teesdalia nudicaulis*, *Cladonia*, *Cetraria*; 64.12 - *Agrostis* spp., *Corynephorus canescens*.
- 4) Geographical distribution: Austria, Belgium, Denmark, France, Germany, Netherlands, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "SD11 *Carex arenaria-Cornicularia aculeata* dune community p.p." and "SD12 *Carex arenaria-Festuca ovina-Agrostis capillaris* grassland p.p."  
Corresponding category of the Nordic vegetation types: "4141 *Corynephorus canescens*-typ".
- 6) OLSSON, H. (1974). Studies on South Swedish sand vegetation. Acta Phytogeogr. Suec. 60:1-170.

**64.71****\* Pannonic inland dunes**NATURA 2000 code: **2340**

PAL.CLASS.: 64.71

- 1) **\* Pannonic inland dunes**
- 2) Inland dunes of the Pannonic plain and of neighbouring basins. In former days widely distributed as a result of hay harvesting and grazing. Good examples exist in mosaics of different habitats with open sand, dune lichen communities, pioneer swards with many therophytes, open and closed swards. Only these habitat complexes should be considered under this title. For steppes and meadow-steppes on stabilised sand or sandy soils, without being associated with dune complexes, see habitat 6260 (34.A1).
- 3) Plants: *Cladonia convoluta*, *C. furcata*, *Corynephorus canescens*, *Thymus serpyllum*, *Viola tricolor* ssp. *tricolor*, *Cerastium semidecandrum*, *Spergularia morisonii*, *Alyssum montanum* ssp. *gmelinii*, *Bassia laniflora*, *Cynodon dactylon*.
- 4) Geographical distribution: Austria (at Drösing an der March).  
This habitat is found in the Pannonic plain and neighbouring basins, Marchfeld, extensive areas in the Slovakian part of the Marchfeld.  
Syntaxa for Austria: *Thymo angustifolii-Corynephoretum canescentis* (fragmentary in disturbed sites).
- 5) Habitat complexes with a variety of particular plant communities and microsites.

- 6) MUCINA, L., GRABHERR, G., ELLMAUER, T. (1993). Die Pflanzengesellschaften Österreichs, Teil 1. Anthropogene Vegetation. Gustav Fischer, Jena.Stuttgart. New York. pp 578.
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## FRESHWATER HABITATS

### *Standing water*

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22.11 x 22.31

**Oligotrophic waters containing very few minerals of Atlantic sandy plains with amphibious vegetation: *Lobelia*, *Littorella* and *Isoetes***

NATURA 2000 code : **3110**

PAL.CLASS.: 22.11 x 22.31

- 1) **Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)**
- 2) Shallow oligotrophic waters with few minerals and bases poor, with an aquatic to amphibious low perennial vegetation belonging to the *Littorelletalia uniflorae* order, on oligotrophic soils of lake and pond banks (sometimes on peaty soils). This vegetation consists of one or more zones, dominated by *Littorella*, *Lobelia dortmana* or *Isoetes*, although not all zones may not be found at a given site.
- 3) Plants: *Isoetes lacustris*, *I. echinospora*, *Littorella uniflora*, *Lobelia dortmanna*, *Deschampsia setacea*, *Subularia aquatica*, *Juncus bulbosus*, *Pilularia globulifera*, *Luronium natans*, *Potamogeton polygonifolius*; in the Boreal region also *Myriophyllum alterniflorum*, *Drepanocladus* spp., *Warnstorfia* spp. and *Fontinalis* spp.
- 4) Geographical distribution: Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, United Kingdom.  
Corresponding category of the German Biotoptypen: "24020201 kalkarmer, oligotropher See des Tief- und Hügellands", "24020301 kalkarmes, oligotrophes, sich selbst überlassenes Abbaugewässer".  
Corresponding category of the Nordic vegetation types: "6413 *Lobelia dortmanna-Isoetes* spp.typ", "6414 *Littorella uniflora-Lobelia dortmanna*-typ". In Boreal region, especially on glacio fluvial soil and with usually dense isoetid vegetation, sparse reeds, elodeid vegetation and varying beds of submerged bryophytes.
- 5) This habitat is found in association with heath (31.1) and *Nanocyperion* (22.32) communities. In France and Ireland this habitat occurs, in particular, in heathland of sandy plains on podzols, where the water table occurs on the surface
- 6) MÄKIRINTA, U. (1978). Die Pflanzensoziologische Gliederung der Wasservegetation im See Kukkia, Südfinnland. Acta Univ. Ouluensis Ser. A. Scientiae Rerum Naturalium Nr. 75, biologica Nr.5.  
THUNMARK, S. (1931). Der See Fiolen und seine Vegetation. Acta Phytogeogr. Suecica. II:1-198.

**22.11 x 22.34****Oligotrophic waters containing very few minerals of West Mediterranean sandy plains with *Isoetes***NATURA 2000 code : **3120**

PAL.CLASS.: 22.11 x 22.34

- 1) **Oligotrophic waters containing very few minerals generally on sandy soils of the West Mediterranean, with *Isoetes***
- 2) Dwarf amphibious vegetation of oligotrophic waters with few minerals, mostly on sandy soils of the Mediterranean region and some irradiations in the thermo-Atlantic sector, and belonging to the *Isoeto-Nano-Juncetea*. Short grasslands of temporary ponds (the priority habitat type 22.34 of Annex I) is a particular subtype (temporary and very shallow waters).
- 3) Plant species: high level - *Isoetes velata*, *I. setacea*, *Pilularia minuta*, #*Marsilea strigosa*; low level - *Isoetes histrix*, *I. durieui*, *Serapias* spp. (*Serapion*).
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.

**22.11 x (22.31 and 22.32) Oligotrophic waters in medio-European and perialpine area with amphibious vegetation: *Littorella* or *Isoetes* or annual vegetation on exposed banks (*Nanocyperetalia*)**

NATURA 2000 code : **3130**

PAL.CLASS.: 22.12 x (22.31 and 22.32)

- 1) **Oligotrophic to mesotrophic standing waters of plains to subalpine levels of the Continental and Alpine Region and mountain areas of other regions, with vegetation belonging to *Littorelletea uniflorae* and/or to *Isoeto-Nanojuncetea*.**
- 2) **3131** (22.12 x 22.31): aquatic to amphibious short perennial vegetation, oligotrophic to mesotrophic, of lake, pond and pool banks and water-land interfaces belonging to the *Littorelletalia uniflorae* order.  
  
**3132** (22.12 x 22.32): amphibious short annual vegetation, pioneer of land interface zones of lakes, pools and ponds with nutrient poor soils, or which grows during periodic drying of these standing waters: *Isoeto-Nanojuncetea* class.

These two units could grow together in close association or individually. Characteristic plant species are generally small size ephemerophytes.

- 3) Plants: 22.12 x 22.31: *Littorella uniflora*, #*Luronium natans*, *Potamogeton polygonifolius*, *Pilularia globulifera*, *Juncus bulbosus* ssp. *bulbosus*, *Eleocharis acicularis*, *Sparganium minimum*.  
22.12 X 22.32 : #*Lindernia procumbens*, *Elatine* spp., *Eleocharis ovata*, *Juncus tenageia*, *Cyperus fuscus*, *C. flavescens*, *C. michelianus*, *Limosella aquatica*, *Schoenoplectus supinus*, *Scirpus setaceus*, *Juncus bufonius*, *Centaurium pulchellum*, *Centunculus minimus*, *Cicendia filiformis*.



- 4) Geographical distribution: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom (particularly in high altitude lakes).  
Corresponding category of the German Biotoptypen: "240301 mesotropher See (Bleisee) (mit Zwergbinsenfluren -wechslnass-, P143)", "240306 meso- bis eutrophes, sich selbst überlassenes Abbaugewässer (mit Zwergbinsenfluren -wechslnass-, P143)".  
Corresponding category of the Nordic vegetation types: "6411 *Eleocharis acicularis*-typ", "6412 *Ranunculus reptans*-*Subularia aquatica*-typ".  
Corresponding association in Azores is *Isoetum azorica* Lüp.
- 5) This habitat type could also develop in wet dune slacks (see 16.32, included in Annex I). In the Atlantic region, such lakes can shelter glacial relict species, e.g. fish such as *Selvelinus alpinus*. Zones with a variable hydrological system, periodically lacking vegetation due to tramping, should not be included.
- 6) JENSSEN, S. (1979). Classification of lakes in southern Sweden on the basis of their macrophyte composition by means of multivariate methods. *Vegetatio* 39:129-146.

**22.12 x 22.44****Hard oligo-mesotrophic waters with benthic vegetation of *Chara* formations**NATURA 2000 code : **3140**

PAL.CLASS.: (22.12 or 22.15) x 22.44

- 1) **Hard oligo-mesotrophic waters with benthic vegetation of *Chara* formations**
- 2) Lakes and pools with waters fairly rich in dissolved bases (pH often 6-7) (21.12) or with mostly blue to greenish, very clear, waters poor (to moderate) in nutrients, base-rich (pH often >7.5) (21.15). The bottom of these unpolluted water bodies are covered with charophyte, *Chara* and *Nitella*, algal carpets. In the Boreal region this habitat type includes small calcareous-rich oligo-mesotrophic gyttja pools with dense *Chara* (dominating species is *C. strigosa*) carpets, often surrounded by various eutrophic fens and pine bogs.
- 3) Plants: *Chara* spp., *Nitella* spp.
- 4) Geographical distribution: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, United Kingdom.  
Corresponding category of the Nordic vegetation types: "633 Långskottsvegetation med kransalger", "6421 *Littorella uniflora*-*Chara* spp. -typ"
- 6) LUNDH, A. (1951). Studies on the vegetation and hydrochemistry of Scanian lakes. III. Distribution of macrophytes and some algal groups. *Bot. Not. Suppl.* 3(1):1-138.  
RINTANEN, T. (1982). Botanical lake types in Finnish Lapland. *Ann. Bot. Fennici* 19:247-274.

**22.13****Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation**NATURA 2000 code : **3150**

PAL.CLASS.: 22.13 x (22.41 or 22.421)

- 1) **Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation**
- 2) Lakes and ponds with mostly dirty grey to blue-green, more or less turbid, waters, particularly rich in dissolved bases (pH usually > 7), with free-floating surface communities of the *Hydrocharition* or, in deep, open waters, with associations of large pondweeds (*Magnopotamion*).
- 3) Plants: *Hydrocharition* - *Lemna* spp., *Spirodela* spp., *Wolffia* spp., *Hydrocharis morsus-ranae*, *Stratiotes aloides*, *Utricularia australis*, *U. vulgaris*, #*Aldrovanda vesiculosa*, ferns (*Azolla*), liverworts (*Riccia* spp., *Ricciocarpus* spp.); *Magnopotamion* - *Potamogeton lucens*, *P. praelongus*, *P. zizii*, *P. perfoliatus*.
- 4) Geographical distribution: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.  
Corresponding category of the Nordic vegetation types: "632 *Potamogeton* spp.-huvudtyp", "6511 *Lemna minor*-*Spirodela polyrrhiza*-typ".
- 6) DAHL, E., KALLIOLA, R., MARKER, E. & PERSSON, Å. (1971). Nordisk vegetationsklassificering för kartläggning. In: IBP i Norden 7. Universitetsforlaget, Oslo, pp. 3-12.

**22.14****Dystrophic lakes**NATURA 2000 code : **3160**

PAL.CLASS.: 22.14

- 1) **Natural dystrophic lakes and ponds**
- 2) Natural lakes and ponds with brown tinted water due to peat and humic acids, generally on peaty soils in bogs or in heaths with natural evolution toward bogs. pH is often low, 3 to 6. Plant communities belong to the *Utricularietalia* order.
- 3) Plants: *Utricularia minor*, *Rhynchospora alba*, *R. fusca*, *Sparganium minimum*, species of *Sphagnum* genus. In the Boreal region also *Nuphar lutea*, *N. pumila*, *Carex lasiocarpa*, *C. rostrata*, *Nymphaea candida*, *Drepanocladus* spp., *Warnstorfia trichophylla*, *W. procera*.  
Animals: Odonata (dragonflies and damselflies)
- 4) Geographical distribution: Austria, Belgium (High Ardennes in particular), Denmark, Finland, Germany, Greece, Spain, France, Ireland, Italy, Netherlands (e.g. reserve "de Groote Peel"), Portugal, Sweden, United Kingdom.  
Corresponding category of the German Biotoptypen: "240101 natürliches, dystrophes Gewässer (z. B. Kolk, Moorauge, Randlagg).  
Corresponding category of the Nordic vegetation types: "6211 *Nuphar*-typ", "652 Vattenmossvegetation".

**22.34****\* Mediterranean temporary ponds**NATURA 2000 code : **3170**

PAL.CLASS.: 22.34

**1) \* Mediterranean temporary ponds**

- 2) Very shallow temporary ponds (a few centimetres) which exist only in winter or late spring, with flora mainly composed of Mediterranean therophytic and geophytic species belonging to the alliances *Isoetion*, *Nanocyperion flavescens*, *Preslion cervinae*, *Agrostion salmanticae*, *Heleochoion* and *Lythron tribracteati*.
- 3) Plants: *Agrostis pourretii*, *Centaurium spicatum*, *Chaetopogon fasciculatus*, *Cicendia filiformis*, *Crypsis aculeata*, *C. alopecuroides*, *C. schoenoides*, *Cyperus flavescens*, *C. fuscus*, *C. michelianus*, *Damasonium alisma*, *Elatine macropoda*, *Eryngium corniculatum*, *E. galioides*, *Exaculum pusillum*, *Fimbristylis bisumbellata*, *Glinus lotoides*, *Gnaphalium uliginosum*, *Illecebrum verticillatum*, #*Isoetes boryana*, *I. delilei*, *I. duriei*, *I. heldreichii*, *I. histrix*, #*I. malinverniana*, *I. velata*, *Juncus buffonius*, *J. capitatus*, *J. pygmaeus*, *J. tenageia*, *Lythrum castellatum*, \**L. flexuosum*, *L. tribracteatum*, #*Marsilea batardae*, #*M. strigosa*, *Mentha cervina*, *Ranunculus dichotomiflorus*, *R. lateriflorus*, *Serapias lingua*, *S. neglecta*, *S. vomeracea*.
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain, United Kingdom. Corresponding association in Azores is *Anthemido-Menthetum pulegii* Lüp., with *Anthemis nobilis*, *Mentha pulegium*, *Juncus bulbosus*, *Hypericum humifusum*, *Scirpus setacea*, *Peplis portula*, *Isoetes azorica*.

**\* Turloughs (Ireland)**NATURA 2000 code : **3180**

PAL.CLASS.: 22.5

**1) \* Turloughs**

- 2) Temporary lakes principally filled by subterranean waters and particular to karstic limestone areas in Ireland. Most flood in the autumn and then dry up between April and July. However, some may flood at any time of the year after heavy rainfall and dry out again in a few days; others, close to the sea, may be affected by the tide in summer. These lakes fill and empty at particular places. The soils are quite variable, including limestone bedrock, marls, peat, clay and humus, while aquatic conditions range from ultra oligotrophic to eutrophic. The vegetation mainly belongs to the alliance *Lolio-Potentillion anserinae* Tx. 1947, but also *Caricion davallianae* Klika 1934.
- 3) Plants: *Cinclidotus fontinaloides*, *Fontinalis antipyretica* (Bryophyta).  
Animals: *Tanyrastix stagnalis* (wet phase) and the beetles *Agonum lugens*, *A. livens*, *Badister meridionalis*, *Blethisa multipunctata* and *Pelophila borealis* (dry phase)<sup>20</sup>.
- 4) Geographical distribution: at present, only considered in Ireland.
- 6) COXON, C.E. (1986). A study of the hydrology and geomorphology of turloughs. Ph.D. Thesis, Trinity College, Dublin.  
COXON, C.E. (1987). The spatial distribution of turloughs. *Irish Geography*. 20: 11 - 23.  
GOODWILLIE, R. (1992). Turloughs over 10 ha: vegetation survey and evaluation. A report for the National Parks and Wildlife Service of the Office of Public Works (unpublished).

<sup>20</sup> The animals listed should not be regarded as characteristic in any strict sense; both fauna and flora of turloughs are characteristic of intermittently flooded zones.

- MACGOWRAN, B. (1985). Phytosociological and ecological studies on turloughs in the west of Ireland. Ph.D. Thesis, National University of Ireland, Dublin.
- PRAEGER, R.L. (1932). The flora of turloughs: a preliminary note. Proceedings of the Royal Irish Academy. 41B: 37 - 45.
- SYKORA, K.V. (1982). Lolio-Potentillion Communities in Ireland. Acta Botanica Neerlandica. 31(3): 185 - 199.

## Running water

Sections of water courses with natural or semi-natural dynamics (minor, average and major beds) where the water quality shows no significant deterioration

### 24.221 and 24.222 Alpine rivers and the herbaceous vegetation along their banks

NATURA 2000 code : **3220**

PAL.CLASS.: 24.221 and 24.222

- 1) **Alpine rivers and the herbaceous vegetation along their banks**
- 2) **3221** (24.221) - Open assemblages of herbaceous or suffrutescent pioneering plants, rich in alpine species, colonising gravel beds of streams with an alpine, summer-high, flow regime, formed in northern boreal and lower Arctic mountains, hills and sometimes lowlands, as well as in the alpine and subalpine zones of higher, glaciated, mountains of more southern regions, sometimes with abyssal stations at lower altitudes (*Epilobion fleischeri* p.).  
**3222** (24.222) - Open or closed assemblages of herbaceous or suffrutescent pioneering plants, colonising, within the montane or sub-montane levels, gravel beds of streams with an alpine, summer-high, flow regime, born in high mountains (*Epilobion fleischeri* p., *Calamagrostion pseudophragmites*).
- 3) Plants: 24.221 - *Astragalus sempervirens*, *Dryas octopetala*, *Epilobium fleischeri*, *Gypsophila repens*, *Rhacomitrium canescens*, *Rumex cutatus*, *Saxifraga aizoides*, *S. bryoides*, *S. caerulea*, *Trifolium palescens*; 24.222 - *Chondrilla chondrilloides*, *Calamagrostis pseudophragmites*, *Erucastrum nasturtiifolium*, *Gypsophila repens*, *Dryas octopetala*, *Aethionema saxatile*, *Epilobium dodonaei*, *Erigeron acris*, *Leontodon berinii*, *Buphthalmum salicifolium*, *Euphorbia cyparissias*, *Fumana procumbens*, *Agrostis gigantea*, *Anthyllis vulneraria* ssp. *alpestris*, *Campanula cochleariifolia*, *Hieracium piloselloides*, *Calamagrostis pseudophragmites*, *Conyza canadensis*, *Pritzelago alpina*, and seedlings of *Salix elaeagnos*, *Salix purpurea*, *Salix daphnoides* and *Myricaria germanica*.
- 4) Geographical distribution: Austria, Finland, France, Germany, Greece, Italy, Spain, Sweden.  
 Corresponding category of the Nordic vegetation types: "7211 *Calamagrostis stricta*-*Lotus corniculatus*-*Oxyria digyna*-typ", "7214 *Racomitrium canescens*-*Oxyria digyna* -typ", "7222 *Eriophorum scheuchzeri* -typ", "7223 *Calamagrostis stricta* -typ" and "7224 *Carex aquatilis*-*Equisetum fluviatile* -typ".

**24.223****Alpine rivers and their ligneous vegetation with  
*Myricaria germanica***NATURA 2000 code : **3230**

PAL.CLASS.: 24.223 x 44.111

- 1) **Alpine rivers and their ligneous vegetation with *Myricaria germanica***
- 2) Communities of low shrubby pioneers invading the herbaceous formations of 24.221 and 24.222 on gravel deposits rich in fine silt, of mountain and northern boreal streams with an alpine, summer-high, flow regime. *Myricaria germanica* and *Salix* spp. are characteristic (*Salici-Myricarietum*).
- 3) Plants: *Myricaria germanica*, *Salix elaeagnos*, *Salix purpurea* ssp. *gracilis*, *Salix daphnoides*, *Salix nigricans*.
- 4) Geographical distribution: Austria, Finland, France, Germany, Italy, Spain, Sweden.  
Corresponding category of the Nordic vegetation types: "7212 *Myricaria germanica*-typ".

**24.224****Alpine rivers and their ligneous vegetation with  
*Salix elaeagnos***NATURA 2000 code : **3240**

PAL.CLASS.: 24.224 x 44.112

- 1) **Alpine rivers and their ligneous vegetation with *Salix elaeagnos***
- 2) Thickets or woods of, among others, *Salix* spp., *Hippophae rhamnoides*, *Alnus* spp., *Betula* spp., on stream gravels of mountain and northern boreal streams with an alpine, summer-high, flow regime. Formations of *Salix elaeagnos*, *Salix purpurea* ssp. *gracilis*, *Salix daphnoides*, *Salix nigricans* and *Hippophae rhamnoides* of higher gravel shoals in Alpine and peri-Alpine valleys, with outposts in and around the Carpathians and the Dinarids.
- 3) Plants: *Salix elaeagnos*, *Salix purpurea* ssp. *gracilis*, *Salix daphnoides*, *Salix nigricans* and *Hippophae rhamnoides*.
- 4) Geographical distribution: Austria, France, Germany, Greece, Italy, Spain.

**24.225****Constantly flowing Mediterranean river with *Glaucium flavum***NATURA 2000 code : **3250**

PAL.CLASS.: 24.225

- 1) **Constantly flowing Mediterranean rivers with *Glaucium flavum***
- 2) Communities colonising gravel deposits of rivers with a Mediterranean, summer-low, flow regime, with formations of the *Glaucium flavi*.
- 3) Plants: *Myricaria germanica*, *Erucastrum nasturtiifolium*, *Glaucium flavum*, *Oenothera biennis*.
- 4) Geographical distribution: France, Greece, Italy, Spain.

## 24.4

**Floating vegetation of *Ranunculus* of plain, submountainous rivers**NATURA 2000 code: **3260**

PAL.CLASS.: 24.4

- 1) **Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation.**
- 2) Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitriche-Batrachion* (low water level during Summer) or aquatic mosses.
- 3) Plants: *Ranunculus saniculifolius*, *R. trichophyllus*, *R. fluitans*, *R. peltatus*, *R. penicillatus* ssp. *penicillatus*, *R. penicillatus* ssp. *pseudofluitantis*, *R. aquatilis*, *Myriophyllum* spp., *Callitriche* spp., *Sium erectum*, *Zannichellia palustris*, *Potamogeton* spp., *Fontinalis antipyretica*.
- 4) Geographical distribution: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.  
Corresponding category of the German Biotoptypen: "23010101 naturnahes, kalkreiches Epi-/Metarhithral", "23010201 naturnahes, kalkarmes Epi-/Metarhithral", "23010301 naturnahes, kalkreiches Hyporhithral", "23010401 naturnahes, kalkarmes Hyporhithral", "23020101 naturnahes Epipotamal", "23010201 naturnahes Metapotamal", "23010301 naturnahes Hypopotamal" (mit flutenden Macrophyten, P138).  
Corresponding category of the Nordic vegetation types: "6621 *Myriophyllum alterniflorum*-*Potamogeton alpinus*-*Fontinalis antipyretica*-typ".
- 5) This habitat is sometimes associated with *Butomus umbellatus* bank communities. It is important to take this point into account in the process of site selection.
- 6) SJÖRS, H. (1967). Nordisk växtgeografi. 2 uppl. Svenska Bokförlaget Bonniers, Stockholm, 240 pp.

## 24.52

***Chenopodietum rubri* of submountainous rivers**NATURA 2000 code : **3270**

PAL.CLASS.: 24.52

- 1) **Muddy river banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation**
- 2) Muddy river banks of plain to submontane levels, with annual pioneer nitrophilous vegetation of the *Chenopodium rubri* p.p. and the *Bidention* p.p. alliances. During the spring and at the beginning of the summer, corresponding sites look like muddy banks without any vegetation (late development in the year). If the conditions are not favourable, this vegetation has a weak development or could be completely absent.
- 3) Plants: *Chenopodium rubrum*, *Bidens frondosa*, *Xanthium* sp., *Polygonum lapathifolium*.
- 4) Geographical distribution: Austria, Belgium, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain.

Corresponding category of the German Biotoptypen: "230605 zeitweilig trockenfallende Schlammfläche an fließenden Gewässern (krautreich, P026)", "230605 zeitweilig trockenfallende Schlammfläche an fließenden Gewässern (krautreich, P026)".

- 5) This habitat is found in close association with dense populations of the *Bidens* genus or of neophytic species. In order to support the conservation of these communities, with a late or irregular annual development, it is important to take into account bank widths of 50 to 100 m and even parts without vegetation (24.51).

## 24.53

### Constantly flowing Mediterranean rivers: *Paspalo-Agrostidion* and hanging curtains of *Salix* and *Populus alba*

NATURA 2000 code : **3280**

PAL.CLASS.: 24.53

- 1) **Constantly flowing Mediterranean rivers with *Paspalo-Agrostidion* species and hanging curtains of *Salix* and *Populus alba***
- 2) Nitrophilous annual and perennial grass and sedge formations of the alluvial banks of great Mediterranean rivers, with *Paspalum paspaloides*, *P. vaginatum*, *Polypogon viridis* (= *Agrostis semiverticillata*), *Cyperus fuscus*, and hanging curtains of *Salix* and *Populus alba*.
- 3) Plants: *Paspalum paspaloides*, *P. vaginatum*, *Polypogon viridis* (= *Agrostis semiverticillata*), *Cyperus fuscus*, *Salix* spp., *Populus alba*.
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.

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### Intermittently flowing Mediterranean rivers

NATURA 2000 code : **3290**

PAL.CLASS.: 24.16 and 24.53

- 1) **Intermittently flowing Mediterranean rivers**
- 2) Intermittently flowing Mediterranean rivers with the *Paspalo-Agrostidion* communities. They correspond to the rivers type 24.53, but with the particularity of an interrupted flow and a dry bed during a part of the year. The bed of the river can be completely dry or left with some pools.
- 3) Plants: *Polygonum amphibium*, *Ranunculus fluitans*, *Potamogeton natans*, *P. nodosus*, *P. pectinatus*.
- 4) Geographical distribution: France, Greece, Italy, Spain, Portugal.

## TEMPERATE HEATH AND SCRUB

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### 31.11 Northern Atlantic wet heaths with *Erica tetralix*

NATURA 2000 code : **4010**

PAL.CLASS.: 31.11

- 1) Northern Atlantic wet heaths with *Erica tetralix*
  - 2) Humid, peaty or semi-peaty heaths, other than blanket bogs, of the Atlantic and sub-Atlantic domains.
  - 3) Plants: *Erica tetralix*.
  - 4) Geographical distribution: Belgium, Denmark, France, Germany, Ireland, Netherlands, Portugal, Spain, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "M14 *Schoenus nigricans-Nartheccium ossifragum* heath p.p.", "M15 *Scirpus cespitosus-Nartheccium ossifragum* mire", "M16 *Erica tetralix-Sphagnum compactum* wet heath" and "H5 *Erica vagans-Schoenus nigricans* heath".  
Corresponding category of the Nordic vegetation types: "5121 *Erica tetralix*-typ".
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### 31.12 \* Southern Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix*

NATURA 2000 code : **4020**

PAL.CLASS.: 31.12

- 1) \* Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix*
- 2) Hygrophilous heaths of areas with a temperate oceanic climate, on semi-peaty or dried-out soils, with surface minerals in the case of peaty soils (hydromor), with vegetation of the alliances *Genistion micrantho-anglicae* and *Ulicion minoris*: *Ulici minoris-Ericetum ciliaris*, *Ulici gallii-Ericetum mackaiana*, *Ulici minoris-Ericetum tetralicis* (Schwickerath 33 Tuxen 37), *Cirsio filipenduli-Ericetum ciliaris*.
- 3) Plants: *Centaurea uliginosa*, *Erica ciliaris*, *E. mackaiana*, *E. tetralix*, *Euphorbia polygaliphylla*, *Genista anglica*, *G. carpetana*, *G. micrantha*, *Sphagnum* spp., *Ulex minor* var. *lusitanicus*.
- 4) Geographical distribution: France (common in Sologne and in Brittany), Portugal, Spain, United Kingdom (rare and confined to the south of England).  
Corresponding category in the United Kingdom National Vegetation Classification: "H3 *Ulex minor-Agrostis* heath", "H4 *Ulex gallii-Agrostis* heath" and "M16 *Erica tetralix-Sphagnum compactum*" where these contain *Erica ciliaris*.



## 31.2

Dry heaths (all subtypes)<sup>21</sup>

NATURA 2000 code : 4030

PAL.CLASS.: 31.2

- 1) **European dry heaths**
- 2) Mesophile or xerophile heaths on siliceous, podsolic soils in moist Atlantic and sub-Atlantic climates of plains and low mountains of Western, Central and Northern Europe.
- 3) Plants: 31.21 - *Vaccinium* spp., *Calluna vulgaris*; 31.22 - *Calluna vulgaris*, *Genista anglica*, *G. germanica*, *G. pilosa*, accompanied by *Empetrum nigrum* or *Vaccinium* spp.; 31.23 - *Ulex maritimus*, *U. gallii*, *Erica cinerea*, *E. mackaiana*, *E. vagans*; 31.24 - *Erica umbellata*, *E. aragonensis*, *E. cinerea*, *E. andevalensis*, *Cistus salvifolius*, *Calluna vulgaris*; 31.25 - *Erica cinerea*.
- 4) Geographical distribution: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "H1 *Calluna vulgaris-Festuca ovina* heath", "H2 *Calluna vulgaris-Ulex minor* heath", "H3 *Ulex minor-Agrostis curtisii* heath", "H4 *Ulex gallii-Agrostis curtisii* heath", "H7 *Calluna vulgaris-Scilla verna* heath", "H8 *Calluna vulgaris-Ulex gallii* heath", "H9 *Calluna vulgaris-Deschampsia flexuosa* heath", "H10 *Calluna vulgaris-Erica cinerea* heath", "H12 *Calluna vulgaris-Vaccinium myrtillus* heaths", "H16 *Calluna vulgaris-Arctostaphylos uva-ursi* heath", "H18 *Vaccinium myrtillus-Deschampsia flexuosa* heath" and "H21 *Calluna vulgaris-Vaccinium myrtillus-Sphagnum capillifolium* heath".  
Corresponding category of the Nordic vegetation types: "5111 *Rhacomitrium lanuginosum-Empetrum hermaphroditum*-typ", "5113 *Calluna vulgaris-Empetrum nigrum-Vaccinium vitis-idaea*-typ", "5115 *Calluna vulgaris*-typ", "5116 *Vaccinium myrtillus-Calluna vulgaris*-typ", "5117 *Calluna vulgaris-Hieracium pilosella*-typ", "5131 *Deschampsia flexuosa-Galium saxatile*-typ", "5132 *Agrostis capillaris-Galium saxatile*-typ".  
The following sub-types are included:  
31.21 Sub-montane *Vaccinium-Calluna* heaths. *Calluno-Genistion pilosae* p. (*Vaccinium vitis-idaeae* p.): *Vaccinio myrtilli-Callunetum* s.l. i.a.  
Heaths rich in *Vaccinium* spp., usually with *Calluna vulgaris*, of the northern and western British Isles, the Hercynian ranges and the lower levels of the Alps, the Carpathians, the Pyrenees and the Cordillera Cantabrica.  
31.22 Sub-Atlantic *Calluna-Genista* heaths. *Calluno-Genistion pilosae* p.  
Low *Calluna* heaths often rich in *Genista*, mostly of the Germano-Baltic lowlands. Similar formations occurring in British upland areas, montane zones of high mountains of the western Mediterranean basin and high rainfall Adriatic influenced areas are most conveniently listed here.  
31.23 Atlantic *Erica-Ulex* heaths. *Ulicenion minoris*; *Daboecenion cantabricae* p.; *Ulicion maritimae* p.  
Heaths rich in gorse (*Ulex*) of the Atlantic margins.  
31.24 Ibero-Atlantic *Erica-Ulex-Cistus* heaths. *Daboecenion cantabricae* p.; *Ericenion umbellatae* p., *Ericenion aragonensis*; *Ulicion maritimae* p.; *Genistion micrantho-anglicae* p.  
Aquitanian heaths with rock-roses. Iberian heaths with numerous species of heathers (notably *Erica umbellata*, *E. aragonensis*) and brooms, rock-roses and often *Daboecia*. When the rock-roses and other Mediterranean shrubs become dominant they should be classified under sclerophyllous scrubs (32).  
31.25 Boreo-Atlantic *Erica cinerea* heaths.

<sup>21</sup> In the Official Journal this habitat type is listed as priority (\*); after checking the Commission proposal and the working documents of the European Council, it was confirmed that 'Dry heaths (all subtypes)' IS NOT a priority habitat type.

## 31.234

\* **Dry coastal heaths with *Erica vagans* and *Ulex maritimus***NATURA 2000 code : **4040**

PAL.CLASS.: 31.234

- 1) \* **Dry Atlantic coastal heaths with *Erica vagans***
- 2) Coastal heaths of temperate areas with *Erica vagans* and *Ulex europaeus* on well-drained soil, other than cushiony maritime formations.
- 3) Plants: *Erica vagans*, *Ulex europaeus*.
- 4) Geographical distribution: British isles (Lizard District of Cornwall) and France (coasts of the Channel and Brittany to the Landes).  
Corresponding category in the United Kingdom National Vegetation Classification: "H6 *Erica vagans-Ulex europaeus* heath".  
The presence of *Ulex europaeus* is not obligatory.

## 31.3

\* **Endemic macaronesian dry heaths**NATURA 2000 code : **4050**

PAL.CLASS.: 31.3

- 1) \* **Endemic macaronesian heaths**
- 2) *Ericaceous* formations (low and medium-tall stages) of the Atlantic isles. *Andryalo-Ericetalia*: *Fayo-Ericion arboreae*, *Telino-Adenocarpion foliolosae* (Canary); *Calluno-Ulicetalia*: *Daboecion azoricae*, *Ericetum azoricae*, *Daphno-Ericetum azoricae* (Azores).
- 3) Plants: *Adenocarpus foliolosus*, *Calluna vulgaris*, *Chamaecytisus proliferus* ssp. *proliferus*, #*Cistus chinamadensis*, *Cletura arborea*, *Daboecia azorica*, *Erica arborea*, *E. maderensis*, *E. platycodon*, #*E. scoparia* ssp. *azorica*, *Ilex canariensis*, *Juniperus brevifolia*, *Laurus azorica*, *Luzula purpureo-splendens*, *Lysimachia azorica*, *Myrica faya*, *Pteridium aquilinum*, *Teline canariensis*, *T. splendens*, *T. stenopetala*, *Thymus caespititius*, *Vaccinium cylindraceum*.
- 4) Geographical distribution: Canary, Azores and Madeira Islands.
- 5) Macaronesian Laurel forests (45.6) and Canarian heath forests (49.9) are tall forest-like formations associated with this habitat type.
- 6) RIVAS-MARTÍNEZ, S.; WILDPRET, W.; ARCO, M.; RODRÍGUEZ, O.; PÉREZ DE PAZ, P.L.; GARCÍA GALLO, A.; ACEBES, J.R., DÍAZ, T.E. & FERNÁNDEZ-GONZÁLEZ, F. (1993). Las comunidades vegetales de la isla de Tenerife (Islas Canarias). *Itinera Geobot.* 7: 169 - 374.

## 31.4

## Alpine and subalpine heaths

NATURA 2000 code: 4060

PAL.CLASS.: 31.4

## 1) Alpine and boreal heaths

- 2) Small, dwarf or prostrate shrub formations of the alpine and sub-alpine zones of the mountains of Eurasia dominated by ericaceous species, *Dryas octopetala*, dwarf junipers, brooms or greenweeds; *Dryas* heaths of the British Isles and Scandinavia.

- 3) Plants: 31.41 - *Loiseleuria procumbens*, *Vaccinium* spp.; 31.42 - *Rhododendron ferrugineum*; 31.44 - *Empetrum hermaphroditum*, *Vaccinium uliginosum*; 31.45 - *Juniperus nana*, *Loiseleuria procumbens*, *Empetrum hermaphroditum*, *Arctostaphylos uva-ursi*, *Arctostaphylos alpina*; in Fennoscandia also *Betula nana*, *Cassiope tetragona*, *Cornus suecica*, *Juniperus communis*, *Phyllodoce caerulea*, *Vaccinium myrtillus* and *Cladonia alpestris*; 31.47 - *Arctostaphylos uva-ursi*, *Arctostaphylos alpina*; 31.48 - *Rhododendron hirsutum*, *Rhododendron intermedium*, *Rhodothamnus chamaecistus* and *Erica herbacea*; 31.49 - *Dryas octopetala*; 31.4A - *Vaccinium myrtillus*, *Vaccinium uliginosum* s.l., *Vaccinium vitis-idaea*; 31.4B - *Genista radiata*, *G. holopetala*, *G. hassertiana*, *Chamaecytisus eriocarpus*, *C. absinthioides*.

- 4) Geographical distribution: Austria, Finland, France, Germany, Greece, Ireland, Italy, Portugal, Spain, Sweden, United Kingdom.

Corresponding category in the United Kingdom National Vegetation Classification: "H13 *Calluna vulgaris*-*Cladonia arbuscula* heath", "H14 *Calluna vulgaris*-*Racomitrium lanuginosum* heath", "H15 *Calluna vulgaris*-*Juniperus communis* ssp. *nana* heath", "H17 *Calluna vulgaris* *Arctostaphylos alpinus* heath", "H19 *Vaccinium myrtillus*-*Cladonia arbuscula* heath", "H20 *Vaccinium myrtillus*-*Racomitrium lanuginosum* heath" and "H22 *Vaccinium myrtillus*-*Rubus chamaemorus* heath".

Corresponding category of the Nordic vegetation types: "11 Snöfria vindhedar", "121 Hedvegetation på fattigt underlag", "122 Hedvegetation på rikt/kalkrikt underlag", "1311 *Cassiope hypnoides*-*Salix herbacea* typ", "1321 *Salix polaris* typ".

The following sub-types are included:

31.41 Alpid dwarf ericoid wind heaths. *Loiseleurio-Vaccinion*.

Very low, single-stratum, carpets of trailing azalea, *Loiseleuria procumbens*, prostrate *Vaccinium* spp. or other prostrate ericoid shrublets, accompanied by lichen, of high windswept, mostly snowfree, localities in the alpine belt of the high mountains of the Alpine system.

31.42 Acidocline alpenrose heaths. *Rhododendro-Vaccinion*.

*Rhododendron* spp.-dominated heaths of acid podsols in the Alps, the Pyrenees, the Dinarids, the Carpathians, the Balkan Range, the Pontic Range, the Caucasus and the Himalayan system, often with *Vaccinium* spp., sometimes with dwarf pines.

31.43 Mountain dwarf juniper scrub. *Juniperion nanae*, *Pino-Juniperion sabiniae* p., *Pino-Cytisium purgantis* p.

Usually dense formations of prostrate junipers of the higher levels of southern Palaeartic mountains.

31.44 High mountain *Empetrum-Vaccinium* heaths. *Empetro-Vaccinietum uliginosi*.

Dwarf heaths dominated by *Empetrum hermaphroditum*, *Vaccinium uliginosum*, with *Arctostaphylos alpina*, *Vaccinium myrtillus*, *Vaccinium vitis-idaea* and lycopodes (*Huperzia selago*, *Diphasiastrum alpinum*), mosses (*Barbilophozia lycopodioides*, *Hylocomium splendens*, *Pleurozium schreberi*, *Rhythidiadelphus triquetrus*) and lichens (*Cetraria islandica*, *Cladonia arbuscula*, *Cladonia rangiferina*, *Cladonia stellaris*, *Cladonia gracilis*, *Peltigera aphthosa*) of the sub-alpine belt of the Alps, the Carpathians, the Pyrenees, the Central Massif, the Jura, the Northern

Apennines, characteristic of relatively windswept, snow-free stations, in frost-exposure situations that are, however, less extreme than those prevailing where communities of 31.41 dominate. Unlike the formations of 31.41, those of 31.44 are clearly two-layered.

#### 31.45 Boreo-alpine heaths

Alpine heaths of the highlands and islands of Scotland, alpine and lowland boreal heaths of Iceland, alpine heaths of boreal mountains, in particular of the mountains of Scandinavia, of the Urals, of the mountains of Siberia, alpine heaths of Far Eastern mountains at, or just south of, the limits of the boreal zone, with *Juniperus nana*, *Loiseleuria procumbens*, *Empetrum hermaphroditum*, *Arctostaphylos uva-ursi*, *Arctostaphylos alpina* and elements of Alpine flora.

(31.46 *Bruckenthalia* heaths: only outside the European Union.)

#### 31.47 . Alpide bearberry heaths. *Mugo-Rhodoretum hirsuti* p., *Juniperion nanae* p., i.a.

Mats of *Arctostaphylos uva-ursi* or *Arctostaphylos alpina* of the alpine, sub-alpine and locally, montane, belts of the Alps, the Pyrenees, the northern and central Apennines, the Dinarides, the Carpathians, the Balkan Range, the Rhodopides (south to the Slavianka-Orvilos, the Menikion, the Pangeon, the Falakron and the Rhodopi), the Moeso-Macedonian mountains (including Athos), the Pelagonides (south to the Greek Macedonian border ranges Tzena, Pinovon and Kajmakchalan) and Olympus, in the Thessalian mountains, mostly on calcareous substrates.

#### 31.48 Hairy alpenrose-erica heaths. *Mugo-Rhodoretum hirsuti* p.

Forest substitution heaths, treeline fringe formations and alpine heaths or mats of calcareous soils in the Alps and the Dinarides, with *Rhododendron hirsutum*, *Rhododendron intermedium*, *Rhodothamnus chamaecistus* and *Erica herbacea*, often accompanied by *Clematis alpina*, *Daphne striata*, *Daphne mezereum*, *Globularia cordifolia*, *Arctostaphylos uva-ursi*. *Rhododendron hirsutum* and, mostly in the Austrian Alps, *Erica herbacea* are the most frequent dominants; other shrubs can locally play that role. *Arctostaphylos* spp.-dominated facies have, however, been included in 31.47.

#### 31.49 Mountain avens mats

Dwarf heaths formed by mats of the woody *Dryas octopetala* in high Palaeartic mountains, in boreal regions and in isolated Atlantic coastal outposts.

#### 31.4A High mountain dwarf bilberry heaths

*Vaccinium*-dominated dwarf heaths of the sub-alpine belt of southern mountains, in particular, of the northern and central Apennines, the Balkan Range, the Helenides, the Pontic Range and the Caucasus, with *Vaccinium myrtillus*, *Vaccinium uliginosum* s.l., *Vaccinium vitis-idaea* and, locally, *Empetrum nigrum*. They are richer in grassland species than the communities of 31.44 and often take the appearance of alpine grassland with dwarf shrubs. *Vaccinium myrtillus* also plays a much more dominant role, in lieu of *Vaccinium uliginosum* and *Empetrum hermaphroditum*.

#### 31.4B High mountain greenweed heaths

Low *Genista* spp. or *Chamaecytisus* spp. heaths of the sub-alpine, low alpine or montane belts of high southern nemoral mountains, in particular of the southern Alps, the Apennines, the Dinarides, the southern Carpathians, the Balkan Range, the Moeso-Macedonian mountains, the Pelagonides, the northern Pindus, the Rhodopides, the Thessalian mountains.

- 6) HAAPASAARI, M. (1988). The oligotrophic heath vegetation of northern Fennoscandia and its zonation. Acta Bot. Fennica 135:1-219.  
OKSANEN, L. & VIRTANEN, R. (1995). Topographic, altitudinal and regional patterns in continental and suboceanic heath vegetation of northern Fennoscandia. Acta Bot. Fennica 153:1-80.

**31.5****\* Scrub with *Pinus mugo* and *Rhododendron hirsutum*  
(*Mugo-Rhododendretum hirsuti*)**NATURA 2000 code : **4070**

PAL.CLASS.: 31.5

- 1) **\* Bushes with *Pinus mugo* and *Rhododendron hirsutum*  
(*Mugo-Rhododendretum hirsuti*)**
- 2) Ligneous dwarf formations with *Pinus mugo* and *Rhododendron hirsutum* ranging from heath (*Erica herbacea*) to open forest, on neutro-basic and often calcareous soils of the sub-Alpine level (*Mugo-Rhododendretum hirsuti*).
- 3) Plants: *Pinus mugo*, *Rhododendron chamaecistus*, *R. hirsutum*.
- 4) Geographical distribution: Alps (Austria, France, Germany, Italy) and Apennines.  
Corresponding category of the German Biotoptypen: "6905 Alpenrosengebüsch", "6904 Latschengebüsch".

**31.622****Sub-Arctic willow scrub**NATURA 2000 code : **4080**

PAL.CLASS.: 31.622

- 1) **Sub-Arctic willow scrub**
- 2) Subarctic willow formations of the Highlands of Scotland, of the mountains of Iceland and of the mountains of Scandinavia (often along brooks), European Russia, Siberia, northern China, Korea and Japan.
- 3) Plants: *Salix lapponum*, *S. lanata*, *S. arbuscula*, *S. myrsinites*, *S. glauca*.
- 4) Geographical distribution: Finland, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "W20 *Salix lapponum-Luzula sylvatica* scrub".  
Corresponding category of the Nordic vegetation types: "127 Videvegetation".

## 31.7

## Endemic oro-Mediterranean heaths with gorse

NATURA 2000 code : 4090

PAL.CLASS.: 31.7

## 1) Endemic oro-Mediterranean heaths with gorse

- 2) Primary cushion heaths of the high, dry mountains of the Mediterranean and Irano-Turanian regions, with low, cushion-forming, often spiny shrubs, such as *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 (33) and of deserts and semideserts (7).

- 3) Plants: 31.71 - *Echinopartum horridum*; 31.72 - *Echinopartum lusitanicum* ssp. *barnadesii*, *E. ibericum* ssp. *pulviniformis*; 31.73 - *Erinacea anthyllis*, *Vella spinosa*, *Astragalus sempervirens* ssp. *nevadensis*, *A. granatensis* ssp. *granatensis* (*A. boissieri*), *Ptilotrichum spinosum*, *Bupleurum spinosum*, *Genista baetica*; 31.74 - *Erinacea anthyllis*, *Vella spinosa*, *Andryala agardhii*, *Convolvulus boissieri*, *Hippocrepis squamata* ssp. *eriocarpa*, *Pterocephalus spathulatus*, *Thymus granatensis*; 31.75 - *Astragalus sirinicus* ssp. *genargenteus*, *Rosa seraphini*, *Anthyllis hermanniae*, *Thymus herba-barona*, *Cerastium boissieri*, *Genista salzmännii*, *G. corsica*, *Berberis aetnensis*, *Prunus prostrata*, *Daphne oleoides*; 31.76 - *Astragalus granatensis* ssp. *siculus*, *Berberis aetnensis*, *Juniperus hemisphaerica*, *Genista aetnensis*, *Adenocarpus bivonae*, *Viola aethnensis*; 31.77 - *Astragalus granatensis* ssp. *nebrodensis*, *A. parnassi* ssp. *calabrus*, *A. sirinicus* ssp. *sirinicus*, *Genista cupanii*, *G. sylvestris* ssp. *dalmatica*; 31.78 - *Astragalus angustifolius*; 31.79 - *Astragalus creticus* ssp. *rumelicus*, *A. parnassi*, *A. angustifolius*; 31.7A - *Astragalus angustifolius*, *Minuartia stellata*; 31.7B - *Astragalus creticus* ssp. *creticus*, *A. angustifolius*, *Chamaecytisus creticus*; 31.7C - *Astragalus creticus* var. *samius*, *A. pilodes*, *A. trojanus* var. *chius*, *A. parnassi*, *A. p.* var. *samothracious*, *A. monachorum*; 31.7D - *Genista acanthoclada*; 31.7E - *Astragalus sempervirens* ssp. *sempervirens*, *A. s.* ssp. *muticus*, *A. s.* ssp. *cephalonicus*; 31.7F - *Spartocytisus supranubius*, *Adenocarpus viscosus* var. *spartioides*.

4) Geographical distribution: France, Greece, Italy, Portugal, Spain

The following sub-types are included:

31.71 Pyrenean hedgehog-heaths. *Junipero-Genistetum horridae*.

*Echinopartum horridum* formations of dry slopes of the supra-Mediterranean zone of the southern Pyrenees; accompanying the dense, spiny cushions are *Juniperus hemisphaerica*, *Buxus sempervirens*, *Ononis fruticosa*, *Arctostaphylos uva-ursi* ssp. *crassifolia* and *Pinus sylvestris*.

31.72 Cordilleran hedgehog-heaths. *Cytiso oromediterranei-Echinopartum barnadesii*, *Echinoparto pulviniformis-Cytisetum oromediterranei*, *Teucreei salviastris-Echinopartum pulviniformis*, *Genisto hystericis-Echinopartum lusitanici*

Formations of the Cordillera Central and adjacent areas dominated by diverse forms of *Echinopartum*.

31.73 Nevadan hedgehog-heaths. *Erinacetalia* p., *Lavandulo-Genistion boissieri* p.

Highly developed hedgehog formations of the Sierra Nevada with *Erinacea anthyllis*, *Vella spinosa*, *Astragalus sempervirens* ssp. *nevadensis*, *A. granatensis* ssp. *granatensis* (*A. boissieri*), *Ptilotrichum spinosum*, *Bupleurum spinosum*, *Genista baetica*. Associated dwarf suffrutescent formations of high slopes and crests.

31.74 Franco-Iberian hedgehog-heaths

Oro-Mediterranean and montane hedgehog-heaths of other Iberian ranges and of southern France.

31.75 Cyrno-Sardian hedgehog-heaths. *Carici-Genistetalia* (*Carlinetalia macrocephalae*)

Expanses of small, compact bushes with *Astragalus sirinicus* ssp. *genargenteus*, *Rosa seraphini*, *Anthyllis hermanniae*, *Thymus herba-barona*, *Cerastium boissieri*, *Genista salzmannii*, *G. corsica*, *Berberis aetnensis*, *Prunus prostrata* and *Daphne oleoides*, of Sardinian and Corsican mountains.

31.76 Mount Etna hedgehog-heaths. *Astragaletum siculi*

Lava-colonising formations with cushions of *Astragalus granatensis* ssp. *siculus*, *Berberis aetnensis*, *Juniperus hemisphaerica*, *Genista aetnensis*, *Adenocarpus bivonae*, *Viola aethnensis*.

31.77 Madonie and Apennine hedgehog-heaths

Hedgehog-heaths formed by *Astragalus* spp. or *Genista* spp., of the mountains of the southern Italian peninsula and Sicily, except Etna.

31.78 Helleno-Balkan sylvatic *Astragalus* hedgehog-heaths

Hedgehog-heaths occupying situations peripheral to the main range of the alti- and oro-Mediterranean hedgehog-heath communities of high Hellenic mountains (31.79 and 31.7A), mostly dominated by *Astragalus angustifolius*, characteristic, in particular, of zoogenous clearings within the forest belt of southern Greek mountains and of regions of irradiation of Mediterranean communities within the hills and mountains of the Moesian zone.

31.79 Hellenic oro-Mediterranean hedgehog-heaths. *Daphno-Festucetea: Eryngio-Bromion* p.

Hedgehog-heaths developed on relatively humus-rich rendzini-form soils at or above treeline, in the 1700-2200 m altitudinal range of high Greek mountains; hedgehog-heath facies of associated grasslands; similar, impoverished formations descending into the forest belts of the same mountains, with the exception of those of the Peloponnese, where they are replaced by distinctive formations, listed under 31.78.

31.7A Hellenic alti-Mediterranean hedgehog-heaths. *Daphno-Festucetea: Astragalo-Seslerion*

Shrubby formations of the high mountains of the Peloponnese, of the southern mainland Greek mountains and of the Thessalian Olympus system, colonising the altitudinal range immediately above that occupied by the communities of 31.79, as well as stony slopes with shallow soil, loose screes and humus-deficient soils within the main 1700-2200 m range of these communities. Included are true spiny hedgehog-heaths, cushiony formations of dwarf suffrutescents and bush-dominated facies of stripped grasslands. *Astragalus angustifolius*, *Acantholimon androsaceum*, *Astragalus lacteus*, *Convolvulus cochlearis*, *Rindera graeca*, *Aster alpinus*, *Globularia stygia*, *Minuartia stellata*, *Erysimum pusillum*, *Thymus teucroides*, *Alyssum kionae*, *Paronychia kapela*, *Thymus hirsutus*, *Anthyllis aurea*, *Achillea ageratifolia*, *Sideritis scardica*, *Linum flavum*, *Thymus boissieri*, *Sesleria caerulea* are characteristic.

31.7B Cretan hedgehog-heaths. *Saturejetea spinosae*

Hedgehog-heaths of high mountains of Crete, in the 1500-2500 m altitudinal range, with *Astragalus creticus* ssp. *creticus*, *A. angustifolius*, *Acantholimon androsaceum*, *Atraphaxis billardieri*, *Berberis cretica*, *Chamaecytisus creticus*, *Daphne oleoides*, *Prunus prostrata*, *Euphorbia acanthothamnus*, *Verbascum spinosum*, *Sideritis syriaca*, *Satureja spinosa*, *Asperula idaea*, *Rhamnus prunifolius*, *Pimpinella tragium*, *Acinos alpinus*.

31.7C Aegean summital hedgehog-heaths

Isolated, endemic-rich, mostly summital hedgehog-heaths of calcareous mountains of Aegean islands and Mount Athos.

31.7D Southern Hellenic *Genista acanthoclada* hedgehog-heaths

Formations dominated by hemispherical shrubs of *Genista acanthoclada* of the middle levels (about 800 - 1200 m) of mountains and plateaux of the Peloponnese.

31.7E *Astragalus sempervirens* hedgehog-heaths

*Astragalus sempervirens* ssp. *sempervirens*, ssp. *muticus*, ssp. *cephalonicus* formations of the southern Alps, the eastern Pyrenees, Iberia, the Apennines and Greece, transitional between the alpine and sub-alpine heaths of 31.4 and the true Mediterranean hedgehog-heaths of 31.7.

31.7F Canarian cushion-heaths. *Spartocytision nubigeni*

Open formations dominated by broom-like plants of the montane zone (above 1900 m) of the Canary Islands, with many endemic species.

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## SCLEROPHYLLOUS SCRUB (MATORRAL)

### *Sub-Mediterranean and temperate*

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#### 31.82                      **Stable *Buxus sempervirens* formations on calcareous rock slopes (*Berberidion* p.)**

NATURA 2000 code : **5110**

PAL.CLASS.: 31.82

- 1)    **Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (*Berberidion* p.p.)**
- 2)    Stable xerothermophilous and calcicolous scrubs dominated by *Buxus sempervirens*, of hill and montane levels. These formations correspond to xerothermophilous *Buxus* thickets with their fringe associations of the *Geranium sanguinei* alliance on calcareous or siliceous substratum. They also constitute the natural woodland edge of calcareous dry forests rich with *Buxus*.  
In the euro-siberian region, the more open formations are rich in submediterranean plant species.  
Syntaxa: *Berberidion* p.p., *Amelanchiero-Buxion*
- 3)    Plants: *Buxus sempervirens*, *Prunus spinosa*, *Prunus mahaleb*, *Cornus mas*, *Crataegus* spp., *Berberis vulgaris*, *Ligustrum vulgare*, *Viburnum lantana*, *Amelanchier ovalis*, *Geranium sanguineum*, *Dictamnus albus*.
- 4)    Geographical distribution: Belgium (Meuse and Viroin valley), France, Germany (Moselle valley, limit of the distribution area), Greece, Italy, Luxembourg (Ahn, Pellembierg, Moselle), Spain, United Kingdom (one post-glacial refugium site of *Buxus* in southern England).  
Corresponding category of the German Biotoptypen: "410103 Gebüsch trocken-wärmer Standorte (Berberitzen-, Felsenmispel-, Felsenbirnen-, Sanddorngebüsch etc) (mit *Buxus sempervirens*, P036b).
- 5)    Succession phase of calcareous grasslands toward mixed deciduous forests, for example with *Quercus pubescens* or continental pine forests with *Pinus sylvestris* (the word "stable" concerns those formations which are practically at climax stage, but on very superficial soils where natural succession towards forest can not take place).  
These communities are associated with calcareous grasslands, mixed oak or *Quercus pubescens* groves, beech groves rich in orchid species or with *Pinus nigra* and *Pinus leucodermis* (e.g. in Greece).

**31.842****Mountain *Genista purgans* formations**NATURA 2000 code : **5120**

PAL.CLASS.: 31.842

- 1) **Mountain *Cytisus purgans* formations**
- 2) *Cytisus purgans*-dominated formations of higher levels (upper montane, subalpine, oro-Mediterranean) of south-western European mountains, on superficial soils, often associated with dwarf juniper scrubs (31.43) or hedgehog-heaths (31.7), and physiognomically reminiscent of the latter. *Pino-Cytision purgantis* p., *Genistion polygaliphyllae* p.
- 3) Plants: *Cytisus (Genista) purgans*.
- 4) Geographical distribution: France, Spain.

**31.88*****Juniperus communis* formations on calcareous heaths or grasslands<sup>22</sup>**NATURA 2000 code : **5130**

PAL.CLASS.: 31.88

- 1) ***Juniperus communis* formations on heaths or calcareous grasslands**
- 2) Formations with *Juniperus communis* of plain to montane levels. They mainly correspond to phytodynamic succession of the following types of vegetation:
  - a) generally, mesophilous or xerophilous calcareous and nutrient poor grasslands, grazed or let lie fallow, of the *Festuco-Brometea* and *Elyno-Sesleretea*.
  - b) more rarely, heathlands of the *Calluna vulgaris-Ulicetea minoris* (31.2).
- 3) Plants: *Juniperus communis*, *Crataegus* spp., *Rosa* spp., *Prunus spinosa*.  
For a) typical species of the *Festuco-Brometea* and *Elyno-Sesleretea*.  
For b) *Calluna vulgaris*, *Vaccinium myrtillus*, *Empetrum nigrum*, *Erica tetralix*, *Deschampsia flexuosa*, *Nardus stricta*.
- 4) Geographical distribution: Austria, Belgium, Denmark, Germany, Greece, France, Ireland, Italy, Luxembourg, Netherlands, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "W19 - *Juniperus communis* ssp. *communis*-*Oxalis acetosella* woodland" and juniper rich facies of "W21 - *Crataegus monogyna*-*Hedera helix* scrub".  
Corresponding category of the German Biotoptypen: "340201 submediterrane Halbtrockenrasen auf karbonatischem Boden (mit Wacholdergebüschchen, P036a)", "340203 subkontinentale Halbtrockenrasen auf karbonatischem Boden (mit Wacholdergebüschchen, P036a)", "4003 Heiden auf sandigen Böden (Calluna-Heiden) (mit Wacholdergebüschchen, P036a)".  
Corresponding category of the Nordic vegetation types: "5115e *Juniperus communis*-*Calluna vulgaris* variant".
- 6) REJMANEK, M. & ROSEN, E. (1988). The effects of colonizing shrubs (*Juniperus communis* and *Potentilla fruticosa*) on species richness in the grasslands of Stora Alvaret, Öland (Sweden). *Acta Phytogeogr. Suec.* 76:67-72.

<sup>22</sup> The title in the french version is correct. The title must be corrected in the english and the german version.

31.89

**\* *Cistus palhinhae* formations on maritime wet heaths  
(*Junipero-Cistetum palhinhae*)**

NATURA 2000 code : **5140**

PAL.CLASS.: 32.2B

- 1) **\* *Cistus palhinhae* formations on maritime wet heaths**
- 2) Low brush and garrigue formations of the dolomitic tableland, karsts, sands and terra-rosas of the vicinity of Cape San Vicente (Portugal), rich in endemics (*Ulicetum erinacei*, *Genista triacanthi-Cistetum palhinhae*).
- 3) Plants: #*Biscutela vicentina*, #*Cistus palhinhae*, *Genista hirsuta* ssp. *algarbiensis*, *G. triacanthus*, *Juniperus turbinata*, *Serratula monardii* var. *algarbiensis*, *Sideritis arborescens* ssp. *lusitanica*, *Teucrium vincentinum*, *Ulex erinaceus*.
- 4) Geographical distribution: south-western Portugal (Cabo Sardão to Ponta de Almadena).
- 6) RIVAS-MARTÍNEZ, S.; LOUSÃ, M.; DÍAZ, T.E.; FERNANDÉZ-GONZÁLEZ, F. & COSTA, J.C. (1990). La vegetación del sur de Portugal (Sado, Alentejo y Algarve). *Itinera Geobot.* 3: 5 - 126.

## Mediterranean arborescent matorral

### 32.131 to 32.135 Juniper formations

NATURA 2000 code : **5210**

PAL.CLASS.: 32.131 to 32.136

- 1) **Mediterranean juniper matorrals**
- 2) Mediterranean and sub-Mediterranean evergreen sclerophyllous bush and scrub organized around arborescent junipers. Mixed dominance can be indicated by combination of codes.
- 3) Plants: *Juniperus oxycedrus*, *J. phoenicea*, *J. foetidissima*, *J. excelsa*, *J. communis*, *J. drupacea*, *J. thurifera*.
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.  
The following sub-types are included:
  - 5211** (32.131) *Juniperus oxycedrus* arborescent matorral  
Arborescent matorral dominated by *Juniperus oxycedrus* s.l.
  - 5212** (32.132) *Juniperus phoenicea* arborescent matorral  
Arborescent matorral dominated by *Juniperus phoenicea* s.l..
  - 5213** (32.133) *Juniperus excelsa* and *J. foetidissima* arborescent matorrals  
Arborescent matorrals of Greece, Anatolia and the Near East, dominated by *Juniperus excelsa* or *J. foetidissima*.
  - 5214** (32.134) *Juniperus communis* arborescent matorral  
Mediterranean formations dominated by *Juniperus communis*.
  - 5215** (32.135) *Juniperus drupacea* arborescent matorral  
Formations derived from 42.A5<sup>23</sup>, limited to the Peloponnese and Asia Minor.
  - 5216** (32.136) *Juniperus thurifera* arborescent matorral  
Formations derived from 42.A2<sup>24</sup>.

<sup>23</sup> 42.A5 - Syrian juniper woods : *Juniperus drupacea* woods of the northern slopes of Mount Parnon and of the Karlik mountain in Thrace, Greece. Part of the formation takes the appearance of an arborescent matorral, listed under 32.135.

<sup>24</sup> 42.A2 - Spanish juniper woods (*Juniperion thuriferae*) : Forest formations dominated by *Juniperus thuriferae* of Spain, southern France and Corsica and North Africa. Many communities may be better described as arborescent matorrals, and listed under 32.136; geographical divisions can nevertheless be retained by appending the suffixes of 42.A2 to 32.136.

**32.17****\* Matorral with *Zyziphus***NATURA 2000 code : **5220**

PAL.CLASS.: 32.17

- 1) **\* Matorral with *Zyziphus***
- 2) Pre-desert deciduous brush of *Periploca laevigata*, *Lycium intricatum*, *Asparagus stipularis*, *A. albus*, *Withania frutescens* with tall *Zyziphus lotus*, confined to the arid Iberian South-west under a xerophytic thermo-Mediterranean bio-climate; corresponds to the mature phase or climax of climatophile and edapho-xero-psammophile vegetation series (*Periplocion angustifoliae*: *Ziziphietum loti*, *Zizipho-Maytenetum europaei*, *Mayteno-Periplocetum*).
- 3) Plants: *Asparagus albus*, *Calicotome intermedia*, *Chamaerops humilis*, *Maytenus senegalensis* ssp. *europaeus*, *Periploca laevigata* ssp. *angustifolia*, *Phlomis purpurea* ssp. *almeriensis*, *Rhamnus oleoides* ssp. *angustifolia*, *Withania frutescens*, *Zyziphus lotus*.
- 4) Geographical distribution: south-western Spain (from Mar Menor - Murcia to cabo Sacratif - Granada).
- 6) ALCARAZ, F.; DÍAZ, T.E.; RIVAS-MARTÍNEZ, S. & SÁNCHEZ GÓMEZ, P. (1989). Datos sobre la vegetación del sureste de España: provincia biogeográfica Murciano-Almeriense. *Itinera Geobot.* 2: 1 - 133.  
PEINADO, M.; ACARAZ, F. & MARTÍNEZ PARRAS, J.M. (1992). Vegetation of South-eastern Spain. *Flora et Vegetatio Mundi.* 10: 1 - 487.

**32.18****\* Matorral with *Laurus nobilis***NATURA 2000 code : **5230**

PAL.CLASS.: 32.18

- 1) **\* Matorral with *Laurus nobilis***
- 2) Humid arborescent matorral with tall laurel (*Laurus nobilis*).
- 3) Plants: *Arbutus unedo*, *Ceratonia siliqua*, *Fraxinus ornus*, *Laurus nobilis*, *Olea europaea* var. *sylvestris*, *Phillyrea latifolia*, *Quercus ilex*, *Rubia peregrina* ssp. *longifolia*, *Smilax aspera* var. *altissima*, *Viburnum tinus*.
- 4) Geographical distribution: Greece, Italy (particularly developed in certain localities of Sardinia, Sicily and Campania), Spain.  
The syntaxa of the Spanish types are: *Quercetea ilicis*, *Querco-Oleion sylvestris*: *Viburno tini-Fraxinetum orni lauretosum nobilis* (southern mountains of Valencia); *Quercion ilicis*: *Lauro-Quercetum ilicis* facies of *Laurus nobilis* (from the Asturias to the Basque Country).

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## **Thermo-Mediterranean and pre-steppe brush**

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**32.216****Laurel thickets**NATURA 2000 code : **5310**

PAL.CLASS.: 32.216

- 1) **Laurel thickets**
  - 2) Lower facies of *Laurus nobilis* thickets described under 32.18 code in the Annex I, generally of humid or fresh stations.
  - 3) Plants: *Laurus nobilis*.
  - 4) Geographical distribution: Greece (*Lauro-Quercetum ilicis* and *Orno-Quercetum ilicis lauretosum*), France (a Var association: *Lauro-Quercetum pubescentis*), Italy.
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**32.217****Low formations of euphorbia close to cliffs**NATURA 2000 code : **5320**

PAL.CLASS.: 32.217

- 1) **Low formations of euphorbia close to cliffs**
- 2) Low formations of *Helichrysum* (*H. italicum* ssp. *microphyllum*, *H. italicum* ssp. *italicum*) with spurges (*Euphorbia pithyusa*, i.a.), *Pistacia lentiscus*, *Camphorosma monspeliaca*, *Artemisia densiflora* or *Thymelaea passerina*, *T. hirsuta*, *T. tartonraira* of the immediate vicinity of sea cliffs, forming the transition between cliff vegetation or clifftop phrygas and thermo-Mediterranean brushes; they are particularly characteristic of the large Mediterranean islands.
- 3) Plants: *Helichrysum italicum* ssp. *microphyllum*, *H. italicum* ssp. *italicum*, *Euphorbia pithyusa*, *Pistacia lentiscus*, *Camphorosma monspeliaca*, *Artemisia densiflora*, *Thymelaea passerina*, *T. hirsuta*, *T. tartonraira*.
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.

**32.22 to 32.26****All types**NATURA 2000 code : **5330**

PAL.CLASS.: 32.22 to 32.26

**1) Thermo-Mediterranean and pre-desert scrub**

- 2) 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 extension or optimal development in the thermo-Mediterranean zone. Also included are the numerous, strongly characterised, 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 phryganas, which, however, on account of their strong structural singularity, are listed separately under 33.

- 3) Plants: 32.22 - *Euphorbia dendroides*; 32.23 - *Ampelodesmos mauritanica*; 32.24 - *Chamaerops humilis*; 32.25 - *Ziziphus lotus*, *Maytenus senegalensis* var. *europaeus*, *Periploca laevigata* ssp. *angustifolia*, *Salsola webbii*, *Sideretis foetens*, *Ulex argentatus* ssp. *erinaceus*, *Genista umbellata*; 32.26 - *Lygos sphaerocarpa*, *L. monosperma*, *L. raetam* ssp. *gussonei*, *Genista cinerea* ssp. *speciosa*, *G. valentina*, *G. spartioides* ssp. *retamoides*, *G. s.* ssp. *pseudoretamoides*, *G. haenseleri*, *G. ramosissima*, *G. ephedroides*, *G. dorycnifolia*, *Cytisus aeolicus*.

- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.

The following sub-types are included:

**5331** (32.22) Tree-spurge formations

Stands of *Euphorbia dendroides*, remarkable tertiary relict of Macaronesian origin; they occur as a facies of the thermo-Mediterranean brushes of the Balearics, Corsica, Sardinia, Sicily, Isles Eolie, Egadi, Pelagi, Pantelleria, Crete, and, very locally, of those of the coasts of northern Catalonia, south-eastern France, peninsular Italy and its islands, central Greece, notably on slopes facing the gulf of Corinth, the Peloponnese, the Aegean archipelagos, and enclaves of the Mediterranean periphery of Anatolia and the Levant. Particularly extensive and robust stands occur in Sicily, Sardinia and Crete where they may extend to relatively high altitudes. Very local formations in Mediterranean North Africa occupy the steep rocky slopes of some coastal capes and isolated inland sites (Ichkeul).

**5332** (32.23) Diss-dominated garrigues

Garrigues invaded and dominated by the high tussocks of *Ampelodesmos mauritanica*; typically thermo-Mediterranean, they also occur extensively in the meso-Mediterranean zone. They are most prevalent on the Tyrrhenian coast of central and southern Italy, in Sicily, in the Mediterranean zone and the less arid parts of the Saharo-Mediterranean transition zone of North Africa.

**5333** (32.24) Palmetto brush

*Chamaerops humilis*-dominated formations; other thermo-Mediterranean brushes or garrigues rich in the physiognomically important palmetto can be identified by a combination of this code and that of the other appropriate subdivision of 32.2. Palmetto brushes are best represented in the coastal areas of south-western, southern and eastern Iberia, the Balearics, Sicily and its satellite islands and Mediterranean North Africa, with more sporadic occurrences in the Guadalquivir basin, Sardinia, and the Tyrrhenian coasts and islands of peninsular Italy.

**5334** (32.25) Mediterranean pre-desert scrub. *Periplocion angustifoliae*, *Anthyllidetalia terniflorae*.

Shrub formations constituting, with the halo-nitrophilous scrubs (15.724) and the localised gypsum scrubs (15.93), much of the natural and semi-natural vegetation of the arid zone of south-eastern

Spain (Almeria, Murcia, Alicante), a highly distinctive region of unique climatological, biological and landscape character within Europe, extremely rich in African and endemic species. Several of the most remarkable formations remain in only a few undisturbed localities and are gravely at risk<sup>25</sup>. Similar formations occur in the upper arid (Mediterranean arid) zone of North Africa. Outposts of these communities also exist in Sicily, the Egadi islands, the Pelagie islands, Malta and Pantelleria.

**5335** (32.26) Thermo-Mediterranean broom fields (retamares)

West Mediterranean formations dominated by retamas (*Lygos* spp.) or by large, non-spiny thermo-Mediterranean brooms of genera *Cytisus* and *Genista*, limited to the Iberian peninsula, the Balearics, Mediterranean North Africa, Sicily and its associated islands, the Cilento coast of Campania.

## **Phrygana**<sup>26</sup>

### **33.1**

### ***Astragalo-Plantaginetum subulatae phrygana***

NATURA 2000 code: **5410**

PAL.CLASS.: 33.1

- 1) ***Astragalo-Plantaginetum subulatae phrygana***
- 2) Rare, extremely local and isolated, cushion-forming thermo-Mediterranean sclerophyllous associations of clifftops and adjacent areas dispersed along the coasts of Provence, Cap Corse, the Straits of Bonifacio, Catalonia (Cabo de Creus) and extreme south-western Portugal (Cabo de São Vicente), characterised by the presence of *Astragalus massiliensis* or *Anthyllis hermanniae*, variously accompanied by *Thymelaea hirsuta*, *Helichrysum italicum*, *Plantago subulatum*, *Armeria ruscinonensis*.
- 3) Plants: *Anthyllis hermanniae*, *Thymelaea hirsuta*, *Helichrysum italicum*, *Plantago subulatum*, *Armeria ruscinonensis*.
- 4) Geographical distribution: France, Italy (Sardinia), Portugal, Spain.

<sup>25</sup> Communities dominated by hummocks of very tall stands of Lotus tree *Zyziphius lotus*, are included in the Annex I priority habitat 'Matorral with *Zyziphius*' (32.17).

<sup>26</sup> Cushion-forming thermo-Mediterranean sclerophyllous formations, often thorny and summer deciduous. They are best developed in the eastern Mediterranean, where they may occupy considerable surfaces in coastal areas and occasionally inland. They also include a few rare, relict associations of the west Mediterranean, mostly characteristic of the edge of seashores and of maritime cliffs, where they constitute an often narrow belt between the cliff communities and thermo-Mediterranean brushes, incorporating, in addition to characteristic, often endemic or very rare, hemispherical cushion-forming species, an admixture of species belonging to these two vegetation complexes.



## 33.3

***Sarcopoterium spinosum phrygana***NATURA 2000 code : **5420**

PAL.CLASS.: 33.3

- 1) ***Sarcopoterium spinosum phrygana***
- 2) Low, thorny formations of hemispherical shrubs of the coastal thermo-Mediterranean zone of Aegean islands, of mainland Greece and the Ionian islands, of coastal Anatolia, much more widespread and diverse than the western Mediterranean formations.
- 3) Plants: *Sarcopoterium spinosum*, *Centaurea spinosa*, *Satureja thymbra*, *Thymus capitatus*, *Genista acanthoclada*, *Anthyllis hermanniae*, *Euphorbia acanthothamnos*, *Stachys spinosa*, *Ballota pseudodictamnus*, *Ballota acetabulosa*, *Erica manipuliflora*, *Rhamnus oleoides*, *Lithospermum hispidulum*, *Fumana arabica*, *Fumana thymifolia*, *Cistus creticus*, *Cistus parviflorus*, *Cistus salviifolius*, *Pistacia lentiscus*, *Teucrium brevifolium*, *Teucrium divaricatum*, *Teucrium polium*, *Calicotome villosa*, *Micromeria graeca*, *Micromeria juliana*, *Micromeria nervosa*, *Salvia triloba*, *Ononis spinosa*, *Helichrysum italicum* ssp. *microphyllum*, *Helichrysum italicum* ssp. *italicum*, *Phagnalium graecum*.
- 4) Geographical distribution: Greece, Italy.

## 33.4

**Cretan formations (*Euphorbio-verbascion*)**NATURA 2000 code : **5430**

PAL.CLASS.: 33.4 to 33.A

- 1) **Cretan, Sardinian, Italian and Balearic phrygana (*Euphorbio-verbascion*)**
- 2) Cushion-forming thermo-Mediterranean sclerophyllous formations, often thorny and summer deciduous. The following sub-types are included:
  - Mid-elevation phryganas of Crete (33.4) - varied formations of supra- and oro- Mediterranean levels of Crete resulting from the broad contact between phryganas and hedgehog-heaths (32.7), with *Euphorbia acanthothamnos*, *Verbascum spinosum*, *Berberis cretica*, *Phlomis cretica*, *Satureja biroi*, *Sideritis syriaca*, *Hypericum empetrifolia*, *Origanum microphyllum*, *Micromeria juliana*, *Helichrysum italicum* ssp. *microphyllum*, *Genista acanthoclada*.
  - *Hypericum* phryganas (33.5) - extremely rare, local colonies of hemispherical shrubs of *Hypericum aegyptiacum* forming open phryganas on calcareous rocks by the sea in the Ionian islands, western Crete, Sardinia and Lampedusa.
  - Italian *Sarcopoterium* phryganas (33.6) - very local, impoverished *Sarcopoterium spinosum* formations of Capo St. Elia (southern Sardinian coast) and of the Gulf of Taranto (Puglia, Calabria).
  - Sardinian *Genista acanthoclada* phrygana (33.7) - very local *Genista acanthoclada* ssp. *sardoa*-dominated communities of north-western Sardinia.
  - Balearic cliff-top phryganas (33.8) - formations of the coasts of Mallorca and Minorca dominated by the cushion-forming Balearic endemics *Launaea cervicornis*, *Astragalus balearicus*, *\*Centaurea balearica*, *Anthyllis fulgurans*, *A. hermanniae* ssp. *hystris*, *Teucrium subspinosum*.
  - Cyrno-Sardinian *Genista* phryganas (33.9) - thermo-Mediterranean formations of headlands and peninsulas of Corsica and Sardinia dominated by cushion-forming spiny *Genista corsica* or *G. morisii*. These endemic species participate in the constitution of hedgehog-heaths (31.75) as well as in that of the coastal formations listed here, which assume an evident phrygana appearance; they may also enter in the composition of mid-elevation formations of less distinctive appearance which can be listed under 32.482.

- Pantelleria phrygana (33.A) - coastal formation of hemispherical shrubs with the Pantelleria endemics *Helichrysum saxatile* ssp. *errerae* and *Matthiola pulchella*, vicariant of the west Mediterranean, Balearic and Sardinian clifftop phrygas.

- 3) Plants: 33.4 - *Euphorbia acanthothamnus*, *Verbascum spinosum*, *Berberis cretica*, *Phlomis cretica*, *Satureja biroi*, *Sideritis syriaca*, *Hypericum empetrifolia*, *Origanum microphyllum*, *Micromeria juliana*, *Helichrysum italicum* ssp. *microphyllum*, *Genista acanthoclada*; 33.5 - *Hypericum aegyptiacum*; 33.6 - *Sarcopoterium spinosum*; 33.7 - *Genista acanthoclada* ssp. *sardoa*; 33.8 - *Launaea cervicornis*, *Astragalus balearicus*, \**Centaurea balearica*, *Anthyllis fulgurans*, *A. hermanniae* ssp. *hystrix*, *Teucrium subspinosum*; 33.9 - *Genista corsica*, *G. morisii*; 33.A - *Helichrysum saxatile* ssp. *errerae*, *Matthiola pulchella*.
- 4) Geographical distribution: Greece, Italy, Spain.
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## NATURAL AND SEMI-NATURAL GRASSLAND FORMATIONS

### Natural grasslands

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#### 34.11 \* Karstic calcareous grasslands (*Alyso-Sedion albi*)

NATURA 2000 code : **6110**

PAL.CLASS.: 34.11

- 1) \* **Rupicolous calcareous or basophilic grasslands (*Alyso-Sedion albi*)**
  - 2) Open xerothermophile pioneer communities on superficial calcareous or soils rich in bases (basic volcanic substrates), dominated by annuals and succulents of the *Alyso alyssoidis-Sedion albi* Oberdorfer & Müller in Müller 61.  
Similar communities may develop on artificial substrates; these should not be taken into account.
  - 3) Plants: *Alyssum alyssoides*, *Arabis recta*, *Cerastium* spp., *Hornungia petraea*, *Jovibarba* spp., *Poa badensis*, *Saxifraga tridactylites*, *Sedum* spp., *Sempervivum* spp., *Teucrium botrys*.
  - 4) Geographical distribution: Austria, Belgium, France, Germany, Italy, Luxembourg, Spain, Sweden.  
Corresponding category of the German Biotoptypen: "320101 natürlicher Karbonatfels (Kalk, Dolomit) (lückige Vegetation, P002)".  
Corresponding category of the Nordic vegetation types: *Asplenium ruta-muraria-Asplenium trichomanes-Homalothecium sericeum*-variant of "*Sedum album-Tortella* spp.-typ".
  - 5) In some regions of Belgium and Germany this habitat is very closely linked with *Xerobromion* and *Mesobromion* associations.
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#### 34.12 \* Xeric sand calcareous grasslands (*Koelerion glaucae*)

NATURA 2000 code : **6120**

PAL.CLASS.: 34.12

- 1) \* **Xeric sand calcareous grasslands (*Koelerion glaucae*)**
- 2) Dry, frequently open grasslands on more or less calciferous sand with a subcontinental centre of distribution (*Koelerion glaucae*, *Sileno conicae-Cerastion semidecandri*, *Sedo-Cerastion* p.).
- 3) Plants: *Allium schoenoprasum*, *Alyssum montanum* ssp. *gemelinii*, *Astragalus arenarius*, *Cardaminopsis arenosa*, *Carex ligerica*, *Carex praecox*, *Dianthus deltoides*, *Euphorbia seguieriana*, *Festuca psammophila*, *Gypsophila fastigiata*, *Helichrysum arenarium*, *Herniaria glabra*, *Koelerion glauca*, *Petrorhagia prolifera*, *Sedum reflexum*, *Silene chlorantha*.
- 4) Geographical distribution: Austria, Belgium, Denmark, France, Germany, Luxembourg, Netherlands, Sweden (eastern Skåne, Öland).  
Corresponding category of the German Biotoptypen: "340403 ausdauernder Sandtrockenrasen mit geschlossener Narbe".  
Corresponding category of the Nordic vegetation types: "5141 *Koeleria glauca*-typ".
- 5) This habitat type occurs in association with non coastal dune complexes.

- 6) OLSSON, H. (1974). Studies on South Swedish sand vegetation. *Acta Phytogeogr. Suec.* 60:1-170.
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### 34.2 Calaminarian grasslands

NATURA 2000 code : **6130**

PAL.CLASS.: 34.2, 36.44

- 1) **Calaminarian grasslands (*Violetalia calaminariae*)**
  - 2) Generally open natural or semi-natural grasslands 1) on natural rock outcrops, rich in heavy metals (e.g. zinc, lead), 2) river gravels and shingles, 3) on old terrils or spoil heaps around mines. These open grasslands are characterised by a highly specialised flora, with subspecies and ecotypes adapted to heavy metals. The threatened endemic taxa are generally absent from the pioneer vegetation of younger terrils. This pioneer vegetation is not considered to be a priority.
  - 3) Plants: *Viola calaminaria* and metallophyte races of *Thlaspi caerulescens*, *Armeria maritima*, *Minuartia verna*, *Silene vulgaris*, *Festuca ophioliticola*, *Cochleria alpina sensu lato*.
  - 4) Geographical distribution: Belgium (around Kelmis and Moresnet), France, Germany (Sachsen and Eiffel e.g.), Ireland, Italy, United Kingdom (including sites of serpentine soils in Scotland).  
Corresponding category of the German Biotoptypen: "3405a natürliche und halbnatürliche Schwermetallrasen".  
Corresponding category in the United Kingdom National Vegetation Classification: "OV37 *Festuca ovina*-*Minuartia verna* community".
  - 5) Seminal sites are to be taken into account mainly if natural sites are very rare or absent from a region or, if these sites shelter characteristic or outstanding plant species.
  - 6) BIRSE E.L. (1982). Plant communities on serpentine in Scotland. *Vegetatio*, 49 141-162.
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### 36.314 Siliceous Pyrenean grassland with *Festuca eskia*

NATURA 2000 code : **6140**

PAL.CLASS.: 36.314

- 1) **Siliceous Pyrenean *Festuca eskia* grasslands**
- 2) Subalpine and lower alpine closed mesophile *Festuca eskia* grasslands of north-facing slopes (ubacs) and depressions in the Pyrenees with *Arnica montana*, *Ranunculus pyrenaicus*, *Selinum pyrenaicum*, *Trifolium alpinum*, *Campanula barbata*, *Gentiana punctata*, *Leucorchis albida*, *Phyteuma betonicifolium*.
- 3) Plants: *Festuca eskia*.
- 4) Geographical distribution: France, Spain.

**36.32****Siliceous alpine and boreal grasslands**NATURA 2000 code : **6150**

PAL.CLASS.: 36.32

- 1) **Siliceous alpine and boreal grasslands**
- 2) Boreo-alpine formations of the higher summits of the boreal mountains of northern Finland and Sweden, of Scotland, northern England and northern Wales, with *Juncus trifidus*, *Carex bigelowii*, mosses and lichens.
- 3) Plants: *Juncus trifidus*, *Carex bigelowii*, *Cassiope tetragona*.
- 4) Geographical distribution: Finland, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "U7 *Nardus stricta*-*Carex bigelowii* grass heath", "U8 *Carex bigelowii*-*Polytrichum alpinum* sedge heath", "U9 *Juncus trifidus*-*Racomitrium lanuginosum* rush-heath", "U10 *Carex bigelowii*-*Racomitrium lanuginosum* moss heath", "U11 *Polytrichum sexangulare*-*Kiaeria starkei* snow-bed", "U12 *Salix herbacea*-*Racomitrium lanuginosum* snow-bed" and "U14 *Alchemilla alpina*-*Sibbaldia procumbens* dwarf-herb community".
- 6) OKSANEN, L. & VIRTANEN, R. (1995). Topographic, altitudinal and regional pattern in suboceanic and continental heath vegetation of northern Fennoscandia. Acta Bot. Fenn. 153:1-80.

**36.36****Siliceous *Festuca indigesta* Iberian grasslands**NATURA 2000 code : **6160**

PAL.CLASS.: 36.361

- 1) **Oro-Iberian *Festuca indigesta* grasslands**
- 2) Thermophile, open, stripped and garland fescue grasslands of siliceous upper slopes and summits of the high Mediterranean mountains of the Iberian peninsula, locally extending into the Euro-Siberian domain in the subalpine level of the Cantabrian mountains (*Festucetalia indigestae*).
- 3) Plants: *Festuca indigesta*.
- 4) Geographical distribution: Spain.

**36.41 to 36.45****Alpine calcareous grasslands<sup>27</sup>**NATURA 2000 code : **6170**

PAL.CLASS.: 36.41 to 36.43, 36.37, 36.38

- 1) **Alpine and subalpine calcareous grasslands**
- 2) Alpine and subalpine grasslands of base-rich soils of the western Alps (Western and Central European ranges) and, very locally, of their satellite Jurassian, Hercynian and Caledonian ranges, with *Dryas octopetala*, *Gentiana nivalis*, *Gentiana campestris*, *Alchemilla hoppeana*, *Alchemilla conjuncta*, *Alchemilla flabellata*, *Anthyllis vulneraria*, *Astragalus alpinus*, *Aster alpinus*, *Draba aizoides*, *Globularia nudicaulis*, *Helianthemum nummularium* ssp. *grandiflorum*, *Helianthemum oelandicum* ssp. *alpestre*, *Pulsatilla alpina* ssp. *alpina*, *Phyteuma orbiculare*, *Astrantia major*,

<sup>27</sup> 36.4 - Alpine and subalpine calciphilous grasslands (*Elyno-Seslerietea*)

*Polygala alpestris* (37.41 to 37.43). Also included the grasslands of the subalpine (oro-Mediterranean) and alpine levels of the highest mountains of Corsica (36.37), and the Mesophile, closed, short turfs of the subalpine and alpine levels of the southern and central Apennines, developed locally above treeline, on calcareous substrates (36.38).

- 3) Plants: 36.41 to 36.43 - *Dryas octopetala*, *Gentiana nivalis*, *Gentiana campestris*, *Alchemilla hoppeana*, *Alchemilla conjuncta*, *Alchemilla flabellata*, *Anthyllis vulneraria*, *Astragalus alpinus*, *Aster alpinus*, *Draba aizoides*, *Globularia nudicaulis*, *Helianthemum nummularium* ssp. *grandiflorum*, *Helianthemum oelandicum* ssp. *alpestre*, *Pulsatilla alpina* ssp. *alpina*, *Phyteuma orbiculare*, *Astrantia major*, *Polygala alpestris*; 36.37 - *Plantago subulata* ssp. *insularis*, *Sagina pilifera*, *Armeria multiceps*, *Paronychia polygonifolia*, *Bellardiochloa violacea*, *Phleum brachyrachyum*, *Geum montanum*, *Sibbaldia procumbens*, *Veronica alpina*; 36.38 - *Festuca violacea* ssp. *macrathera*, *Trifolium thalii*.

- 4) Geographical distribution: Austria, France, Germany, Greece, Italy, Spain, Sweden, United Kingdom.

Corresponding category in the United Kingdom National Vegetation Classification: "CG12 *Festuca ovina*-*Alchemilla alpina*-*Silene acaulis* dwarf-herb heath", "CG13 *Dryas octopetala*-*Carex flacca* heath", "CG14 *Dryas octopetala*-*Silene acaulis* ledge community".

Corresponding category of the Nordic vegetation types: "123 Lågörtvegetation på rikt/kalkrikt underlag".

The following habitat types are included:

**6171** (36.41) Closed calciphile alpine grasslands

Mesophile, mostly closed, vigorous, often grazed or mowed, grasslands on deep soils of the subalpine and lower alpine levels of the Alps, the Pyrenees, the mountains of the Balkan peninsula, and, locally, of the Apennines and the Jura.

**6172** (36.42) Wind edge naked-rush swards

Meso-xerophile, relatively closed and unsculptured swards of *Kobresia myosuroides* (*Elyna myosuroides*) forming on deep, fine soils of protruding ridges and edges exposed to strong winds in the alpine and nival levels of the Alps, the Carpathians, the Pyrenees, the Cantabrian Mountains, Scandinavian mountains and, very locally, the Abruzzi and the mountains of the Balkan peninsula, with *Oxytropis jacquinii* (*Oxytropis montana*), *Oxytropis pyrenaica*, *Oxytropis carinthiaca*, *Oxytropis foucaudii*, *Oxytropis halleri*, *Antennaria carpatica*, *Dryas octopetala*, *Draba carinthiaca*, *Draba siliquosa*, *Draba fladnizensis*, *Draba aizoides*, *Gentiana tenella*, *Erigeron uniflorus*, *Dianthus glacialis*, *Dianthus monspessulanus* ssp. *sternbergii*, *Potentilla nivea*, *Saussurea alpina*, *Geranium argenteum*, *Sesleria sphaerocephala*, *Carex atrata*, *Carex brevicollis*, *Carex foetida*, *Carex capillaris*, *Carex nigra*, *Carex curvula* ssp. *rosae* and *Carex rupestris*.

Scandinavian *Kobresia* grasslands with *Carex rupestris* are included.

**6173** (36.43) Calciphilous stepped and garland grasslands

Xero-thermophile, open, sculptured, stepped or garland grasslands of the Alps, the Carpathians, the Pyrenees, the mountains of the Balkan peninsula and the Mediterranean mountains, with very local outposts in the Jura.

(36.44) Alpine heavy metal communities: included in habitat 6130 'Calaminarian grasslands (*Violetalia calaminariae*)', see page 65.

36.37 Oro-Corsican grasslands

Grasslands of the subalpine (oro-Mediterranean) and alpine levels of the highest mountains of Corsica.

36.38 Oro-Apennine closed grasslands

Mesophile, closed, short turfs of the subalpine and alpine levels of the southern and central Apennines, developed locally above treeline, on calcareous substrates.

- 6) BRINGER, K.-G. (1961). Den lågalpina Dryas-hedens differentiering och ståndortsekologi inom Torneträsk-området. 1-2. Sven. Bot. Tidskr. 55:349-375, 551-584.

## 36.5

## Macaronesian mountain grasslands

NATURA 2000 code : **6180**

PAL.CLASS.: 38.5

- 1) **Macaronesian mesophile grasslands**
- 2) Secondary grasslands of the highest levels of the Atlantic islands.
- 3) Plants: *Holcus rigidus*, *Festuca jubata*, *Deschampsia foliosa*, *Ranunculus cortusifolius*, *Rumex azorica*, *Cardamine caldeirarum*, *Dryopteris azorica*, *D. crispifolia*, *Euphrasia grandiflora*, *Lactuca watsoniana*, *Senecio malvifolius*, *Tolpis azorica*, *Bellis azorica*, *Sanicula azorica*, *Ammi* spp.
- 4) Geographical distribution: Canary Islands, Azores, Madeira.

## Semi-natural dry grasslands and scrubland facies

### 34.31 to 34.34      Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (\* important orchid sites)

NATURA 2000 code : **6210**

PAL.CLASS.: 34.31 to 34.34

#### 1) Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (\* important orchid sites)

- 2) Dry to semi-dry calcareous grasslands of the *Festuco-Brometea*. This habitat is formed on the one hand by steppic or subcontinental grasslands (*Festucetalia valesiaca*) and, on the other, by the grasslands of more oceanic and sub-Mediterranean regions (*Brometalia erecti*); in the latter case, a distinction is made between primary *Xerobromion* grasslands and secondary (semi-natural) *Mesobromion* grasslands with *Bromus erectus*; the latter are characterised by their rich orchid flora. Abandonment results in thermophile brushwood with an intermediate stage of thermophile fringe vegetation (*Trifolio-Geranietea*).

By important orchid sites one should understand the sites that are important on the basis of one or more of the following three criteria:

- (a) the site hosts a rich suite of orchid species
- (b) the site hosts an important population of at least one orchid species considered not very common on the national territory
- (c) the site hosts one or several orchid species considered to be rare, very rare or exceptional on the national territory.

- 3) Plants: *Mesobromion* - *Anthyllis vulneraria*, *Arabis hirsuta*, *Brachypodium pinnatum*, *Bromus inermis*, *Campanula glomerata*, *Carex caryophylla*, *Carlina vulgaris*, *Centaurea scabiosa*, *Dianthus carthusianorum*, *Eryngium campestre*, *Koeleria pyramidata*, *Leontodon hispidus*, *Medicago sativa* ssp. *falcata*, *Ophrys apifera*, *O. insectifera*, *Orchis mascula*, *O. militaris*, *O. morio*, *O. purpurea*, *O. ustulata*, *O. mascula*, *Polygala comosa*, *Primula veris*, *Sanguisorba minor*, *Scabiosa columbaria*, *Veronica prostrata*, *V. teucrium*. *Xerobromion* - *Bromus erectus*, *Fumana procumbens*, *Globularia elongata*, *Hippocrepis comosa*. *Festucetalia valesiaca*: *Adonis vernalis*, *Euphorbia seguierana*, *Festuca valesiaca*, *Silene otites*, *Stipa capillata*, *S. joannis*.

Animals: *Papilio machaon*, *Iphiclides podalirius* (Lepidoptera); *Libelloides* spp., *Mantis religiosa* (Neuroptera).

- 4) Geographical distribution: all the European Union.

Corresponding category in the United Kingdom National Vegetation Classification: "CG1 *Festuca ovina-Carlina vulgaris* grassland", "CG2 *Festuca ovina-Avenula pratensis* grassland", "CG3 *Bromus erectus* grassland", "CG4 *Brachypodium pinnatum* grassland", "CG5 *Bromus erectus-Brachypodium pinnatum* grassland", "CG6 *Avenula pubescens* grassland", "CG7 *Festuca ovina-Hieracium pilosella-Thymus praecox/pulegioides* grassland", "CG8 *Sesleria albicans-Scabiosa columbaria* grassland", "CG9 *Sesleria albicans-Galium sternerii* grassland".

In France the following sub-types are found: **6211** (34.31) - Subcontinental (Euro-Siberian and eastern) grasslands of the inner Alps stretching perhaps to Alsace (*Stipo capillatae-Festucetalia valesiaca* Gaultier 89 prov.); **6212** (34.32) - Sub-Atlantic xerocline calcicolous grasslands [*Mesobrometalia erecti* Royer 87 (IX 212: *Brometalia erecti* Br-Bl. 36)]; **6213** (34.33) -



Sub-Atlantic xerophile calcicolous grasslands (*Xerobromenalia erecti* Royer 87); **6214** (34.34) - Central European calcareo-siliceous grasslands generally established on hyperxerothermophile sands, partly denuded (*Koelerio macranthae-Phleion phloeidis* Korneck 74 (*Koelerio macranthae-Phleonia phloeidis* (Korneck 74) Royer 87).

Corresponding category of the German Biotoptypen: "340101 submediterraner Trockenrasen auf karbonatischem Untergrund", "34020301 subkontinentaler Halbtrockenrasen auf karbonatischem Boden, gemäht", "34020102 submediterraner Halbtrockenrasen auf karbonatischem Boden, beweidet Mähweide", "34020103 submediterraner Halbtrockenrasen auf karbonatischem Boden, brachgefallen", "340103 subkontinentaler Trockenrasen auf karbonatischem Untergrund", "34020101 submediterraner Halbtrockenrasen auf karbonatischem Boden, gemäht", "34020302 subkontinentaler Halbtrockenrasen auf karbonatischem Boden, beweidet Mähweide", "34020303 subkontinentaler Halbtrockenrasen auf karbonatischem Boden, brachgefallen", "3403 natürlicher Steppenrasen (kontinental, auf tiefgründigem Boden)".

Corresponding category of the Nordic vegetation types: *Avenula pratensis-Artemisia oelandica*-variant of "5213 *Avenula pratensis-Fragaria viridis-Filipendula vulgaris*-typ"

- 5) Often in association with scrubland and thermophile forests and with dry pioneer Sedum meadows (*Sedo-Scleranthea*).
- 6) ALBERTSSON, N. (1950). Das grosse südliche Alvar der Insel Öland. Eine Pflanzensoziologische Übersicht. Sven. Bot. Tidskr. 44:269-331.

### 34.31

#### \* Sub-continental steppic grasslands

NATURA 2000 code : **6240**

PAL.CLASS.: 34.315

- 1) \* Sub-Pannonic steppic grasslands
- 2) Steppic grasslands, dominated by tussock-grasses, chamaephytes and perennials of the alliance *Festucion vallesiaca* and related syntaxa. These xerotherme communities are developed on southern exposed slopes with AC-soils on rocky substrate and on clay-sandy sedimentation layers enriched with gravels. They are partially of natural, partially of anthropogenic origin.
- 3) Plants: *Festuca vallesiaca*, *Allium flavum*, *Gagea pusilla*, *Hesperis tristis*, *Iris pumila*, *Ranunculus illyricus*, *Teucrium chamaedrys*, *Medicago minima*, *Globularia cordifolia*, *Helianthemum canum*, *Poa badensis*, *Scorzonera austriaca*, *Potentilla arenaria*, *Seseli hippomarathrum*, *Alyssum alyssoides*, *Artemisia austriaca*, *Chrysopogon gryllus*, *Astragalus austriacus*, *A. excapus*, *A. onobrychis*, *Oxytropis pilosa*, *Daphne cneorum*, *Iris humilis* ssp. *arenaria*, *Carex humilis*, *Festuca rupicola*, *Stipa capillata*, *S. joannis*, *Botriochloa ischaemum*.
- 4) Geographical distribution: Austria (most important sites: south slopes of the Leitha mountains, Hainburger mountains, mountains of the Waschberg range).  
Syntaxa for Austria: *Astragalo austriaci-Festucetum sulcatae*, *Ranunculo illyrici-Festucetum valesiaca*, *Medicagini minima-Festucetum valesiaca*, *Poa-Festucetum valesiaca*, *Stipo joannis-Avenastretum besseri*, *Teucrio botryos-Andropogonetum ischaemi*.  
Xerophilous grasslands of Ponto-Pannonic affinities of the hills of the western, northern and south-western periphery of the Pannonic basin and of the Hungarian Central Range.
- 6) MUCINA, L., GRABHERR, G., ELLMAUER, T. (1993). Die Pflanzengesellschaften Österreichs, Teil 1. Anthropogene Vegetation. Gustav Fischer, Jena.Stuttgart. New York. pp 578.

## 34.5

**\* Pseudo-steppe with grasses and annuals**  
**(Thero-Brachypodietea)**

NATURA 2000 code : **6220**

PAL.CLASS.: 34.5

- 1) **\* Pseudo-steppe with grasses and annuals (Thero-Brachypodietea)**
- 2) Meso- and thermo-Mediterranean xerophile, mostly open, short-grass annual grasslands rich in therophytes; therophyte communities of oligotrophic soils on base-rich, often calcareous substrates. Perennial communities - *Thero-Brachypodietea*, *Thero-Brachypodietalia*: *Thero-Brachypodion*. *Poetea bulbosae*: *Astragalo-Poion bulbosae* (basiphile), *Trifolio-Periballion* (silicolous). Annual communities - *Tuberarietea guttatae* Br.-Bl. 1952 em. Rivas-Martínez 1978, *Trachynietalia distachyae* Rivas-Martínez 1978: *Trachynion distachyae* (calciphile), *Sedo-Ctenopsion* (gypsophile), *Omphalodion commutatae* (dolomitic and silico-basiphile).
- 3) Plants: *Brachypodium distachyum*, *B. retusum*.
- 4) Geographical distribution: Spain, southern France, Greece, Italy, Portugal.  
 In France a distinction can be made between: (a) annual herbaceous vegetation of dry, initial, low-nitrogen soils ranging from neutro-basic to calcareous: *Stipo capensis-Brachypodietea distachyae* (Br-Bl. 47) Brullo 85; (b) vegetation of more or less closed grasslands on deep, nitrocline and xerocline soil: *Brachypodietalia phoenicoidis* (Br-Bl. 31) Molinier 34.  
 In Italy this habitat mainly exists in the South and on the islands (*Thero-Brachypodietea*, *Poetea bulbosae*, *Lygeo-Stipetea*).

## 34.91

**\* Pannonic steppes**

NATURA 2000 code : **6250**

PAL.CLASS.: 34.91

- 1) **\* Pannonic loess steppic grasslands**
- 2) Grassland communities of the Pannonic region, rich in perennial grasses and herbs on loess deposits. Originally expanding over large areas, nowadays restricted to specific land forms like loess ridges formed by fluvial erosion and accumulation.
- 3) Plants: *Artemisia pontica*, *Astragalus vesicarius*, *A. austriacus*, *A. onobrychis*, *Crambe tatarica*, *Nonea pulla*, *Salvia nemorosa*, *Ornithogalum pannonicum*, *Agropyron pectinatum*, *Phlomis tuberosa*, *Bromus inermis*, *Festuca rupicola*, *Falcaria vulgaris*, *Peucedanum alsaticum*, *Elymus hispidus*, *Chamaecytisus supinus*, *Achillea pannonica*.
- 4) Geographical distribution: Austria (only a few sites in the Weinviertel).  
Syntaxa for Austria: *Astragalo excapi-Crambetum tatarici*.  
 This habitat is found from the Pannonic life zone to the steppes of South Russia and Ukraine.
- 6) MUCINA, L., GRABHERR, G., ELLMAUER, T. (1993). Die Pflanzengesellschaften Österreichs, Teil 1. Anthropogene Vegetation. Gustav Fischer, Jena.Stuttgart. New York. pp 578.

### 34.A1 \* Pannonic sand steppes

NATURA 2000 code : **6260**

PAL.CLASS.: 34.A1

- 1) \* Pannonic sand steppes
- 2) Formations dominated by medium or tall perennial tuft-forming grasses or suffrutescents, with lacunar ground cover, together with their associated therophyte communities developed on mobile or fixed sands (alluvial sands, subfossile dune systems) within the range of the Pannonic steppes (34.91), thus in the Pannonic basin and the areas of preponderant influence of its communities.
- 3) Plants: *Festuca vaginata*, *Helychrysum arenarium*, *Dianthus serotinus*, *Gypsophila fastigiata*, *G. paniculata*, *Koeleria glauca*, *Alyssum montanum* ssp. *gmelinii*, *Bassia laniflora*, *Centaurea scabiosa* ssp. *sadleriana*, *C. jacea* ssp. *angustifolia*, *Erysimum diffusum*, *Stipa capillata*, *S. pulcherrima*, *Cynodon dactylon*, *Festuca pseudovina*.  
Animals: insects - *Gampsocleis glabra*, *Myrmeleotetrix antennatus*, \**Callimorpha quadripunctaria*, *Cletis maculosa*, *Zygaena laeta*, *Z. punctum*, *Scythris kasyi*.
- 4) Geographical distribution: Austria (in the Marchfeld, Seewinkel, pioneer habitats scattered throughout the fringe of the pannonic life zone).  
Syntaxa for Austria: *Festucetum vaginatae*, *Brometum tectorum*, *Equisetetum ramosissimi*, *Potentillo arenariae-Festucetum pseudovinae*.  
This habitat is found in the Pannonic plain and adjacent areas (puszta).
- 6) MUCINA, L., GRABHERR, G., ELLMAUER, T. (1993). Die Pflanzengesellschaften Österreichs, Teil 1. Anthropogene Vegetation. Gustav Fischer, Jena.Stuttgart. New York. pp 578.

### 35.1 \* Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in continental Europe)

NATURA 2000 code : **6230**

PAL.CLASS.: 35.1, 36.31

- 1) \* Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in continental Europe)
- 2) Closed, dry or mesophile, perennial *Nardus* grasslands occupying siliceous soils in Atlantic or sub-Atlantic or boreal lowland, hill and montane regions of middle and northern Europe and western Iberia. Vegetation highly varied, but the variation is characterised by continuity. *Nardetalia*: 35.1-*Violo-Nardion* (*Nardo-Galion saxatilis*, *Violion caninae*); 36.31- *Nardion*.  
  
By species-rich sites one should understand the sites with a high number of species. In general, the habitats which have become irreversibly degraded through overgrazing should be excluded.
- 3) Plants: *Antennaria dioica*, *Arnica montana*, *Campanula barbata*, *Carex ericetorum*, *C. pallescens*, *C. panicea*, *Festuca ovina*, *Galium saxatile*, *Gentiana pneumonanthe*, *Hypericum maculatum*, *Hypochoeris maculata*, *Lathyrus montanus*, *Leontodon helveticus*, *Leucorchis albida*, *Meum athamanticum*, *Nardus stricta*, *Pedicularis sylvatica*, *Platanthera bifolia*, *Polygala vulgaris*, *Potentilla aurea*, *P. erecta*, *Veronica officinalis*, *Viola canina*.  
Animals: *Miramella alpina*.

- 4) Geographical distribution: Alps, Pyrenees, Apennines, Jura, Hercynian ranges, Netherlands, British Isles, Iberia peninsula, Luxembourg, Finland, Sweden.  
 The habitat sub-types belonging to the *Nardion* alliance shows a strong regional differentiation: Alps and Pyrenees - *Geo-montani-Nardetum*, Black Forest - *Leontodonto-Nardetum*, Harz - *Pulsatillo micranthae-Nardetum*, Bayerischer Wald - *Lycopodio-Nardetum*.  
 This habitat covers the most species-rich sites of the types "*CG10 Festuca ovina-Agrostis capillaris-Thymus praecox*" and "*CG11 Festuca ovina-Agrostis capillaris-Alchemilla alpina* grass heath" in the United Kingdom National Vegetation Classification. Corresponding category of the German Biotoptypen: "34060101 gemähter Borstgrasrasen der planaren bis submontanen Stufe", "34060102 beweideter Borstgrasrasen der planaren bis submontanen Stufe (incl. Mähweide)", "34060103 brachgefallener Borstgrasrasen der planaren bis submontanen Stufe", "34060201 gemähter Borstgrasrasen der montanen bis hochmontanen Stufe", "34060202 beweideter Borstgrasrasen der montanen bis hochmontanen Stufe (incl. Mähweide)", "34060203 brachgefallener Borstgrasrasen der montanen bis hochmontanen Stufe".  
 Corresponding category of the Nordic vegetation types: "5133 *Nardus stricta*-typ" and "5233a *Carex nigra-Carex panicea-Nardus stricta*-variant".
- 6) SJÖRS, H. (1967). Nordisk växtgeografi. 2 uppl. Svenska Bokförlaget Bonniers, Stockholm, 240 pp.

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## ***Sclerophillous grazed forests (dehesas)***

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**32.11****Sclerophillous grazed forests (dehesas) with *Quercus suber* and / or *Quercus ilex***NATURA 2000 code : **6310**

PAL.CLASS.: 32.11 x 91.2

- 1) **Sclerophillous grazed forests (dehesas) with evergreen oaks**
- 2) A characteristic landscape of the south-western quadrant of the Iberian peninsula in which crops, pasture land or Meso-Mediterranean arborescent matorral, in juxtaposition or rotation, are shaded by a fairly closed to very open canopy of native evergreen oaks (*Quercus suber*, *Q. ilex*, *Q. rotundifolia*, *Q. coccifera*). It is an important habitat of raptors, including the threatened Iberian endemic eagle *Aquila adalberti*, of the crane *Grus grus*, of large insects and their predators and of the endangered felid *Lynx pardinus*.
- 3) Plants: *Quercus suber*, *Q. ilex*, *Q. rotundifolia*, *Q. coccifera*.
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.

## Semi-natural tall-herb humid meadows

37.31

### *Molinia* meadows on chalk and clay (*Eu-Molinion*)

NATURA 2000 code : **6410**

PAL.CLASS.: 37.31

- 1) *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)
- 2) *Molinia* meadows of plain to montane levels, on more or less wet nutrient poor soils (nitrogen, phosphorus). They stem from extensive management, sometimes with a mowing late in the year or, they correspond to a deteriorated stage of draining peat bogs.  
Two subtypes are considered:
  - 37.311: on neutro-alkaline to calcareous soils with a fluctuating water table, relatively rich in species (*Eu-molinion*). The soil is sometimes peaty with a summer drying.
  - 37.312: on more acid soils of the *Junco-Molinion* (*Juncion acutiflori*) except species-poor meadows or on degraded peaty soils.
- 3) Plants: 37.311 - *Molinia caerulea*, *Dianthus superbus*, *Selinum carvifolia*, *Cirsium tuberosum*, *Colchicum autumnale*, *Inula salicina*, *Silaum silaus*, *Sanguisorba officinalis*, *Serratula tinctoria*, *Tetragonolobus maritimus*; 37.312 - *Viola persiciflora*, *V. palustris*, *Galium uliginosum*, *Cirsium dissectum*, *Crepis paludosa*, *Luzula multiflora*, *Juncus conglomeratus*, *Ophioglossum vulgatum*, *Inula britannica*, *Lotus uliginosus*, *Dianthus deltoides*, *Potentilla erecta*, *P. anglica*, *Carex pallescens*.
- 4) Geographical distribution: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "M26 - *Molinia caerulea*-*Crepis paludosa* fen meadow" and "M24 - *Molinia caerulea*-*Cirsium dissectum* fen meadow type" ("M23 - *Juncus effusus/acutiflorus*-*Galium palustre* rush pasture" and "M25 - *Molinia caerulea*-*Potentilla erecta* mire" are excluded). Corresponding category of the German Biotoptypen: "35020102 Pfeifengraswiese auf kalkreichen Standort".  
Corresponding category of the Nordic vegetation types: "5233 *Carex nigra*-*Carex panicea*-*Molinia caerulea*-typ", "5234 *Carex flacca*-*Primula farinosa*-*Orchis* spp.-typ" and "5235 *Molinia caerulea*-typ".
- 5) In some regions, these grasslands are in close contact with *Nardetalia* communities. For the *Molinia* meadows of river valleys, a transition toward *Cnidion dubii* alliance is observed.
- 6) EKSTAM, U., ARONSSON, N. & FORSHED, N. (1988). Ängar. Om naturliga slåttermarker i ängslandskapet. LTs förlag, Stockholm, 209 pp.

## 37.4

### Mediterranean tall-herb and rush meadows (*Molinio-Holoschoenion*)

NATURA 2000 code: **6420**

PAL.CLASS.: 37.4

- 1) **Mediterranean tall humid grasslands (*Molinio-Holoschoenion*)**
- 2) Mediterranean humid grasslands of tall grasses and rushes, widespread in the entire Mediterranean basin, extending along the coasts of the Black Sea, in particular in dunal systems, north to the Dobrogea and the Danube Delta, in valleys of the Balkan peninsula north to the Banat.
- 3) Plants: *Scirpus holoschoenus* (*Holoschoenus vulgaris*), *Agrostis stolonifera*, *A. reuteri*, *Galium debile*, *Molinia caerulea*, *Briza minor*, *Melica cupanii*, *Cyperus longus*, *Linum tenue*, *Trifolium resupinatum*, *Schoenus nigricans*, *Peucedanum hispanicum*, *Carex mairii*, *Juncus maritimus*, *J. acutus*, *Asteriscus aquaticus*, *Hypericum tomentosum*, *H. tetrapterum*, *Inula viscosa*, *Oenanthe pimpinelloides*, *O. lachenalii*, *Eupatorium cannabinum*, *Prunella vulgaris*, *Pulicaria dysenterica*, *Tetragonolobus maritimus*, *Orchis laxiflora*, *Dactylorhiza elata*, *Succisa pratensis*, *Sonchus maritimus* ssp. *aquatilis*, *Silaum silaus*, *Sanguisorba officinalis*, *Serratula tinctoria*, *Genista tinctoria*, *Cirsium monspessulanum*, *C. pyrenaicum*, *Senecio doria*, *Dorycnium rectum*, *Erica terminalis*, *Euphorbia pubescens*, *Lysimachia ephemereum*.
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.

## 37.7 and 37.8

### Eutrophic tall herbs

NATURA 2000 code: **6430**

PAL.CLASS.: 37.7 and 37.8

- 1) **Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels**
- 2) **6431** (37.7) - Wet and nitrophilous tall herb edge communities, along water courses and woodland borders belonging to the *Glechometalia hederaceae* and the *Convolvuletalia sepium* orders (*Senecion fluviatilis*, *Aegopodion podagrariae*, *Convolvulion sepium*, *Filipendulion*).  
**6432** (37.8) - Hygrophilous perennial tall herb communities of montane to alpine levels of the *Betulo-Adenostyletea* class.
- 3) Plants: 37.7 - *Glechoma hederacea*, *Epilobium hirsutum*, *Senecio fluviatilis*, *Filipendula ulmaria*, *Angelica archangelica*, *Petasites hybridus*, *Cirsium oleraceum*, *Chaerophyllum hirsutum*, *Aegopodium podagraria*, *Alliaria petiolata*, *Geranium robertianum*, *Silene dioica*, *Lamium album*, *Lysimachia punctata*, *Lythrum salicaria*, *Crepis paludosa*; 37.8 - *Aconitum lycoctonum* (*A. vulparia*), *A. napellus*, *Geranium sylvaticum*, *Trollius europaeus*, *Adenostyles alliariae*, *Peucedanum ostruthium*, *Cicerbita alpina*, *Digitalis grandiflora*, *Calamagrostis arundinacea*, *Cirsium helenioides*.
- 4) Geographical distribution: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands (also in salt meadows), Spain, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "U17 - *Luzula sylvatica*-*Geum rivale* tall herb community".  
Corresponding category of the German Biotoptypen: "390101 krautiger Ufersaum an besonnten Gewässern", "39050101 feuchter Staudensaum der planaren bis submontanen Stufe", "390102 krautiger Ufersaum an beschatteten Gewässern (z.B. mit *Cardamine amara*, Bitteres Schaumkraut)",

"35020203 nährstoffreiche, Feucht- bzw. Naßgrünlandbrache der planaren bis submontanen Stufe", "35020303 nährstoffreiche, Feucht- bzw. Naßgrünlandbrache der planaren bis hochmontanen Stufe", "39050201 montane bis hochmontane Hochstaudenflur", "39050202 montane bis hochmontane Hochgrasflur (*Calamagrostion arundinaceae*)", "6701 subalpine bzw. alpine Hochstaudenflur (Alpen)".

Corresponding category of the Nordic vegetation types: "126 Högörtängsvegetation".

- 5) Similar communities to 37.8, with a weak development, occur at lower altitude along rivers and forest borders (in Wallonia -Belgium for example). Nitrophilous edge communities comprising only basal, common species in the region have no conservation priority. These tall herb communities could also develop in wet meadows, let lie fallow, without any cutting. Large areas of wet meadows let lie fallow and neophyte communities with *Helianthus tuberosus*, *Impatiens glandulifera*, should not be taken into account.
- 6) DAHL, E. (1987). Alpine-subalpine plant communities of South Scandinavia. *Phytocoenologia* 15:455-484.  
LARSSON, A. (1976). Den sydsvenska fuktängen. Vegetation, dynamic och skötsel. Medd. Avd. Ekol. Bot. Lund 31.

### — *Cnidion venosae* meadows liable to flooding

NATURA 2000 code : **6440**

PAL.CLASS.: 37.23

- 1) **Alluvial meadows of river valleys of the *Cnidion dubii* alliance**
- 2) Alluvial meadows with natural dynamic of flooding belonging to the *Cnidion dubii* alliance, under continental to subcontinental climatic conditions.
- 3) Plants: *Cnidium dubium* (*C. venosum*), *Viola persicifolia*, *Scutellaria hastifolia*, *Allium angulosum*, *Oenanthe lachenalii*, *Gratifolia officinalis*, *Carex praecox* var. *suzae*, *Juncus atratus*, *Lythrum virgatum*.
- 4) Geographical distribution: Austria, France, Germany.  
Corresponding category of the German Biotoptypen: "35020201 nährstoffreiche, extensive Feucht- bzw. Naßwiese der planaren bis submontanen Stufe", "35020202 nährstoffreiche, extensive Feucht- bzw. Naßwiese der planaren bis submontanen Stufe (incl. Mähweide)", "350204 Flutrasen".
- 5) It is a transition habitat between wet and dry meadows and which cover small areas. This point has to taken into account for the site selection.



## Mesophile grasslands

### 38.2 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)

NATURA 2000 code : **6510**

PAL.CLASS.: 38.2

- 1) **Extensive hay meadows of the plain to submontane levels (*Arrhenatherion*, *Brachypodio-Centaureion nemoralis*)**
- 2) Species-rich hay meadows on little to moderately fertilised soils of the plain to submontane levels, belonging to the *Arrhenatherion* and the *Brachypodio-Centaureion nemoralis* alliances. These extensive grasslands are rich in flowers and are not reaped before flowering of the grasses and than only one or two times per year.
- 3) Plants: *Arrhenatherum elatius*, *Trisetum flavescens* ssp. *flavescens*, *Pimpinella major*, *Centaurea jacea*, *Crepis biennis*, *Knautia arvensis*, *Tragopogon pratensis*, *Daucus carota*, *Leucanthemum vulgare*, *Alopecurus pratensis*, *Sanguisorba officinalis*, *Campanula patula*, *Leontodon hispidus*, *L. nudicaulis*, *Linum bienne*, *Oenanthe pimpinelloides*, *Rhinanthus lanceolatus*, *Malva moschata*, *Serapias cordigera*.
- 4) Geographical distribution: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "MG4 -*Alopecurus pratensis*-*Sanguisorba officinalis* grassland". Corresponding category of the German Biotoptypen: "34070101 artenreiche, frische Mähwiese der planaren bis submontanen Stufe", "34070102 artenreiche, frische Weide der planaren bis submontanen Stufe (incl. Mähweide)".  
Corresponding category of the Nordic vegetation types: "5223 *Leucanthemum vulgare*-typ".
- 5) Wet to dry sub-types occur. If management practices become intensive with important fertiliser supply, the species diversity rapidly declines.
- 6) BUFFA, G., MARCHIORI, S., SBURLINO, G. (1988-1989). Contributo alla conoscenza dei prati e prato-pascoli della Bassa Valsugana (Trento). Not. Fitosoc., 24: 125-134.  
EKSTAM, U, ARONSSON, N. & FORSHED, N. (1988). Ängar. Om naturliga slåttermarker i ängslandskapet. LTs förlag, Stockholm, 209 pp.  
PEDROTTI, F. (1963). I prati falciabili della Val di Sole (Trentino occidentale). St. Trent. Sc. Nat., 40 (1): 3-122.

## 38.3

**Mountain hay meadows**  
**(British types with *Geranium sylvaticum*)**

NATURA 2000 code : **6520**

PAL.CLASS.: 38.31

- 1) **Mountain hay meadows**
- 2) Species-rich mesophile hay meadows of the montane and sub-alpine levels (mostly above 600 metres) usually dominated by *Trisetum flavescens* and with *Heracleum sphondylium*, *Viola cornuta*, *Astrantia major*, *Carum carvi*, *Crepis mollis*, *C. pyrenaica*, *Bistorta major*, (*Polygonum bistorta*), *Silene dioica*, *S. vulgaris*, *Campanula glomerata*, *Salvia pratensis*, *Centaurea nemoralis*, *Anthoxanthum odoratum*, *Crocus albiflorus*, *Geranium phaeum*, *G. sylvaticum*, *Narcissus poeticus*, *Malva moschata*, *Valeriana repens*, *Trollius europaeus*, *Pimpinella major*, *Muscari botryoides*, *Lilium bulbiferum*, *Thlaspi caerulescens*, *Viola tricolor* ssp. *subalpina*, *Phyteuma halleri*, *P. orbiculare*, *Primula elatior*, *Chaerophyllum hirsutum* and many others.
- 3) Plants: *Trisetum flavescens* and with *Heracleum sphondylium*, *Viola cornuta*, *Astrantia major*, *Carum carvi*, *Crepis mollis*, *C. pyrenaica*, *Bistorta major* (*Polygonum bistorta*), *Silene dioica*, *S. vulgaris*, *Campanula glomerata*, *Salvia pratensis*, *Centaurea nemoralis*, *Anthoxanthum odoratum*, *Crocus albiflorus*, *Geranium phaeum*, *G. sylvaticum*, *Narcissus poeticus*, *Malva moschata*, *Valeriana repens*, *Trollius europaeus*, *Pimpinella major*, *Muscari botryoides*, *Lilium bulbiferum*, *Thlaspi caerulescens*, *Viola tricolor* ssp. *subalpina*, *Phyteuma halleri*, *P. orbiculare*, *Primula elatior*, *Chaerophyllum hirsutum*, *Alchemilla* spp., *Cirsium heterophyllum*.
- 4) Geographical distribution: Austria, Finland, France, Germany, Italy, Portugal, Sweden, United Kingdom.  
 British types with *Geranium sylvaticum*. Corresponding category in the United Kingdom National Vegetation Classification: ""MG3 *Anthoxanthum odoratum*-*Geranium sylvaticum* grassland".  
 Corresponding category of the Nordic vegetation types: "5224 *Geranium sylvaticum*-typ", "5225 *Festuca ovina*-*Bistorta vivipara*-typ" and "5226 *Festuca rubra*-*Bistorta vivipara*-typ".
- 6) SJÖRS, H. (1967). Nordisk växtgeografi. 2 uppl. Svenska Bokförlaget Bonniers, Stockholm, 240 pp.

# RAISED BOGS AND MIRES AND FENS

## *Sphagnum acid bogs*

### 51.1

### \* Active raised bogs

NATURA 2000 code : **7110**

PAL.CLASS.: 51.1

#### 1) \* Active raised bogs

- 2) Acid bogs, ombrotrophic, poor in mineral nutrients, sustained mainly by rainwater, with a water level generally higher than the surrounding water table, with perennial vegetation dominated by colourful *Sphagna* hummocks allowing for the growth of the bog (*Erico-Sphagnetalia magellanici*, *Scheuchzerietalia palustris* p., *Utricularietalia intermedio-minoris* p., *Caricetalia fuscae* p.). Typically, pools may be present in western United Kingdom, Ireland, Finland and Sweden. The term "active" must be taken to mean still supporting a significant area of vegetation that is normally peat forming, but bogs where active peat formation is temporarily at a standstill, such as after a fire or during a natural climatic cycle e.g., a period of drought, are also included.

- 3) Plants: *Erico-Sphagnetalia magellanici* - *Andromeda polifolia*, *Carex pauciflora*, *Cladonia* spp., *Drosera rotundifolia*, *Eriophorum vaginatum*, *Odontoschisma sphagni*, *Sphagnum magellanicum*, *S. imbricatum*, *S. fuscum*, *Vaccinium oxycoccos*; in the Boreal region also *Betula nana*, *Chamaedaphne calyculata*, *Calluna vulgaris*, *Ledum palustre* and *Sphagnum angustifolium*. *Scheuchzerietalia palustris* p., *Utricularietalia intermedio-minoris* p., *Caricetalia fuscae* p. - *Carex fusca*, *C. limosa*, *Drosera anglica*, *D. intermedia*, *Eriophorum gracile*, *Rhynchospora alba*, *R. fusca*, *Scheuchzeria palustris*, *Utricularia intermedia*, *U. minor*, *U. ochroleuca*; in the Boreal region also *Sphagnum balticum* and *S. majus*.

Animals: Dragonflies - *Leucorrhinia dubia*, *Aeshna subartica*, *A. caerulea*, *A. juncea*, *Somatochlora arctica*, *S. alpestris*. Butterflies - *Cölias palaeno*, *Boloria aquilonaris*, *Coenonympha tullia*, *Vacciniina optilete*, *Hypenodes turfosalis*, *Eugraphe subrosea*. Spiders - *Pardosa sphagnicola*, *Glyphesis cottonae*. Ants - *Formica transkaucaasia*. Cricket/Grasshopper - *Metrioptera brachyptera*, *Stethophyma grossum*.

- 4) Geographical distribution: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Ireland, Netherlands, Spain (Pyrenees and Cantabrian mountains), Sweden, United Kingdom.

Variations can occur depending on local climatic and geomorphological conditions. In Belgium, this habitat is only present in High Ardennes; a typical site is the Fagne Walloon.

Corresponding category in the United Kingdom National Vegetation Classification: "M1 *Sphagnum auriculatum* bog pool community", "M3 *Eriophorum angustifolium* bog pool community", "M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire", "M20a *Eriophorum vaginatum* blanket and mixed mire - species poor sub community". Corresponding category of the German Biotoptypen: "360101 Hochmoor der planaren bis submontanen Stufe", "360102 Hochmoor der montanen bis hochmontanen Stufe".

Corresponding category of the Nordic vegetation types: "312 Ristuvvegetation", "313 Fastmattevegetation", "314 Mjukmatte-och lösbottnvegetation" and "311 Skogmossvegetation" when comprising a part of the mire complexe.

- 5) In order to support the conservation of this ecosystem over its geographic range and its genetic diversity, marginal areas of lower quality as a result of damage or degradation which abut active raised

bogs may need to be included, protected and, where practicable, regenerated. There are very few intact or near-intact raised bogs in Europe, except in Finland and Sweden where active raised bogs are predominant mire complex type in hemiboreal and southern boreal regions.

- 6) CURTIS, J.R. (in press). The raised bogs of Ireland: their ecology, status and conservation. Government Publications, Dublin.
- EUROLA, S., HICKS, S. & KAAKINEN, E. (1984). Key to Finnish Mire Types.
- MOORE, J.J. (1968). A classification of the bogs and wet heaths of northern Europe (Oxycocco-Sphagnetea Br.-Bl. et Tx. 1943). In: Pflanzensoziologische Systematik. Bericht über das internationale Symposium in Stolzenau/Weser 1964 der Internationale Vereinigung für Vegetationskunde (R.Tuxen, Ed.). Junk, Den Haag. 306 - 320.
- NATURE CONSERVATION COUNCIL (1989). Guidelines for the selection of biological SSSIs. Nature Conservation Council, Peterborough.
- OSWALD, H. (1923). Die Vegetation des Hochmoores Komosse. Sv. Växtsociol. Sällsk. Handl. 1:1-436.
- SCHOUTEN, M.C.G. (1984). Some aspects of the ecogeographical gradient in Irish ombrotrophic bogs. Peat Congress, Dublin. 1: 414 - 432.
- TUXEN, R.; MIYAWAKI, A. & FUJIWARA, K. (1972). Eine erweiterte Gliederung der Oxycocco-Sphagnetea. In: Grundfragen und Methoden in der Pflanzensoziologie. (R.Tuxen, Ed.). Junk, Den Haag. 500 - 520.

## 51.2

### Degraded raised bogs (still capable of natural regeneration)

NATURA 2000 code : **7120**

PAL.CLASS.: 51.2

- 1) **Degraded raised bogs (still capable of natural regeneration)**
- 2) These are raised bogs where there has been disruption (usually anthropogenic) to the natural hydrology of the peat body, leading to surface desiccation and/or species change or loss. Vegetation on these sites usually contains species typical of active raised bog as the main component, but the relative abundance of individual species is different. Sites judged to be still capable of natural regeneration will include those areas where the hydrology can be repaired and where, with appropriate rehabilitation management, there is a reasonable expectation of re-establishing vegetation with peat-forming capability within 30 years. Sites unlikely to qualify as SACs are those that consist largely of bare peat, that are dominated by agricultural grasses or other crops, or where components of bog vegetation have been eradicated by closed canopy woodlands.
- 4) Geographical distribution: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Spain, Sweden, United Kingdom.
- 6) MALMER, N. (1965). The southern mires. Acta Phytogeogr. Suec. 50:149-158.

## 52.1 and 52.2

## Blanket bog ( \* active only)

NATURA 2000 code : **7130** )

PAL.CLASS.: 52.1 and 52.2

- 1) **Blanket bog ( \* active only)**
- 2) Extensive bog communities or landscapes on flat or sloping ground with poor surface drainage, in oceanic climates with heavy rainfall, characteristic of western and northern Britain and Ireland. In spite of some lateral water flow, blanket bogs are mostly ombrotrophic. They often cover extensive areas with local topographic features supporting distinct communities [*Erico-Sphagnetalia magellanici*: *Pleurozio purpureae-Ericetum tetralicis*, *Vaccinio-Ericetum tetralicis* p.; *Scheuchzerietalia palustris* p., *Utricularietalia intermedio-minoris* p., *Caricetalia fuscae* p.]. Sphagna play an important role in all of them but the cyperaceous component is greater than in raised bogs. The term "active" must be taken to mean still supporting a significant area of vegetation that is normally peat forming.
- 3) Plants: 52.1- *Calluna vulgaris*, *Campylopus atrovirens*, *Carex panicea*, *Drosera rotundifolia*, *Erica tetralix*, *Eriophorum vaginatum*, *Molinia caerulea*, *Myrica gale*, *Narthecium ossifragum*, *Pedicularis sylvatica*, *Pinguicula lusitanica*, *Pleurozia purpurea*, *Polygala serpyllifolia*, *Potentilla erecta*, *Racomitrium languginosum*, *Rhynchospora alba*, *Schoenus nigricans*, *Scirpus cespitosus*, *Sphagnum pulchrum*, *S. strictum*, *S. compactum*, *S. auriculatum*. 52.2 - *Calluna vulgaris*, *Diplophyllum albicans*, *Drosera rotundifolia*, *Empetrum nigrum*, *Erica tetralix*, *Eriophorum vaginatum*, *Myrica taylorii*, *Narthecium ossifragum*, *Rubus chamaemorus*, *Scirpus cespitosus*, *Vaccinium myrtillus*.  
Animals: *Pluvialis apricaria*, *Calidris alpina*.
- 4) Geographical distribution: France, Ireland, Sweden, United Kingdom.  
Sub-types of the British Isles: **7131** (52.1) - Hyper-Atlantic blanket bogs of the western coastlands of Ireland, western Scotland and its islands, Cumbria, Northern Wales; bogs locally dominated by sphagna (*Sphagnum auriculatum*, *S. magellanicum*, *S. compactum*, *S. papillosum*, *S. nemoreum*, *S. rubellum*, *S. tenellum*, *S. subnitens*), or, particularly in parts of western Ireland, mucilaginous algal deposits (*Zygonium*). **7132** (52.2) - Blanket bogs of high ground, hills and mountains in Scotland, Ireland, Western England and Wales.  
Corresponding category in the United Kingdom National Vegetation Classification: "M1 *Sphagnum auriculatum* bog pool community", "M15 *Scirpus cespitosus-Erica tetralix* wet heath", "M17 *Scirpus cespitosus-Eriophorum vaginatum* blanket mire", "M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire", "M19 *Calluna vulgaris-Eriophorum vaginatum* blanket mire", "M20 *Eriophorum vaginatum* blanket mire".
- 5) In the United Kingdom discrete areas of raised bog and blanket bog may occur in some districts, showing their characteristic differences. In many other areas, however, peatlands which may have begun as raised bog have become merged in a general expanse of blanket bog, losing their distinctive marginal features. Within these blanket bogs, there are other peat-forming systems which, strictly speaking, form part of various biotopes of aquatic and amphibious zones, fens and moorland.
- 6) DOYLE, G.J. & MOORE, J.J. (1980). Western blanket bog (*Pleurozio purpureae-Ericetum tetralicis*) in Ireland and Great Britain. *Colloques Phytosociologiques*. VII: 213 - 223.  
MOORE, J.J. (1968). A classification of the bogs and wet heaths of northern Europe (*Oxycocco-Sphagnetalia* Br.-Bl. et Tx. 1943). In: *Pflanzensoziologische Systematik. Bericht über das internationale Symposium in Stolzenau/Weser 1964 der Internationale Vereinigung für Vegetationskunde* (R.Tuxen, Ed.). Junk, Den Haag. 306 - 320.  
NATURE CONSERVATION COUNCIL (1989). Guidelines for the selection of biological SSSI's. Nature Conservation Council, Peterborough.

TUXEN, R.; MIYAWAKI, A. & FUJIWARA, K. (1972). Eine erweiterte Gliederung der Oxyocco-Sphagnetea. In: Grundfragen und Methoden in der Pflanzensoziologie. (R.Tuxen, Ed.). Junk, Den Haag. 500 - 520.

## 54.5 Transition mires and quaking bogs

NATURA 2000 code : **7140**

PAL.CLASS.: 54.5

### 1) Transition mires and quaking bogs

- 2) Peat-forming communities developed at the oligotrophic to mesotrophic water surfaces, with characteristics intermediate between soligenous and ombrogenous types. They present a large and diverse range of plant communities. In large peaty systems, the most prominent communities are swaying swards, floating carpets or quaking mires formed by medium-sized or small sedges, associated with sphagnum or brown mosses. They are generally accompanied by aquatic and amphibious communities. In the Boreal region this habitat type includes minerotrophic fens that are not part of a larger mire complex, open swamps and small fens in the transition zone between water (lakes, ponds) and mineral soil.

These mires and bogs belong to the *Scheuchzerietalia palustris* order (oligotrophic floating carpets among others) and to the *Caricetalia fuscae* order (quaking communities). Oligotrophic water-land interfaces with *Carex rostrata* are included.

- 3) Plants: *Eriophorum gracile*, *Carex chordorrhiza*, *Carex lasiocarpa*, *Carex diandra*, *Carex rostrata*, *Carex limosa*, *Scheuchzeria palustris*, *Hammarbya paludosa*, #*Liparis loeselii*, *Rhynchospora alba*, *R. fusca*, *Menyanthes trifoliata*, *Epilobium palustre*, *Pedicularis palustris*, *Sphagnum* sp. (*S. papillosum*, *S. angustifolium*, *S. subsecundum*, *S. fimbriatum*, *S. riparium*, *S. cuspidatum*, *Calliergon giganteum*, *Drepanocladus revolvens*, *Scorpidium scorpioides*, *Campylium stellatum*, *Aneura pinguis*.

- 4) Geographical distribution: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Spain, Sweden, United Kingdom.

Corresponding category in the United Kingdom National Vegetation Classification: "M4 - *Carex rostrata*-*Sphagnum recurvum* mire", "M5 - *Carex rostrata*-*Sphagnum squarrosum* mire", "M8 - *Carex rostrata*-*Sphagnum warnstofii* mire", "M9 *Carex rostrata*-*Calliergon cuspidatum/giganteum*", "S27 - *Carex rostrata*-*Potentilla palustris* fen".

Corresponding category of the German Biotoptypen: "360201 Übergangs- oder Zwischenmoor der planaren bis submontanen Stufe", "360202 Übergangs- oder Zwischenmoor der montanen bis hochmontanen Stufe".

Corresponding category of the Nordic vegetation types: "312 Ristuvvegetation", "32 Fattigkärrvegetation (except 321)", "314 Mjukmatte-och lösbottenvegetation på öppna mossar", "3321 *Trichophorum caespitosum*-*Molinia caerulea*-*Sphagnum* spp.-*Drepanocladus* spp.-typ", "3323 *Carex nigra*-*Drepanocladus exannulatus*-*Calliergon* spp.-typ", "*Trichophorum caespitosum*-*Drepanocladus revolvens*-variant of 3323", "3331 *Carex* spp.-*Sphagnum* spp.- *Drepanocladus* spp.-typ", "*Carex* spp.-*Sphagnum fallax*-*subsecundum*-variant of 3331", "3333 *Potentilla palustris*-*Carex* spp.-*Sphagnum* spp.- *Drepanocladus exannulatus*-typ", "3341 *Carex* spp.-*Phragmites-Iris pseudacorus*-*Sphagnum*-typ".

- 5) Amphibious communities (22.3), fens (54.2 et 54.4), bogs (51.1-2) or humid grasslands (37.2-3).
- 6) DU RIETZ, G. E. (1949). Huvudenheter och huvudgränser i svensk myrvegetation. Sven. Bot. Tidskr. 43:274-309.

**54.6****Depressions on peat substrates (*Rhynchosporion*)**NATURA 2000 code : **7150**

PAL.CLASS.: 54.6

- 1) **Depressions on peat substrates (*Rhynchosporion*)**
- 2) Highly constant pioneer communities of humid exposed peat or, sometimes, sand, with *Rhynchospora alba*, *R. fusca*, *Drosera intermedia*, *D. rotundifolia*, *Lycopodiella inundata*, forming on stripped areas of blanket bogs or raised bogs, but also on naturally seep- or frost-eroded areas of wet heaths and bogs, in flushes and in the fluctuation zone of oligotrophic pools with sandy, slightly peaty substratum. These communities are similar, and closely related, to those of shallow bog hollows (51.122) and of transition mires (54.57).
- 3) Plants: *Rhynchospora alba*, *R. fusca*, *Drosera intermedia*, *D. rotundifolia*, *Lycopodiella inundata*.
- 4) Geographical distribution: Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Spain, United Kingdom.

## Calcareous fens

### 53.3 \* Calcareous fens with *Cladium mariscus* and *Carex davalliana*

NATURA 2000 code : **7210**

PAL.CLASS.: 53.3

- 1) \* Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*
- 2) *Cladium mariscus* beds of the emergent-plant zones of lakes, fallow lands or succession stage of extensively farmed wet meadows in contact with the vegetation of the *Caricion davallianae* or other *Phragmition* species [*Cladietum marisci* (Allorge 1922) Zobrist 1935].
- 3) Plants: *Cladium mariscus*, #*Kosteletzka pentacarpos*.
- 4) Geographical distribution: all the European Union, except Denmark and Greece.  
Corresponding category in the United Kingdom National Vegetation Classification: "S2 *Cladietum marisci*", "S24 *Peucedano-Phragmitetum australis*", "S25 *Phragmites australis-Eupatorium cannabinum* fen", "M9 *Carex rostrata- Calliargon* spp. mire", "M13 *Schoenus nigricans-Juncus subnodulosus* mire", "M14 *Schoenus nigricans-Nartheceium ossifragum* mire", "M24 *Molinia caerulea-Cirsium dissectum* fen meadow", "SD14 *Salix repens-Campylium stellatum* dune slack" and "SD 15 *Salix repens-Calliargon cuspidatum* dune slack".  
Corresponding category of the German Biotoptypen: "3804 Schneidenröhricht".  
Corresponding category of the Nordic vegetation types: "3441a *Cladium mariscus*-variant".
- 5) In contact with calcareous fens (54.2), but also with acid fens, extensive wet meadows, other reed beds and large sedge communities.
- 6) STERNER, R. (1926). Ölands växtvärld. Södra Kalmar län III. Hjalmar Appeltoffts Bokhandel, Kalmar, 237 pp.

### 54.12 \* Petrifying springs with tufa formation (*Cratoneurion*)

NATURA 2000 code : **7220**

PAL.CLASS.: 54.12

- 1) \* Petrifying springs with tufa formation (*Cratoneurion*)
- 2) Hard water springs with active formation of travertine or tufa. These formations are found in such diverse environments as forests or open countryside. They are generally small (point or linear formations) and dominated by bryophytes (*Cratoneurion commutati*).
- 3) Plants: *Arabis soyeri*, *Cochlearia pyrenaica* (in sites with heavy metals), *Pinguicula vulgaris*, *Saxifraga aizoides*. Mosses: *Catoscopium nigratum*, *Cratoneurion commutatum*, *C. commutatum* var. *falcatum*, *C. filicinum*, *Eucladium verticillatum*, *Gymnostomum recurvirostrum*. In the Boreal region also *Carex appropinquata*, *Epilobium davuricum*, *Juncus triglumis*, *Drepanocladus vernicosus*, *Philonotis calcarea*, *Scorpidium revolvens*, *S.cossoni*, *Cratoneurion decipiens*, *Bryum pseudotriquetum*.



- 4) **Geographical distribution:** Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Sweden, United Kingdom.  
 Typical sites in: Lorraine (Belgium), The Burren, Ben Bulbin, North Mayo and Pollardstown Fen (Ireland).  
 Corresponding category in the United Kingdom National Vegetation Classification: "M37 *Cratoneuron commutatum-Festuca rubra* spring community" and "M38 *Cratoneuron commutatum-Carex nigra* spring community".  
 Corresponding category of the German Biotoptypen: "220102 kalkreiche Sicker- und Sumpfquelle", "220302 kalkreiche Sturzquelle", "220402 kalkreiche, temporäre Sicker- und Stumpfquelle", "220502 kalkreiche, temporäre Sturzquelle".  
 Corresponding category of the Nordic vegetation types: "3521 *Philonotis*-typ" and "3522 *Cratoneuron*-typ".
- 5) Can form complexes with transition mires, fens, chasmophytic communities of cold and humid environments and heaths and calcareous grassland (*Festuco-Brometalia*).  
 In order to preserve this habitat of very limited expanse in the field, it is essential to preserve its surroundings and the whole hydrological system concerned.
- 6) MALMER, N. (1971). Förslag till riktlinjer för en enhetlig klassificering av myrvegetation i Norden. In: IBP i Norden 7. Universitetsforlaget, Oslo, pp. 45-58.

## 54.2

## Alkaline fens

NATURA 2000 code : **7230**

PAL.CLASS.: 54.2

- 1) **Alkaline fens**
- 2) Wetlands mostly or largely occupied by peat- or tufa-producing small sedge and brown moss communities developed on soils permanently waterlogged, with a soligenous or topogenous base-rich, often calcareous water supply, and with the water table at, or slightly above or below, the substratum. Peat formation, when it occurs, is infra-aquatic. Calciphile small sedges and other Cyperaceae usually dominate the mire communities, which belong to the *Caricion davallianae*, characterised by a usually prominent "brown moss" carpet formed by *Campylium stellatum*, *Drepanocladus intermedius*, *D. revolvens*, *Cratoneuron commutatum*, *Acrocladium cuspidatum*, *Ctenidium molluscum*, *Fissidens adianthoides*, *Bryum pseudotriquetrum* and others, a grasslike growth of *Schoenus nigricans*, *S. ferrugineus*, *Eriophorum latifolium*, *Carex davalliana*, *C. flava*, *C. lepidocarpa*, *C. hostiana*, *C. panicea*, *Juncus subnodulosus*, *Scirpus cespitosus*, *Eleocharis quinqueflora*, and a very rich herbaceous flora including *Tofieldia calyculata*, *Dactylorhiza incarnata*, *D. traunsteineri*, *D. traunsteinerioides*, *D. russowii*, *D. majalis* ssp. *brevifolia*, *D. cruenta*, #*Liparis loeselii*, *Herminium monorchis*, *Epipactis palustris*, *Pinguicula vulgaris*, *Pedicularis sceptrum-carolinum*, *Primula farinosa*, *Swertia perennis*. Wet grasslands (*Molinietalia caerulea*, 37), tall sedge beds (*Magnocaricion*, 53.2), reed formations (*Phragmition*, 53.1), fen sedge beds (*Cladietum mariscae*, 53.3), may form part of the fen system, with communities related to transition mires (54.5, 54.6) and amphibious or aquatic vegetation (22.3, 22.4) or spring communities (54.1) developing in depressions. The sub-units below, which can, alone or in combination, and together with codes selected from the categories just mentioned, precise the composition of the fen, are understood to include the mire communities sensu stricto (*Caricion davallianae*), their transition to the *Molinion*, and assemblages that, although they may be phytosociologically referable to alkaline *Molinion* associations, contain a large representation of the *Caricion davallianae* species listed, in addition to being integrated in the fen system; this somewhat parallels the definition of an integrated class *Molinio-Caricetalia davallianae* in Rameau et al., 1989. Outside of rich fen systems, fen communities can occur on small surfaces in dune slack systems (16.3), in transition mires (54.5), in wet grasslands (37), on tufa cones (54.121) and in a few other situations.. The codes below can be

used, in conjunction with the principal code relevant, to signal their presence. Rich fens are exceptionally endowed with spectacular, specialised, strictly restricted species. They are among the habitats that have undergone the most serious decline. They are essentially extinct in several regions and gravely endangered in most. A very few large systems remain, in particular in pre-Alpine Bavaria, in the Italian pre-Alps, in collinar and montane eastern France, in north-eastern Germany, in the coastal marshes of northern France, in eastern and northern England, in Wales, in Ireland, and in Finland and Sweden.

- 3) Plants: *Schoenus nigricans*, *S. ferrugineus*, *Carex* spp., *Eriophorum latifolium*, *Cinclidium stygium*, *Tomentypnum nitens*.
- 4) Geographical distribution: all the European Union, except Luxembourg and Portugal. Corresponding category of the Nordic vegetation types: 34 Rikkärrvegetation-typ", "352 Rik källkärvegetation".
- 6) SJÖRS, H. (1948). Myrvegetation i Bergslagen. Acta Phytogeogr. Suec. 21:1-299.

## 54.3

**\* Alpine pioneer formations of  
*Caricion bicoloris-atrofuscæ***

NATURA 2000 code : **7240**

PAL.CLASS.: 54.3

- 1) **\* Alpine pioneer formations of *Caricion bicoloris-atrofuscæ***
- 2) Alpine, peri-Alpine and northern British communities colonising neutral to slightly acid gravelly, sandy, stony, sometimes somewhat argilous or peaty substrates soaked by cold water, in moraines and on edges of springs, rivulets, glacial torrents of the alpine or sub-alpine levels, or on alluvial sands of pure, cold, slow-flowing rivers and calm backwaters. The permanent or continue soil frost during a long period is essential for the existence of this habitat type. Low vegetation composed principally of species of *Carex* and *Juncus* (*Caricion bicoloris-atrofuscæ*).
- 3) Plants: *Carex atrofuscæ*, *C. bicolor*, *C. maritima*, *C. microglochin*, *C. vaginata*, *Juncus alpinoarticulatus*, *J. arcticus*, *J. castaneus*, *J. triglumis*, *Kobresia simpliciuscula*, *Typha lugdunensis*, *T. minima*, *T. shuttleworthii*, *Tofieldia pusilla*.  
Animals: #*Vertigo geyeri*, #*V. genesii*.
- 4) Geographical distribution: Alps, Finland, Sweden, Scotland and Upper Teesdale. Corresponding category of the German Biotoptypen: "6402 Alpine Scwemmböden mit niedriger Vegetation". Corresponding category of the Nordic vegetation types: "3422 *Carex atrofuscæ*-*Drepanocladus revolvens*-typ" and "3423 *Carex saxatilis*-*Drepanocladus revolvens*-typ".
- 5) Associated with humid meadows managed extensively, but also with communities of *Caricion davalliana*.
- 6) PERSSON, Å. (1965). Mountain mires. Acta Phytogeogr. Suec. 50:249-256.

## Aapa mires

54.8

\* Aapa mires

NATURA 2000 code : 7310

PAL.CLASS.: 54.8

- 1) \* Aapa mires
- 2) Mire complexes in southern, middle and northern boreal zones characterised by minerotrophic fen vegetation in the central parts of the complexes. Hydrotopographical mire-units are: mixed mires, string-fens, flark-fens, unraised *Sphagnum fuscum*-bogs, unpatterned topogenous or soligenous lawn-, carpet or mud-bottom fens. Poor *Sphagnum* fens are the most common vegetation types whilst brown moss fens can be common in some regions. In prealpine areas in Sweden and in hill regions of Kainuu and Kuusamo in eastern Finland, sloping fens (>5 grades) are typical variants of aapa mires. They occur rarely also in the Suomenselkä water divide region in western Finland as well in Lapland. In the mire margins, pine mires and spruce swamps and mires on thin peat of different types dominate. In some limited areas with calcareous bedrock rich fens dominate in the complexes.
- 3) Plants: *Chamaedaphne calyculata*, *Empetrum nigrum* (s.lato), *Betula nana*, *Thricophorum cespitosum*, *Eriophorum vaginatum*, *E. russeolum*, *Carex rostrata*, *C. lasiocarpa*, *C. rotundata*, *C. chondorriza*, *C. livida*, *Scheuchzeria palustris*, *Molinia caerulea*, *Rubus chamaemorus*, *Saxifraga hirculus*, *Dactylorhiza incarnata*. Mosses: *Sphagnum papillosum*, *S. jensenii*, *S. lindbergii*, *S. majus*, *S. aongstroemii*, *S. subsecundum*, *S. subfulvum*, *S. pulchrum*, *Warnstorfia exannulata* (*Drepanocladus exannulatus*), *Limprichtia revolvens* (*Drepanocladus revolvens*), *Drepanocladus* (s.lato) spp., *Scorpidium scorpioides*.  
Animals: butterflies - *Pyrgus centaureae*, *Erebia disa*; moths: *Syngrapha diasema*, *Apamea maillardi*, *Nola karelica*, *Hypoxystis pluviana*.
- 4) Geographical distribution: Finland, Sweden.  
Aapa mires are also common in Russian Karelia; further to the east, under more continental climatic conditions, they are mostly replaced by ombrotrophic bogs.
- 6) EUROLA, S., HICKS, S. & KAAKINEN, E. (1984). Key to Finnish mire types. In: Moore, P.D. (ed). European mires, 11-117. Academic Press, London.  
RUUHIJÄRVI, R. (1983). The Finnish mire types and their regional distribution. In: Gore, A.J.P. (ed.). Ecosystems of the world. 4B. Mires: Swamp, bog, fen and moor. Regional studies, 47-97. Elsevier, Amsterdam.

## 54.9

## \* Palsa mires

NATURA 2000 code : 7320

PAL.CLASS.: 54.9

- 1) \* Palsa mires
- 2) Mire complexes in the northern boreal, orohemiarctic and alpine regions, where the climate is slightly continental and the mean annual temperature is below  $-1^{\circ}$ . The mires are mainly minerotrophic, excluding the palsas, which are peat mounds with sporadic permafrost. The palsas are usually 2-4 metres high, but up to 7 metres high palsas have been found in Finland and Sweden.
- 3) Plants: *Eriophorum russeolum*, *Carex rotundata*, *C. saxatilis*, *Empetrum nigrum* ssp. *hermaphroditum*, *Ledum palustre*, *Betula nana*, *Vaccinium microcarpum*. Mosses: *Dicranum elongatum*. Lichens: *Ochrolechia* spp., *Cladonia* spp., *Cladina* spp.
- 4) Geographical distribution: northern most Finland and Sweden.  
Palsa mires also occur in northern Norway and in the Kola peninsula. There are a few palsa mires in the Dovre mountains in middle Norway, but they seem to be declining due to climatic change.
- 6) EUROLA, S., HICKS, S. & KAAKINEN, E. (1984). Key to Finnish mire types. In: Moore, P.D. (ed). European mires, 11-117. Academic Press, London.  
RUUHIJÄRVI, R. (1983). The Finnish mire types and their regional distribution. In: Gore, A.J.P. (ed.). Ecosystems of the world. 4B. Mires: Swamp, bog, fen and moor. Regional studies, 47-97. Elsevier, Amsterdam.

## ROCKY HABITATS AND CAVES

### Scree

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#### 61.1

#### Siliceous scree

NATURA 2000 code : **8110**

PAL.CLASS.: 61.1

- 1) **Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)**
- 2) This habitat consist of:
  - a) communities of siliceous scree of the superior montane level to the snow level, growing on more or less moving "cryoclastic systems" with variable granulometry and belonging to the *Androsacetalia alpinae* order.
  - b) vegetation of the montane level of the west and centre of Europe growing on screes sometimes of artificial origin (extraction of materials). It consist of alpine communities often rich in bryophytes, lichens and sometimes in ferns (*Cryptogramma crispa*), belonging to the *Galeopsietalia* order.
- 3) Plants: a) *Androsacetalia alpinae*: *Androsacae alpina*, *Achillea nana*, *Oxyria digyna*, *Geum reptans*, *Saxifraga bryoides*, *Ranunculus glacialis*, *Linaria alpina*, *Cerastium uniflorum*, *Doronicum clusii*, *D. grandiflorum*, *Poa laxa*, *Viola valderia*, *Luzula alpinopilosa*, *Cryptogramma crispa*; b) *Galeopsietalia ladani*: *Galeopsis ladanum* ssp. *ladanum*, *Anarrhinum bellidiflorum*, *Cryptogramma crispa*, *Athyrium alpestre*.
- 4) Geographical distribution: Austria, Belgium (habitat of high conservation priority, present in the Ardennes, Warche valley e.g.), Finland, France, Germany, Greece, Ireland (e.g. the "Slieve League" site, Co. Donegal), Italy, Luxembourg, Sweden, United Kingdom.  
 Corresponding category in the United Kingdom National Vegetation Classification: "U21 *Cryptogramma crispa-Deschampsia flexuosa* community" and "U18 *Cryptogramma crispa-Athyrium distentifolium* snow bed".  
 Corresponding category of the German Biotoptypen: "6304 Silikatschutthalde der Alpen".  
 Corresponding category of the Nordic vegetation types: "1251a *Cryptogramma crispa*-variant", "7141 *Veronica fruticans* -typ" and "7142 *Veronica fruticans-Juniperus communis* -typ".
- 5) This habitat is generally in close association with the chasmophytic vegetation on siliceous rocky slopes (62.2). In Ireland and the United Kingdom, sites sheltering rare arctic-alpine plants (post glacial remnants) have a high conservation value.
- 6) BRINGER, K.-G. (1965). Plant cover of the alpine regions. Chionophobous plant communities. Acta Phytogeogr. Suec. 50:257-262.

## 61.2

## Eutric scree

NATURA 2000 code : **8120**

PAL.CLASS.: 61.2

- 1) **Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*)**
- 2) Calcareous, calcshist or marl screes of the montane to alpine levels under cold climate, with the associations respectively of *Drabion hoppeanae*, *Thlaspion rotundifolii* and *Petasition paradoxo*.
- 3) Plants: *Drabion hoppeanae* (calcschist screes) : *Draba hoppeana*, *Artemisia genipi*, *Campanula cenisia*, *Saxifraga biflora*, *Herniaria alpina*, *Trisetum spicatum* ssp. *ovatipaniculatum*; *Thlaspion rotundifolii* (calcareous scree): *Thlaspi rotundifolium*, *Hutchinsia alpina*, *Papaver rhaeticum*, *Galium villarsi*, *Berardia subacaulis*, *Viola cenisia*, *Arabis alpina*; *Petasition paradoxo* (marl screes): *Petasites paradoxus*, *Gypsophila repens*, *Valeriana montana*, *Leontodon hyoseroides*.
- 4) Geographical distribution: Austria, France, Germany, Ireland (Ben Bulbin), Italy, Spain, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "OV38 - *Gymnocarpium robertianum*-*Arrhenatherum elatius* community".  
Corresponding category of the German Biotoptypen: "6302 Kalkschutthalde der Alpen".  
Corresponding category of the Nordic vegetation types: "7143 *Arenaria norvegica*-typ".
- 5) In Ireland and United Kingdom, preference should be given to sites sheltering rare arctic-alpine plants (post glacial remnants).
- 6) BRINGER, K.-G. (1965). Plant cover of the alpine regions. Chionophobic plant communities. Acta Phytogeogr. Suec. 50:257-262.

## 61.3

## Western Mediterranean and alpine thermophilous scree

NATURA 2000 code : **8130**

PAL.CLASS.: 61.3

- 1) **Western Mediterranean and thermophilous scree**
- 2) Screes of warm exposures in the Alps and the Pyrenees, of calcareous substrates in the Pyrenees, of Mediterranean mountains, hills and lowlands and, locally, of warm, sunny middle European upland or lowland sites. The vegetation belongs to the *Androsacetalia alpinae* p., *Thlaspietalia rotundifolii* p., *Stipetalia calamagrostis* and *Polystichetalia lonchitis* orders.
- 3) Plants: 61.31 - *Achnatherum calamagrostis*, *Galeopsis angustifolia*, *Gymnocarpium robertianum*, *Lentodon hyoseroides*, *Sisymbrium supinum*, *Linaria supina*; 61.32 - *Gouffeia arenarioides*, *Ptychotis heterophylla*, *Centranthus ruber*, *Crucianella latifolia*; 61.33 - *Senecio leucophyllus*, *Taraxacum pyrenaicum*, *Xatartia scabra*, *Armeria alpina*; 61.34 - *Iberis spathulata*, *Papaver suaveolens*, *Galium cometerhizon*, *Plantago monosperma*, *Viola lapeyrousiana*, *Campanula jaubertiana*, *Crepis pygmaea*, *Doronicum grandiflorum*, *Campanula cochleariaefolia*, *Carduus carlinoides*, *Galium cespitosum*, *Festuca glacialis*, *Androsace ciliata*, *Saxifraga oppositifolia*, *Hutchinsia alpina*, *Galium pyrenaicum*, *Minuartia cerastiifolia*, *Saxifraga praetermissa*, *S. aizoides*, *Epilobium anagallidifolium*, *Veronica alpina*, *Taraxacum alpinum*, *Crepis pygmaea*; 64.35 - *Linaria filicaulis*, *Arabis cantabrica*, *Iberis lereschiana*, *Ranunculus parnassifolius* ssp. *favargerii*, *Crepis pygmaea*, *Iberis aperta*, *Rumex scutatus*, *Epilobium*

*anagallidifolium*, *Doronicum grandiflorum* ssp. *braunblanquetii*, *Campanula arvensis*, *Saxifraga praetermissa*, *Arabis cantabrica*, *Ranunculus alpestris* ssp. *leroyi*, *Salix breviserrata*, *Galium pyrenaicum*; 61.38 - *Linaria saxatilis*, *L. alpina*, *Digitalis purpurea* var. *carpetana*, *Senecio pyrenaicus* ssp. *carpetanus*, *Rumex suffruticosus*, *Santolina oblongifolia*, *Conopodium butinioides*, *Reseda gredensis*; 61.39 - *Senecio tournefortii* var. *granatensis*, *Digitalis purpurea* var. *nevadensis*, *Cirsium gregarium*, *Solidago virgaurea* var. *alpestris*, *Holcus caespitosus*, *Crepis oporinoides*, *Eryngium glaciale*, *Linaria aeruginea* var. *nevadensis*, *Viola crassiuscula*, *Linaria glacialis*, *Rhynchosinapis cheiranthos* ssp. *nevadensis*, *Ranunculus glacialis*, *R. parnassifolius*, *Saxifraga oppositifolia*, *Papaver suaveolens*, *Holcus caespitosus*, *Crepis oporinoides*.

4) Geographical distribution: Austria, France, Italy, Portugal, Spain.

The following sub-types are included:

61.31 Peri-Alpine thermophilous screes. *Stipion calamagrostidis*, *Leontodontion hyoseroidis*.

Mostly coarse, unstabilized, sunny calcareous screes of the montane and sub-alpine levels of the Alps and of the uplands and lowlands of western and central middle Europe.

61.32 Provençal screes. *Pimpinello-Gouffeion*.

Screes of Mediterranean southern France, with *Gouffeia arenarioides*, *Ptychotis heterophylla*, *Linaria supina*, *Centranthus ruber*, *Crucianella latifolia*.

61.33 Pyreneo-Alpine thermo-siliceous screes. *Senecion leucophyllae*, *Taraxacion pyrenaici*.

Siliceous screes of warm slopes of the sub-alpine level of the Alps and of the alpine and sub-alpine levels of the Pyrenees, usually composed largely of big stones or boulders, with *Senecio leucophyllus*, *Taraxacum pyrenaicum*, *Galeopsis pyrenaica*, *Xatartia scabra*, *Armeria alpina*.

61.34 Pyrenean calcareous screes. *Iberidion spathulatae*.

Calcareous screes of the Pyrenees.

61.35 Oro-Cantabrian calcareous screes. *Linarion filicaulis*, *Saxifragion praetermissae*.

Basiphile screes of the Cordillera Cantabrica.

61.36 Oro-Cantabrian siliceous screes. *Linarion filicaulis* p., *Linario-Senecion carpetani* p.

Siliceous screes of the Cordillera Cantabrica; floristically rich formations of the "dark" screes of the Cordillera are related to those of 61.351, though somewhat intermediate towards 61.38; other more species-poor ones, characterised by *Trisetum hispidum* and *Rumex suffruticosus*, belong to the latter.

61.37 Iberian fern screes. *Dryopteridion oreadis*, *Dryopteridion submontanae*.

Fern-dominated chaotic, boulder fields of siliceous and calcareous Iberian mountains.

61.38 Carpetano-Iberian siliceous screes. *Linario-Senecion carpetani*.

Screes of the Cordillera Central, the Iberian Range, the Leonese mountains, with *Linaria saxatilis*, *L. alpina*, *Digitalis purpurea* var. *carpetana*, *Senecio pyrenaicus* ssp. *carpetanus*, *Rumex suffruticosus*, *Santolina oblongifolia*, *Conopodium butinioides*, *Reseda gredensis*.

61.39 Nevadan siliceous screes. *Holcion caespitosae*.

Siliceous screes of the high levels of the Sierra Nevada, very rich in endemics.

61.3A Southern Iberian calcareous screes. *Platycapno-Iberidion granatensis*, *Scrophularion sciaphilae*

Screes of the calcareous Baetic mountains of southern and south-eastern Iberia.

61.3B Central Mediterranean screes

Screes of the Italian peninsula and of the large Mediterranean islands.

**61.4****Balkan scree**NATURA 2000 code : **8140**

PAL.CLASS.: 61.4

- 1) **Eastern Mediterranean screes**
  - 2) Screes of the high Greek mountains with vegetation of the *Drypetalia spinosae* order.
  - 3) Plants: 61.41 - *Drypis spinosa*, *Ranunculus brevifolius*, *Senecio thapsoides*, *Aethionema saxatile*; 61.42 - *Campanula hawkinsoniana*, *Arenaria serpentini*, *Cardamine glauca*, *Viola magellensis*, *Alyssum scardicum*, *Silene haussknechtii*.
  - 4) Geographical distribution: Greece.  
The following sub-types are included:  
61.41 Greek limestone screes. *Drypion spinosae* (*Silenion caesia*).  
Formations of the higher mountains of Greece (Pindus, Olympus, Parnassus, Giona, Taygetos, Kilini), with *Drypis spinosa*, *Ranunculus brevifolius*, *Senecio thapsoides*, *Aethionema saxatile*.  
  
61.42 Greek serpentine screes. *Campanulion hawkinsoniana*.  
Less widespread formations restricted to serpentines of the Pindus, with *Campanula hawkinsoniana*, *Arenaria serpentini*, *Cardamine glauca*, *Viola magellensis*, *Alyssum scardicum*, *Silene haussknechtii*.
- 

**61.5****Medio-European siliceous scree**NATURA 2000 code : **8150**

PAL.CLASS.: 61.12

- 1) **Northern upland siliceous screes**
- 2) Siliceous screes of hills of western and central Europe, with *Epilobium collinum*, *Galeopsis segetum*, *Senecio viscosus*, *Anarrhinum bellidifolium*, *Cryptogramma crispa*. Upland siliceous screes, often resulting from quarry activity, and colonised by very impoverished forms of the Alpine communities, usually rich in mosses, lichens and sometimes ferns, notably *Cryptogramma crispa*, are included, but should not be taken into account.
- 3) Plants: *Epilobium collinum*, *Galeopsis segetum*, *Senecio viscosus*, *Anarrhinum bellidifolium*, *Cryptogramma crispa*
- 4) Geographical distribution: Austria, France, Germany, Luxembourg.



**61.6****\* Medio-European calcareous scree**NATURA 2000 code : **8160**

PAL.CLASS.: 61.313

- 1) **\* Calcareous scree of hill and montane levels**
- 2) Calcareous or marly screes of the hill and montane levels extending into mountainous regions (subalpine and alpine), often in dry, warm stations in associations with *Stipetalia calamagrostis*.
- 3) Plants: *Achnatherum calamagrostis*, *Dryopteris robertiana* (= *Gymnocarpium robertianum*), *Galeopsis angustifolia*, *Petasites paradoxus*, *Rumex scutatus*.
- 4) Geographical distribution: Austria, France, southern Germany, Italy, Luxembourg. Calcareous screes of the Paris Basin, and more precisely the calcareous fine screes of the thermo-medio European plains irradiating into the lower valley of the Seine (*Leontodontion hyoseroidis*) may be included here.  
Corresponding category of the German Biotoptypen: "320401 natürliche Schutthalde aus Karbonatgestein".

This habitat type should be clearly distinguished from 61.3 - Western Mediterranean and alpine thermophilous screes, a non-priority Annex I habitat type.

## Chasmophytic vegetation on rocky slopes

### 62.1 and 62.1A Calcareous subtypes

NATURA 2000 code : **8210**

PAL.CLASS.: 62.1

- 1) **Chasmophytic vegetation of calcareous rocky slopes**
- 2) Vegetation of fissures of limestone cliffs, in the mediterranean region and in the euro-siberian plain to alpine levels, belonging essentially to the *Potentilletalia caulescentis* and *Asplenietalia glandulosi* orders. Two levels may be identified: a) thermo- and meso-Mediterranean (*Onosmetalia frutescentis*) with *Campanula versicolor*, *C. rupestris*, *Inula attica*, *I. mixta*, *Odontites luskii*; b) montane- oro-Mediterranean (*Potentilletalia speciosae*, including *Silenion auriculatae*, *Galion degenii* and *Ramondion nathaliae*). This habitat type presents a great regional diversity, with many endemic plant species (indicated under point 3).
- 3) Plants:
  - 8211** (62.11) - Western Mediterranean communities (*Asplenion petrarchae*): *Asplenium petrarchae*, *Asplenium trichomanes* ssp. *pachyrachis*, *Cheilanthes acrostica*, *Melica minuta*, *Hieracium stelligerum*, *Erodium petraeum*; Mesotherm shady fern groups of the supra-Mediterranean level (*Polypodium australe*): *Polypodium cambricum* ssp. *australe*, *Saxifraga corbariensis*, #*Asplenium jahandiezii*, *Asplenium sagittatum*, *Pteris cretica*, *Asplenium trichomanes* ssp. *inexpectans*.
  - 8212** (62.12) - Central Pyrenean communities (*Saxifragion mediae*): *Asperula hirta*, +*Androsace cylindrica*, *Asplenium celtibericum*, *Saxifraga media*, *S. longifolia*, *S. aretioides*, *Potentilla alchimilloides*, *P. nivalis*, *Ramonda myconi*, *Ptilotrichum pyrenaicum*.
  - 8213** (62.13) - Liguro-Apennine cliffs communities (*Saxifragion lingulatae*): *Saxifraga callosae* ssp. *lingulata*, *Primula marginata*, *P. allionii*, *Phyteuma cordatum*, *Ballota frutescens*, *Potentilla saxifraga*, *Silene campanula*, *Phyteuma charmelii*.
  - 8214** (62.14) - Southern Italian communities (*Dianthion rupicolae*): #*Dianthus rupicola*, *Antirrhinum siculum*, *Cymbalaria pubescens*, *Scabiosa limonifolia*.
  - 8215** (62.15) and 62.1B - Euro-Siberian communities and Mediterranean communities of the supra to oro-Mediterranean levels (*Potentilletalia caulescentis*):
    - shady communities : *Cystopteris fragilis*, *Asplenium trichomanes*, *Asplenium viride*.
    - xerophilous communities : *Ceterach officinarum*, *Asplenium ruta-muraria*, *Draba aizoides*, *Kerneria saxatilis*, *Biscutella laevigata*.
    - alpine level communities : *Androsace helvetica*, *Minuartia rupestris*, *Draba tomentosa*.
    - Centre and Southern Italian communities (*Saxifragion australis*): *Saxifraga australis*, *Potentilla nebrodensis*, *Campanula tanfanii*, *Trisetum bertolonii*.
  - 8216** (62.16), **8217** (62.17), **8218** (62.18), **8219** (62.19) and **821A** (62.1A) - Greek and Southern Italian calcareous cliff communities (*Campanulion versicoloris*, *Cirsietalia chamaepeucis*, *Silenion auriculatae*, *Ramondion nathaliae*).
  - 62.1C - Boreal communities with *Asplenium viride*, *Woodsia glabella*.
- 4) Geographical distribution: Austria, Belgium (Meuse valley e.g.- 62.152 essentially), Finland, France (included the Corsican subtypes of the *Brassicion insularis* (62.11) and the *Arenarion bertolonii*

(62.15)), Denmark, Germany, Greece, Ireland, Italy (included Sicily), Luxembourg, Portugal, Sweden, Spain, United Kingdom.

Corresponding category of the German Biotoptypen: "320101 natürlicher Karbonatfels (Kalk, Dolomit)".

Corresponding category of the Nordic vegetation types: "712 Klippvegetation på rika/kalkbergarter".

- 5) This habitat constitutes mosaics with *Xerobrometea* communities (34.1, 34.31-34.34), screes (61) and limestone pavements (62.4).  
In Ireland and the United Kingdom: sites sheltering relict arctic-alpine flora and important bryophyte and/or lichen assemblages.
- 6) BRULLO S., MARCENO C. (1979). *Dianthion rupicolae* nouvelle alliance sud-Tyrienne des *Asplenietalia glandulosi*. Doc. Phytosoc., N.S. 6: 131-146.  
BIONDI E., BALLELLI (1982). La végétation des gorges calcaires des Apennins de l'Ombrie et des Marches. Guide-itinéraire Exc. Int. Phytosoc. en Italie centrale (2-11/7/1982): 189-201.  
KARLSSON, L. (1973). Autecology of cliff and scree plants in Sarek National Park, northern Sweden. Växtekol. Stud. 4:1-203.  
SÖYRINKI, N. & SAARI, V. (1980). Die Flora von Oulanka Nationalpark, Nordfinland. Acta Flor. Fennica 154.

## 62.2

### Silicicolous sub-types

NATURA 2000 code : **8220**

PAL.CLASS.: 62.2

- 1) **Chasmophytic vegetation on siliceous rocky slopes**
- 2) Vegetation of fissures of siliceous inland cliffs, which presents many regional sub-types, described under point 3.
- 3) Plants: 62.21 - Alpine siliceous cliff vegetation (Pyrenees and Alps) and of Hercynian system and its periphery (*Androsacion vandellii*): *Androsace vandellii*, *Saxifraga retusa* ssp. *retusa*, *S. aspera*, *Phyteuma scheuchzeri*, *Primula hirsuta*, *Eritrichium nanum*; Communities of montane level of Pyrenees and Cevennes (*Asarinion procumbentis*: includes 62.26): *Asarina procumbens*, *Dianthus graniticus*, *Saxifraga continentalis*, *S. prostii*, *Anarrhinum bellidifolium*; Saxicolous communities of the plain to hill levels under Middle European climate (*Asplenion septentrionalis*) and communities of the plain level under oceanic climate (*Asplenion billotii-Umbilicarium rupestre*: 62.29 is included): *Asplenium septentrionale*, *A. adiantum-nigrum*, *A. billotii*, *A. foreziense*, *A. onopteris*. - Hercynian serpentine cliffs (*Asplenion cuneifolii*): *Asplenium cuneifolium*, *A. alternifolium*, *A. adulterinum*.  
62.22 - high altitude siliceous cliff vegetation of Iberian mountains: - Central Iberian mountains (*Saxifragion willkommiana*): *Saxifraga willkommiana*, *S. orogredensis*, *Murbeckiella boryi*; - Sierra Nevada (*Saxifragion nevadensis*): *Saxifraga nevadensis*.  
62.23 - South-western Alpine siliceous cliff vegetation (*Saxifragion pedemontanae*): *Saxifraga pedemontana*, *#S. florulenta*, *Galium tendae*, *Sempervivum montanum* ssp. *burnatii*, *Jovibarba allionii*.  
62.24 - Cyro-Sardian siliceous montane cliff vegetation (*Potentillion crassinerviae*): *Potentilla crassinervia*, *Armeria leucocephala*, *Silene requientii*, *Saxifraga pedemontana* ssp. *cervicornis*.  
62.25 - Northern Greek siliceous cliff vegetation (*Silenion lerchenfeldiana*): *Silene lerchenfeldiana*.  
62.26 - see 62.21  
62.27 - Western Iberian siliceous cliff vegetation of the submontane level (*Cheilanthion hispanicae*): *Cheilanthes hispanica*, *C. tinaei*.

62.28 - Provenço-Iberian siliceous cliff vegetation on rock faces rich in basic silicates (basalts and peridots), of the thermo to meso-Mediterranean levels (*Phagnalo saxatilis-Cheilanthon maderensis*): *Cheilanthes maderensis*, *C. marantae*, *C. vellea*, *Asplenium balearicum*.

62.29 : see 62.21.

62.2A - Boreal siliceous cliffs (rapakivi cliffs).

- 4) Geographical distribution: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Portugal, Luxembourg, Spain, Sweden, United Kingdom.  
Corresponding category of the German Biotoptypen: "320102 natürlicher Silikatfels (ohne Serpentin)", "320103 natürlicher Serpentinfels".  
Corresponding category of the Nordic vegetation types: "711 Klippvegetation på fattiga bergarter", "713 Klippvegetation på serpentinerarter.
- 5) This habitat type is found in close association with siliceous scree (61.1) and pioneer grassland (62.3). In Ireland and the United Kingdom: sites sheltering relict arctic-alpine flora and important bryophyte and/or lichen assemblages.
- 6) JALAS, J. (1961). Regionale Züge in der Felsenvegetation und flora Ostfennoscandiens. Arch. Soc. Vanamo, 16 Suppl.:38-49.  
KALLIO, P. (1954). Züge aus der flora und vegetation der rapakivifelsen im südöstlichen teil des rapakivigebietes von Laitila in Südwestfinland. Ann. Univ. Turkuensis A XVII:1-64.

## 62.3

### Pioneer vegetation on rock surfaces

NATURA 2000 code : **8230**

PAL.CLASS.: 62.42

- 1) **Pioneer vegetation on siliceous rock surfaces (*Sedo-Scleranthion*, *Sedo albi-Veronicion dillenii*)**
- 2) Pioneer communities of the *Sedo-Scleranthion* or the *Sedo albi-Veronicion dillenii* alliances, colonising superficial soils of siliceous rock surfaces.  
As a consequence of drying, this open vegetation is characterised by mosses, lichens and *Crassulacea*.
- 3) Plants: *Sedo-Scleranthion*: *Sempervivum arachnoideum*, *Sempervivum montanum*, *Sedum annuum*, *Silene rupestris*, *Veronica fruticans*; *Sedo albi-Veronicion dillenii*: *Veronica verna*, *Veronica dillenii*, *Gagea bohémica*, *Gagea saxatilis*, *Riccia ciliifera*; plant species belonging to the two syntaxa: *Allium montanum*, *Sedum acre*, *Sedum album*, *Sedum reflexum*, *Sedum sexangulare*, *Scleranthus perennis*, *Rumex acetosella*.  
Mosses: *Polytrichum piliferum*, *Ceratodon purpureus*.
- 4) Geographical distribution: Austria, Belgium, Finland, France, Germany, Greece, Italy, Portugal, Spain, Sweden.  
Corresponding category of the German Biotoptypen: "320102 natürlicher Silikatfels (ohne Serpentin) (lückige Vegetation, P002)".  
Corresponding category of the Nordic vegetation types: partly "711 Klippvegetation på fattiga bergarter" and "5211 *Sedum* spp.-*Viola tricolor*-*Aira praecox*-typ".
- 5) This habitat is associated with the 62.2 type, and corresponds to the vegetation colonising siliceous rocks. The vegetation colonising calcareous rocks is included under 34.11 "Karstic calcareous

grasslands (*Alyso-Sedion albi*)" and 62.4 "Limestone pavements" specific for Ireland, the United Kingdom and Sweden.

- 6) HALLBERG, H. P. & IVARSSON, R. (1965). Vegetation of coastal Bohuslän. Acta Phytogeogr. Suec. 50:111-122.

## 62.4 \* Limestone pavements

NATURA 2000 code : **8240**

PAL.CLASS.: 62.3

### 1) \* Limestone pavements

- 2) Regular blocks of limestone known as "clints" with loose flags separated by a network of vertical fissures known as "grykes" or "shattered pavements", containing more loose limestone rubble. The rock surface is almost devoid of overlying soils (considerably less than 50% cover) except for some patches of shallow skeletal or loessic soils, although more extensive areas of deeper soil occasionally occur; sometimes there is encroachment of peat. This morphology offers a variety of microclimates allowing the establishment of complex vegetation consisting of a mosaic of different communities. The fissures provide a cold humid microclimate where shade-tolerant vascular plants such as *Geranium robertianum* and *Ceterach officinale* occur, as well as formations of herbaceous species typical of calcareous woodland; the small pockets of soil are occupied by communities of *Mesobromion* (e.g. *Seslerio-Mesobromenion*); heath and scrub also occur (e.g. *Corylo-Fraxinetum*). Apart from the species rich areas of scrub (generally *Prunetalia spinosae*), the ecosystem is maintained by grazing in some regions; this, combined with severe winds, means that isolated shrubs can only survive in prostrate growth form (e.g. *Dryas octopetala*); at ungrazed sites, marginal areas of *Geranium sanguineum* occur.

In Sweden, limestone blocks are larger and cracks are smaller. The species composition reflects a more continental, dryer and cooler climate. The pavements are mostly exposed with scattered cushions of bryophytes, more seldom covered by a thin layer of soil. The surface is covered by *Sedum album*, *Cerastium pumilum*, *C. semidecandrum*, lichens (*Aspicilia calcarea*, *Thamnolia vermicularis*, *Verrucaria nigrescens*) and bryophytes (*Tortella tortuosa*, *Grimmia pulvinata*). The vegetation in the cracks contains *Gymnocarpium robertianum*, *Asplenium ruta-muraria*, *A. trichomanes* ssp. *quadrivalens* and, occasionally, bushes of *Prunus spinosa*, *Fraxinus excelsior*, *Cotoneaster* spp., *Rosa* spp.

- 3) Plants: Britain and Ireland - *Asplenium* spp., *Ceterach officinale*, *Cystopteris fragilis*, *Dryas octopetala*, *Dryopteris villarii*, *Epipactis atrorubens*, *Gentiana verna*, *Polygonatum odoratum*, *Ribes spicatum*. Sweden - *Sedum album*, *Cerastium pumilum*, *C. semidecandrum*, *Aspicilia calcarea*, *Thamnolia vermicularis*, *Verrucaria nigrescens*, *Tortella tortuosa*, *Grimmia pulvinata*, *Gymnocarpium robertianum*, *Asplenium ruta-muraria*, *A. trichomanes* ssp. *quadrivalens*.

- 4) Geographical distribution: Ireland, United Kingdom, Sweden (Öland and Gotland). Some sites in Ireland host an open *Taxus-Juniperus* scrub of major interest; certain arctic alpine species such as *Gentiana verna* and *Dryas octopetala* are characteristic and in The Burren, these species occur with Atlantic-Mediterranean species such as *Neotinea maculata*. Very locally in the United Kingdom, ancient woodland containing *Tilia cordata* occurs which is of great conservation importance. Corresponding category in the United Kingdom National Vegetation Classification: "W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland" and "W9 *Fraxinus excelsior-Sorbus aucuparia-Mercurialis perennis* woodland". Corresponding category of the Nordic vegetation types: "5151b *Asplenium ruta-muraria-Asplenium trichomanes-Homalothecium sericeum*-variant" variant of "5151 *Sedum album-Tortella* spp. typ".

- 6) BOBE, B. (1991). Gefässpflanzenvegetation und Mikroklima der Karstspalten des Grossen Alvars auf Öland, Schweden. Unpubl. diploma work, München.
- ETHERINGTON, J.R. (1981). Limestone heaths in south-west Britain: their soils and the maintenance of their calcicole-calcifuge mixtures.
- KELLY, D. & KIRBY, E.N. (1982). Irish native woodlands over limestone. *J. Life Sci. R. Dubl. Soc.* 3, 181-198.
- O' SULLIVAN, A.M. (1982). The lowland grasslands of Ireland. *J. Life Sci. R. Dubl. Soc.* 3, 131-142.
- WARD, S.D. & EVANS, D.F. (1976). Conservation assessment of British limestone pavements based upon floristic criteria. *Biological Conservation*, 9, 217-233.

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## Other rocky habitats

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65

### Caves not open to the public

NATURA 2000 code : **8310**

PAL.CLASS.: 65

- 1) **Caves not open to the public**
  - 2) Caves not open to the public, including their water areas and flows, hosting specialised or high endemic species, or that are of paramount importance for the conservation of Annex II species (e.g. bats, amphibians).
  - 3) Plants: mosses only (e.g. *Schistostega pennata*) and algal carpets at the entry of caves.  
Animals: Very specialised and highly endemic cavernicolous fauna. It includes underground relic forms of a fauna which has been diversified outside. This fauna is mainly composed of invertebrates which exclusively live in caves and underground waters. The cavernicolous terrestrial invertebrates are mainly coleoptera, belonging to the *Bathysciinae* and *Trechinae* families in particular, which are carnivorous and have a very limited distribution. Cavernicolous aquatic invertebrates constitute a highly endemic fauna, dominated by crustaceans (*Isopoda*, *Amphipoda*, *Syncarida*, *Copepoda*) and include many living fossils. Aquatic molluscs, belonging to the *Hydrobiidae* family are also found. With regard to vertebrates, caves constitute hibernation sites for most European bat species, among which many are threatened (see Annex II). Several species can live together in the same cave. Caves also shelter some very rare amphibious species like *Proteus anguinus* and several species of the *Speleomantes* genus.
  - 4) Geographical distribution: all of European Union, except Finland (only severely impoverished examples found in Northern Europe).  
Corresponding category of the German Biotoptypen: "3101 natürliche Höhlen und Balmen", "310201 Balme (Halbhöhle) bzw. Eingangsbereich mit Tageslichteinfluß", "310202 natürliche Höhle (Bereiche ohne Tageslichteinfluß).
  - 6) DE BROYER C. Vers la conservation intégrée des habitats souterrains. Naturopa, nouvelles de l'environnement n° 94-5. Conseil de l'Europe, 1-4.
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### Fields of lava and natural excavations

NATURA 2000 code : **8320**

PAL.CLASS.: 66.1 to 66.6

- 1) **Fields of lava and natural excavations**
- 2) Sites and products of recent volcanic activity harbouring distinct biological communities.
- 3) Plants: *Viola cheiranthifolia*, *Silene nocteolens*, *Argyranthemum teneriffae*; lichens: *Stereocaulon vesubianum*.  
Animals: crustaceans: *Munidopsis polymorpha*, *Speleonectes* spp.

- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.  
The following sub-types are included:
- 66.1 Teide violet community. *Violetea cheiranthifoliae*.  
Very open formation of the summit of the Teide volcano of Tenerife, above (2700) 3000 metres, with *Viola cheiranthifolia* and a few individuals of *Silene nocteolens* and *Argyranthemum teneriffae*.
- 66.2 Etna summital communities  
Communities of Mount Etna, above the limit of hedgehog heaths.
- 66.3 Barren lava fields  
Almost bare lava formations of other volcanoes, and of lower altitudes on Etna and Teide, colonised by, besides communities related to ones covered in other sections, lichens (e.g. *Stereocaulon vesuvianum*) and invertebrates.
- 66.4 Volcanic ash and lapilli fields
- 66.5 Lava tubes  
Caves formed by hollow basaltic tubes resulting from the cooling of the surface of lava flows whose molten interior continued to flow. The very large tube created by the volcano La Corona of Lanzarote harbours unique communities of invertebrates, in particular, the decapode crustacean *Munidopsis polymorpha*, endemic to that locality, and several crustaceans of the genus *Speleonectes*.
- 66.6 Fumaroles  
Orifices in volcanic areas through which escape hot gases and vapours. Their very extreme environment is colonised by paucispecific but highly distinct communities.

### Submerged or partially submerged sea caves

NATURA 2000 code: **8330**

PAL.CLASS.: 12.7, 11.26, 11.294

- 1) **Submerged or partially submerged sea caves**
- 2) Caves situated under the sea or opened to it, at least at high tide, including partially submerged sea caves. Their bottom and sides harbour communities of marine invertebrates and algae.
- 4) Geographical distribution: Denmark, France, Germany, Greece, Ireland, Italy, Portugal, Spain, Sweden, United Kingdom.

### Permanent glaciers

NATURA 2000 code: **8340**

PAL.CLASS.: 63.2 and 63.3

- 1) **Permanent glaciers**
- 2) Rock and true glaciers.
- 3) Geographical distribution: Austria, France, Germany, Sweden.



## FORESTS

(Sub)natural woodland vegetation comprising native species forming forests of tall trees, with typical undergrowth, and meeting the following criteria: rare or residual, and / or hosting species of Community interest <sup>28</sup>

### *Boreal forests*

#### 42.C

#### \* Western taiga

NATURA 2000 code : **9010**

PAL.CLASS.: 41.B8, 41.C3, 41.D5, 42.C

#### 1) \* Natural old Boreal and hemiboreal forests

- 2) Natural old forests as well as those young forest stages naturally developing after fire. Natural old forests represent climax or late succession stages with slight human impact or without any human impact. Present natural old forests are only minor remnants of those originally occurring in Fennoscandia. With intensive forestry, which is carried out practically throughout the countries, the main features of natural old forests disappear, i.e. the considerable amount of dead and rotten wood, the great variation in tree age and length and species composition, the trees from previous generations, the more stable microclimate. Old natural forests are habitats of many threatened species, especially bryophytes, lichens, fungi, and invertebrates (mostly beetles). Some of the present old natural forests have human impact, but in spite of that they maintain many characteristics of the natural forests.

Because of the important role of fire, burned forest areas, and their young succession stages, have been naturally common in the boreal region. Nowadays they are extremely rare because of the efficient fire protection and forestry. Natural recently burned forest areas are very important habitats to many endangered species. Typical for natural burned areas is the great amount of dead burned wood and the varying amount of living trees which greatly conditions the regeneration of the forest. The character of the forests vary with the different boreal zones (hemi-, southern, middle, northern) and different site types.

The following sub-types are distinguished, according to the main tree species and site type variation:

- natural old spruce forests
- natural old pine forests
- natural old mixed forests
- natural old trivial deciduous forests
- recently burnt areas
- younger forests naturally developed after fire

- 3) Plants: pine forests - *Pinus sylvestris*, *Vaccinium vitis-idaea*, *Calluna vulgaris*, *Empetrum nigrum*, *Pleurozium schreberi*, *Cladonia* spp.; spruce and mixed forests - *Picea abies*, *Pinus sylvestris*, *Betula* spp., *Vaccinium myrtillus*, *Deschampsia flexuosa*, *Maianthemum bifolium*, *Oxalis acetosella*, *Trientalis europea*, *Dicranum* spp., *Pleurozium schreberi*, *Hylocomium splendens*; deciduous forests

<sup>28</sup> For forest habitat types the following additional criteria were accepted by the Scientific Working Group (21-22 June 1993):

- forests of native species;
- forests with a high degree of naturalness;
- forests of tall trees and high forest;
- presence of old and dead trees;
- forests with a substantial area;
- forests having benefited from continuous sustainable management over a significant period.

- *Betula* spp., *Populus tremula*, *Deschampsia flexuosa*, *Vaccinium myrtillus*, *Agrostis capillaris*, *Equisetum sylvaticum*.

Lichens - *Evernia divaricata*, *Lobaria pulmonaria*.

Fungi - *Amylocystis lapponica*, *Gloiodon strigosum*, *Fomitopsis populicola*, *Skeletocutis odora*, *S. stellae*, *Phlebia centrifuga*, *Haploporus odoratus*, *Aporpium cargae*, *Gelatoporia pannocincata*, *Phellinus populicola*.

Animals: mammals - \**Pteromys volans*, *Myopus schisticolor*, *Sorex minutus*; birds - *Picoides tridactylus*, *Perisoreus infaustus*, *Dendrocopos leucotos*, *D. minor*; beetles - *Tragosoma depsarium*, *Pytho kolwensis*, *P. abieticola*, #*Cucujus cinnaberinus*, *Peltis grossa*, \**Osmoderma eremita*.

4) Geographical distribution: Finland, Sweden.

Originally natural old forests were found in the whole boreal and hemiboreal zones, except in the oro-hemiarctic treeless zone. In Finland nowadays most of the natural old forests are found in eastern and northern parts, in southern and western parts of the country only remnants of these forests remain. In Sweden most of the old natural forests are in the north and only some of them in the south.

6) KALELA, A. (1961). Waldvegetationszonen Finnlands und ihre klimatischen paralleltypen. Arch. Soc. zool. bot. fenn. Vanamo 16 Suppl.:65-83.

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## Forests of temperate Europe

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### 41.11 *Luzulo-Fagetum* beech forests

NATURA 2000 code: **9110**

PAL.CLASS.: 41.11

- 1) *Luzulo-Fagetum* beech forests
  - 2) *Fagus sylvatica* and, in higher mountains, *Fagus sylvatica-Abies alba* or *Fagus sylvatica-Abies alba-Picea abies* forests developed on acid soils of the medio-European domain of central and northern Central Europe, with *Luzula luzuloides*, *Polytrichum formosum* and often *Deschampsia flexuosa*, *Calamagrostis villosa*, *Vaccinium myrtillus*, *Pteridium aquilinum*.
  - 3) Plants: *Fagus sylvatica*, *Abies alba*, *Picea abies*, *Luzula luzuloides*, *Polytrichum formosum* and often *Deschampsia flexuosa*, *Calamagrostis villosa*, *Vaccinium myrtillus*, *Pteridium aquilinum*.
  - 4) Geographical distribution: Austria, Belgium, France, Germany, Italy, Luxembourg, Netherlands, Spain, Sweden.  
Corresponding category of the Nordic vegetation types: "2221 *Fagus sylvatica-Deschampsia flexuosa-Vaccinium myrtillus*-typ"  
The following sub-types are included:  
41.111 Medio-European collinar woodrush beech forests  
Acidophilous *Fagus sylvatica* forests of the lesser Hercynian ranges and Lorraine, of the collinar level of the greater Hercynian ranges, the Jura and the Alpine periphery, of the western sub-Pannonic and the intra-Pannonic hills, not or little accompanied by spontaneous conifers, and generally with an admixture of *Quercus petraea*, or in some cases *Quercus robur*, in the canopy.  
  
41.112 Medio-European montane woodrush beech forests  
Acidophilous forests of *Fagus sylvatica*, *Fagus sylvatica* and *Abies alba* or *Fagus sylvatica*, *Abies alba* and *Picea abies* of the montane and high-montane levels of the greater Hercynian ranges, from the Vosges and the Black Forest to the Bohemian Quadrangle, the Jura, the Alps, the Carpathians and the Bavarian Plateau.
  - 6) LINDGREN, L. (1970). Beech forest vegetation in Sweden - a survey. Bot. Notiser 123:401-421.
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### 41.12 Beech forests with *Ilex* and *Taxus*, rich in epiphytes (*Ilici-Fagion*)

NATURA 2000 code: **9120**

PAL.CLASS.: 41.12

- 1) Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrub layer (*Quercion robori-petraeae* or *Ilici-Fagion*)
- 2) Beech forests with *Ilex*, growing on acid soils, of the plain to montane levels under humid Atlantic climate. The acid substrate corresponds to alterations of acid rocks or to silt with siliceous more or less degraded or, to old alluvial deposits. The soils are of acid brown type, leaching or with an evolution towards podsol type. The humus is of moder to dysmoder type. These beech forests present different varieties:

- a) subatlantic beech-oak forests of the plains and hill levels with *Ilex aquifolium*
- b) hyper-Atlantic beech-oak forests of the plains and hill levels with *Ilex* and *Taxus*, rich in epiphytes
- c) pure beech forests or acidophilous beech-fir forests of the montane level, with *Ilex aquifolium* in the field layer.

- 3) Plants: *Ilex aquifolium*, *Taxus baccata*, *Ruscus aculeatus*, *Deschampsia flexuosa*, *Hieracium sabaudum*, *H. umbellatum*, *Pteridium aquilinum*, *Vaccinium myrtillus*, *Lonicera periclymenum*, *Melampyrum pratense*, *Teucrium scorodonia*, *Holcus mollis*.
- 4) Geographical distribution: a): along the west European coast, from Denmark to Normandy with some irradiations in the Morvan; b) southern British Isles and Brittany; c) Pyrenees, Cantabric mountains, Massif Central and Morvan.  
Correspondence in the national classification of the United Kingdom: "W14 *Fagus sylvatica*-*Rubus fruticosus* woodland" and "W15 *Fagus sylvatica*-*Deschampsia flexuosa* woodland p.p.". Corresponding category of the German Biotoptypen: "43070502 bodensaurer Buchenwald der planaren Stufe".
- 5) Oak may dominate in some of these forests due to the coppice-with-standards regime of the past centuries. If the intensity of the management decreases beech and also *Ilex* often regenerate spontaneously.

#### 41.13

#### *Asperulo-Fagetum* beech forests

NATURA 2000 code : **9130**

PAL.CLASS.: 41.13

- 1) *Asperulo-Fagetum* beech forests
- 2) *Fagus sylvatica* and, in higher mountains, *Fagus sylvatica*-*Abies alba* or *Fagus sylvatica*-*Abies alba*-*Picea abies* forests developed on neutral or near-neutral soils, with mild humus (mull), of the medio-European and Atlantic domains of Western Europe and of central and northern Central Europe, characterised by a strong representation of species belonging to the ecological groups of *Anemone nemorosa*, of *Lamium galeobdolon*, of *Galium odoratum* and *Melica uniflora* and, in mountains, various *Dentaria* spp., forming a richer and more abundant herb layer than in the forests of 41.11 and 41.12.
- 3) Plants: *Fagus sylvatica*, *Abies alba*, *Picea abies*, *Anemone nemorosa*, *Lamium galeobdolon*, *Galium odoratum*, *Melica uniflora*, *Dentaria* spp.
- 4) Geographical distribution: Austria, Belgium, Denmark, France, Germany, Luxembourg, Netherlands, Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "W12 *Fagus sylvatica*-*Mercurialis perennis* woodland p.p." and "W14 *Fagus sylvatica*-*Rubus fruticosus* woodland p.p.". Corresponding category of the Nordic vegetation types: "2222 *Fagus sylvatica*-*Lamium galeobdolon*-*Melica uniflora*-typ" and "2223 *Fagus sylvatica*-*Mercurialis perennis*-*Allium ursinum*-typ".  
The following sub-types are included:  
41.131 Medio-European collinar neutrophilous beech forests  
Neurocline or basicline *Fagus sylvatica* and *Fagus sylvatica*-*Quercus petraea*-*Quercus robur* forests of hills, low mountains and plateaux of the Hercynian arc and its peripheral regions, of the Jura, Lorraine, the Paris basin, Burgundy, the Alpine piedmont, the Carpathians and a few localities of the North Sea-Baltic plain.

## 41.132 Atlantic neutrophile beech forests

Atlantic beech and beech-oak forests with *Hyacinthoides non-scripta*, of southern England, the Boulonnais, Picardy, the Oise, Lys and Schelde basins.

## 41.133 Medio-European montane neutrophilous beech forests

Neutrophile forests of *Fagus sylvatica*, *Fagus sylvatica* and *Abies alba*, *Fagus sylvatica* and *Picea abies*, or *Fagus sylvatica*, *Abies alba* and *Picea abies* of the montane and high-montane levels of the Jura, the northern and eastern Alps, the western Carpathians and the great Hercynian ranges.

## 41.134 Bohemian lime-beech forests

*Fagus sylvatica* or *Fagus sylvatica-Abies alba* forests rich in *Tilia* spp., of the Bohemian basin.

## 41.135 Pannonic neutrophilous beech forests

Neutrophilous beech forests of medio-European affinities of the hills of the Pannonic plain and its western periphery.

- 6) BERGENDORFF, C., LARSSON, A. & NIHLGÅRD, B. (1979). Sydliga lövskogsbestånd i Sverige. Statens naturvårdsverk. Rapport. SNV PM 1278, Solna, 68 pp.

## 41.15

Subalpine beech woods with *Acer* and *Rumex arifolius*

NATURA 2000 code : 9140

PAL.CLASS.: 41.15

- 1) **Medio-European subalpine beech woods (with *Acer* and *Rumex arifolius*)**
- 2) *Fagus sylvatica* woods usually composed of low, low-branching trees, with much sycamore (*Acer pseudoplatanus*), situated near the tree limit, mostly in low mountains with oceanic climate of Western Europe and of central and northern Central Europe, in particular the Vosges, Black Forest, Rhön, Jura, outer Alps, Central Massif, Pyrenees, the mountains of the Bohemian Quadrangle, and, very locally, the Carpathians. The herb layer is similar to that of the forests of 41.13 or locally of 41.11 and contain elements of the adjacent open grasslands.
- 3) Plants: *Fagus sylvatica*, *Acer pseudoplatanus*, *Rumex arifolius*.
- 4) Geographical distribution: Austria, France, Germany, Italy.

## 41.16

Calcareous beech forests (*Cephalanthero-Fagion*)

NATURA 2000 code : 9150

PAL.CLASS.: 41.16

- 1) **Medio-European limestone beech forests (*Cephalanthero-Fagion*)**
- 2) Xero-thermophile *Fagus sylvatica* forests developed on calcareous, often superficial, soils, usually of steep slopes, of the medio-European and Atlantic domains of Western Europe and of central and northern Central Europe, with a generally abundant herb and shrub undergrowth, characterized by sedges (*Carex digitata*, *Carex flacca*, *Carex montana*, *Carex alba*), grasses (*Sesleria albicans*, *Brachypodium pinnatum*), orchids (*Cephalanthera* spp., *Neottia nidus-avis*, *Epipactis leptochila*, *Epipactis microphylla*) and thermophile species, transgressive of the *Quercetalia pubescenti-petraeae*. The bush-layer includes several calcicolous species (*Ligustrum vulgare*, *Berberis vulgaris*) and *Buxus sempervirens* can dominate.

- 3) Plants: *Fagus sylvatica*, *Carex digitata*, *C. flacca*, *C. montana*, *C. alba*, *Sesleria albicans*, *Brachypodium pinnatum*, *Cephalanthera* spp., *Neottia nidus-avis*, *Epipactis leptochila*, *Epipactis microphylla*, *Buxus sempervirens*.
- 4) Geographical distribution: Austria, Belgium, Denmark, France, Germany, Greece, Luxemburg, Spain, Sweden.  
Corresponding category of the Nordic vegetation types: "2223 *Fagus sylvatica*-*Mercurialis perennis*-*Allium ursinum* -typ".  
The following sub-types are included:  
41.161 Middle European dry-slope limestone beech forests  
Middle European sedge and orchid beech woods of slopes with reduced water availability.  
  
41.162 North-western Iberian xerophile beech woods  
*Fagus sylvatica* forests of relatively low precipitation zones of the southern ranges of the Pais Vasco and of superficially dry calcareous soils of the Cordillera Cantabrica, with *Brachypodium pinnatum* ssp. *rupestre*, *Sesleria argentea* ssp. *hispanica*, *Carex brevicollis*, *Carex ornithopoda*, *Carex sempervirens*, *Carex caudata*, *Cephalanthera damasonium*, *C. longifolia*, *Epipactis helleborine*, *Epipactis microphylla*, *Neottia nidus-avis*.

**41.24*****Stellario-Carpinetum* oak-hornbeam forests**NATURA 2000 code : **9160**

PAL.CLASS.: 41.24

- 1) **Sub-Atlantic and medio-European oak or oak-hornbeam forests (*Carpinion betuli*)**
- 2) Forests of *Quercus robur* (or *Quercus robur* and *Quercus petraea*) on hydromorphic soils or soils with high water table (bottoms of valleys, depressions or in the vicinity of riparian forests). The substrate corresponds to silts, clayey and silt-laden colluvions, as well as to silt-laden alterations or to siliceous rocks with a high degree of saturation. Forests of *Quercus robur* or natural mixed forests composed of *Quercus robur*, *Quercus petraea*, *Carpinus betulus* and *Tilia cordata*. *Endymion non-scriptus* is absent or rare.
- 3) Plants: *Quercus robur*, *Carpinus betulus*, *Acer campestre*, *Tilia cordata*, *Stellaria holostea*, *Carex brizoides*, *Poa chaixii*, *Potentilla sterilis*, *Dactylis polygama*, *Ranunculus nemorosus*, *Galium sylvaticum*.
- 4) Geographical distribution: Austria, Belgium, Denmark, Germany, Greece, Spain (one site along the Bidasoa river), France, Italy, Luxembourg, Netherlands, Sweden, United Kingdom.  
Corresponding category of the German Biotoptypen: "430703 Stieleichen-Hainbuchenwald feuchter bis frischer Standorte".  
Corresponding category of the Nordic vegetation types: "2223 *Fagus sylvatica*-*Mercurialis perennis*-*Allium ursinum*-typ".
- 5) Not to be confused with forests of *Quercus robur* arising from the management of beech-oak forests as coppice or coppice-with-standards on well drained soils.
- 6) DIEKMANN, M. (1994). Deciduous forest vegetation in Boreo-nemoral Scandinavia. Acta Phytogeogr. Suec. 80:1-112.

**41.26*****Galio-Carpinetum* oak-hornbeam forests**NATURA 2000 code : **9170**

PAL.CLASS.: 41.261

- 1) ***Galio-Carpinetum* oak-hornbeam forests**
- 2) *Quercus petraea-Carpinus betulus* forests of regions with sub-continental climate within the central European range of *Fagus sylvatica*, such as the Upper Rhine plain, the rain shadows of the Harz, Rhön and Spessart, the Swabian-Franconian basin, the Bavarian plateau and Thuringe, the Austrian northern pre-Alps and the Wienerwald, the Polish central lowlands and adjacent hills of Silesia, Great Poland and Kujawy, dominated by *Quercus petraea* and with *Sorbus torminalis*, *Sorbus domestica*, *Acer campestre*, *Ligustrum vulgare*, *Convallaria majalis*, *Carex montana*, *Carex umbrosa*, *Festuca heterophylla*.
- 3) Plants: *Quercus petraea*, *Carpinus betulus*, *Sorbus torminalis*, *S. domestica*, *Acer campestre*, *Ligustrum vulgare*, *Convallaria majalis*, *Carex montana*, *C. umbrosa*, *Festuca heterophylla*.
- 4) Geographical distribution: Austria, Denmark, France, Germany, Sweden.  
Corresponding category of the Nordic vegetation types: "2224 *Carpinus betulus*-typ".

**41.2B****\* Pannonic oak-hornbeam forests**NATURA 2000 code : **91G0**

PAL.CLASS.: 41.2B, 41.266, 41.267

- 1) **\* Pannonic oak-hornbeam forests**
- 2) Forests with *Quercus petraea* and *Carpinus betulus*, on different soil types (on calcareous but also on siliceous substrate), shrub- and herb layer are dominated by subcontinental and submediterranean plant species (*Carici pilosae-Carpinetum*, *Primulo veris-Carpinetum*, *Fraxino pannonici-Carpinetum*). They occur in shady, humid valleys and slopes, particularly on deep soils but also on hill tops with shallow, oligotrophic substrates. These habitats are confined to the eastern parts of Austria with pannonic climate and have their main distribution in Slovakia (Karpaten), and Tschechien (Bohemia and Moravia).
- 3) Plants: *Carex pilosa*, *Euphorbia amigdaloides*, *Symphytum tuberosum*, *Dentaria bulbifera*, *Glechoma hirsuta*, *Festuca heterophylla*, *Carpinus betulus*, *Quercus petrae*, *Q. robur*, *Tilia cordata*, *Evonymus verrucosa*, *Acer campestre*, *Sorbus torminalis*, *Galium sylvaticum*, *Viola mirabilis*, *Gagea spathacea*.
- 4) Geographical distribution: eastern Austria.
- 5) These habitats may form a transition towards xerophile oak woods (*Quercus petraeae-cerris* forests and *Quercus pubescens* woods).
- 6) MUCINA, L., GRABHERR, G., WALLNÖFER, S. (1993). Die Pflanzengesellschaften Österreichs. Teil III, S. 199.  
NEUHÄUSL U. NEUHÄUSLOVA-NOVOTNA (1968). Übersicht der Carpinion-Gesellschaften der Tschechoslowakei.

## 41.4

**\* *Tilio-Acerion* ravine forests**NATURA 2000 code : **9180**

PAL.CLASS.: 41.4

- 1) **\* *Tilio-Acerion* forests of slopes, screes and ravines**
- 2) Mixed forests of secondary species (*Acer pseudoplatanus*, *Fraxinus excelsior*, *Ulmus glabra*, *Tilia cordata*) of coarse scree, abrupt rocky slopes or coarse colluvions of slopes, particularly on calcareous, but also on siliceous, substrates (*Tilio-Acerion* Klika 55). A distinction can be made between one grouping which is typical of cool and humid environments (hygroscopic and shade tolerant forests), generally dominated by the sycamore maple (*Acer pseudoplatanus*) - sub-alliance *Lunario-Acerenion*, and another which is typical of dry, warm screes (xerothermophile forests), generally dominated by limes (*Tilia cordata*, *T. platyphyllos*) - sub-alliance *Tilio-Acerenion*.  
The habitat types belonging to the *Carpinion* should not be included here.
- 3) Plants: *Lunario-Acerenion* - *Acer pseudoplatanus*, *Actaea spicata*, *Fraxinus excelsior*, *Helleborus viridis*, *Lunaria rediviva*, *Taxus baccata*, *Ulmus glabra*. *Tilio-Acerenion* - *Carpinus betulus*, *Corylus avellana*, *Quercus* sp., *Sesleria varia*, *Tilia cordata*, *T. platyphyllos*.
- 4) Geographical distribution: Austria, Belgium (Wallonie), Finland, France (Lorraine, Jura, Bourgogne), Germany, Italy, Luxemburg, Netherlands (Savelbos and Schone Grub), Spain (region cantabro-pirenaica), Sweden, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland" and "W9 *Fraxinus excelsior-Sorbus aucuparia-Mercurialis perennis* woodland".  
Corresponding category of the German Biotoptypen: "430604 Sommerlinden-Begulmen-Blockschuttwald", "430603 Ahorn-Linden-Hangschuttwald (wärmere Standorte)", "430602 Eschen-Ahorn-Schlucht- bzw. -Hangwald (fleucht-kühle Standorte)", "430601 Sommerlinden-Hainbuchen-Schuttwald".  
Corresponding category of the Nordic vegetation types: "2233 *Ulmus glabra* -typ", "2235 *Tilia cordata* -typ" and "2236 *Quercus robur-Ulmus glabra-Tilia cordata*-typ". In Boreal region corresponding species-poor communities often with *Anemone nemorosa*, *Corydalis* spp., *Primula veris*.
- 5) Slight changes in the conditions of the substrate (especially "consolidated" substrate) or humidity produce a transition towards beech forests (*Cephalanthero Fagenion*, *Luzulo Fagenion*) or towards thermophile oak forests.
- 6) BERGENDORFF, C., LARSSON, A. & NIHLGÅRD, B. (1979). Sydliga lövskogsbestånd i Sverige. Statens naturvårdsverk. Rapport. SNV PM 1278, Solna, 68 pp.

## 41.51

**Old acidophilous oak woods with *Quercus robur* on sandy plains**NATURA 2000 code : **9190**

PAL.CLASS.: 41.51 and 41.54

- 1) **Old acidophilous oak woods with *Quercus robur* on sandy plains**
- 2) 41.51 - Acidophilous forests of the Baltic-North Sea plain, composed of *Quercus robur*, *Betula pendula* and *Betula pubescens*, often mixed with *Sorbus aucuparia* and *Populus tremula*, on very oligotrophic, often sandy (or moraine) and podsolized or hydromorphic soils; the bush layer, poorly developed, includes *Frangula alnus*; the herb layer is formed by *Deschampsia flexuosa* and other



grasses and herbs of acid soils (sometimes includes *Molinia caerulea*), and is often invaded by bracken. Forests of this type often prevail in the northern European plain, from Jutland to Flanders; they occupy more limited edaphic enclaves in the Ardennes and the middle and upper Rhenish ranges, in north-western France, Normandy, Brittany, the Paris basin, the Morvan, Great Britain, Sweden and southwestern Finland. East of the Elbe, in the Baltic lowlands, they are represented, east to Mecklenburg, by stands transitional, to a greater or lesser extent, to 41.58. Syntaxa: *Quercus-Betuletum*, *Molino-Quercetum*, *Trientalo-Quercetum roboris*.

41.54 - Forests of *Quercus robur* and, sporadically *Quercus pyrenaica* or hybrids, on podzols of southwestern France, with an herb layer constituted by the group of *Deschampsia flexuosa*, with *Molinia caerulea* and *Peucedanum gallicum*. Syntaxa: *Peucedano-Quercetum roboris*.

- 3) Plants: *Quercus robur*, *Betula pendula*, *B. pubescens*, *Sorbus aucuparia*, *Populus tremula*.
- 4) Geographical distribution: Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Sweden, United Kingdom.  
Corresponding category of the Nordic vegetation types: "2231 *Quercus petraea/robur-Melampyrum pratense-Deschampsia flexuosa*-typ" and "2232 *Quercus robur-Melica* spp.-typ".
- 6) RÜHLING, Å. & TYLER, G. (1986). Vegetation i sydsvenska ekskogar-en regional jämförelse. Sven. Bot. Tidskr. 80:133-143.

## 41.53

### Old oak woods with *Ilex* and *Blechnum* in the British Isles

NATURA 2000 code: **91A0**

PAL.CLASS.: 41.53

- 1) **Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles**
- 2) Acidophilous *Quercus petraea* woods of Britain and Ireland, with low, low-branched, trees, with many ferns, mosses, lichens and evergreen bushes.
- 3) Plants: *Quercus petraea*, *Ilex aquifolium*, *Blechnum* ssp.
- 4) Geographical distribution: Ireland, United Kingdom.  
Corresponding category in the United Kingdom National Vegetation Classification: "W10 *Quercus* spp.-*Pteridium aquilinum-Rubus fruticosus* woodland p.p.", "W11 *Quercus petraea-Betula pubescens-Oxalis acetosella* woodland p.p." and "W17 *Quercus petraea-Betula pubescens-Dicranum majus* woodland p.p."  
The following sub-types are included:  
41.531 Irish sessile oak woods  
*Quercus petraea* woods of Ireland, particularly rich in evergreen bushes, including *Arbutus unedo*.  
  
41.532 British sessile oak woods  
Acidophilous *Quercus petraea* woods of western Britain, mostly found in Scotland, Wales, Northern England and South Western England.

**41.7374****\* Pannonian white-oak woods**NATURA 2000 code : **91H0**

PAL.CLASS.: 41.7374

- 1) **\* Pannonian white-oak woods**
- 2) Xerophyle oak woods dominated by *Quercus pubescens* on extreme dry, southern exposed locations on shallow, calcareous soils. Because of these extreme site conditions, the woods are often fragmentary and low-growing, sometimes only shrubby. The herb layer is rich in species and often contains xerotherme species from dry grasslands or forest fringes. The center of distribution is in the southern parts of Eastern Europe (Hungary, southern Slovakia, eastern Austria).
- 3) Plants: *Quercus pubescens*, *Q. cerris*, *Fraxinus ornus*, *Sorbus domestica*, *S. torminalis*, *Colutea arborescens*, *Cornus mas*, *Pyrus pyraster*, *Arabis pauciflora*, *A. turrita*, *Buglossoides purpurcaerulea*, *Campanula bononiensis*, *Carex michelii*, *Euphorbia polychroma*, *Lactuca quercina*, *Limodorum abortivum*, *Milittis melissophyllum*, *Orchis purpurea*, *Potentilla alba*, *P. micrantha*, *Pulmonaria mollis* ssp. *mollis*, *Tanacetum corymbosum*, *Viola suavis*, *Euphorbia angulata*.
- 4) Geographical distribution: Austria (eastern and south-eastern parts with summerwarm climate).
- 5) White-oak woods often form mosaics with dry grasslands.

**41.7A****\* Euro-Siberian steppe oak woods**NATURA 2000 code : **91I0**

PAL.CLASS.: 41.7A

- 1) **\* Euro-Siberian steppe oak woods**
- 2) Xero-thermophile oak woods of the plains of south-eastern Europe. The climate is very continental, with high changes of temperature. The substrate consists of 'Löss' (Tschernosem soils). *Quercus robur*, *Quercus cerris* and *Quercus pubescens* dominate in the treelayer of this habitat type, which is rich in continental stepic vegetation elements and geophytes of the *Aceri tatarici-Quercion* Zólyomi 1957. The center of distribution lies in southern Russia and the Ukraine, and reaches to the western distribution limit in eastern parts of Austria.
- 3) Plants: *Quercus cerris*, *Q. pubescens*, *Q. robur*, *Q. petraea*, *Acer campestre*, *Sorbus torminalis*, *Cornus sanguinea*, *Crataegus monogyna*, *Euonymus verrucosa*, *Ligustrum vulgare*, *Prunus spinosa*, *Pyrus pyraster*, *Rhamnus cathartica*, *Ulmus minor*, *Buglossoides purpurocaerulea*, *Carex michelii*, *Dactylis polygama*, *Geum urbanum*, *Lathyrus niger*, *Polygonatum latifolium*, *Pulmonaria mollis* spp. *mollis*, *Tanacetum corymbosum*, *Vincetoxicum hirsutinaria*.
- 4) Geographical distribution: Lower Austria (Burgenland).
- 5) This habitat type, which formed the natural vegetation of south-eastern Europe, is today very fragmented. In Austria they are often degraded by invasion of Robinia.

**41.86*****Fraxinus angustifolia* woods**NATURA 2000 code : **91B0**

PAL.CLASS.: 41.86

- 1) **Thermophilous *Fraxinus angustifolia* woods**
- 2) Non-alluvial, non-ravine formations dominated by *Fraxinus angustifolia*, often mixed with *Quercus pubescens* or *Q. pyrenaica*.
- 3) Plants: *Fraxinus angustifolia*.
- 4) Geographical distribution: Italy, Portugal, Spain.  
The following sub-types are included:  
41.861 Sicilian narrow-leaved ash woods  
*Fraxinus angustifolia* woods of western Sicily.  
  
41.862 Iberian narrow-leaved ash woods  
*Fraxinus angustifolia* woods of the Iberian peninsula.

**42.51****\* Caledonian forest**NATURA 2000 code : **91C0**

PAL.CLASS.: 42.51

- 1) **\* Caledonian forest**
- 2) Relict, indigenous pine forests of *Pinus sylvestris* var. *scotica*, endemic in the central and north eastern Grampians and the northern and western Highlands of Scotland and associated *Betula* and *Juniperus* woodlands of northern character within this area. They are mostly open and have a ground layer rich in ericaceous species and bryophytes, in particular *Hylocomium splendens*, and often harbouring abundant *Deschampsia flexuosa*, *Goodyera repens*, *Listera cordata*, *Corallorhiza trifida*, *Linnaea borealis*, *Trientalis europaea*, *Pyrola minor*, *Moneses uniflora*, *Orthilia secunda*. The dominant trees are: *Sorbus aucuparia*, *Betula pubescens*, *B. pendula*, *Juniperus communis*, *Ilex aquifolium*, *Populus tremula*.
- 3) Plants: *Corallorhiza trifida*, *Deschampsia flexuosa*, *Goodyera repens*, *Linnaea borealis*, *Listera cordata*, *Moneses uniflora*, *Orthilia secunda*, *Pinus sylvestris* var. *scotica*, *Pyrola minor*, *Trientalis europaea*. Bryophytes : *Hylocomium splendens*, *Pleurozium schreberi*.
- 4) Geographical distribution: central and north-eastern Grampians of Scotland. Corresponding category in the United Kingdom National Vegetation Classification: the majority of Caledonian forests belong to "W18 *Pinus sylvestris*-*Hylocomium splendens* woodland"; however, not all of these forests are semi-natural. Stands dominated by *Juniperus* belong to the category "W19 *Juniperus communis* ssp. *communis*-*Oxalis acetosella* woodland".

**44.A1 to 44.A4****\* Bog woodland**NATURA 2000 code : **91D0**

PAL.CLASS.: 44.A1 to 44.A4

**1) \* Bog woodland**

2) Coniferous and broad-leaved forests on a humid to wet peaty substrate, with the water level permanently high and even higher than the surrounding water table. The water is always very poor in nutrients (raised bogs and acid fens). These communities are generally dominated by *Betula pubescens*, *Frangula alnus*, *Pinus sylvestris*, *Pinus rotundata* and *Picea abies*, with species specific to bogland or, more generally, to oligotrophic environments, such as *Vaccinium* spp., *Sphagnum* spp., *Carex* spp. [*Vaccinio-Piceetea*: *Piceo-Vaccinienion uliginosi* (*Betulion pubescentis*, *Ledo-Pinion*) i.a.]. In the Boreal region, also spruce swamp woods, which are minerotrophic mire sites along margins of different mire complexes, as well as in separate strips in valleys and along brooks.

3) Plants: *Agrostis canina*, *Betula pubescens*, *B. carpatica*, *Carex canescens*, *C. echinata*, *C. nigra*, *C. rostrata*, *Frangula alnus*, *Juncus acutiflorus*, *Molinia caerulea*, *Trientalis europaea*, *Picea abies*, *Pinus rotundata*, *P. sylvestris*, *Sphagnum* spp., *Vaccinium oxycoccus*, *V. uliginosum*, *Viola palustris*; in spruce swamp woods also: *Carex disperma*, *C. tenuiflora*, *Diplazium sibiricum*, *Hylocomium umbratum* and *Rhytidiadelphus triquetrus*.

4) Geographical distribution: Austria, Belgium, Finland, France, Germany, Greece, Italy, Ireland, Luxemburg, Sweden, United Kingdom.

Typical sites in: Wallone and German Fagne.

The following sub-types are included:

**91D1** (44.A1) - Sphagnum birch woods

**91D2** (44.A2) - Scots pine mire woods

**91D3** (44.A3) - Mountain pine bog woods

**91D4** (44.A4) - Mire spruce woods

In most of the Irish sites, these forests represent sub types of raised bogs, generally degraded and invaded by commercial forestry species; however, those stands dominated by *Betula pubescens* or *Pinus sylvestris* may be of interest. In Greece, formations with *Pinus sylvestris* are confined to the northern mountains, where forests of *Picea abies* on a sphagnum rich ground layer also occur. Corresponding category in the United Kingdom National Vegetation Classification: "W4 *Betula pubescens*-*Molinia caerulea* woodland". Corresponding category of the German Biotoptypen: "430101 Birken-Moorwald", "440104 Latschen-Moorwald", "440101 Fichten-Moorwald", "440103 Spirken-Moorwald", "440102 Waldkiefern-Moorwald".

Corresponding category of the Nordic vegetation types: "311 Skogsmossevegetation", "321 Skogs- och kratkärvegetation".

5) Forests on the edge of upland bogs or transition mires may form a transition towards swamp forests (*Alnetea glutinosa*, *Alno-Ulmion* pp.).

6) DIERSSEN, B. & DIERSSEN, K. (1982). Kiefernreiche Phytocoenosen oligotropher Moore im mittleren und nordwestlichen Europa. Überlegungen zur Problematik ihrer Zuordnung zu höheren syn systematischen Einheiten. In: Dierschke, H. (ed.) Struktur und Dynamic von Wäldern. Ber. Intern. Symp. IVV 1982, pp. 299-331.

## 44.3

\* Residual alluvial forests (*Alnion glutinoso-incanae*)

NATURA 2000 code: 91E0

PAL.CLASS.: 44.3, 44.2 and 44.13

- 1) \* Mixed ash-alder alluvial forests of temperate and Boreal Europe (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)
- 2) Riparian forests of *Fraxinus excelsior* and *Alnus glutinosa*, of temperate and Boreal Europe lowland and hill watercourses (44.3: *Alno-Padion*); riparian woods of *Alnus incanae* of montane and sub-montane rivers of the Alps and the northern Apennines (44.2: *Alnion incanae*); arborescent galleries of tall *Salix alba*, *S. fragilis* and *Populus nigra*, along medio-European lowland, hill or sub-montane rivers (44.13: *Salicion albae*). All types occur on heavy soils (generally rich in alluvial deposits) periodically inundated by the annual rise of the river (or brook) level, but otherwise well-drained and aerated during low-water. The herbaceous layer invariably includes many large species (*Filipendula ulmaria*, *Angelica sylvestris*, *Cardamine* spp., *Rumex sanguineus*, *Carex* spp., *Cirsium oleraceum*) and various vernal geophytes can occur, such as *Ranunculus ficaria*, *Anemone nemorosa*, *A. ranunculoides*, *Corydalis solida*.

Plants: tree layer - *Alnus glutinosa*, *Alnus incanae*, *Fraxinus excelsior*; *Populus nigra*, *Salix alba*, *S. fragilis*; *Betula pubescens*, *Ulmus glabra*; herb layer - *Angelica sylvestris*, *Cardamine amara*, *C. pratensis*, *Carex acutiformis*, *C. pendula*, *C. remota*, *C. strigosa*, *C. sylvatica*, *Cirsium oleraceum*, *Equisetum telmateia*, *Equisetum* spp., *Filipendula ulmaria*, *Geranium sylvaticum*, *Geum rivale*, *Lycopus europaeus*, *Lysimachia nemorum*, *Rumex sanguineus*, *Stellaria nemorum*, *Urtica dioica*.

- 4) Geographical distribution: all the European Union except the Mediterranean biogeographical region. This habitat includes several sub-types: ash-alder woods of springs and their rivers (44.31 *Carici remotae-Fraxinetum*); ash-alder woods of fast-flowing rivers (44.32 *Stellario-Alnetum glutinosae*); ash-alder woods of slow-flowing rivers (44.33 *Pruno-Fraxinetum*, *Ulmo-Fraxinetum*); montane grey alder galleries (44.21 *Calamagrosti variaae-Alnetum incanae* Moor 58); sub-montane grey alder galleries (44.22 *Equiseto hyemalis-Alnetum incanae* Moor 58); white willow gallery forests (44.13 *Salicion albae*). The Spanish types belong to the alliance *Osmundo-Alnion* (Cantabric atlantic and southeast Iberia peninsula).  
Corresponding category in the United Kingdom National Vegetation Classification: "W5 *Alnus glutinosa-Carex paniculata* woodland", "W6 *Alnus glutinosa-Urtica dioica* woodland" and "W7 *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* woodland".  
Corresponding category of the German Biotoptypen: "43040401 Weichholzaunenwald mit weitgehend ungetörter Überflutungsdynamik", "43040402 Weichholzaunenwald ohne Überflutung", "430403 Schwarzerlenwald (an Fließgewässern)", "430402 Eschenwald (an Fließgewässern)", "430401 Grauerlenauenwald (montan, Alpenvorland, Alpen).  
Corresponding category of the Nordic vegetation types: "2234 *Fraxinus excelsior*-typ" and "224 Alskog".

- 5) Most of these forests are in contact with humid meadows or ravine forests (*Tilio-Acerion*). A succession towards *Carpinion* (*Primulo-Carpinetum*) can be observed.
- 6) BRUNET, J. (1991). Vegetation i Skånes alm- och askskogar. Sven. Bot. Tidskr. 85:377-384.

## 44.4

## Mixed oak-elm-ash forests

NATURA 2000 code : **91F0**

PAL.CLASS.: 44.4

- 1) **Riparian mixed forests of *Quercus robur*, *Ulmus laevis* and *Ulmus minor*, *Fraxinus excelsior* or *Fraxinus angustifolia*, along the great rivers of the Atlantic and Middle-European provinces (*Ulmenion minoris*)**
- 2) Forests of hardwood trees of the major part of the river bed, liable to flooding during regular rising of water level or, of low areas liable to flooding following the raising of the water table. These forests develop on recent alluvial deposits. The soil may be well drained between rising or remain wet. Following the hydric regime, the woody dominated species belong to *Fraxinus*, *Ulmus* or *Quercus* genus. The undergrowth is well developed.
- 3) Plants: *Quercus robur*, *Ulmus laevis*, *U. minor*, *U. glabra*, *Fraxinus excelsior*, *Fraxinus angustifolia*, *Populus nigra*, *P. canescens*, *P. tremula*, *Alnus glutinosa*, *Prunus padus*, *Humulus lupulus*, *Vitis vinifera* ssp. *sylvestris*, *Tamus communis*, *Hedera helix*, *Phalaris arundinacea*, *Corydalis solida*, *Gagea lutea*, *Ribes rubrum*.
- 4) Geographical distribution: Austria, Belgium (some threatened fragments), Germany, Greece (with *Quercus pedunculiflora*, *Periploca graeca*, etc.), France, Italy (in the alluvial plain of the Po), Netherlands (some residual areas), Sweden .  
Corresponding category of the German Biotoptypen: "43040501 Hartholzauenwald mit weitgehend ungestörter Überflutungsdynamik", "43040502 Hartholzauenwald ohne Überflutung".  
Corresponding category of the Nordic vegetation types: "2223 *Ulmus glabra*-typ", "2236 *Quercus robur-Ulmus glabra-Tilia cordata* typ".
- 5) These forests form mosaics with pioneer or stable forests of soft wood trees, in low areas of the river bed; they may develop also from alluvial forests of hard wood trees. This habitat type often occurs in conjunction with alder-ash woodlands (44.3).

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## Mediterranean deciduous forests

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### 41.181 \* Apennine beech forests with *Taxus* and *Ilex*

NATURA 2000 code : **9210**

PAL.CLASS.: 41.181, 41.185 and 41.186

- 1) \* Apennine beech forests with *Taxus* and *Ilex*
  - 2) Thermophilous beech forests of the Italian mountains south of parallel 42, highly fragmented and harbouring many endemics, with *Taxus baccata* and *Ilex aquifolium* (*Geranio nodosi-Fagion*, *Geranio striati-Fagion*).
  - 3) Plants: *Fagus sylvaticus*, *Ilex aquifolium*, *Taxus baccata*.
  - 4) Geographical distribution: Apennine and Sicily.  
This habitat type includes: Monte Gargano Foresta Umbra, rich in *Taxus baccata* (41.181); silicolous beech forests of the Aspromonte range of Calabria with *Taxus baccata*, *Populus tremula*, *Sorbus aucuparia* and *Betula pendula* (41.185); Relict beech forests of the Madonie, Nebrodi and, very locally, the monti Peloritani, with *Ilex aquifolium*, *Daphne laureola*, *Crataegus monogyna* and *Prunus spinosa* (41.186).
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### 41.184 \* Apennine beech forests with *Abies alba* and beech forests with *Abies nebrodensis*

NATURA 2000 code : **9220**

PAL.CLASS.: 41.186 and 41.187

- 1) \* Apennine beech forests with *Abies alba* and beech forests with *Abies nebrodensis*
- 2) Beech forests of the hill level of Italian mountains south of parallel 42, on sites colder than those of 41.181, highly fragmented and harbouring many endemics, with *Abies alba* and *Abies nebrodensis* (*Geranio nodosi-Fagion*, *Geranio striati-Fagion*).
- 3) Plants: *Abies alba*, \**A. nebrodensis*, *Fagus sylvatica*.
- 4) Geographical distribution: Apennine and Sicily.  
Relict beech forests of the Madonie, Nebrodi and, very locally, the monti Peloritani, with *Ilex aquifolium*, *Daphne laureola*, *Crataegus monogyna* and *Prunus spinosa* (41.186); isolated beech forests of Mount Etna, at the southern limit of the range of the species (41.187).

## 41.6

Galicio-Portuguese oak woods with *Quercus robur* and *Quercus pyrenaica*

NATURA 2000 code : 9230

PAL.CLASS.: 41.6

- 1) Galicio-Portuguese oak woods with *Quercus robur* and *Quercus pyrenaica*
- 2) *Quercus pyrenaica* -dominated forests of the Iberian peninsula and, locally, south-western France (*Quercion robori-pyrenaicae*).
- 3) Plants: *Quercus pyrenaica*, *Q. robur*.
- 4) Geographical distribution: France, Portugal, Spain.  
The following sub-types are included:
  - 41.61 Central Iberian *Quercus pyrenaica* forests  
Supra- and sometimes meso-Mediterranean *Quercus pyrenaica* forests of western Iberia, the Leonese interior, the Cordillera Central, the Iberian Range, the Montes de Toledo and the Sierra Morena.
  - 41.62 Cantabrian *Quercus pyrenaica* forests  
*Melampyro pratense-Quercetum pyrenaicae*, *Linario triornithophorae-Quercetum pyrenaicae*  
*Quercus pyrenaica* formations of medio-European character, of the collinar and montane levels of the Cantabrian chain and its satellite ranges west to the Sierra de Picos de Ancares in Galicia, characteristic of areas with comparatively low precipitation, in the rain shadow of the coastward ranges or the interior oro-Cantabrian hills.
  - 41.63 Maestrazgan *Quercus pyrenaica* forests  
*Cephalanthero rubrae-Quercetum pyrenaicae*  
*Quercus pyrenaica* forests of the sub-Mediterranean siliceous enclaves of the Maestrazgo and eastern Catalanian ranges, reduced to a very few relicts in the Penagolosa and Prades massifs.
  - 41.64 Baetic *Quercus pyrenaica* forests  
*Adenocarpus decorticans-Quercetum pyrenaicae*  
*Quercus pyrenaica* forests of siliceous supra-Mediterranean areas with sub-humid climate of the western Sierra Nevada, the Sierra de Alfacar, the northern flanks of the Sierra de Cazulas and the Sierra Tejada; in more humid locations *Fraxinus angustifolius* and *Acer granatense* accompany *Q. pyrenaica*.
  - 41.65 French *Quercus pyrenaica* forests  
*Betulo-Quercetum pyrenaica* i. a.  
*Quercus pyrenaica* forests of south-western France north to the Sologne where they constitute relatively extensive formations on poor soils, with *Betula pendula*, *Lonicera periclymenum*, *Deschampsia flexuosa*, *Holcus mollis*, *Molinia caerulea*, *Teucrium scorodonia*.



## 41.77

***Quercus faginea* woods (Iberian Peninsula)**NATURA 2000 code : **9240**

PALCLASS.: 41.77

- 1) ***Quercus faginea* woods (Iberian Peninsula)**
- 2) Iberian and North African forests and woods dominated by *Quercus faginea*, *Quercus canariensis* or *Quercus afares*. The humid formations of south-western Iberia (41.772 and 41.773) are forest types of unique character in Europe and of extreme biological importance; also highly distinctive and vulnerable are the North African communities (41.776) and the Baetic formations listed under 41.7714 and 41.7715.
- 3) Plants: *Quercus faginea*, *Q. canariensis*.
- 4) Geographical distribution: Portugal, Spain.  
The following sub-types are included:
  - 41.771 Spanish *Quercus faginea* forests  
*Spiraeo obovatae-Quercetum fagineae*, *Cephalanthero longifoliae-Quercetum fagineae*, *Violo wilkommii-Quercetum fagineae*, *Daphno latifoliae-Aceretum granatensis*, *Fraxino orni-Quercetum fagineae*  
Xero-mesophile *Quercus faginea* formations of slopes and plateaux of middle elevations of the Spanish Meseta and associated ranges.
  - 41.772 Portuguese *Quercus faginea* forests  
*Arisaro-Quercetum fagineae*  
Humid, epiphyte-clad, dense, relict *Quercus faginea* forests of Portugal, restricted to a very few isolated localities.
  - 41.773 Andalusian *Quercus canariensis* forests  
*Rusco hypophylli-Quercetum canariensis*  
Humid and hyper-humid, luxuriant *Quercus canariensis* forests of the sierras of extreme southern Spain, limited to the Aljibe and a very few localities in the Serrania de Ronda.
  - 41.774 Catalanian *Quercus canariensis* stands  
*Carici depressae-Quercetum canariensis*  
Formations of Catalonia rich in *Quercus canariensis*.
  - 41.775 Balearic *Quercus faginea* woods  
*Aceri-Quercetum fagineae* p.  
Relict formations of Mallorca dominated by, or rich in, *Quercus faginea*.

**41.85*****Quercus trojana* woods (Italy and Greece)**NATURA 2000 code : **9250**

PAL.CLASS.: 41.78

- 1) ***Quercus trojana* woods (Italy and Greece)**
- 2) Supra-Mediterranean, and occasionally meso-Mediterranean woods dominated by the semi-deciduous *Quercus trojana* or its allies (*Quercetum trojanae*).
- 3) Plants: *Quercus trojana*.
- 4) Geographical distribution: Greece, Italy.  
The following sub-types are included:
  - 41.781 Helleno-Balkanic Trojan oak woods  
Usually low formations dominated by *Quercus trojana*, often with junipers or maples, of Macedonia, Thrace and Thessaly, north to Herzegovina, Montenegro, Albania and the Vardar valley of Paeonia.
  - 41.782 Apulian Trojan oak woods  
Relict woods, sometimes of considerable height, of *Quercus trojana* and *Q. pubescens*, often with an admixture of *Q. ilex* and its associated vegetation (Murge: e.g. bosco delle Pianelle, foresta Gaglione).

**41.9****Chestnut woods**NATURA 2000 code : **9260**

PAL.CLASS.: 41.9

- 1) **Chestnut woods**
- 2) Supra-Mediterranean and sub-Mediterranean *Castanea sativa*-dominated forests and old established plantations with semi-natural undergrowth.
- 3) Plants: *Castanea sativa*.
- 4) Geographical distribution: Austria, France, Greece, Italy, Portugal, Spain.

**41.1A x 42.17****Hellenic beech forests with *Abies borisii-regis***NATURA 2000 code : **9270**

PAL.CLASS.: 41.1A

- 1) **Hellenic beech forests with *Abies borisii-regis***
- 2) *Fagus sylvatica* forests of the Pindus north to the Smolikas and the Grammos, and of the Chassia, Olympus and Ossa groups, with reduced medio-European character and high endemism, characterised by the presence of *Abies borisii-regis*, *Doronicum caucasicum*, *Galium laconicum*, *Lathyrus venetus*, *Helleborus cyclophyllus* (*Fagion hellenicum*).
- 3) Plants: *Fagus sylvatica*, *Abies borisii-regis*.
- 4) Geographical distribution: Greece.

**41.1B*****Quercus frainetto* woods**NATURA 2000 code : **9280**

PAL.CLASS.: 41.1B

- 1) ***Quercus frainetto* woods**
- 2) *Fagus sylvatica* or *Fagus moesiaca* forests, more thermophile than those of 41.19 and 41.1A, occurring in the transition zone between the supra-Mediterranean and montane levels of Thrace and Macedonia, characterised by the presence of numerous species of the *Quercion frainetto*.
- 3) Plants: *Fagus sylvatica*, *Quercus frainetto*.
- 4) Geographical distribution: Greece, Italy.

**42.A1****Cypress forests (*Acero-Cupression*)**NATURA 2000 code : **9290**

PAL.CLASS.: 42.A1

- 1) **Cypress forests (*Acero-Cupression*)**
- 2) Montane forests of the Mediterranean basin, of the Elburz and of the Sahara dominated by *Cupressus sempervirens*, *Cupressus atlantica* or *Cupressus dupreziana* (*Acero-Cupression*).
- 3) Plants: *Cupressus sempervirens*.
- 4) Geographical distribution: Greece.

**44.17*****Salix alba* and *Populus alba* galleries**NATURA 2000 code : **92A0**

PAL.CLASS.: 44.141 and 44.6

- 1) ***Salix alba* and *Populus alba* galleries**
- 2) Riparian forests of the Mediterranean basin dominated by *Salix alba*, *Salix fragilis* or their relatives (44.141).  
Mediterranean and Central Eurasian multi-layered riverine forests with *Populus* spp., *Ulmus* spp., *Salix* spp., *Alnus* spp., *Acer* spp., *Tamarix* spp., *Juglans regia*, lianas. Tall poplars, *Populus alba*, *Populus caspica*, *Populus euphratica* (*Populus diversifolia*), are usually dominant in height; they may be absent or sparse in some associations which are then dominated by species of the genera listed above (44.6).
- 3) Plants: *Salix alba*, *Populus alba*.
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.

## 44.52

### Riparian formations on intermittent Mediterranean water courses with *Rhododendron ponticum*, *Salix* and others

NATURA 2000 code : **92B0**

PAL.CLASS.: 44.52 and 44.54

- 1) **Riparian formations on intermittent Mediterranean water courses with *Rhododendron ponticum*, *Salix* and others**
- 2) Highly remarkable, relict thermo- and meso-Mediterranean alder galleries of deep, steep-sided valleys of the sierras of the Campo de Gibraltar and of southern Portugal, with *Rhododendron ponticum* ssp. *baeticum*, *Frangula alnus* ssp. *baetica*, *Arisarum proboscideum* and a rich fern community including *Pteris incompleta*, *Diplazium caudatum*, #*Culcita macrocarpa* (44.52).  
Relict *Betula parvibracteata* riparian galleries limited to two stations of the Montes de Toledo (Cordillera Oretana), one in the Sierra de Rio Frio where a unique gallery of about 20 km in length survives, the other at the spring of the Estena. The dominant species, an extremely narrow endemic, is accompanied by *Myrica gale*, *Frangula alnus*, *Salix atrocinnerea*, *Galium broterianum*, *Scilla ramburei* (44.54).
- 3) Plants: *Rhododendron ponticum* ssp. *baeticum*, *Frangula alnus* ssp. *baetica*, *Arisarum proboscideum*, *Betula parvibracteata*.
- 4) Geographical distribution: Portugal, Spain.
- 5) The *Rhododendron*-alder galleries are often in contact with humid to hyper-humid *Quercus canariensis* forests (41.773) and with *Salix pedicellata* formations (44.1271).

## 44.7

### Oriental plane woods (*Platanion orientalis*)

NATURA 2000 code : **92C0**

PAL.CLASS.: 44.71 and 44.72

- 1) **Oriental plane and sweet gum woods (*Platanion orientalis*)**
- 2) Forests and woods, for the most part riparian, dominated by *Platanus orientalis* (oriental plane) or *Liquidambar orientalis* (sweet gum), belonging to the *Platanion orientalis* alliance.
- 3) Plants: *Platanus orientalis*, *Liquidambar orientalis*.
- 4) Geographical distribution: Greece, Italy.  
The following sub-types are included:  
44.71 Oriental plane woods (*Platanion orientalis*)  
Forests of *Platanus orientalis*.  
44.711 Helleno-Balkan riparian plane forests  
*Platanus orientalis* gallery forests of Greek and southern Balkanic watercourses, temporary rivers and gorges; they are distributed throughout the mainland and archipelagos, colonising poorly stabilised alluvions of large rivers, gravel or boulder deposits of permanent or temporary torrents, spring basins, and particularly, the bottom of steep, shady gorges, where they constitute species-rich communities. The accompanying flora may include *Salix alba*, *S. elaeagnos*, *S. purpurea*, *Alnus glutinosa*, *Cercis siliquastrum*, *Celtis australis*, *Populus alba*, *P. nigra*, *Juglans regia*, *Fraxinus ornus*, *Alnus glutinosa*, *Crataegus monogyna*, *Cornus sanguinea*, *Ruscus aculeatus*, *Vitex agnus-castus*, *Nerium oleander*, *Rubus* spp.,

*Rosa sempervirens*, *Hedera helix*, *Clematis vitalba*, *Vitis vinifera* ssp. *sylvestris*, *Ranunculus ficaria*, *Anemone blanda*, *Aristolochia rotunda*, *Saponaria officinalis*, *Symphytum bulbosum*, *Hypericum hircinum*, *Calamintha grandiflora*, *Melissa officinalis*, *Helleborus cyclophyllus*, *Cyclamen hederifolium*, *C. repandum*, *C. creticum*, *Galanthus nivalis* ssp. *reginae-olgae*, *Dracunculus vulgaris*, *Arum italicum*, *Biarum tenuifolium*, *Brachypodium sylvaticum*, *Dactylis glomerata* and may be rich in mosses, lichens and ferns, among which *Pteridium aquilinum* is often abundant. Various associations have been described, reflecting regional and ecological variation in the composition of the undergrowth. The plane tree galleries are particularly well represented along the Ionian coast and in the Pindus; other important local complexes exist in Macedonia, in Thrace, around the Olympus massif, in the Pelion, in the Peloponnese, particularly in the Taygetos, where luxuriant gorge forests reach 1300m, in Euboea and in Crete; local, distinctive, representatives occur in other Aegean islands, such as Rhodes, Samos, Samothrace, Thasos. Restriction to gorges is increasingly pronounced towards the south.

44.712 Hellenic slope plane woods

*Platanus orientalis* woods on colluvions, detritus cones, ravine sides or other poorly stabilised substrates, of Greece.

44.713 Sicilian plane tree canyons

Relict *Platanus orientalis*-dominated or -rich galleries of the Cassabile, the Anapo, the Irminio and the Carbo rivers, in the Iblei range of south-eastern Sicily, of the gorge of the Sirmeto, in the vicinity of the Nebrodi. Some of these formations, in particular, in the gorges of the Cassabile and of the Anapo, are true plane tree woods. Others, such as on the Sirmeto, are *Populus alba*, *Fraxinus angustifolia*, *Salix* spp. formations with *Platanus orientalis*; as they grade into each other, and because of the very isolated occurrence, and great biogeographical and historical interest of *Platanus orientalis* in Sicily, they are all listed here. Plane tree woods have had a much greater extension in Sicily and probably in Calabria. A large forest has, in particular, existed on the Alcantara, where the species is now extinct.

44.72 Sweet gum woods

Riverine forests dominated by the Tertiary relict *Liquidambar orientalis*, with very limited range in south Asia Minor and Rhodes.

44.721 Rhodian sweet gum woods

*Liquidambar orientalis* gallery forest of the Petaloudhes Valley, on Rhodes, with poorly developed undergrowth and a ground layer dominated by *Adiantum capillus-veneris* in damp areas. This forest constitutes the only European formation of this species and harbours the unique, concentrated aggregation of Jersey Tiger Moths, *Panaxia quadripunctaria*.

## 44.8 Thermo-Mediterranean riparian galleries (*Nerio-Tamariceteae*) and south-west Iberian Peninsula riparian galleries (*Securinegion tinctoriae*)

NATURA 2000 code : **92D0**

PAL.CLASS.: 44.81 to 44.84

- 1) Southern riparian galleries and thickets (*Nerio-Tamaricetea* and *Securinegion tinctoriae*)
- 2) Tamarisk, oleander, chaste tree galleries and thickets and similar low ligneous formations of permanent or temporary streams and wetlands of the thermo-Mediterranean zone and south-western Iberia, and of the most hygromorphic locations within the Saharo-Mediterranean and Saharo-Sindian zones.  
The formations with *Tamarix africana* should not be taken into account.
- 3) Plants: *Nerium oleander*, *Vitex agnus-castus*, *Tamarix* spp., *Securinega tinctoria*, *Prunus lusitanica*, *Viburnum tinus*.

4) Geographical distribution: France, Greece, Italy, Portugal, Spain.

The following habitat types are included:

- 44.81 Oleander, chaste tree and tamarix galleries  
*Nerio-Tamaricetea*

Thickets and galleries of *Nerium oleander*, *Vitex agnus-castus* or *Tamarix* spp.

- 44.811 Oleander galleries  
*Nerion oleandri* p.

*Nerium oleander* cordons and screens, often with *Tamarix* spp., *Vitex agnus-castus*, *Dittrichia viscosa*, *Saccharum ravennae*, *Arundo donax*, *Rubus ulmifolius*, most typical of temporary water courses, but also lining small and sometimes large rivers, marking springs and areas of high water table in southern and eastern Iberia, very locally in eastern Provence, Liguria and Corsica (Saint-Florent), in southern Italy, Sardinia and Sicily, in southern and western Greece, the Aegean and Ionian archipelagos, Crete, the eastern Mediterranean, North Africa and Mesopotamia. They are particularly abundant in the south and east of Iberia, in Sicily and in the Aegean and eastern Mediterranean region and in North Africa.

- 44.812 Chaste tree thickets  
*Nerion oleandri* p.: *Vinco majoris-Viticetum agni-casti* i.a.

*Vitex agnus-castus* formations of temporary water courses and other humid sites within, mostly, the thermo-Mediterranean zone. They occur, though uncommonly, in the Mediterranean south and east of Spain and in the Balearics; they are local and rare in eastern Provence, the Tyrrhenian coast of Italy, Puglia, the gulf of Taranto, Corsica, Sardinia and Sicily. They are frequent in Greece, particularly along the Ionian coasts, where they can constitute dense thickets, uncommon again in the Aegean archipelagos and Crete. They extend to the southern Balkans, Crimea, Mediterranean Asia Minor and North Africa.

- 44.813 Mediterraneo-Macaronesian tamarisk thickets

Formations, mostly of Mediterranean and thermo-Atlantic coasts and lowlands, dominated by *Tamarix* spp..

- 44.82 South-western Iberian tamujares  
*Securinegion tinctoriae: Pyro bourgaeanae-Securinegetum tinctoriae*

Low, spiny, almost monospecific fringes formed by the Ibero-African shrubby spurge *Securinega tinctoria* on the outer edge of temporary or permanent water courses of great seasonal amplitude in the south-western quadrant of the Iberian peninsula (Montes de Toledo, Sierra Morena, Extremadura, south-western Andalusia, southern Portugal). Among the few associated plants, are the lianas *Bryonia cretica*, *Tamus communis* and the endemic *Clematis campaniflora*. *Pyrus bourgaeana* may transgress from neighbouring communities.

- 44.83 Oretanian lauriphyllous galleries  
*Viburno tini-Prunetum lusitanicae*

Supra- and upper meso-Mediterranean riparian galleries of the Montes de Toledo (Cordillera Oretana), constituted by the lauriphyllous *Prunus lusitanica* and *Viburnum tinus*; they line water courses on the inner edge of alder galleries of 44.551 and 44.552, which they sometimes entirely replace.

- 44.84 Oretanian bog-myrtle willow scrub  
*Frangulo-Myricaetum galeae*

Tall scrub of Montes de Toledo streams, with *Frangula alnus*, *Salix atrocinerea*, *S. salvifolia* and *Myrica gale*.

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## Mediterranean sclerophyllous forests

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### 41.7C Cretan *Quercus brachyphylla* forests

NATURA 2000 code : **9310**

PAL.CLASS.: 41.735

- 1)  **Aegean *Quercus brachyphylla* woods**
  - 2) Stands of *Quercus brachyphylla*, often associated with *Quercus macrolepis* or *Q. ilex*, of the Peloponnese and Crete.
  - 3) Plants: *Quercus brachyphylla*.
  - 4) Geographical distribution: Greece.
- 

### 45.1 *Olea* and *Ceratonia* forests

NATURA 2000 code : **9320**

PAL.CLASS.: 45.1

- 1)  ***Olea* and *Ceratonia* forests**
  - 2) Thermo-Mediterranean or thermo-Canarian woodland dominated by arborescent *Olea europaea* ssp. *sylvestris*, *Ceratonia siliqua*, *Pistacia lentiscus*, *Myrtus communis* or, in the Canary Islands, by *Olea europaea* ssp. *cerasiformis* and *Pistacia atlantica*. Most formations will be listed as arborescent matorral (35.12), but a few stands may have a sufficiently tall, closed canopy to qualify for this unit.
  - 3) Plants: *Olea europaea* ssp. *sylvestris*, *Ceratonia siliqua*, *Pistacia lentiscus*, *Myrtus communis*, *Olea europaea* ssp. *cerasiformis*, *Pistacia atlantica*.
  - 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.  
The following sub-types are included:
    - 45.11 Wild olive woodland  
*Olea europaea* ssp. *sylvestris* - dominated formations. A climax olive forest, with *Ceratonia siliqua* and *Pistacia lentiscus* exists on the north flank of Djebel Ichkeul in northern Tunisia. Elsewhere, the communities most resembling olive forest are found in southern Andalusia (*Tamo communis-Oleetum sylvestris*: extinct?), in Menorca (*Prasio majoris-Oleetum sylvestris*), Sardinia, Sicily, Calabria, Crete.
    - 45.12 Carob woodland  
*Ceratonia siliqua* - dominated formations, often with *Olea europaea* ssp. *sylvestris* and *Pistacia lentiscus*. The most developed examples, some truly forest-like, are to be found in Tunisia, on the slopes of the Djebel, where they constitute carob-dominated facies of the wild olive woodlands (45.11), in Mallorca (*Cneoro tricocci-Ceratonietum siliquae*), in eastern Sardinia, in south-eastern Sicily, in Puglia, in Crete.
    - 45.13 Canarian olive woodland  
*Olea europaea* ssp. *cerasiformis* and *Pistacia atlantica* formations of the Canary Islands.
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**45.2*****Quercus suber* forests**NATURA 2000 code : **9330**

PAL.CLASS.: 45.2

- 1) ***Quercus suber* forests**
- 2) West-Mediterranean silicicolous forests dominated by *Quercus suber*, usually more thermophile and hygrophile than 45.3.
- 3) Plants: *Quercus suber*.
- 4) Geographical distribution: France, Italy, Portugal, Spain.  
The following sub-types are included:
  - 45.21 Tyrrenian cork-oak forests  
*Quercion suberis*  
Mostly meso-Mediterranean *Quercus suber* forests of Italy, Sicily, Sardinia, Corsica, France and north-eastern Spain. They are most often degraded to arborescent matorral (32.11).
  - 45.22 South-western Iberian cork-oak forests  
*Quercion fagineo-suberis*  
*Quercus suber* forests, often with *Q. faginea* or *Q. canariensis*, of the south-western quadrant of the Iberian peninsula.
  - 45.23 North-western Iberian cork-oak forests  
Very local, exiguous *Quercus suber* enclaves in the *Q. pyrenaica* forest area of the valleys of the Sil and of the Mino (Galicia).
  - 45.24 Aquitanian cork-oak woodland  
Isolated *Q. suber*-dominated stands occurring either as a facies of dunal pine-cork oak forests or in a very limited area of the eastern Landes.

**45.3*****Quercus ilex*<sup>29</sup> forests**NATURA 2000 code : **9340**

PAL.CLASS.: 45.3

- 1) ***Quercus ilex* and *Quercus rotundifolia* forests**
- 2) Forests dominated by *Quercus ilex* or *Q. rotundifolia*, often, but not necessarily, calcicolous.
- 3) Plants: *Quercus ilex*, *Q. rotundifolia*.
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.  
The following sub-types are included:
  - 45.31 Meso-Mediterranean holm-oak forests  
Rich meso-Mediterranean formations, penetrating locally, mostly in ravines, into the thermo-Mediterranean zone. They are often degraded to arborescent matorral (32.11), and some of the types listed below no longer exist in the fully developed forest state relevant to category 45; they have nevertheless been included, both to provide appropriate codes for use in 32.11, and because restoration may be possible.
  - 45.32 Supra-Mediterranean holm-oak forests

<sup>29</sup> and *Quercus rotundifolia*.



Formations of the supra-Mediterranean levels, often mixed with deciduous oaks, *Acer* spp. or *Ostrya carpinifolia*.

45.33 Aquitanian holm-oak woodland  
Isolated *Quercus ilex*-dominated stands occurring as a facies of dunal pine-holm oak forests.

45.34 *Quercus rotundifolia* woodland  
Iberian forest communities formed by *Q. rotundifolia*. Generally, even in mature state, less tall, less luxuriant and drier than the fully developed forests that can be constituted by the closely related *Q. ilex*, they are, moreover, most often degraded into open woodland or even arborescent matorral. Species characteristic of the undergrowth are *Arbutus unedo*, *Phillyrea angustifolia*, *Rhamnus alaternus*, *Pistacia terebinthus*, *Rubia peregrina*, *Jasminum fruticans*, *Smilax aspera*, *Lonicera etrusca*, *L. implexa*.

## 45.5 *Quercus macrolepis* forests

NATURA 2000 code : **9350**

PAL.CLASS.: 41.79

- 1) *Quercus macrolepis* forests
- 2) Woods dominated by the semi-deciduous *Quercus macrolepis*, often fairly open, of the mostly meso-Mediterranean zone of Greece, Albania, western Asia, and, very locally, southern Italy.
- 3) Plants: *Quercus macrolepis*.
- 4) Geographical distribution: Greece, Italy.  
The following sub-types are included:
  - 41.791 Hellenic valonia oak woods  
*Quercus macrolepis* formations of continental Greece and its archipelagos, as well as of adjacent Albania; well developed forests exist, in particular, in the Ionian islands and on Lesbos; more modified, grove-like, stands, exist on the maritime slopes of the low mountains bordering the gulf of Arta and in western Etolia, in the north-western Peloponnese, in Thessaly, in Attica, in Thrace.
  - 41.792 Apulian valonia oak woods  
Relict *Quercus macrolepis* formations of Salento (Tricase).

## 45.61 to 45.63

\* Macaronesian laurel forests (*Laurus*, *Ocotea*)NATURA 2000 code : **9360**

PAL.CLASS.: 45.61 to 45.63

- 1) \* Macaronesian laurel forests (*Laurus*, *Ocotea*)
- 2) Humid to hyper-humid, mist-bound, luxuriant, evergreen, lauriphyllous forests of the cloud belt of the Macaronesian islands, extremely rich in floral and faunal species, among which many are restricted to these communities (*Pruno-Lauretalia*). Genera such as *Picconia*, *Semele*, *Gesnouinia*, *Lactucosonchus*, *Ixanthus* are entirely endemic to these communities, while others, such as *Isoplexis*, *Visnea* and *Phyllis*, reach in them their maximum development; in addition, each of the formations of the various archipelagos harbours distinctive endemic species.
- 3) Plants: *Apollonias barbujana*, *Ardisia bahamensis*, *Asparagus fallax*, *Canarina canariensis*, *Carex canariensis*, *C. eregrina*, *Clethra arborea*, *Convolvulus canariensis*, *Cryptotaenia elegans*, *Erica arborea*, *Euphorbia melifera*, #*E. stygiana*, #*Frangula azorica*, *Geranium canariensis*, *Heberdenia excelsa*, *Hedera canariensis*, *Ilex canariensis*, *I. perado* ssp. *azorica*, *I. perado* ssp. *perado*, *Isolexis canariensis*, *Ixanthus viscosus*, *Juniperus brevifolia*, *Laurus azorica*, *Myrica faya*, *Ocotea foetens*, *Persea indica*, #*Picconia azorica*, *P. excelsa*, \**Pittosporum coriaceum*, *Pleiomis canariensis* (= *Myrsine canariensis*), *Prunus lusitanica*, #*P. l.* ssp. *azorica*, *P. l.* ssp. *hixa*, *Rubia peregrina*, *Rubus bollei*, *Ruscus streptophyllus*, *Sambucus lanceolata*, \**S. palmensis*, *Semele androgyna*, *Senecio auritus* (= *S. maderensis*), *Sideretis canariensis*, *S. macrostachys*, *Smilax aspera*, *S. canariensis*, *S. divaricata*, *Sonchus fruticosus*, *Tamus edulis*, *Teline maderensis* (= *Cytisus maderensis*), *Vaccinium cylindraceum*, *V. padifolium*, *Viburnum tinus* ssp. *subcordatum*, *Visnea mocanera*.  
Animals: *Columba bollei*, *C. junionae*, *C. trocaz*, *Fringilla coelebs* ssp. *ombriosa*, *F. t. ssp. polatzeki*.
- 4) Geographical distribution: Canary, Azores and Madeira Islands.

This habitat type includes:

**9361** - lauriphyllous forests of the Azores (45.61 *Ericetalia azorica* p.), where the humid forests of the coastal areas (*Myrico-Pittosporietum undulati* p.) have been totally or almost totally degraded, largely invaded by the introduced Australian *Pittosporum undulatum*; a better representation survives of the hyper-humid forests (*Calcito-Juniperion brevifoliae* p.) of higher elevations;

**9362** - lauriphyllous forests of Madeira (45.62 *Pruno-Lauretalia azorica*) still occupying a relatively large surface, of the order of 10,000 ha ;

**9363** - lauriphyllous forests of the Canary Islands (45.63 *Ixantho-Laurion azoricae*); the laurel forests of each island harbour a distinctive set of endemic plants and animals, as exemplified by the species of the composite genus *Pericallis*, the well-marked races of the chaffinch *Fringilla coelebs* or the carabid fauna.

**45.7****\* Palm groves of *Phoenix***NATURA 2000 code : **9370**

PAL.CLASS.: 45.7

- 1) **\* Palm groves of *Phoenix***
- 2) Woods, often riparian, formed by the two endemic palm trees of the Community, *Phoenix theophrasti* of Crete, and *Phoenix canariensis* of the Canary Islands.
- 3) Plants: *Phoenix canariensis*, #*Phoenix theophrasti*.
- 4) Geographical distribution: Crete and Canary Islands.  
The palm groves of Crete are restricted to damp sandy coastal valleys; they include the extensive forest of Vai, where the luxuriant palm growth is accompanied by a thick shrubby undergrowth rich of *Nerium oleander*, and about four other smaller coastal groves, notably on the south coast of the prefectorate of Rethimnon. The Canarian palm groves are mostly characteristic of the bottom of barrancos and of alluvial soils, below 600 metres; particularly representative examples are found at Fragata, Maspalomas and Barranco de Tirajana in the Gran Canary, Valle Gran Rey in La Gomera, Masca in Ténériffe and Brena Alta in La Palma.

**45.8****Forests of *Ilex aquifolium***NATURA 2000 code : **9380**

PAL.CLASS.: 45.8

- 1) **Forests of *Ilex aquifolium***
- 2) Communities dominated by arborescent *Ilex aquifolium*, relict of various forests with a field layer rich in *Ilex* and sometimes with *Taxus* (42.A7), of the supra-Mediterranean level on various substrates. These woods correspond to the senescence stage of a forest with a undergrowth with *Taxus* and *Ilex* (belonging among others to the *Ilici-Quercetum ilicis*), after the fading of the tree layer. They generally form patches inside or outside forests.
- 4) Geographical distribution: Greece, north-west of Spain, France (Corsica, Cevennes, Sainte-Baume), Italy (Sardinia), north and central Portugal.

## Alpine and subalpine coniferous forests

### 42.21 to 42.23

### Acidophilous forests (*Vaccinio-Piceetea*)

NATURA 2000 code: **9410**

PAL.CLASS.: 42.21 to 42.23

- 1) **Acidophilous spruce forests (*Vaccinio-Piceetea*)**
- 2) Sub-alpine and alpine conifer forests of the Alps, the Carpathians, the Dinarids, the Balkan Range, the Rhodopes, the Apennines, the Jura and the Hercynian ranges (dominated by *Picea abies*), of the Pontic Range (dominated by *Picea orientalis*), and of the Caucasus (dominated by *Picea omorika*).
- 3) Plants: *Picea abies*, *Vaccinium* spp.
- 4) Geographical distribution: Austria, France, Germany, Greece, Italy.  
The following sub-types are included
  - 9411** (42.21) Alpine and Carpathian sub-alpine spruce forests. *Piceetum subalpinum*.  
*Picea abies* forests of the lower sub-alpine level, and of anomalous stations in the montane level, of the outer, intermediate and inner Alps; in the latter, they are often in continuity with the montane spruce forests of 42.22. The spruces are often stunted or columnar; they are accompanied by an undergrowth of decidedly sub-alpine affinities. *Picea abies* forests of the lower sub-alpine level of the Carpathians.
  - 9412** (42.22) Inner range montane spruce forests. *Piceetum montanum*.  
*Picea abies* forests of the montane level of the inner Alps, characteristic of regions climatically unfavourable to both beech and fir. Analogous *Picea abies* forests of the montane and collinar levels of the inner basin of the Slovakian Carpathians subjected to a climate of high continentality.
  - 9413** (42.23) Hercynian sub-alpine spruce forests  
Sub-alpine *Picea abies* forests of high Hercynian ranges <sup>30</sup>.

<sup>30</sup> Bayerischer Wald, Harz (above 750 m) and Erzgebirge.

**42.31 and 42.32****Alpine forests with larch and *Pinus cembra***NATURA 2000 code: **9420**

PAL.CLASS.: 42.31 and 42.32

- 1) **Alpine larch-arolla forests**
- 2) Forests of the sub-alpine and sometimes montane levels of the Alps and the Carpathians, dominated by *Larix decidua* or *Pinus cembra*; the two species may form either pure or mixed stands, and may be associated with *Picea abies* or, in the western Alps, *Pinus uncinata*.
- 3) Plants: *Larix decidua*, *Pinus cembra*.
- 4) Geographical distribution: Austria, France, Germany.  
The following sub-types are included:
  - 9421** (42.31) Eastern Alpine siliceous larch and arolla forests. *Larici-Cembretum*.  
Sub-alpine *Larix decidua*, *Pinus cembra*, or *Larix decidua-Pinus cembra* forests of the eastern and central Alps, mostly of the inner ranges, usually on siliceous substrates, with an often species-poor undergrowth comprising *Vaccinium myrtillus*, *Rhododendron ferrugineum*, *Calamagrostis villosa*, *Luzula albida*.
  - 9422** (42.32) Eastern Alpine calcicolous larch and arolla forests. *Laricetum*, *Larici-Cembretum rhododendretosum hirsuti*  
Sub-alpine and montane *Larix decidua*, *Larix decidua - Picea abies*, *Pinus cembra* or *Larix decidua-Pinus cembra* forests of the eastern and central Alps, mostly of the outer ranges, on calcareous substrates, with a usually species-rich undergrowth including *Erica herbacea*, *Polygala chamaebuxus*, *Rhododendron hirsutum* or *Pinus mugo*.

## 42.4

***Pinus uncinata* forests**  
 (\* on gypsum or limestone)

NATURA 2000 code : **9430**

PAL.CLASS.: 42.4

- 1) **Subalpine and montane *Pinus uncinata* forests**  
 (\* on gypsum or limestone)
- 2) Mountain pine forests (*Pinus uncinata*), usually open and with a very developed shrubby understory, of the subalpine and montane levels of the Alps, the Jura, the Pyrenees and the Iberian mountains; on limestone, gypsum or siliceous substrate in a cool or thermophile situation depending on the region. Sometimes mixed with *Pinus sylvestris*, more rarely with *Larix-Pinus cembra*.
- 3) Plants: *Arctostaphylos alpina*, *A. uva-ursi*, *Astrantia minor*, *Calluna vulgaris*, *Coronilla vaginalis*, *Cotoneaster integerrimus*, *Crepis alpestris*, *Daphne striata*, *Deschampsia flexuosa*, *Dryas octopetala*, *Erica herbacea*, *Homogyne alpina*, *Huperzia selago*, *Juniperus hemisphaerica*, *J. nana*, *Lycopodium annotinum*, *Pinus uncinata*, *Polygala chamaebuxus*, *Rhamnus saxatilis*, *Rhododendron ferrugineum*, *Rhododendron hirsutum*, *Thesium rostratum*, *Vaccinium myrtillus*, *V. uliginosum*.
- 4) Geographical distribution: Alps, Jura and Pyrenees.  
 Two major types: 42.41 - mountain pine forests of the western outer Alps, the Jura and Pyrenean uplands, developed on siliceous or decalcified soils of the subalpine level with a predominately ericaceous undergrowth comprising *Rhododendron ferrugineum* (*Rhododendro-Vaccinion* p.); 42.42 - xerocline mountain pine forests of the inner Alps, of the western outer Alps and the Jura, and of Pyrenean adrets, accompanied by a shrubby undergrowth in which *Rhododendron ferrugineum* is absent or rare (*Junipero-Pinion* p., *Erico-Pinion* p.)  
 Corresponding category of the German Biotoptypen: "7002 Schneeheide-Kiefernwald".
- 5) In association with bog woodland (44.A), *Pinus mugo* scrub (31.5) and sometimes pioneer phases of fir or spruce in disturbed zones.

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## Mediterranean mountainous coniferous forests

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### 42.14 \* Apennine *Abies alba* and *Picea excelsa* forests

NATURA 2000 code : **9510**

PAL.CLASS.: 42.15

- 1) \* Southern Apennine silver fir forests
  - 2) Relict *Abies alba* woods associated with the beech forests of the *Geranio versicolori-Fagion* of the Lucano-Calabrian Apennines (Pollino, Sila, Aspromonte).
  - 3) Plants: *Abies alba*.
  - 4) Geographical distribution: southern Apennines (Molise, Basilicata, Calabria).
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### 42.19 *Abies pinsapo* forests

NATURA 2000 code : **9520**

PAL.CLASS.: 42.19

- 1) *Abies pinsapo* forests
  - 2) Forests and stands of the endemic *Abies pinsapo* of the supra-meso-Mediterranean level of Andalucia. Calcicolous forests and stands limited to the Serrania de Ronda and associated ranges (42.191); ultra basic serpentine outcroppings of the Sierra de Bermeja and isolated stands of associated ranges (42.192).
  - 3) Plants: *Abies pinsapo*.
  - 4) Geographical distribution: Andalucia (Spain).
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### 42.61 to 42.66 \* Mediterranean pine forests with endemic black pines

NATURA 2000 code : **9530**

PAL.CLASS.: 42.61 to 42.66

- 1) \* (Sub) Mediterranean pine forests with endemic black pines
- 2) Forests of the montane-Mediterranean level, on dolomitic substrate (high tolerance to magnesium), dominated by pines of the *Pinus nigra* group, often with a dense structure.
- 3) Plants: *Pinus laricio*, *Pinus nigra*, *Pinus pallasiana*, *Pinus salzmannii*.  
Animals: *Sitta whiteheadi*.
- 4) Geographical distribution: Alps, Apennines, Corsica, Spain, Greece and Sicily.  
Sub-types and typical sites of this habitat are:

**9531** (42.61) Alpino-Apennine *Pinus nigra* forests - *Pinus nigra* s.s. forests of the eastern Italian, Austrian and Slovenian Alps and of the Apennines;

**9532** (42.62) Western Balkanic *Pinus nigra* forests - *Pinus nigra* ssp. *nigra* of the Dinarides, the Pelagonides; *Pinus dalmatica* forests of the Dalmatian coastal areas;

**9533** (42.63) Salzmänn's pine forests - *Pinus salzmannii* forests of Spain (Pyrenees, northern Iberian Range, sierra de Gredos, serrania de Cuenca, Maestrazgo, sierras de Cazorla, Segura and Alcaraz, calcareous periphery of the Sierra Nevada) and the Causses;

**9534** (42.64) Corsican laricio pine forests - *Pinus laricio* forests of the mountains of Corsica (1000 to 1800 m) on granitic soils;

**9535** (42.65) Calabrian laricio pine forests - *Pinus laricio* var. *calabrica* forests of the Sila (Sila Greca, Sila Grande, Sila Piccola), the Aspromonte and Etna;

**9536** (42.66) Pallas's pine forests - montane forests of *Pinus pallasiana* of Greece and the Balkan peninsula.

## 42.8

### Mediterranean pine forests with endemic Mesogean pines, including *Pinus mugo* and *Pinus leucodermis*

NATURA 2000 code : **9540**

PAL.CLASS.: 42.8

- 1) **Mediterranean pine forests with endemic Mesogean pines**
- 2) Mediterranean and thermo-Atlantic woods of thermophilous pines, mostly appearing as substitution or paraclimatic stages of forests of the *Quercetalia ilicis* or *Ceratonio-Rhamnetalia*. Long-established plantations of these pines, within their natural area of occurrence, and with an undergrowth basically similar to that of paraclimatic formations, are included.
- 3) Plants: *Pinus pinaster* ssp. *atlantica*, *Pinus pinaster* ssp. *pinaster* (= *Pinus mesogeensis*), *Pinus pinea*, *Pinus halepensis*, *Pinus brutia*, *Pinus mugo*, *Pinus leucodermis*.
- 4) Geographical distribution: France, Greece, Italy, Portugal, Spain.  
The following sub-types are included:
  - 42.81 Maritime pine forests  
Forests and plantations of *Pinus pinaster* ssp. *atlantica* of south-western France and the western Iberian peninsula.
  - 42.82 Mesogean pine forests  
Forests of *Pinus pinaster* ssp. *pinaster* (= *Pinus mesogeensis*) of the western Mediterranean, mostly in siliceous meso-Mediterranean, upper meso-Mediterranean and supra-Mediterranean situations of Spain, Corsica, south-eastern France, north-western Italy, Sardinia and Pantelleria.
    - 42.821 Iberian mesogean pine forests  
*Pinus pinaster* forests of the Iberian peninsula, appearing mostly as substitution communities of *Quercus rotundifolia*, *Q. pyrenaica* or, locally, *Q. suber*, *Q. faginea* woodlands.
    - 42.822 Corbières mesogean pine forests  
Isolated *Pinus pinaster* - dominated woods of the Corbières.
    - 42.823 Franco-Italian mesogean pine forests



*Pinus pinaster* forests of siliceous lower meso-Mediterranean areas of Provence, of marls and limestones of the upper meso-Mediterranean level of the Maritime Alps and the Ligurian Alps, and of mostly siliceous or clayey soils of the hills of Liguria and Tuscany.

42.824 Corsican mesogean pine forests

*Pinetum pinastri, Erico-Arbutetum p., Galio-Pinetum p.*

*Pinus pinaster*-dominated forests of the meso- and supra-Mediterranean levels of Corsica, mostly on granitic substrates; they are very developed, accompanied by a maquis-like understory, in the meso-Mediterranean zone, mostly at its upper tier; they occur locally within the supra-Mediterranean zone, on adrets and at lower altitudes, as facies of Iaricio pine forests.

42.825 Sardinian mesogean pine forests

*Pinus pinaster* formations on granitic substrates of northern Sardinia, with *Arbutus unedo*, *Quercus ilex*, *Rosmarinus officinalis*, *Erica arborea*, *Genista corsica*, *Lavandula stoechas*, *Rubia peregrina*, *Calicotome spinosa*, *Pistacia lentiscus*, *Teucrium marum*.

42.826 Pantellerian mesogean pine forests

*Pinus pinaster* woods of Pantelleria.

42.83 Stone pine forests

Mediterranean forests and old naturalised plantations of *Pinus pinea*. Antique introduction in many areas makes the distinction between spontaneous forests and long-established formations of artificial origin often difficult. These are thus included here, while recent, obviously artificial groves are not.

42.831 Iberian stone pine forests

*Pinus pinea* forests of the Iberian peninsula, where they reach their greatest development.

42.832 Balearic stone pine woods

*Pinus pinea* formations of the Balearic Islands, native only on Ibiza and Formentera.

42.833 Provence stone pine woods

*Pinus pinea* formations of Provence, possibly spontaneous on coastal sands and in the Maures area.

42.834 Corsican stone pine woods

*Pinus pinea* formations of the littoral of Corsica, some of which may be of natural origin, in particular on old dunes of the east coast.

42.835 Sardinian stone pine forests

*Pinus pinea* formations of Sardinia.

42.836 Sicilian stone pine forests

*Pinus pinea* formations of the Monti Peloritani, north-western Sicily, of probable native origin.

42.837 Peninsular Italian stone pine forests

Large, ancient, *Pinus pinea* plantations of the Tyrennian, and locally, Adriatic coasts of the Italian peninsula, in Liguria, Tuscany, Latium, Campania, Emilia-Romana (Ravenna) and Friuli-Venetia Giulia (Grado).

42.838 Greek stone pine forests

*Pinus pinea* woods of the littoral and coastal hills of the Peloponnese, Chalcidice, Crete and Aegean islands, rather local but probably in part, at least, spontaneous; a splendid example exists, in particular, on Skiathos.

42.84 Aleppo pine forests

Woods of *Pinus halepensis*, a frequent colonist of thermo- and calcicolous meso-Mediterranean scrubs. The distinction between spontaneous forests and long-established formations of artificial origin is often difficult. The latter are thus included here, while recent, obviously artificial groves are not.

42.841 Iberian Aleppo pine forests

*Pinus halepensis* forests of Spain, considered native for at least two-thirds of their considerable expanse; they are mostly restricted to eastern regions on the Mediterranean slope of the Catalanian mountains, the Maestrazgo, the pre-Baetic ranges of the upper

Guadalquivir basin, the southern Andalusian mountains; they penetrate farther inland in the Ebro basin and around the headwaters of the Tagus and Guadalquivir systems.

42.842 Balearic Aleppo pine forests

*Pinus halepensis* formations of the Balearics, present and probably native on all the major islands.

42.843 Provenço-Ligurian Aleppo pine forests

Mostly lower meso-Mediterranean *Pinus halepensis* forests of Provence and of the lower slopes and coastlines of the Maritime and Ligurian Alps, extensive and undoubtedly native.

42.844 Corsican Aleppo pine woods

Rare and local *Pinus halepensis* woods of the Corsican coasts, some, at least, possibly natural.

42.845 Sardinian Aleppo pine woods

*Pinus halepensis* formations of Sardinia, where certainly native woods occur on Isola di San Pietro and the Sulcis coast of Iglesias.

42.846 Sicilian Aleppo pine woods

*Pinus halepensis* formations of Sicily and peripheral islands (Egadi, Lampedusa, Pantelleria).

42.847 Peninsular Italian Aleppo pine forests

*Pinus halepensis* formations of the Italian peninsula; extensive, probably at least partially native ones are individualised in the subdivisions below.

42.848 Greek Aleppo pine forests

*Pinus halepensis* formations of Greece, where the species is relatively widespread, particularly in Attica, Thessaly, the coasts of the Peloponnese and of central continental Greece, the Ionian islands, Chalcidici, the northern Sporades, Euboea and Skiros.

42.85 Aegean pine forests

*Pinus brutia* forests of Crete and eastern Aegean islands. Eastern vicariants of Aleppo pine forests (42.84), they comprise, however, taller, more luxuriant, and often extensive, formations. Disjunct formations of this pine or of related species, described from Crimea and the Caucasian region (*Pinus pityusa*, *Pinus stankewiczii*, *Pinus eldarica*) have been included..

42.851 Aegean pine forests of Crete

*Pinus brutia*-dominated forests of Crete and its satellite islands Gavdos and Gaidaronisi, pure or mixed with *Cupressus sempervirens*; they are widespread in particular in the White Mountains, the Psiloriti range, the Dikti range and, locally, in the Sitia mountains and the Asterousia mountains.

42.852 Aegean pine forests of Lesbos

Extensive *Pinus brutia* forests of Lesbos, occupying Mount Olympus and surrounding hills in the south-eastern quadrant of the island, as well as parts of the Kuratsonas range in the north-west; these forests harbour the only European population of the nuthatch *Sitta krueperi* and the most significant one of the orchid *Comperia comperiana*.

42.853 Aegean pine forests of Samos

*Pinus brutia* forests covering large expanses of Samos, in particular in the Ambelos range, the Kerki mountains, the southern hills and the north-eastern peninsula.

42.854 Aegean pine woods of Chios

Remnant forests of Chios with a composition and stratification similar to those of the forests of Samos.

42.855 Aegean pine forests of Thasos

Broad *Pinus brutia* belt on the lower reaches of Thasos, up to about 400 to 500 metres, mixed with *Pinus pallasiana* in the higher areas.

42.856 Aegean pine woods of Samothrace

Mostly sparse *Pinus brutia* formations of the lowlands of Samothrace.

42.857 Aegean pine forests of Rhodes

Remnant *Pinus brutia* forests of Rhodes, still represented by some relatively natural formations with rich scrub undergrowth.

42.858 Aegean pine forests of Karpathos

Fairly extensive *Pinus brutia* forests of Karpathos, distributed, in particular, in the northern coastal area, the southern interior and the middle elevation of Kali Limni.

42.859 Aegean pine forests of the Dodecanese

*Pinus brutia* formations of the islands of Simi, Kos, Leros and Ikaria.

## 42.9 Macaronesian pine forests (endemic)

NATURA 2000 code: **9550**

PAL.CLASS.: 42.9

### 1) Canarian endemic pine forests

- 2) Forests of endemic *Pinus canariensis*, of the dry montane level at around 800 to 2000 metres (locally down to 500 and up to 2500 metres) in Tenerife, La Palma, Gran Canaria and Hierro, with *Chamaecytisus proliferus*, *Adenocarpus foliolosus*, *Cistus symphytifolius*, *Lotus campylocladus*, *L. hillebrandii*, *L. spartioides*, *Daphne gnidium*, *Juniperus cedrus*, *Micromeria* spp.; these forests, of which well-preserved examples have become rare, are the only habitat of *Fringilla teydea*, *Dendrocopos major canariensis* and *D. m. thanneri*.

- 3) Plants: *Pinus canariensis*, *Chamaecytisus proliferus*, *Adenocarpus foliolosus*, *Cistus symphytifolius*, *Lotus campylocladus*, *L. hillebrandii*, *L. spartioides*, *Daphne gnidium*, *Juniperus cedrus*, *Micromeria* spp.

- 4) Geographical distribution: Canary islands.

The following sub-types are included:

#### 42.91 Canary pine-rockrose forests

Climax *Pinus canariensis* forests within the main zone of altitudinal occurrence, with an undergrowth characterised and often dominated by *Cistus symphytifolius* and comprising *Chamaecytisus proliferus*, *Lotus campylocladus*, *L. hillebrandii*, *L. spartioides*, *Juniperus cedrus*, *Bystropogon originifolius*, *Argyranthemum adauctum*.

#### 42.92 Canary pine-dry scrub forests

Formations of dry, south-facing slopes in the lower part of the *Pinus canariensis* belt, transitional towards juniper formations and their degradation scrubs, with an undergrowth often formed by *Cistus monspeliensis*, *Euphorbia obtusifolia* ssp. *regis-jubae*, *Salvia canariensis*, *Micromeria hyssopifolia*, *Echium aculeatum*.

#### 42.93 Canary pine-heath forests

Formations of humid, fogbound north- and north-west-facing slopes in the lower reaches of the *Pinus canariensis* belt, with an abundance of *Erica arborea* and *Myrica faya*, and occasionally with *Ilex canariensis* and *Arbutus canariensis*; epiphytic lichens are abundant, as are dense carpets of mosses, in particular, *Hypnum cupressiforme*. These woods are the main habitat of *Regulus teneriffae*.

#### 42.94 Canary pine-broom woods

Formations of the highest altitudes of the *Pinus canariensis* belt, invaded by species of the supra-Canarian level, in particular *Adenocarpus viscosus*.

#### 42.95 Canary pine-juniper woods

##### *Junipero cedri-Pinetum canariensis*

*Pinus canariensis* and *Juniperus cedrus* formations of steep, rocky slopes of high altitudes of Tenerife and La Palma.

## 42.A2 to 42.A5 and 42.A8 \* Endemic Mediterranean forests with *Juniperus* spp.

NATURA 2000 code : **9560**

PAL.CLASS.: 42.A2 to 42.A5 and 42.A8

- 1) \* Endemic Mediterranean forests with *Juniperus* spp.
- 2) Medium altitude forest formations dominated by *Juniperus* spp. The arborescent matorrals (32.13 and 31.3) should not be included.
- 3) Plants: *Juniperus brevifolia*, *J. cedrus*, *J. drupacea*, *J. excelsa*, *J. foetidissima*, *J. oxycedrus*, *J. phoenicea*, *J. thurifera*.  
Animals:
- 4) Geographical distribution: Greece, Spain, France, Azores.  
Sub-types and typical sites of this habitat are:

**9561** (42.A2) Spanish juniper woods (*Juniperon thuriferae*) - forest formations dominated by *Juniperus thuriferae* of Spain (calcareous substrates in the supra-Mediterranean levels of the Iberian Range and neighbouring plateaux, often with *Pinus sylvestris*, *P. salzmannii*, *Juniperus hemisphaerica* and *Berberis hispanica*; enclaves on the periphery of and within the Sierra de Guadarrama, occurring both on rare local limestone deposits and in a few siliceous stations; dry, warm, rocky, calcareous southern slopes of the Cordillera Cantabrica, between the Rio Pisuerga and the Rio Luna, with *Juniperus nana*, *J. sabina*, *Berberis vulgaris* ssp. *cantabrica*, *Rhamnus alpinus*, *Viburnum lantana*; gypsiferous soils of the Ebro basin, with *Rhamnus lycioides*; clay soils of the Campo de Montiel; Sierra Taibilla), southern France (Montagne de Rie); warm calcareous supra-Mediterranean slopes of the south-western Alps, in Drôme, Hautes-Alpes and Alpes-de-Haute-Provence, between 700 and 1200 metres; warm calcareous supra-Mediterranean slopes of the Isère valley, in the western Alps, between 300 and 500 metres; valleys in the interior of Corsica -Pinnera, Rudda, Pruniccia - sometimes mixed with *Pinus laricio*;

**9562** (42.A3) Grecian juniper woods (*Juniperetum excelsae*) - forest formations dominated by *Juniperus excelsa*, of the *Ostryo-Carpinion* zone of the mountains of northern Greece (up to 900-1000m, around lake Prespa);

**9563** (42.A4) Stinking juniper woods - forest formations dominated by *Juniperus foetidissima* on adrets of the upper supra-Mediterranean level in Greece;

**9564** (42.A5) Syrian juniper woods - *Juniperus drupacea* woods of the northern slopes of Mount Parnon, Greece;

**9565** (42.A8) Macaronesian juniper woods - *Juniperus cedrus* formations of the high altitudes in Tenerife, La Palma, Gomera, Gran Canaria, restricted to steep rocky slopes; *Juniperus phoenicea* formations of Tenerife, La Palma, Hierro, Gran Canaria, La Gomera (*Maytenio-Juniperion phoeniceae* p.); endemic *Juniperus brevifolia* formations of the Azores (*Juniperion brevifoliae* p.).

- 5) The arborescent matorrals of *Juniperus thurifera* (32.136), *Juniperus excelsa* and *J. foetidissima* (32.133), *Juniperus drupacea* (32.135) and the ericoid-dominated facies of the Macaronesian *Juniperus* formations (31.3) are generally associated in the field, but they should not be included in this habitat type.

**42.A6****\* *Tetraclinis articulata* forests (Andalusia)**NATURA 2000 code : **9570**

PAL.CLASS.: 42.A6

- 1) \* *Tetraclinis articulata* forests (Murcia)
- 2) Xero-thermophile forests of Arbor-vitae (*Tetraclinis articulata*), restricted to extreme south-eastern Spain (*Periplocion angustifoliae*: *Arisaro-Tetraclinidetum articulatae*, *Mayteno-Periplocetum angustifoliae*).
- 3) Plants: *Asparagus albus*, *A. stipularis*, *Arisarum vulgare*, *Brachypodium retusum*, *Chamaerops humilis*, *Lavandula dentata*, *Lithodora fruticosa*, *Periploca laevigata*, *Rhamnus lycioides*, *Tetraclinis articulata*, *Teucrium carthaginense*, *Thymus glandulosus*.
- 4) Geographical distribution: south-eastern Spain.

**42.A71 to 42.A73****\* *Taxus baccata* woods**NATURA 2000 code : **9580**

PAL.CLASS.: 42.A71 to 42.A73

- 1) \* *Taxus baccata* woods
- 2) Woods dominated by *Taxus baccata*, often with *Ilex aquifolium*, of very local occurrence. This habitat type may have two origins: senescent phase of a beech wood or beech-fir wood, made up of clusters of *Taxus* after the fall of the tall species, surrounded by layered stands of beech-yew; residual *Taxus* stand with disappearance of the tall species, both above and in the proximity of *Taxus*.
- 3) Plants: *Buxus sempervirens*, *Ilex aquifolium*, *Mercurialis perennis*, *Sorbus aria*, *Taxus baccata*.
- 4) Geographical distribution: Corsica, Sardinia, Ireland, United Kingdom.  
Habitat sub-types included:
  - 9581** (42.A71) British yew woods <sup>31</sup> - *Taxus baccata* woods with *Sorbus aria* or *Mercurialis perennis* of dry valleys and scarps of the Chalk of south-east England, very locally of the Durham Magnesium limestone, Morecambe Bay and elsewhere. They also occur in the forest of Muckcross (Killarney, Ireland). Corresponding category in the United Kingdom National Vegetation Classification: "W13 *Taxus baccata* woodland";
  - 9582** (42.A72) Corsican yew woods - Formations of *Taxus baccata*, *Ilex aquifolium*, *Buxus sempervirens* restricted to cool, montane areas in the Tenda range, the San Pedrone range and the Cap Corse mountains;
  - 9583** (42.A73) Sardinian yew woods - *Taxus baccata* and *Ilex aquifolium* woods of the Catena del Marghine and the Mount Limbara system.  
In the north and centre of Portugal there are *Taxus baccata* relicts, sometimes in small isolated formations (Serras do Gerês and Estrela), that may be included in this habitat type.

<sup>31</sup> The code 42.A71 British formations are not in the right place in Annex I, since these formations belong to the 'Forests of temperate Europe'

## **Contributions from the national experts**

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