European Red List of Vascular Plants

Melanie Bilz, Shelagh P. Kell, Nigel Maxted and Richard V. Lansdown



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Foreword



Europe is a continent rich in natural and cultural heritage, with a diverse range of habitat conditions from dry Mediterranean maquis in the south to the Arctic tundra of the far north.

Possibly more than anywhere else in the world the European landscapes have been changed by human activities so that now the continent is covered with a mosaic of natural and semi-natural habitats surrounding urbanized areas. Although bringing higher diversity, this modification has obviously also placed great pressures on our wildlife and natural areas. In consequence, biodiversity loss is an enormous challenge in the EU today, with around one in four species currently threatened with extinction and 88% of fish stocks over-exploited or significantly depleted.

In line with global commitments made in Nagoya in October 2010, where world leaders adopted a package of measures to address global biodiversity loss over the coming decade, the European Commission has adopted in May 2011 an ambitious new strategy to halt the loss of biodiversity and ecosystem services in the EU by 2020. There are six main targets, and 20 actions to help Europe reach its goal.

The six targets cover:

1. full implementation of EU nature legislation to protect biodiversity
2. better protection for ecosystems, and more use of green infrastructure
3. more sustainable agriculture and forestry
4. better management of fish stocks
5. tighter controls on invasive alien species
6. a bigger EU contribution to averting global biodiversity loss

Numerous scientific studies show that biodiversity in Europe has been declining rapidly for some time during periods of expansion and intensification of land use. The reporting process under Article 17 of the EU Habitats Directive underlines this fact as most species and habitats of community interest are still not under a favourable conservation status.

Regional European Red Lists are another important tool to scientifically assess and communicate the status of species. They usefully complement the reporting under the Habitats Directive as they usually address all species in a specific taxonomic group, not just those protected by EU legislation. They hence give important complementary and comprehensive information about the situation of biodiversity in Europe.

This first assessment of Europe's Vascular Plants has assessed 1,826 species. The assessment comprises three groups: plants included in European and international policy instruments, selected priority crop wild relatives, and aquatic plant species present in Europe. The assessment shows us that at least 467 species are threatened.

Assessments carried out for other taxonomic groups at European level show that 44% of freshwater molluscs, 37% of freshwater fishes, 23% of amphibians, 19% of reptiles, 15% of mammals and dragonflies, 13% of birds, and 9% of butterflies are threatened, groups that have been comprehensively assessed in Europe. Additional European Red Lists assessing a selection from species groups have shown that 20% of assessed terrestrial molluscs and 11% of assessed saproxylic beetles are also threatened.

Unfortunately, the drivers for these declines are mostly still in place. Intensified livestock farming, recreational activities, tourism and urban development, wild plant collection, invasive alien species, natural system modification and pollution pose the main threats for vascular plants.

What can we as Europeans do about this? First and foremost, we need to fully implement the existing European legislation. The EU Habitats and Birds Directives are the main pieces of legislation ensuring the protection of Europe's nature. The Natura 2000 network of protected sites and the efforts to conserve and restore biodiversity in the wider countryside are helping to guarantee its future conservation. But the challenge is a wider one, as the new EU Biodiversity Strategy shows. Sustainable use of our wider environment and the maintaining of ecosystem services have come to the centre of our attention.

I hope that this European Red List for Vascular Plants will add another piece of evidence for the fact that efforts aimed at halting the loss of biodiversity need a major boost in the coming years.

Pia Bucella
Director
Directorate B: Nature, Biodiversity & Land Use
European Commission

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Expert participants at the European Plants Red List workshop, June 2010, Brest, France. Photograph © Melanie Bilz.



Expert participants at the European Crop Wild Relatives Red List workshop, April 2010, Cascais, Portugal. Photograph © Melanie Bilz.



Executive summary

Aim

The European Red List is a review of the conservation status of c. 6,000 European species (mammals, reptiles, amphibians, dragonflies, butterflies, freshwater fishes, and selected groups of beetles, molluscs, and vascular plants) according to IUCN regional Red Listing guidelines. It identifies those species that are threatened with extinction at the regional level – in order that appropriate conservation action can be taken to improve their status. This Red List publication summarises results for selected vascular plants in Europe.

Scope

In Europe, there are more than 20,000 species of vascular plants[1]. This Red List includes 1,826 selected species of vascular plants native to Europe or naturalised before AD 1500. The species selected belong to one or more of three groups:

- Plants listed under European or global policy instruments such as the Habitats Directive, Bern Convention, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the EU Wildlife Trade Regulation
- Crop wild relatives (CWR) of priority crops
- Aquatic plant species

Geographical scope is continent-wide, extending from Iceland in the west to the Urals in the east, and from Franz Josef Land in the north to the Canary Islands in the south. The Caucasus region is not included. Red List assessments were made at two regional levels: for geographical Europe, and for the 27 current Member States of the European Union.

Status assessment

The status of all species was assessed using the IUCN Red List Criteria (IUCN 2001), which are the world's most widely accepted system for measuring extinction risk. All assessments followed the Guidelines for Application of IUCN Red List Criteria at Regional Levels (IUCN 2003). These assessments were compiled from information from a large network of experts from almost every country and from an extensive literature review. The assessments were then completed and reviewed during two workshops held in Cascais (Portugal) and Brest (France) through discussions as well as through email correspondence with relevant experts. Assessments are available on the European Red List website and data portal: http://ec.europa.eu/environment/nature/conservation/species/redlist and http://www.iucnredlist.org/europe.

Results

Three groups of vascular plants have been assessed, totalling 1,826 species among which 467 have been identified as threatened with extinction. Species listed in policy instruments have a high number of threatened species with at least 44.9% at European and 47.3% at EU 27 level. A further 9.5% are classed as Near Threatened. This high percentage can be explained with the fact that this group of species had already been identified as being of conservation concern. Of the CWR species assessed, at least 11.5% are threatened at European level and 10.5% in the EU 27 member states, with another 4.5% that are Near Threatened. The group of aquatic plants shows that at least 6.6% of the species in Europe and 7.2% in the EU 27 are threatened with extinction. Moreover, 7.4% are Near Threatened.

By comparison, 44% of freshwater molluscs, 37% of freshwater fishes, 23% of amphibians, 19% of reptiles, 15% of mammals and dragonflies, 13% of birds, and 9% of butterflies are threatened, groups that have been comprehensively assessed in Europe (Cuttelod *et al.* 2011, Freyhof and Brooks 2011, Temple and Cox 2009, Cox and Temple 2009, Temple and Terry 2007, Kalkman *et al.* 2010, BirdLife International 2004a, van Swaay *et al.* 2010). Additional European Red Lists assessing a selection from species groups have shown that 20% of terrestrial molluscs and 11% of the saproxylic beetles are also threatened (Cuttelod *et al.* 2011, Nieto and Alexander 2010). No other groups have yet been comprehensively assessed at the European level. Looking at the population trend, it is noted that 38.4% of the policy plants, 15.8% of the aquatic plants and 10.9% of the crop wild relatives

1 Source: Euro+Med Plantbase 2006-2011

are declining. But more interestingly it needs to be noted that the population trend is unknown for 48.2% of the crop wild relatives, 36.7% of the policy plants and 18.6% of the aquatic plants.

The main current threats emerging in the analysis were: Intensified livestock farming, recreational activities, tourism and urban development, wild plant collection, invasive alien species, natural system modifications and pollution.

Conclusions and recommendations

- **Threatened European vascular plants require further conservation actions to improve their status**. In particular: ensuring the adequate protection and management of important plant habitats, identifying hotspots of diversity that may then be subject to more active conservation, drawing up and implementing Species Action Plans for threatened species, improving land management policies, and revising national and European legislation, taking account of species identified as threatened where needed.
- **It is important to conserve both inter- and intra-specific genetic diversity** to ensure that the full range of genetic diversity of a species is protected and in the case of CWR, available for utilization for crop improvement. For the *in situ* conservation of CWR genetic diversity, the establishment of a European network of genetic reserves is needed. For all vascular plant species, the maximum range of ecogeographic diversity should be included in the European protected area network.
- ***In situ* conservation measures need to be accompanied by adequate *ex situ* maintenance** in botanic gardens or gene bank collections. There is a need for systematic gap analysis of all threatened and priority species to ensure they are being actively conserved both *in situ* and *ex situ.*
- **The knowledge base on European vascular plants needs to be expanded.** The taxonomic coverage of this Red List needs to be increased as only around 8% of Europe's plant species have been assessed in this project. Species identified as Data Deficient should be a priority for fieldwork and research.
- **A co-ordinated system of vascular plant recording and monitoring needs to be established** in every European country to improve future assessments and assess the impact of conservation measures and future environmental change. This will improve our knowledge of population trends which is currently lacking for many European plant species.
- **There is an urgent need for a coordinated European approach to CWR conservation**, given the growing problem of global food insecurity resulting from climate change and other threats (as well as the global inter-dependence of nations in terms of food security). The results of this initiative show that a significant proportion of the CWR species assessed are threatened or are likely to become threatened in the near future and that some crop complexes, such as the cultivated beets, brassicas, oat, lettuce and wheat are particularly at risk – these species should be subject to immediate conservation gap analysis and concerted *in situ* and *ex situ* actions.
- **Biodiversity and agrobiodiversity conservation activities need to be integrated and coordinated.** Conservation actions are often hindered through the unnecessary departmentalisation of European biodiversity and agrobiodiversity communities leading to duplication of knowledge, poor integration of conservation action and limited implementation – working more closely together will itself yield better conservation outcomes.
- **The network of European plant experts needs to be strengthened** by providing training, improving communication, and mobilisation of financial resources. Specialist Groups play a vital role in this network and in the implementation of conservation measures.

1. Background

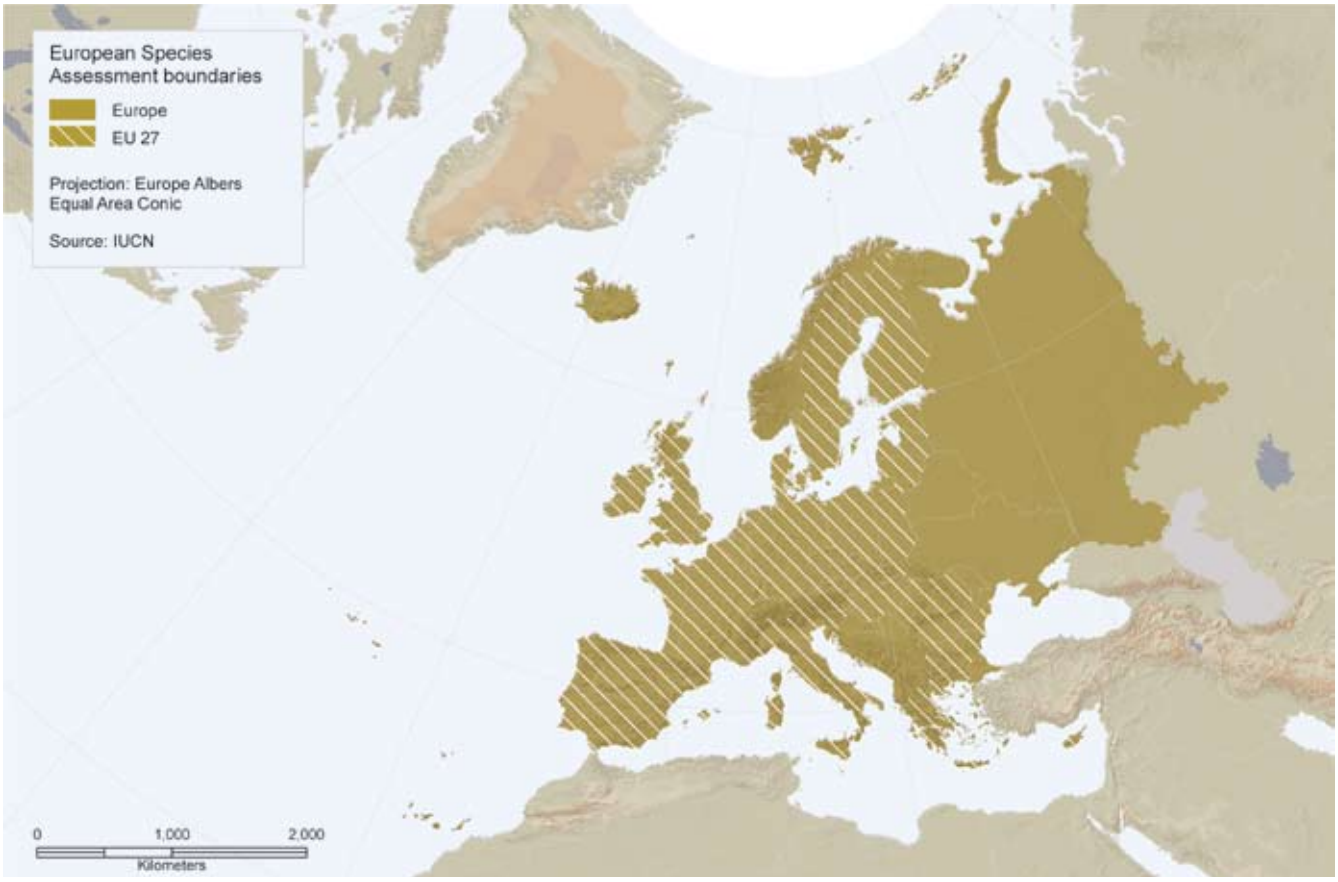
1.1 The European context

Europe is one of the seven traditional continents of the Earth, although physically and geologically it is the westernmost peninsula of Eurasia. Europe is bound to the north by the Arctic Ocean, to the west by the Atlantic Ocean, to the south by the Mediterranean Sea, and to the southeast by the Black Sea and the Caucasus Mountains. In the east, Europe is separated from Asia by the Ural Mountains and the Caspian Sea (see Figure 1). It is the world's second-smallest continent in terms of area, covering approximately 10,400,000 square kilometres (4,010,000 square miles) or 2% of the Earth's surface. In terms of human population, Europe is the third-largest continent (after Asia and Africa) with a population of some 731 million – about 11% of the world's population. Europe is the most urbanised and, together with Asia, the most densely populated continent in the world.

The European Union, comprising 27 Member States, is Europe's largest political and economic entity. It is the world's largest economy with an estimated GDP in 2008 of 18.9 trillion US dollars (Central Intelligence Agency 2009). Per-capita GDP in many EU states is among the highest in the world, and rates of resource consumption and waste production are correspondingly high – the EU 27's "ecological footprint" has been estimated to exceed the region's biological capacity (the total area of cropland, pasture, forest, and fishing grounds available to produce food, fibre and timber, and absorb waste) by 2.6 times (WWF 2007).

The EU's Member States stretch from the Arctic Circle in the north to the Mediterranean in the south, and from the Atlantic coast in the west to the Pannonian steppes in the east – an area containing a great diversity of landscapes and habitats and a wealth of flora and fauna. European biodiversity includes 489 species of birds (IUCN 2011), 260 species of mammals (Temple and Terry 2007, 2009), 151 species of reptiles, 85 species of amphibians, 546 species of freshwater fishes (Kottelat and Freyhof 2007), 20-25,000 species of vascular plants (Euro+Med Plantbase 2006-2011) and well over 100,000 species of invertebrates (Fauna Europaea 2004). The Mediterranean part of Europe, which is particularly rich in plant and animal species, has been recognised as

Figure 1. Regional assessments were made for two areas – geographical Europe and the EU 27



a global "biodiversity hotspot" (Mittermeier *et al.* 2004, Cuttelod *et al.* 2008).

Europe has arguably the most highly fragmented landscape of all continents, and only a tiny fraction of its land surface can be considered as wilderness. For centuries, most of Europe's land has been used by humans to produce food, timber and fuel and to provide living space, and currently in western Europe, more than 80% of land is under some form of direct management (European Environment Agency 2007). Consequently, European species are to a large extent dependent upon semi-natural habitats created and maintained by human activity, particularly traditional, non-intensive forms of land management. These habitats are under pressure from agricultural intensification, urban sprawl, infrastructure development, tourism pressure, land abandonment, acidification, eutrophication and desertification. Many species are directly affected by overexploitation, persecution and impacts of alien invasive species, as well as climate change being set to become an increasingly serious threat in the future. Europe is a huge, diverse region and the relative importance of different threats varies widely across its biogeographic regions and countries. Although considerable efforts have been made to protect and conserve European habitats and species (e.g. see Sections 6.3, 6.4, 6.5), biodiversity decline and the associated loss of vital ecosystem services (such as water purification, crop pollination and carbon sequestration) continues to be a major concern in the region.

1.2 European vascular plants: diversity and endemism

Plants are a fundamental part of ecosystems, forming their physical structure, and are of essential importance to the functioning of the planet's atmosphere. The majority of plants conduct photosynthesis, a process that by using sunlight energy, converts carbon dioxide and water into organic compounds (such as sugar), water and most importantly into oxygen. Plant species provide habitat, enable the life of animal species and are primary producers for the food web. Plant cover significantly influences the climate, water resources and soil stability and composition (Hamilton and Hamilton 2006). Humankind has relied on plants for thousands of years for food, shelter, fuel, fibre, clothing, for medicinal purposes and for their ornamental and cultural value.

The publication on Centres of Plant Diversity (WWF and IUCN 1994) stated that there are 12,500 vascular plant species in Europe with 28% of the plants being endemic to the region. More recent figures indicate that the total number of vascular plant taxa in Europe is 20-25,000 (Euro+Med Plantbase 2006-2011). Twenty four centres of plant diversity have been identified of which nine occur on the Iberian Peninsula and 14 are mountain ranges (e.g. Alps, Pyrenees, Troodos Mountains and Carpathians) (WWF and IUCN 1994). The main natural vegetation is mixed forests. Agricultural expansion and human settlements have reduced the forest cover to 30% in Europe (Sharrock and Jones 2009).

The areas with the highest plant richness in Europe are in the Mediterranean region. The Iberian Peninsula and Balearic Islands have around 7,500 taxa (species and subspecies) (Castroviejo 2010), followed by Italy with 6,711 species (Conti *et al.* 2005). In Greece, the total number of species is around 5,700 (Strid and Tan 1997) and in France, it reaches 4,630 species (Walter and Gillett 1998). However, per unit area Greece is the country with the highest concentration of native plant species.

The Iberian Peninsula is an important area of plant diversity in Europe. Two threatened plant species that are endemic to Spain: *Silene hifacensis* (left) and *Helianthemum alypoides*. Photographs © Javier Fabado Alós and Juan Mota Poveda/Proyecto AFA.





1.3 Species threat status

The conservation status of plants and animals is one of the most widely used indicators for assessing the condition of ecosystems and their biodiversity. It also provides an important tool in establishing priorities for species conservation. At the global scale, the best source of information on the conservation status of plants and animals is the *IUCN Red List of Threatened Species* (see www.iucnredlist.org; IUCN 2011). The Red List is designed to determine the relative risk of extinction, with the main purpose of cataloguing and highlighting those taxa that are facing a higher risk of extinction. It provides taxonomic, conservation status, and distribution information on taxa that have been evaluated using the *IUCN Red List Categories and Criteria: Version 3.1* (IUCN 2001). There are nine Categories, ranging from Least Concern, for species that are not threatened, to the Extinct category, for species that have disappeared from the planet[2]. The IUCN Red List Categories are based on a set of quantitative criteria linked to population trends, population size and structure, and geographic range. Species classified as Vulnerable, Endangered and Critically Endangered are considered as 'threatened'. When conducting regional or national assessments, two additional categories are used: Regionally Extinct, and Not Applicable for non-native species (IUCN 2003) (Figure 2).

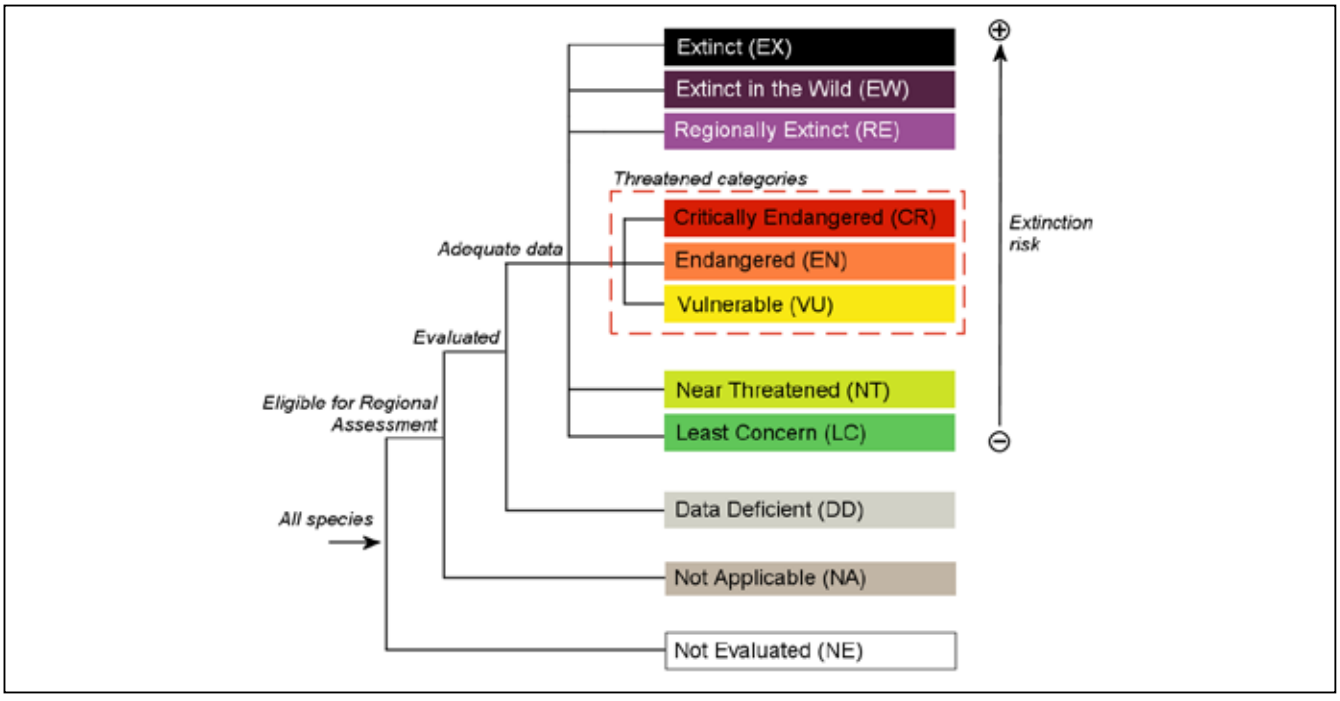
The IUCN Red List is intended to be policy-relevant, and it can be used to inform conservation planning and priority setting processes, but it is not intended to be policy-prescriptive, and it is not in itself a system for setting biodiversity conservation priorities.

1.4 Objectives of the assessment

The European regional assessment has four main objectives:

- To contribute to regional conservation planning through provision of a baseline dataset reporting the status of European vascular plants.
- To identify those geographic areas and habitats needing to be conserved to prevent extinctions and to ensure that European vascular plants reach and maintain a favourable conservation status.
- To identify the major threats and to propose mitigating measures and conservation actions to address them.
- To strengthen the network of experts focused on conservation of vascular plants in Europe so that the assessment information can be kept current and expertise can be targeted to address the highest conservation priorities.

Figure 2. IUCN Red List Categories at regional scale



2 For a description of each of the global IUCN Red List Categories go to: http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria#categories

The assessment provides three main outputs:

- This summary report on the status and distribution of selected groups of European vascular plants; their main threats and recommendations for conservation measures, as well as a poster on their status.
- A freely available database holding the baseline data for monitoring the status and distribution of European vascular plants;
- A website and data portal (http://ec.europa.eu/environment/nature/conservation/species/redlist and http://www.iucnredlist.org/europe) showcasing this data in the form of species factsheets for all European plants that were assessed, along with background and other interpretative material;

The data presented in this report provides a snapshot based on knowledge available at the time of writing. The database will continue to be updated and made freely and widely available. IUCN will ensure wide dissemination of this data to relevant decision makers, NGOs and scientists to inform the implementation of conservation actions on the ground.

Marsilea batardae is endemic to the Iberian Peninsula where it has a limited range in the basins of the rivers Tejo, Sado, Guadiana and Guadalquivir. This aquatic plant suffers from the general destruction and degradation of water bodies such as the construction of dams, embankment of streams or pollution. *Marsilea batardae* has been assessed as Endangered and is protected under the Habitats Directive and Bern Convention. Photograph © Richard V. Lansdown.



2. Assessment Methodology

2.1 Global and regional assessments

The extinction risk of a species can be assessed at global, regional or national level. One species can have a different category in the Global Red List and a Regional Red List. For example, a species that is common worldwide and classed as Least Concern (LC) in the Global Red List could face a high level of threat and fit the Endangered category (EN) in a particular region (see Figure 2 for a list of the IUCN categories). In order to avoid an over- or underestimation of the regional extinction risk of a species, the Guidelines for the application of IUCN Red List Criteria at Regional Level should be applied (IUCN 2003). Logically, an endemic species should have the same category at regional and global level, as it is not present in any other part of the world.

2.2 Geographic scope

The geographical scope is continent-wide, extending from Iceland in the west to the Urals in the east (including European parts of the Russian Federation), and from Franz Josef Land in the north to the Mediterranean in the south (see Figure 1). The Canary Islands, Madeira and the Azores were also included. In the southeast, where definitions of Europe are most contentious, the Caucasus region was not included. Red List assessments were made at two regional levels: 1) for geographical Europe (limits described above); and 2) for the area of the 27 Member States of the European Union.

2.3 Taxonomic scope

The requirements for this project were to assess c. 2,000 vascular plant species including all the ones that are listed under the Annexes II, IV and V of the Habitats Directive. We looked at the families covered under the Habitats Directive to see whether there were any families which could be assessed completely and which were a potential conservation priority. But this approach was soon disregarded and in consultation with different experts from within and outside IUCN/SSC Plant Specialist Groups we decided to look at functional groups of plants. The most logical step was to expand the list of species under the Habitats Directive by including other vascular plant species that are listed under other policy instruments, namely the Bern Convention, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the EU Wildlife Trade regulation. In addition, aquatic plant species were assessed as a group because freshwater systems are among the most threatened ecosystems and as this group would align well with other freshwater species that were being assessed (amphibians, fishes, molluscs, dragonflies). Finally, priority crop wild relatives were selected due to their importance for food security and because a very active and knowledgeable IUCN/SSC Crop Wild Relative Specialist Group was already in place to advance those red list assessments. More detailed information on the selection of species for each of the three groups can be found in chapters 3, 4 and 5.

During the project, experts offered to submit independent assessments for a small number of species. Seven Italian endemics (*Bellevalia webbiana*, *Callianthemum kernerianum*, *Centaurea corensis*, *Dianthus morisianus*, *Limonium calabrum*, *Limonium sibthorpianum*, *Sanguisorba dodecandra*) and one species endemic to Ukraine and the Central Russian upland (*Daphne sophia*) were therefore added to the list of plants in Appendix 2. These species were not included in any of the analysis in chapter 3, 4 or 5, but have been included in the overall figure of threatened plants.

All selected plant species included in this assessment are native to Europe or naturalised before AD 1500. The selection of species for the European Red List of Vascular Plants took place in summer/autumn 2008 and the taxonomy followed at that time was published and unpublished material from Euro+Med Plantbase (2006-2011). In addition names of species were checked against the International Plant Names Index to ensure that they had been validly published. Over the last decade the Royal Botanic Gardens Kew and Missouri Botanical Garden have been continuously working on compiling a comprehensive global plant checklist. As a result, new global databases have become available online since the start of this project such as The World Checklist of Selected Plant Families (The Board of Trustees of the Royal Botanic Gardens, Kew 2010-2011) or The Plant List (2010-2011). As a consequence, there have been some significant changes in what taxa are now recognized as being accepted names and under which genera they are placed; many taxa previously accepted as good species have been lumped with others and relegated to synonymy or they are now treated as infra-specific taxa, former infra-specific taxa have been raised to species

level, and species complexes have been split into multiple species. Therefore, the taxonomy used in the European Red List of Vascular Plants is not concurrent with all the recent developments and in some cases reflects the available taxonomic knowledge at the time of assessment.

The situation is made even more complicated by the molecular work that has been conducted on flowering plants by a team of researchers across the world (known as the Angiosperm Phylogeny Group – APG) in recent years. Based on the findings from both molecular and morphological studies the APG team have been developing a new and completely revised phylogeny of the world's plants. The latest version of this phylogenetic arrangement, known as APG3, has gained widespread acceptance across the botanical community with many herbaria rearranging their collections to match this new treatment. The new treatment has resulted in the complete reordering of plant Orders and Families, new Families have been created, some have been lumped and genera have been moved between them and in some cases even split between families. The IUCN Red List has up until now been using the more traditional approach followed at RBG Kew which involved a mixture of Cronquist's Orders and Brummitt's treatment of Families and Genera. This has been mainly followed in this project but not exclusively. However, now that the APG approach has reached a fairly stable point and is widely accepted and used, it is envisaged that this approach will be followed by the IUCN Red List. When this happens, it will have consequences for the European Red List of Vascular Plants as the numbers of species previously recorded in various Genera, Families and Orders will change considerably as the changes are implemented.

Distinct subspecies were only assessed as part of this project when they were listed in the EC Habitats Directive or the Bern Convention, or in cases where a species is only represented in its wild form at subspecies level. However, due to the taxonomic developments described above, a few species selected in 2008 have since been reclassified as subspecies and are therefore included in this Red List. Other species from the original selection were discarded during the assessment process as they were not taxonomically valid anymore. More notes on the taxonomy followed for the specific groups can be found in chapters 3, 4 and 5.

2.4 Assessment protocol

For the selected plant species that are part of this study, the following data were entered into the database (IUCN Species Information Service – SIS):

- Species' taxonomic classification
- Geographic range (including a distribution map)
- Red List Category and Criteria
- Population information
- Habitat preferences
- Use and trade information
- Major threats
- Conservation measures
- Other general information
- Key literature references

2.5 Review workshop and evaluation of assessments

Two workshops involving around 25 national and taxon experts each were organised on 12-16 April 2010 in Cascais/Portugal for crop wild relatives and 21-24 June 2010 in Brest/France for the policy and a selection of the aquatic plant species. During the workshops, focussed working groups were organised to discuss the preliminary assessments and to add new information to the species summaries and maps. Red List Categories were then defined for each species at the European and EU 27 levels.

Following the review workshop, the data were edited, and outstanding questions were resolved through communications with the experts. Consistency in the use of IUCN Criteria was checked by IUCN staff from the IUCN Red List Unit. The resulting finalised IUCN Red List assessments are a product of scientific consensus concerning species status and are backed by relevant literature and data sources.

Chaenorhinum serpyllifolium ssp. *lusitanicum* is endemic to the southwestern coast of Portugal, occupying an area smaller than 300 km². The subpopulations are isolated and this fragmentation will increase due to the high pressure from urban and tourism development at the coast. It is therefore listed as Endangered. Photograph © Pedro Arsénio.



3. Plants listed in European and international policy instruments – selection and results

3.1 Species selection

This group of plants includes species that are listed under European or international policy instruments of which there are four major instruments that concern plant species:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive)
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Council Regulation (EC) No 338/97 of 9 December 1996 on the protection of species of wild fauna and flora by regulating trade therein

The Bern Convention is a binding international agreement that aims to conserve wild flora and fauna and their natural habitats and to promote European co-operation towards that objective. Its geographical scope does not only include Europe but extends into neighbouring territories of North Africa and Asia (e.g. Turkey). The Bern Convention was the basis for designing the Habitats Directive, a strong legal instrument that needs to be transposed into national law by the European Union member states. There are three annexes of direct relevance to plant species: Annex II, which is by far the most important in terms of conservation impact, requires the designation of Special Areas of Conservation for the species listed in there; Annex IV lists species for which it is prohibited to pick, collect, cut, uproot or destruct plants in their natural range in the wild (Article 13.1(a)) and to keep, transport, sell or exchange those plants (Article 13.1(b)). Annex IV covers all plant species listed in Annex II plus additional ones. Plants listed under Annex V may require management measures for its collection from the wild and exploitation. Under Article 17 of the Habitats Directive, member states are required to report on the status of the species and on the conservation measures taken. The last country reports were provided in 2008 and this information was taken into account for the Red List assessments. Annexes II, IV and V of the Habitats Directive list 641 plant species and subspecies. The Bern

Adonis vernalis, *Menyanthes trifoliata* and *Anacamptis pyramidalis* are all subject to trade regulations. Photographs © Karl-Georg Bernhardt.



Convention includes 612 European plant taxa and there is an overlap of 438 species between the two instruments.

CITES regulates the international trade in endangered species and is legally binding to its parties. It provides a framework for countries to establish national legislation to implement the convention. The trade for all the species listed in Appendix II should be controlled in the form of export permits and re-export certificates being required. For Europe there are only species listed under Appendix II. This includes all snowdrop species (genus *Galanthus*) with a total of seven occurring in Europe of which three are endemic to the region. The genus *Sternbergia* has only two species occurring in Europe: *S. colchiciflora* and *S. lutea*. Furthermore, *Adonis vernalis* is listed and all *Cyclamen* species of which ten occur in Europe. Moreover, the whole orchid family is included under Appendix II totalling around 140 European species. The EU Wildlife Trade Regulation (338/97) lists additional species to CITES that need management at European level. Only six species fall outside CITES under this regulation: *Arctostaphylos uva-ursi*, *Arnica montana*, *Biarum davisii*, *Gentiana lutea*, *Lycopodium clavatum* and *Menyanthes trifoliata*.

In total, there are around 950 species in this group which will be from now on referred to as the "policy species". Many of them are listed in more than one policy instrument and some are also aquatic plants or crop wild relatives[3]. This report analyses the assessments of 891 species. Unfortunately not all species could be assessed, in particular information on mainly single country endemics from the Azores (24 species), Greece (13 species), Spain (8 species), and nine *Cyclamen* species could not be secured for this report. There are assessments that were still under debate at the time of print or have not received feedback from a reviewer yet. Appendix 2 in this publication lists all species assessed so far and shows whether they are included in any of the policy instruments. A few taxonomic changes have taken place since the Annexes of the Habitats Directive and Bern Convention were drawn up and Table 1 shows a list of those species that are included here under a different name. Other species are not recognised as distinct species anymore (e.g. *Centaurium*

Galanthus nivalis is listed under Annex V of the Habitats Directive – all snowdrops are also included in CITES as they are thought after for trade. Photograph © R. Wilford.



3 Species that occur in more than one group are included in the analysis of each of the groups they belong to. A list of all species assessed in this project and whether they belong to more than one group can be found in Appendix 2 of this document.

rigualii, *Ophrys scolopax* ssp. *oestrifera, Ophrys melitensis*, *Semele maderensis*, *Colchicum fominii*, *Gladiolus felicis* or *Narcissus triandrus* ssp. *capax* – although the latter three now form part of valid species that are included in the Annexes). Then there is *Pharbitis preauxii*, listed on the Bern Convention but no distribution data in any of the available taxonomy sources could be found; and *Reseda decursiva* seems to not be present in Europe at all.

Table 1. Species listed in the Habitats Directive and/or Bern Convention that changed name

Included in Habitats Directive?	Included in Bern Convention?	Old name	Currently accepted name
II/IV		*Anacamptis urvilleana*	*Anacamptis pyramidalis*
IV	I	*Androcymbium europaeum*	*Androcymbium gramineum*
	I	*Astragalus aitosensis*	*Astracantha arnacantha* ssp. *aitosensis*
II/IV	I	*Astragalus centralpinus*	*Astragalus alopecurus*
IV		*Bellevalia hackelii*	*Bellevalia dubia* ssp. *hackelii*
	I	*Bromopsis moesiaca*	*Bromus moesiacus*
II/IV	I	*Campanula gelida*	*Campanula bohemica* ssp. *gelida*
II/IV		*Campanula zoysii*	*Favratia zoysii*
II/IV	I	*Centaurea alba* ssp. *heldreichii*	*Centaurea heldreichii*
II/IV	I	*Centaurea alba* ssp. *princeps*	*Centaurea princeps*
II/IV	I	*Centaurea balearica*	*Carthamus balearicus*
II/IV		*Centaurea vicentina*	*Centaurea fraylensis*
II/IV	I	*Ceropegia chrysantha*	*Ceropegia dichotoma* ssp. *krainzii*
II/IV	I	*Chionodoxa lochiae*	*Scilla lochiae*
	I	*Chrysanthemum zawadskii*	*Dendranthema zawadskii*
IV	I	*Colchicum cousturieri*	*Colchicum cupanii* ssp. *cupanii*
	I	*Colchicum davidovii*	*Colchicum szovitsii* ssp. *szovitsii*
	I	*Colchicum fominii*	*Colchicum arenarium*
II/IV	I	*Euphorbia lambii*	*Euphorbia bourgeana*
	I	*Fritillaria tuntasia*	*Fritillaria obliqua* ssp. *tuntasia*
	I	*Gladiolus felicis*	*Gladiolus palustris*
II/IV		*Gymnigritella runei*	*Gymnadenia runei*
II/IV		*Hyacinthoides vincentina*	*Hyacinthoides mauritanica*
II/IV	I	*Iberis arbuscula*	*Iberis runemarkii*
II/IV		*Iris humilis* ssp. *arenaria*	*Iris humilis*
II/IV	I	*Leucojum nicaeense*	*Acis nicaeensis*
V		*Lilium rubrum*	*Lilium pomponium*
II/IV		*Luzula arctica*	*Luzula nivalis*
V		*Murbeckiella pinnatifida* ssp. *herminii*	*Murbeckiella boryi*
II/IV	I	*Muscari gussonei*	*Leopoldia gussonei*
	I	*Narcissus angustifolius*	*Narcissus poeticus* ssp. *radiiflorus*
II/IV		*Narcissus fernandesii*	*Narcissus jonquilla* ssp. *fernandesii*
II/IV		*Narcissus humilis*	*Narcissus cavanillesii*
V		*Narcissus juncifolius*	*Narcissus assoanus*
II/IV		*Narcissus triandrus* ssp. *capax*	*Narcissus triandrus*
II/IV	I	*Nepeta dirphya*	*Nepeta argolica* ssp. *dirphya*
II/IV		*Odontites holliana*	*Odontites hollianus*
	I	*Ononis hackelii*	*Ononis maweana*
IV	I	*Orchis scopulorum*	*Orchis mascula* ssp. *scopulorum*
II/IV	I	*Palaeocyanus crassifolius*	*Cheirolophus crassifolius*
II/IV	I	*Sambucus palmensis*	*Sambucus nigra* ssp. *palmensis*
	I	*Senecio hermosae*	*Canariothamnus hermosae*
II/IV		*Serratula lycopifolia*	*Klasea lycopifolia*
II/IV	I	*Silene furcata* ssp. *angustiflora*	*Silene involucrata* ssp. *tenella*
	I	*Trachelium asperuloides*	*Campanula asperuloides*

3.2 Threat status of policy plants

The status of species listed under policy instruments was assessed at two regional levels: geographical Europe and the EU 27. As these species were pre-identified as needing conservation attention it is not surprising that the percentage of threatened species is very high. At the European level, at least 44.9% of the species (400 species) are considered as threatened. Of those, at least 11.9% are Critically Endangered, 17.2% Endangered and 15.8% Vulnerable (Table 2 and Figure 3 and 4). A further 9.5% (85 species) are classified as Near Threatened as they are significantly declining in parts of their range and need at least to be monitored. Within the EU 27, at least 47.3% of the plants (405 species) are threatened, of which at least 12.6% are Critically Endangered, 18.4% Endangered and 16.2% Vulnerable. In addition, 10.9% of species are considered as Near Threatened. Two species are Regionally Extinct at the EU 27 level: *Veronica euxina* is not found in Bulgaria anymore but still occurs in Moldova and Ukraine; and *Mandragora officinarum* is Regionally Extinct in the EU 27 region as it has disappeared from Italy, but is still present in Croatia and Bosnia and Herzegovina where it is classed as Endangered. Three species are considered Extinct in Europe and globally: *Centaurea pseudoleucolepis*, *Euphrasia mendoncae* and *Viola cryana*. A further three European endemic plant species are classed as Extinct in the Wild: the grasses *Bromus bromoideus* and *Bromus interruptus*, and *Lysimachia minoricensis*. Two species, *Primula egaliksensis* and the Canarian endemic plant *Kunkeliella psilotoclada* are considered as Critically Endangered, Possibly Extinct. The latter was last seen in the wild in 1983 but there is still hope that dormant seeds survived in the soil and the species is conserved in a botanic garden. A list of the species classed as Extinct and threatened (Critically Endangered, Endangered and Vulnerable) at the European and EU 27 level can be found in Appendix 1.

Table 2. Summary of numbers of European policy plants within each category of threat

	IUCN Red List categories	No. species Europe (no. endemic species)	No. species EU 27 (no. endemic species)
	Extinct (EX)	3 (3)	2 (2)
	Extinct in the Wild (EW)	3 (3)	3 (3)
	Regionally Extinct (RE)	0	2 (0)
Threatened categories	Critically Endangered (CR)	106 (104)	108 (103)
	Endangered (EN)	153 (126)	158 (120)
	Vulnerable (VU)	141 (124)	139 (111)
	Near Threatened (NT)	85 (58)	93 (49)
	Least Concern (LC)	219 (101)	203 (77)
	Data Deficient (DD)	181 (120)	149 (88)
	Total number of species assessed*	**891 (639)**	**857 (553)**

* This table does not include species that do not occur in the EU 27 and are therefore considered as Not Evaluated for that region

Figure 3. Red List status of policy plants in Europe

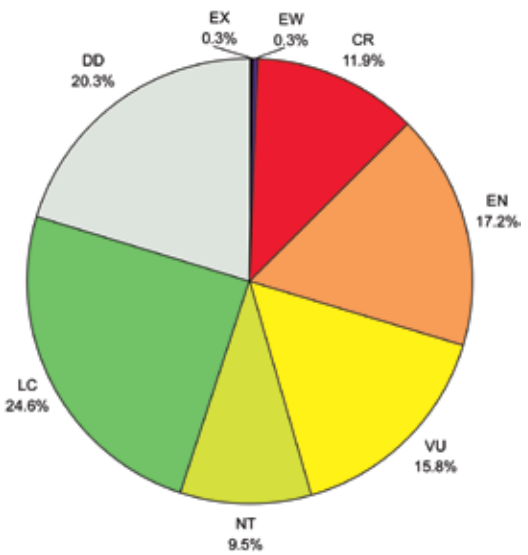
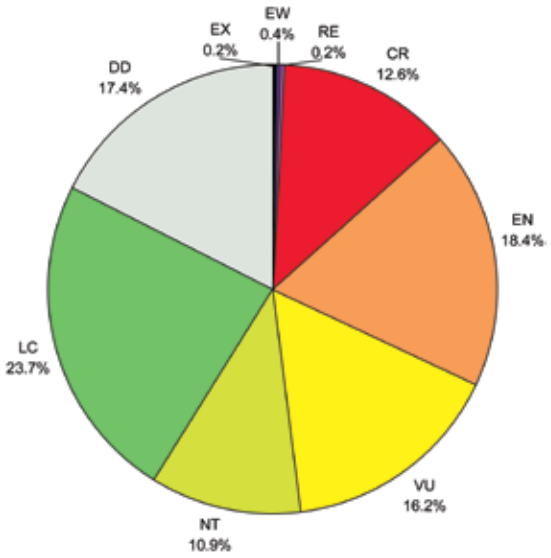


Figure 4. Red List status of policy plants in the EU 27



A total of 181 species (20.3%, compared to 17.4% in the EU 27) are classed as Data Deficient and there are several reasons for this listing. A species can be Data Deficient if its taxonomic concept is being debated which is the case for 19 of the 181 species. But in most cases a Data Deficient category is triggered by insufficient information for the species which might be due to no recent field work or no monitoring data being available. However, in this project, some national country endemics needed to be assessed as Data Deficient as no reliable contact could be established with country experts. This problem mainly concerned plants endemic to Romania and to European Turkey. Although national red lists classed the species as threatened, the necessary supporting information could not be obtained and a full assessment could not be carried out. The lack of information from some countries also affected more widespread species that showed a decline everywhere and were marked as threatened in several countries. As most plant species were assessed using a criterion based on restricted range and declining populations, range data missing from one country could already make an assessment Data Deficient as it was not clear whether the thresholds for a threatened category would be met. Another criterion used for widespread but declining species is based on a certain percentage of population decline over a certain time span. This percentage of population decline would be needed from each of the countries of occurrence in order to make an informed decision about a European-wide rate of decline. This was impossible in most cases as this type of monitoring data is only available for a few sites but hardly even for a population at country level. Examples for those species being Data Deficient are *Gladiolus palustris*, *Pulsatilla patens*, *Tozzia carpathica* or *Typha shuttleworthii*. However, the information available for Data Deficient species is presented in the assessment text and there is the hope that after publishing the incomplete results, experts will develop new research projects and come forward with the needed information to fully assess the threat status of these Data Deficient species.

It might also surprise that 24.6% (or 23.7% in the EU 27) of the species are considered to be of Least Concern having in mind that the group of policy species have been pre-identified as being of conservation concern. The IUCN Red List Categories and Criteria are designed to assess the risk of extinction and a species that is slowly declining throughout its range but still occurs in numerous countries is sometimes not likely to go completely extinct in all of Europe. It needs to be stressed that although they are listed as Least Concern, they need conservation attention and should be at least monitored. A considerable part of the populations should be included in protected areas. There are also cases where the protection under the Habitats Directive or CITES already benefited species in a way that there are no threats anymore and the populations are stable. They would be assessed as Least Concern but that is by no ways an argument to loosen the current protection. A good case to demonstrate that fact is *Cypripedium calceolus* – this attractive orchid is listed under the Habitats Directive, Bern Convention and CITES and has strong populations in Europe. It is classed as Near Threatened for the moment as it is thought that the current protection and the fact that its collection is prohibited are responsible for its favourable status and that as soon as this protection would cease, the populations could decline massively. There are furthermore a few cases where due to taxonomic changes a restricted range taxon now belongs to a more widespread species that is not under threat, e.g. *Murbeckiella pinnatifida* ssp. *herminii* is now included in *Murbeckiella boryi*.

Finally, it should be noted that the percentages of threatened policy plant species mentioned earlier represent minimum estimates. A more realistic value may be calculated based only on the surviving species which have been assessed for their extinction risk (i.e. omitting DD, EX and RE from the total). In this scenario 56.6% of policy plants are threatened in Europe and 57.5% are threatened in the EU 27. Considering that the policy plant species were pre-identified as being of conservation concern, it is likely that a very high percentage of the DD species is also threatened, which would bring the overall percentage of threatened species even higher.

3.3 Spatial distribution of species

3.3.1 Species richness

The following table and figures do not represent actual species richness but reflect how active member states were in including their species in the annexes of the policy instruments and how much data were available for these plants.

Within this group the Iberian Peninsula holds most of the species with 318 occurring in Spain and 211 in Portugal. It is followed by Italy, Greece, and France. Although, the figures do not per se represent species richness, it coincides with the fact that the Mediterranean countries, in particular the Iberian Peninsula, Italy and Greece are the countries with the highest species richness in Europe and the EU 27.

Figure 5. Species richness of policy plants (excluding species assessed as Data Deficient)

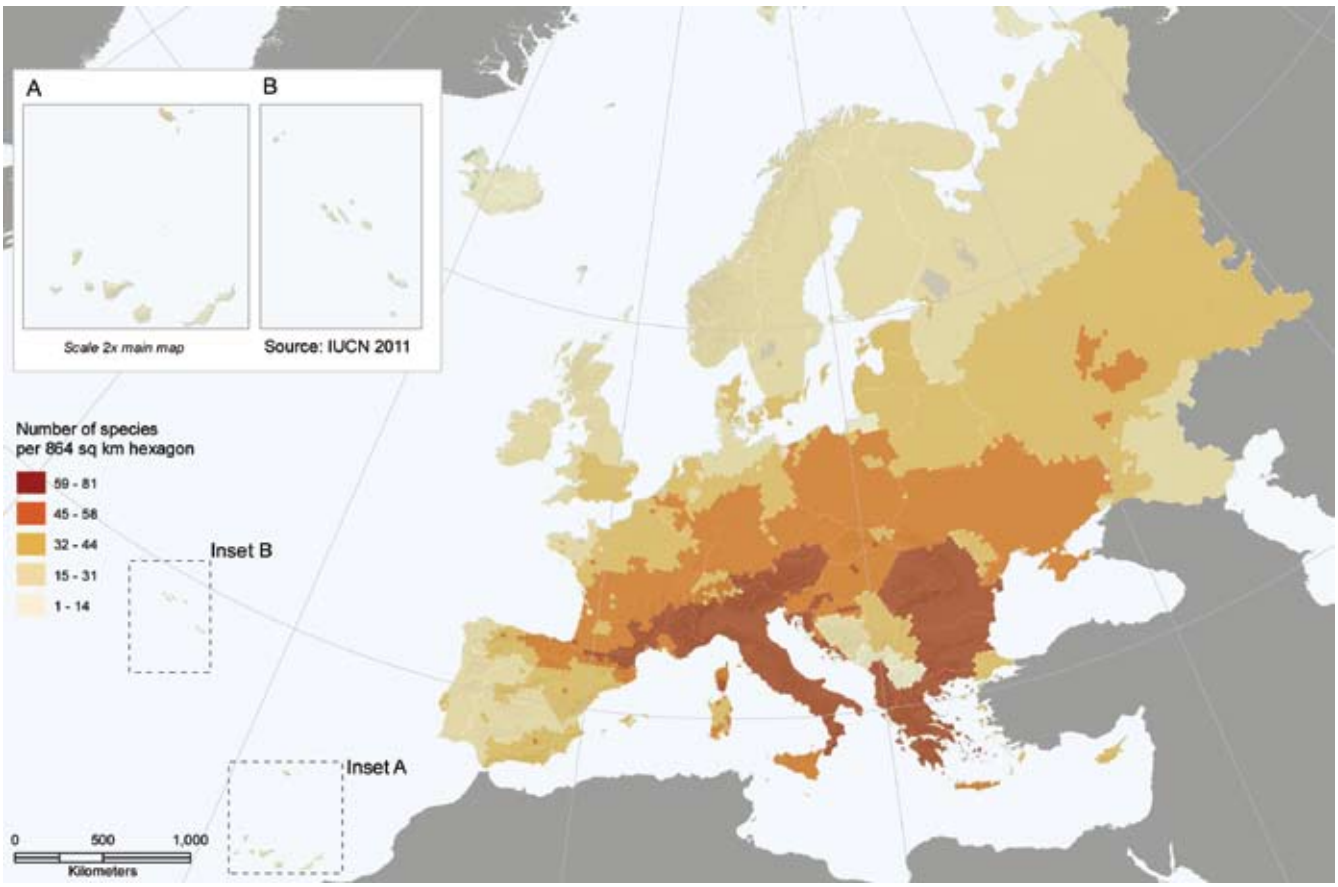


Figure 6. Distribution of endemic policy plant species in Europe (excluding species assessed as Data Deficient)

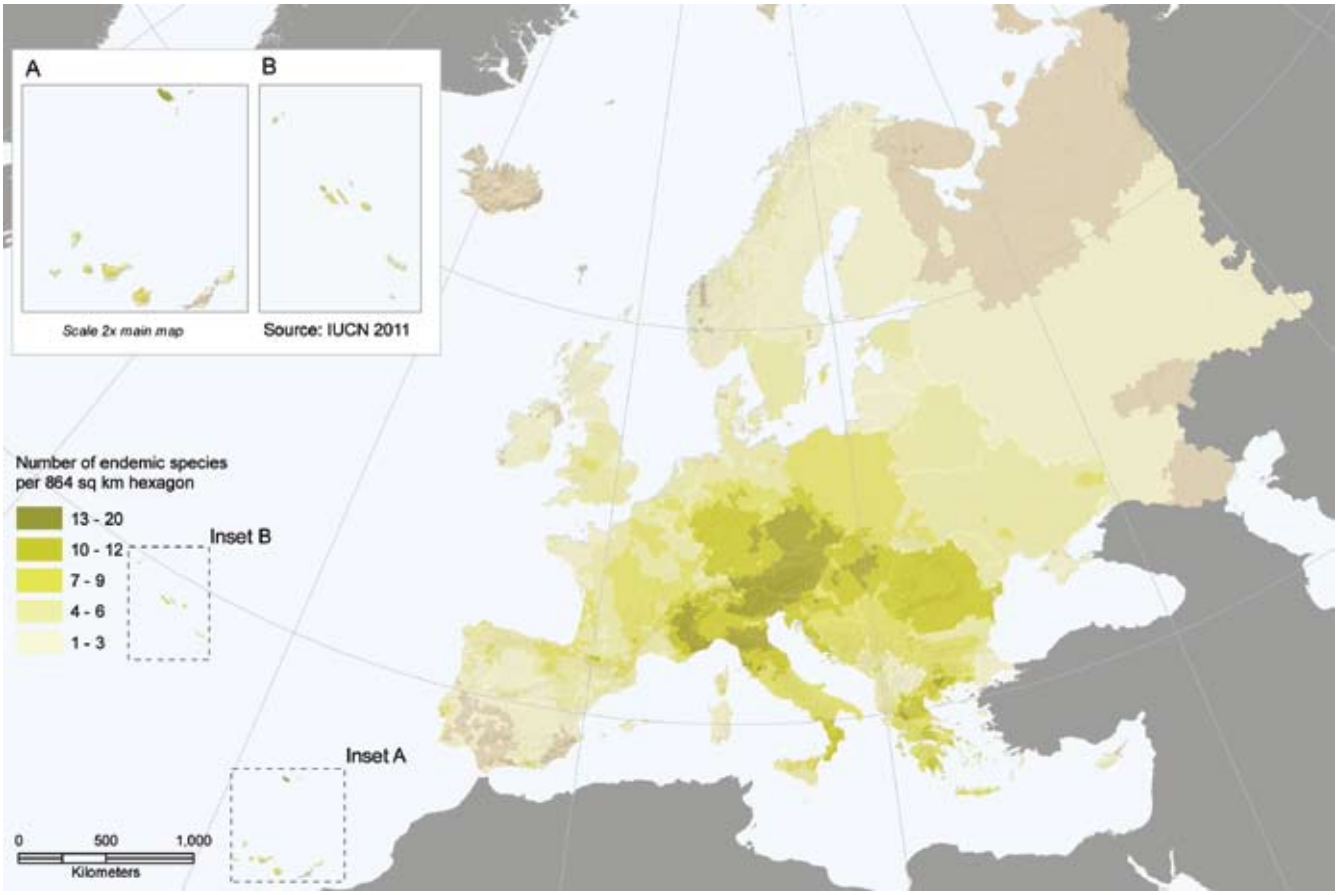


Figure 5 highlights areas of particular high concentrations of policy species. Not surprisingly, the highest number of species is found in the Mediterranean region, the Alps and the Balkan Peninsula. However, a serious note of caution needs to be issued when interpreting the three maps in chapter 3.3. Maps were created using the distribution data available from different literature and internet sources and the data available differed immensely. For some countries it was only known that the species exists in this country and therefore the distribution was mapped to the whole country (e.g. Bulgaria, Romania). For other countries, such as Spain, and for many of the species on the Habitats Directive, distribution data was provided in 10x10 km grid cells and is therefore very precise. In some cases data was available at subnational level and a species was mapped to the administrative unit (e.g. regions in Italy or départments in France). In order to analyse the spatial data, a species count per hexagonal grid cell (864 km²) was carried out and displayed. This results in the illusion that wide areas on the Balkan Peninsula are very species rich compared to the Iberian Peninsula when in fact the latter hosts the most species assessed per country. The data situation is further complicated by plant distribution being coded in geographic units (e.g. floristic regions) that have not caught up with political developments[4]. The most obvious one is the distribution of plant species occurring in former Yugoslavia which in fact now comprises seven individual countries. Moldova is joined in one floristic region with Ukraine and the Baltic States are referred to as one region without further statement in which of the three countries the species is found. In many cases, we had no access to lists of the national flora and it is likely that the countries named above were omitted or wrongly added in the distribution of the plant.

3.3.2 Endemic species richness

Figure 6 shows the distribution of endemic policy species (e.g. those that are unique to Europe and are found nowhere else in the world). Particularly high numbers of endemic species are found in the Mediterranean, the Macaronesian Islands and Central Europe. The Macaronesian Islands also host a variety of species that are not only endemic to Europe but often endemic to the islands: 93 species are only found in the Canary Islands and 41 only in Madeira. The number of species endemic to only one country is high overall with 460 out of 891 assessed. Here again, the Iberian Peninsula hosts the highest number of single country endemics with 63 species found only in mainland Portugal and 51 only in mainland Spain. It is followed by mainland Greece (40 species), mainland Italy (34) and Cyprus (18).

Table 3. Number of policy plant species in the 27 current EU Member States (excluding introduced species)

Country	Total number of species
Austria	117
Belgium	58
Bulgaria	123
Cyprus	62
Czech Republic	109
Denmark	51
Estonia	56
Finland	68
France	171
Germany	109
Greece	180
Hungary	106
Ireland	33
Italy	221
Latvia	60
Lithuania	58
Luxembourg	44
Malta	31
Netherlands	46
Poland	105
Portugal	211
Romania	132
Slovakia	99
Slovenia	98
Spain	318
Sweden	89
United Kingdom	64

3.3.3 Distribution of threatened species

The distribution of threatened vascular plants in Europe (Figure 7) reveals that in particular the Macaronesian Islands with their unique flora host many threatened species. It is furthermore interesting that a high concentration of threatened species is found along coasts (southern and western Iberian Peninsula, northern Norway, Greece, south Crimea) and on Mediterranean

4 For more information on the geographic units used see The World Checklist on Selected Plant Families (The Board of Trustees of the Royal Botanic Gardens, Kew 2010) and the Euro+Med Plantbase (2006-2011).

Figure 7. Distribution of threatened policy plants in Europe

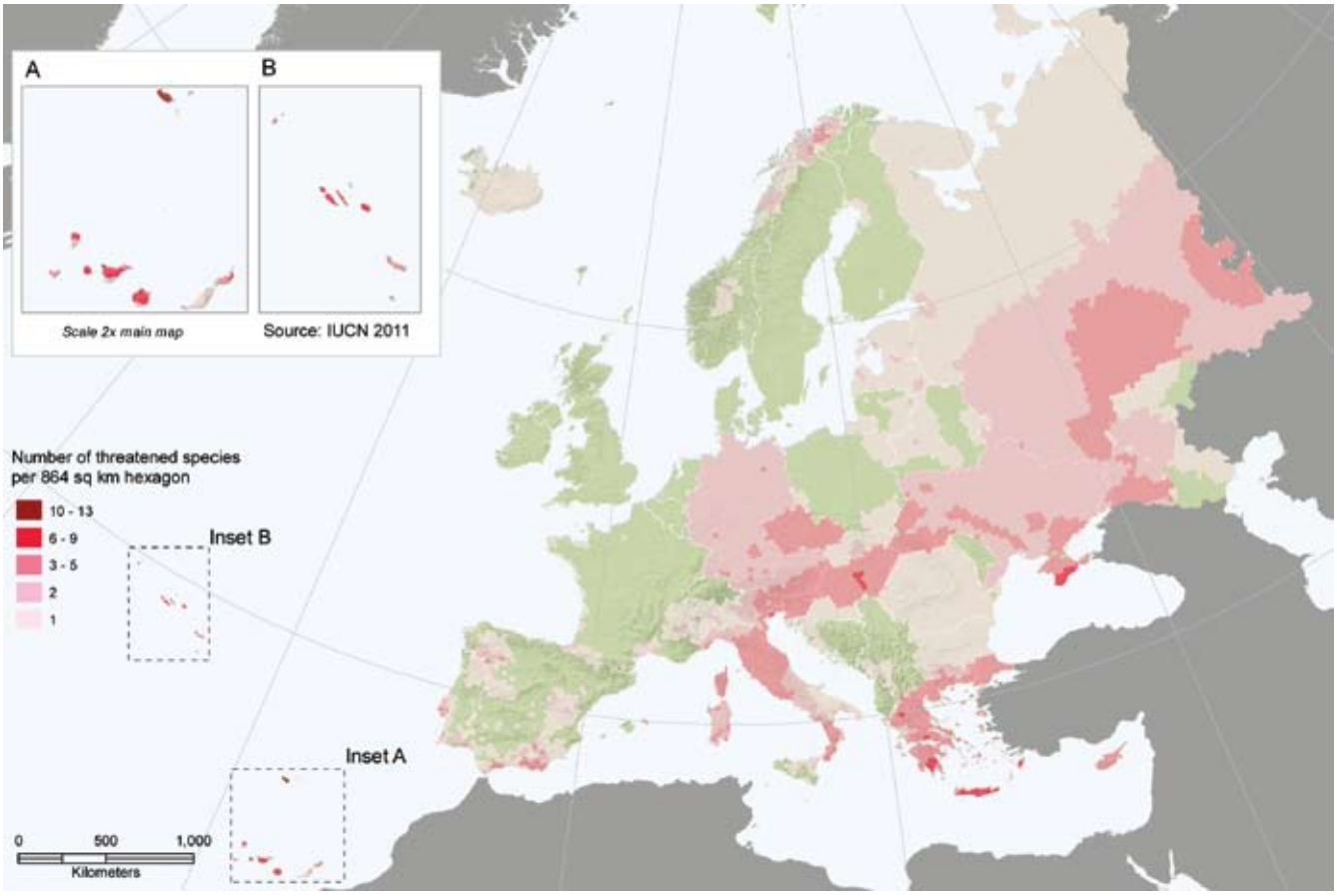
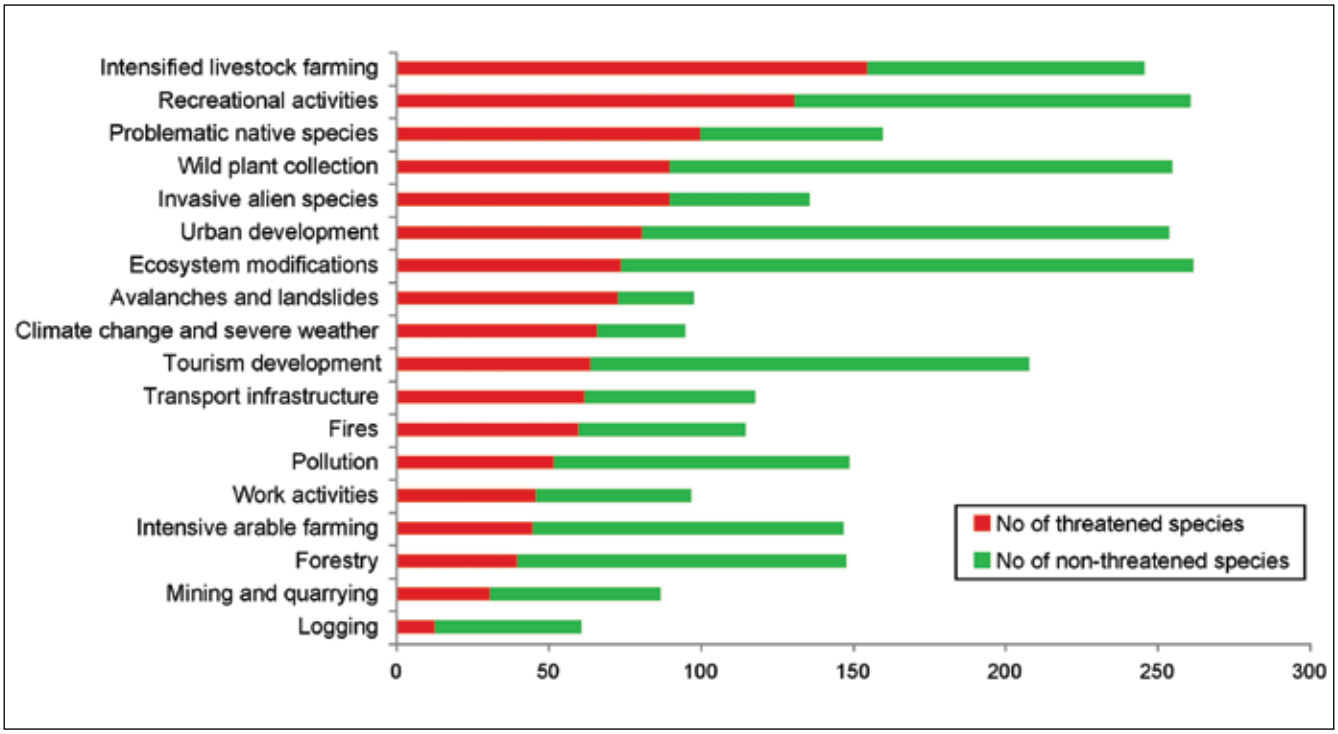


Figure 8. Major threats to policy plants in Europe



islands (Corsica, Cyprus, the Greek islands, and Sardinia). Another area that flagged up as being of concern is the centre of the Pannonian Plain in Hungary.

3.4 Major threats to policy plants in Europe

The major threats to each species were coded using the IUCN Threats Classification Scheme. A summary of the relative importance of the different threatening processes is shown in Figure 8.

The main threat to the threatened plant species in this group is intensified livestock farming, and especially intensive grazing activities have the worst impacts. Plant species are directly affected through livestock eating them or due to trampling and increased nitrification. The conversion of grasslands into agricultural land for livestock, arable farming or forestry is a serious threat leading to habitat loss or at least degradation. On the other hand, many species are in need of moderate disturbance and were thriving well in areas under traditional agricultural use such as extensive grazing. Whereas an intensification of agricultural activities leads to the disappearance of those species on one hand, the complete abandonment of these activities poses also a serious threat (listed under ecosystem modifications). The abandonment leads to changes in the vegetation dynamic and succession of woody plants and shrubs that lead to an increased competition and therefore disappearance of plant species.

Recreational activities such as hiking, mountaineering, or walking are the second biggest factor causing species to be directly or indirectly threatened. Ecosystems frequented by humans often notice a decrease in quality and the plants are in danger of being trampled. Skiing activities in mountain areas, for example, threaten the plant *Campanula bohemica*. Another example are species growing in sand dunes and beaches affected by vehicles accessing the coast, such as in the case of *Anchusa crispa*.

Invasive alien species and problematic native species are particularly threatening the flora on the Canary Islands and Madeira but also in the Mediterranean. Introduced plants such as *Carpobrotus edulis* and *Opuntia ficus-*

Carpobrotus edulis, native to South Africa has been introduced widely to the Mediterranean as an ornamental plant and now replaces native vegetation in many parts of that region as seen here at the coast of Cascais in Portugal. Photograph © Melanie Bilz.



indica aggressively compete for space, light and other resources with native species in a way that often leads to the disappearance of the latter. Grazing and trampling by introduced or native herbivores (such as rabbits, goats or sheep) impact several plants. But also increased seagull populations can cause problems with eutrophication for example for the Portuguese island endemic *Armeria berlengensis*.

Many plant species are very attractive and therefore collected for their beauty. This collection ranges from the occasional picking to systematic collection for the horticultural trade (e.g. snowdrops - *Galanthus* spp., orchids), medicinal use (e.g. *Artemisia granatensis* or *Mandragora officinarum*), or for food (*Thymus* spp., *Micromeria taygetea*). Here the threat is not only the removal of the species from the wild but there are indirect implications such as a reduced reproductive success due to overcollection. It needs to be said that for many species under legislation the collection is already forbidden, restricted, or regulated although this does not exclude illegal activities.

A major driver of habitat loss is urban and tourism development as well as transport infrastructure which affects most of the policy plant species assessed. It is not only the fact that the plants can not cope with a change of its habitat due to an increased use by humans. But the expansion of urban environments or the development of new tourist complexes or roads is creating impermeable, sealed surfaces and a loss of soil habitat for the species. Mining and quarrying is another driver of habitat loss and degradation.

Many species listed in this group are found in rocky areas, on cliffs, in scree or instable substrate and are vulnerable to geological events such as landslides and avalanches. Although this is not a human induced threat, it can seriously affect a population especially if the species is rare and found at very few localities or with a low number of individuals in the first place. Fires, which can occur naturally or be set by humans can have devastating effects on plant populations. An example is the fire that took place in the Central Mountain Massif of Madeira in summer 2010 where it is still not clear how it affected several endemic plant species such as *Viola paradoxa* or *Sorbus maderensis*.

Pollution comes in the form of water pollution and of garbage disposal. Water pollution is mainly caused by run-off from agricultural fields and the application of fertilisers, pesticides and herbicides which can be harmful to other plants or change the native species dynamic and increase competition. Especially plants bound to freshwater environments are affected by water pollution.

The effects of climate change on the selected plant species namely establishes itself in the form of increased droughts, particularly in the Mediterranean area. Other impacts are an increase in storms and floods, habitat shifting and alteration, and temperature extremes (Arnell 2004).

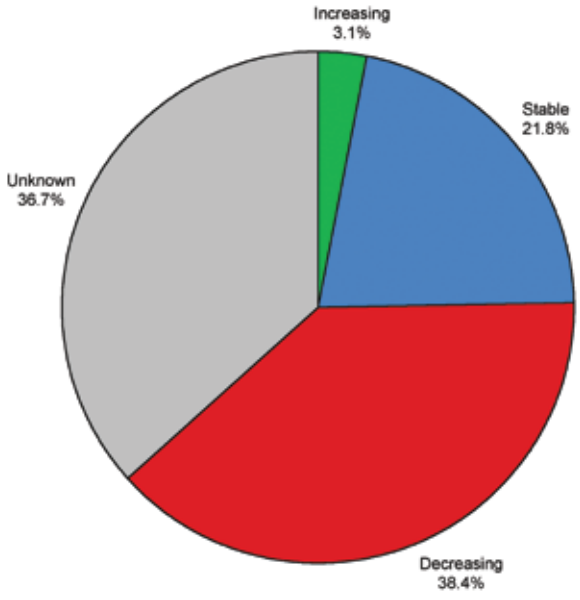
For several species human disturbance in form of work activities such as cleaning of beaches (*Kosteletzkya pentacarpa*), mowing activities at inappropriate times (*Biscutella neustriaca*), removal of forest undergrowth or roadside vegetation (*Erodium rupicola*), etc. is causing population declines.

Last but not least, it should be noted that most plants are faced by more than one threat and that a combination of these can worsen the situation for a species even more, for example, increased drought also increases the risk of fires.

3.5 Population trends

For the selected policy plant species, 38.4% have a declining population trend, whereas 21.8% of the plants have stable populations. More than one third (36.7%) have an unknown trend and a small part of the group (3.1%) have increasing populations (Figure 9).

Figure 9. Population trends of European policy plants



4. Crop wild relatives – species selection and results

4.1 Background

4.1.1 Crop wild relatives: a critical resource for food security and economic stability in Europe

Plant genetic resources (PGR) are defined as the genetic material of plants which is of value as a resource for present and future generations of people (IPGRI 1993). Specifically, plant genetic resources for food and agriculture (PGRFA) are PGR most directly associated with human food production and agriculture which are of current and future economic and food security benefit for humankind (Maxted *et al.* 2008a). A major component of PGRFA are crop wild relatives (CWR) – the wild species closely related to crops that are defined by their potential ability to contribute beneficial traits for crop improvement (Maxted *et al.* 2006).

CWR have been used increasingly in plant breeding since the early 20th century and have provided vital genetic diversity to enhance food crops – for example, to confer resistance to pests and diseases, improve tolerance to environmental conditions such as extreme temperatures, drought and flooding and to improve nutrition, flavour, colour, texture and handling qualities (Maxted and Kell 2009). Gene introductions have tended to be most effective when the wild species are close relatives of the crop, or are even direct ancestors of it; however, recent technological advances have improved the ease of transfer of traits between distantly related species and expanded the value of CWR by increasing their usefulness into the secondary and tertiary crop gene pools (Meilleur and Hodgkin 2004). The contribution of CWR is growing and has largely been through the donation of useful genes coding for pest and disease resistance, abiotic stress tolerance and higher nutritional value (Hajjar and Hodgkin 2007). For example, in wheat, single gene-controlled traits have been introduced from CWR to provide powdery mildew resistance, and increased nutritional value has been fulfilled through the introduction of genes for higher protein content. Genes from wild *Brassica oleracea* plants have created domestic broccoli with high levels of anti-cancer compounds (Hodgkin and Hajjar 2008). The extensive use of CWR in crop improvement is reviewed by Maxted and Kell (2009).

In monetary terms, CWR have contributed significantly to the agricultural and horticultural industries, and to the world economy (Maxted *et al.* 2008a, Maxted and Kell 2009). For example, Pimentel *et al.* (1997) estimated that wild relatives contribute approximately US$ 20 billion toward increased crop yields per year in the United States and US $115 billion worldwide. Further, Phillips and Meilleur (1998) noted that losses of rare wild plants represent a substantial economic loss to agriculture, estimating that the endangered food crop relatives have a worth of about US$ 10 billion annually in wholesale farm values. Although these figures show significant divergence, they highlight the major global economic value of CWR diversity to humankind.

Aegilops tauschii is a secondary wild relative of bread and durum wheat, as well as a number of other cultivated wheats. It is a drought-tolerant species and a possible gene source for pest and disease resistance. It has contributed traits to bread wheat for good baking qualities and winter hardiness, and is also a good quality fodder plant for spring and early summer. In Europe, this species has a restricted range in Crimea and South European Russia where it grows on plains, beaches, dry hillsides and near roads. It is threatened by development for tourism and recreational activities and is regionally assessed as Endangered. Photograph © Vojtech Holubec.



Today, agricultural production is challenged by climate change – current climate change models predict that it will alter the environmental conditions under which our crops grow and is expected to have a dramatic impact on agriculture and horticulture (FAO 2010); for example, it has been estimated that by 2100, wheat yields will be reduced by 40% at low latitudes unless climate change mitigation is undertaken (IPCC 2007). It is likely that many current crop varieties will need replacement to enable them to better suit the new and changing environments under which they will be forced to grow and breeders will therefore have to provide varieties able to cope with the impacts of changing growing conditions – failure to meet this challenge will have a devastating impact on the global economy and social well-being (Maxted and Kell 2009, FAO 2010, Maxted *et al.* 2011).

The genetic diversity within CWR offers an insurance against the predicted harmful impacts of climate change. CWR populations are particularly likely to contain the abiotic adaptive genes necessary to develop new varieties because of the wide variety of habitats in which they grow and broad range of conditions they are adapted to (FAO 2008). Thus, they are recognized as a critical resource with a vital role in food security and economic stability, as well as contributing to environmental sustainability (Prescott-Allen and Prescott Allen 1986, Hoyt 1988, Maxted *et al.* 1997a, Meilleur and Hodgkin 2004, Stolten *et al.* 2006). However, CWR, which are intrinsically no different to any other group of wild species, are subject to an increasing range of threats in their host habitats and more systematic attention to their conservation is required (FAO 1996, 1998; Maxted *et al.* 2008a; Maxted and Kell 2009).

As recognized by Planta Europa (2008), our reliance on a limited number of crops in Europe, combined with their genetic vulnerability and the anticipated impacts of climate change, mean that food security in the region is far from guaranteed. Food crop production is also a major contributor to the European economy. Native European CWR are a tangible resource that may offer insurance against crop failure, food shortages and economic instability; further, as components of natural and semi-natural habitats, CWR are important for maintaining a stable and healthy ecosystem. Therefore, Europe has a number of incentives to ensure the long-term conservation and increased utilization of Europe's native crop species and their wild relatives, as outlined in the FAO Global Plan of Action on the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (Gass and Thormann 1999).

4.1.2 European crop wild relatives: diversity and endemism

Europe has significant endemic genetic diversity of global value in crops of major socio-economic importance and their wild relatives (Heywood 1999), such as oats (*Avena sativa* L.), sugarbeet (*Beta vulgaris* L.), carrot (*Daucus carota* L.), apple (*Malus domestica* Borkh.), annual meadow grass (*Festuca pratensis* Huds.), perennial rye grass (*Lolium perenne* L.) and white clover (*Trifolium repens* L.). Gene pools of many minor crop species and their wild relatives are also present in the region, such as arnica (*Arnica montana* L.), asparagus (*Asparagus officinalis* L.), lettuce (*Lactuca sativa* L.), sage (*Salvia officinalis* L.) and raspberries and blackberries (*Rubus* spp.), as well as herbs and aromatic plants such as mints (*Mentha* spp.) and chives (*Allium* spp.) (Maxted *et al.* 2008a). Europe is also an important region for forest genetic resources, such as pine, poplar and sweet cherry (*Pinus*, *Populus* and *Prunus* spp.), and ornamental plants, such as sweet pea (*Lathyrus odoratus*), sweet pinks (*Dianthus* spp.) and violets (*Viola* spp.).

The eastern Mediterranean region is a particularly rich centre of CWR diversity as it comprises or borders three important Vavilov centres of crop diversity (Vavilov 1926). It is also the major centre of CWR diversity for important crops such as wheat (*T. aestivum* L.), barley (*Hordeum vulgare* L.), oats (*A. sativa* L.), chickpea (*Cicer arietinum* L.), lentil (*Lens culinaris* Medik.), pea (*Pisum sativum* L.), faba bean (*Vicia faba* L.), lucerne (*Medicago sativa* L.), white clover (*T. repens* L.), grape (*Vitis vinifera* L.), fig (*Ficus carica* L.), olive (*Olea europaea* L.) and pistachio (*Pistacia vera* L.), as well as the minor crops flax (*Linum usitatissimum* L.), melon (*Cucumis melo* L.), lettuce (*L. sativa* L.) and sage (*S. officinalis* L.) (Maxted *et al.* 2008a). For each of these groups, the crop species and its wild relatives are found within the Euro-Mediterranean region.

Kell *et al.* (2005) created the first comprehensive catalogue of CWR for Europe and the Mediterranean using a broad definition of a CWR (i.e., any species in the same genus or closely related genera to a cultivated plant species), and found that approximately 80% of the flora of the region consists of crops and their wild relatives. Further analysis revealed that more than 15,000 species are native to Europe, of which at least half are endemic (Kell *et al.* 2008a). The authors

found that four countries contain more than 20% of the species in the Euro-Mediterranean region: Turkey, Spain, Italy and France, which is consistent with the overall proportions of the flora of the region that occur in these countries; however, per unit area, Greece has the highest concentration of CWR diversity in the region. A high percentage of CWR species occur on the EU's oceanic islands, such as the Canary Islands (Spain) and the Azores (Portugal), but also other islands such as Sicily (Italy), Malta and Corsica (France); for example, around 10% of the crop and CWR taxa of the Spanish territories occur in the Canary Islands – taxa that are not found in mainland Spain (Kell *et al.* 2008a). This is not surprising since islands exhibit high levels of endemism due to their isolation from continental areas, so they are natural reservoirs of unique genetic diversity (Dulloo *et al.* 2002).

The broad definition of a CWR adopted to create the CWR Catalogue for Europe and the Mediterranean resulted in a large proportion of the flora of the region that can be considered as crops or their wild relatives. However, in terms of food security, the most important CWR are those related to food crops (Maxted and Kell 2009, Kell *et al.* in prep.). Based on food crops of major significance and secondary or local importance listed by Groombridge and Jenkins (2002), Kell *et al.* (2008a) found that four of the 38 major food crops of the world are native to the Euro-Mediterranean region: cereals – *H. vulgare* L. (barley) and *T. aestivum* L. (wheat); leaf vegetables – *B. oleracea* L. (cabbage); and oil crops – *O. europaea* L. (olive). Three of these crops are native to Europe: wheat, cabbage and olive. Within the 28 major food crop genera of the world, 57 species are endemic to the Euro-Mediterranean region, and of these, at least 11 species are endemic to only one nation, many being limited to islands (e.g., *Brassica balearica* Pers., endemic to the Balearic Islands (Spain), *B. rupestris* Raf., *B. macrocarpa* Guss. and *B. villosa* Biv., endemic to the islands of Sicily (Italy) and Malta, and *B. hilarionis* Post, endemic to Cyprus) (Kell *et al.* 2008a). The authors found that within the minor food crop genera, 938 species and 372 subspecific taxa (subspecies and varieties) can be found growing in the region – of these, 382 species and 46 subspecies are endemic and at least 99 species and 41 subspecies are endemic to only one nation. Of the 69 minor food crops of the world, 23 (33%) are native to the Euro-Mediterranean region and 22 are native to Europe.

4.2 Selection of CWR species for assessment

Wild relatives of a list of priority crops were selected based primarily on their food and economic security importance in Europe. Species were selected from the CWR Catalogue for Europe and the Mediterranean (Kell *et al.* 2005) which contains taxon and distribution data from Euro+Med PlantBase (2006). At the time of production of the species list, the taxonomic and distribution data in Euro+Med PlantBase (www.emplantbase.org/home.html) had been revised for several families; including three of the largest families – Compositae, Poaceae and Rosaceae[5]. These revised data were combined with the 2006 data set for the remaining families to form the basis for species selection, as well as the taxonomic standard for the CWR list. The taxon selection process involved five steps (Kell *et al.* in prep.).

Step 1: CWR native to Europe

As the IUCN Red List Categories and Criteria should only be applied to wild populations inside their natural range, or to populations resulting from benign introductions (IUCN 2001), the first step in the target taxon selection procedure was to select CWR native to Europe. Each taxon occurrence recorded in Euro+Med PlantBase is coded using the Plant Occurrence and Status Scheme (POSS); this was used to filter the records and select those recorded as native, formerly native, doubtfully native or those for which the presence is questionable. This resulted in a list of 19,345 species, including wild relatives of agricultural and horticultural crops, forestry species, ornamentals, and medicinal and aromatic plants.

Step 2: CWR of human and animal food crops

Data from three primary sources were used to select a list of priority crop genera containing wild relatives native to Europe – the CWR Catalogue (Kell *et al.* 2005), GRIN Taxonomy for Plants (USDA, ARS, National Genetic Resources Program 2009) and Mansfeld's World Database of Agricultural and Horticultural Crops (Hanelt and IPK Gatersleben 2001, IPK Gatersleben 2003). Genera containing cultivated taxa used for human and animal food were initially selected as priority groups. This list contains 262 genera, within which there are 7,324 CWR species native to Europe.

Step 3: CWR of high priority human food crops

CWR of a number of human food crops that are

5 In February 2011, a major revision of Euro+Med PlantBase was published; the changes made to the families other than Compositae, Poaceae and Roasaceae are not reflected in the list of CWR species selected for inclusion in the European Red List.

particularly important to Europe in terms of production quantity and/or value were selected. In terms of production quantity, there are 18 crops or crop groups of which Europe produced an average of >1MT in five years from 2003–2007 that have CWR native to Europe that may be important for crop improvement: wheat, sugar beet, barley, grapes, rapeseed, apples, oats, cabbages (and other brassicas), rye, olives, carrots and turnips, onions, peaches and nectarines, peas, lettuce and chicory, pears, plums and sloes, and strawberries (Figure 10). Note that there are other economically important crops excluded from this list (e.g., potato) that have wild relatives in Europe, but they are very distant wild relatives – the centre of diversity of the potato gene pool being in South America – and are therefore not considered a priority in terms of their potential as gene donors for crop improvement. Figure 11 shows the average value of crops or crop groups produced in Europe over five years from 2004–2008 that have CWR native to Europe which may be important for crop improvement. All of the crops or crop groups included in this analysis are also included in the priority list of human food crops based on production quantity. This selection of 18 crops or crop groups is found within 19 genera within which there are 279 species native to Europe.

Step 4: CWR of animal food crops

The production quantity and economic value data that are available for human food crops are not available for animal food crops on an individual crop basis; therefore, it is not possible to prioritize animal food crops according to these criteria. However, of the 279 CWR species identified in the high priority human food CWR group, 106 are wild relatives of forage and/or fodder crops, as well as human food crops; therefore, CWR of a number of animal food crops are included in this list.

Step 5: CWR of other human and animal food crops

To add to the high priority list of 279 species described above, Annex I of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) was also used as the basis for species selection. This is a list of PGRFA established according to criteria of food security and interdependence and includes 78 genera containing human or animal food crops. Fifty-nine of these genera contain taxa that are native to Europe, some of which are already included in the high priority CWR list defined above. Annex I of the ITPGRFA is divided into two lists: 1) human food crops, and 2) forages. The human food crop list mainly lists entire genera because the CWR of these crops are recognized as being important for food security. The forage list only includes specific species because a) the crops are mainly selections from wild species and the CWR are less likely to be used for crop improvement, and b) many of the forage genera contain a very large number of species; for example, *Festuca* contains 204 species native to Europe.

Additional human food crop genera listed in Annex I of the ITPGRFA that were included in the list of CWR for assessment are: *Asparagus*, brassica complex (*Armoracia*, *Barbarea*, *Camelina*, *Crambe*, *Diplotaxis*, *Eruca*, *Isatis*, *Lepidium*, *Raphanus*, *Rorippa* and *Sinapis*[6]), *Cicer*, *Lathyrus* (only those in Gene Pools (GP) 1b and 2 and Taxon Groups (TG) 1b and 2 – see Maxted *et al.* 2006), *Lens*, wheat complex (*Agropyron* and *Elymus*[7]), and *Vicia* (GP1b, TG1b, GP2, TG2 and four species for which data were readily available). *Lathyrus* and *Vicia* species were limited to the close wild relatives only, due to the large number of species included in these genera.

Fifty-two of the forage species listed in Annex I of the ITPGRFA are native to Europe. These were all included for assessment as their continued existence in the wild is important for the future of these crops; thus, knowing their conservation status in the wild is important to inform conservation planning. In addition, all *Medicago* species native to Europe were included on the basis of data availability.

This selection process concluded with a list of 596 species; however, subsequently some of these were removed as they are hybrids. At a later stage in the project, some additional species were added by experts at a European CWR Red List workshop; these included five species in the genus *Sinapidendron*, which is related to brassica crops and endemic to the Madeira archipelago, and some recently described species of *Crambe* endemic to the Canary Islands. The final list of CWR species for assessment comprised 591 species in 25 crop gene pools/groups (Table 4), 188 of which are endemic to Europe.

Twenty-four of these species are also included in either annexes of the EU Habitats Directive or of the Bern Convention that were assessed as part of the European Red List initiative. It is also important to note that a further 634 of the species in the policy list are included in the CWR Catalogue for Europe and the Mediterranean

6 *Brassica* spp. are included in the high priority human food crop list.

7 *Triticum*, *Aegilops* and *Secale* spp. are included in the high priority human food crop list.

Figure 10. Crops/crop groups of which Europe produced an average of >1MT in five years from 2003–2007 that have CWR native to Europe which may be important for crop improvement (Kell *et al.* in prep). Data source: FAOSTAT (FAO 2009).

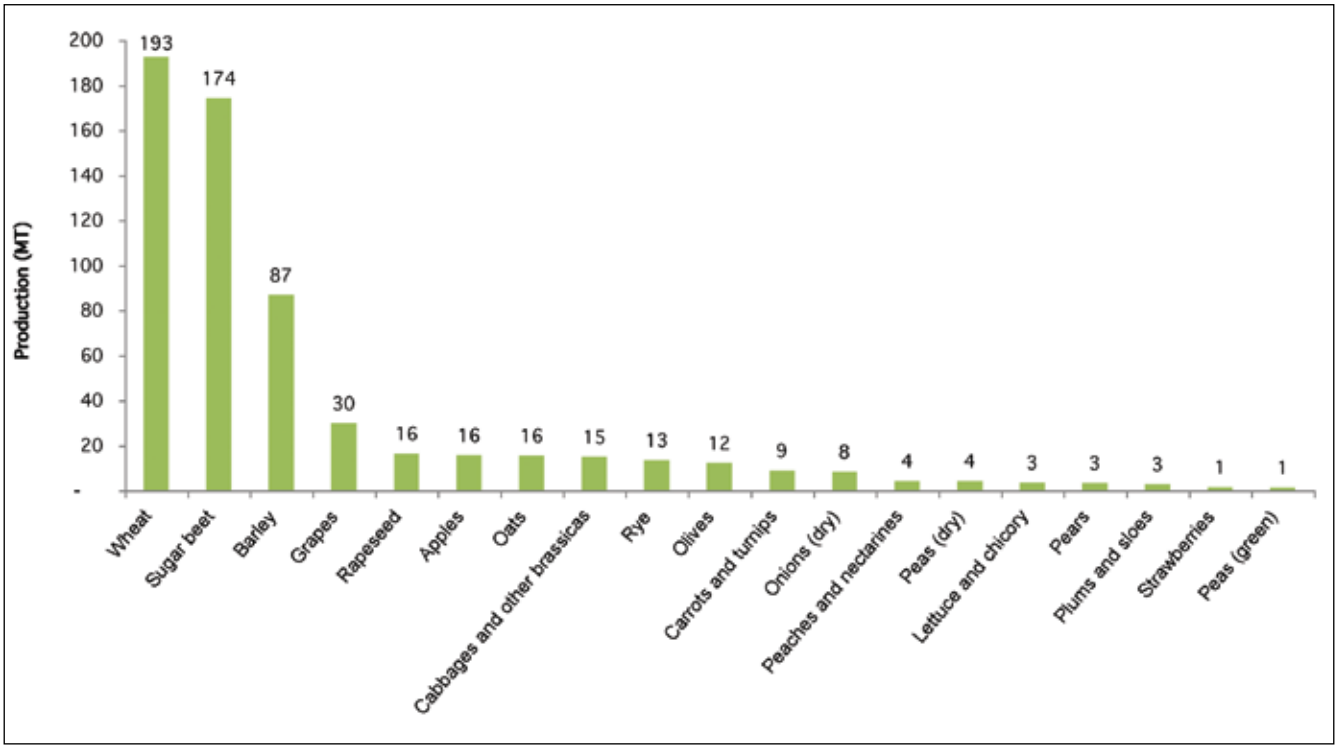
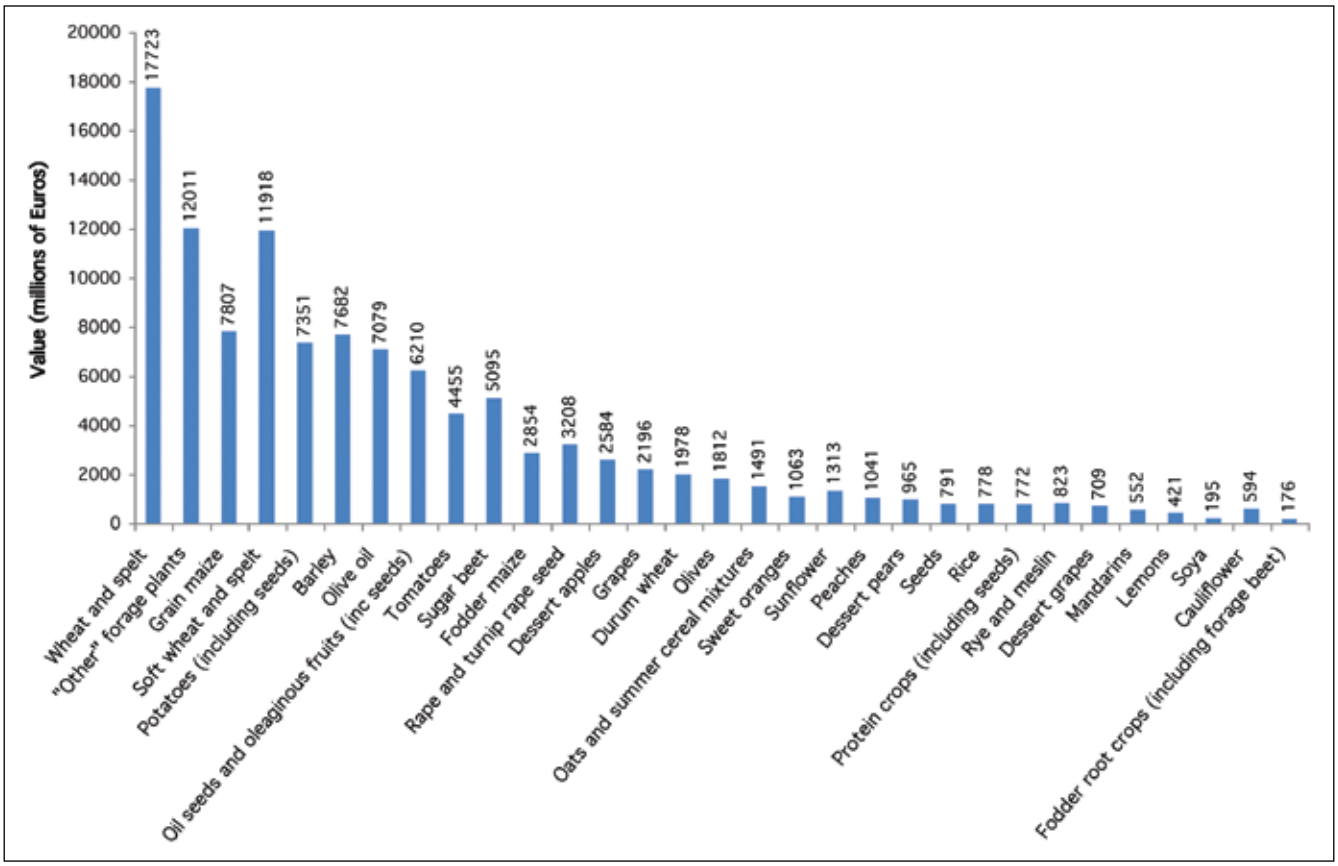


Figure 11. The average value (millions of Euros) of crops/crop groups produced in Europe over five years from 2004–2008 that have CWR native to Europe which may be important for crop improvement (Kell *et al.* in prep). Data source: Eurostat (European Communities 1995–2009).



because they are wild relatives of a range of other crops; including minor food crops, forage crops, forestry species, and medicinal and ornamental plants. Therefore, in addition to the sample selected due to their high potential economic importance as gene donors to human and animal food crops that are particularly important in Europe, the assessment of the policy species will also contribute to our knowledge of the threat status of other European CWR which are of less immediate priority in terms of their potential as gene donors.

Table 4. Overview CWR species selected for assessment

Crop gene pool/group	Genus (or genera)	Total no. of species in gene pool/group[8]	No. of species assessed (% of gene pool/group)
Brassica complex	*Armoracia, Barbarea, Brassica, Camelina, Crambe, Diplotaxis, Eruca, Isatis, Lepidium, Raphanus, Rorippa, Sinapidendron, Sinapis*	506	142 (28%)
Onion, leek, garlic etc.	*Allium*	750	118 (16%)
Legume forages	*Astragalus, Hedysarum, Lotus, Lupinus, Medicago, Melilotus, Onobrychis, Ornithopus, Securigera, Trifolium*	3469	93 (3%)
Wheat	*Aegilops, Agropyron, Elymus, Triticum*	213	36 (17%)
Lettuce	*Lactuca*	130	27 (21%)
Faba bean/vetch	*Vicia*	160	23 (14%)
Asparagus	*Asparagus*	120	19 (16%)
Grass pea	*Lathyrus*	160	19 (12%)
Stone fruits and almond	*Prunus*	200	16 (8%)
Grass forages	*Agrostis, Alopecurus, Arrhenatherum, Festuca, Lolium, Phalaris, Phleum, Poa*	1210	14 (1%)
Oat	*Avena*	25	13 (52%)
Carrot	*Daucus*	22	12 (55%)
Pear	*Pyrus*	15	11 (73%)
Cultivated beets	*Beta, Patellifolia*	13	10 (77%)
Barley	*Hordeum*	32	8 (25%)
Lentil	*Lens*	5	5 (100%)
Apple	*Malus*	40	5 (13%)
Chickpea	*Cicer*	44	4 (9%)
Chicory	*Cichorium*	6	3 (50%)
Strawberry	*Fragaria*	330	3 (1%)
Rye	*Secale*	3	3 (100%)
Other forages	*Atriplex, Salsola*	380	2 (1%)
Garden pea	*Pisum*	3	2 (67%)
Olive	*Olea*	33	2 (6%)
Grape	*Vitis*	65	1 (2%)
	Totals	**7933**	**591 (7%)**

8 Data primarily sourced from Mabberley (2008).

4.3 Threat status of CWR

Out of the 591 CWR species for which regional assessments were carried out, 19 were assessed as Not Applicable, either due to their marginal occurrence in Europe or because they were introduced after AD 1500. The status of the remaining species was assessed at two regional levels: geographical Europe (572 species) and the EU 27 (521 species). At the European level, at least 11.5% (66) of the species are considered as threatened, with at least 3.3% (19) of them being Critically Endangered, 4.4% (22) Endangered and 3.8% (25) Vulnerable – a further 4.5% (26) of the species are classified as Near Threatened (Table 5, Figure 12).

Within the EU 27, at least 10.5% (55) of the CWR species assessed are threatened, of which at least 3.5% (18) are Critically Endangered, 3.3% (17) Endangered and 3.8% (20) Vulnerable – in addition, 4.0% (21) of the species are considered as Near Threatened (Table 5, Figure 13). One species (*Allium jubatum* J.F. Macbr.) is Regionally Extinct within Europe and the EU; it is native to Asiatic Turkey and Bulgaria, but according to Mathew (1996), it has not been found in Bulgaria since its original collection in 1844. Species classed as Extinct or threatened (Critically Endangered, Endangered and Vulnerable) at the European and EU 27 level are listed in Table 6.

Table 5. Summary of numbers of selected CWR species within each category of threat

	IUCN Red List categories	No. species Europe (no. endemic species)	No. species EU 27 (no. endemic species)
	Extinct (EX)	0	0
	Extinct in the Wild (EW)	0	0
	Regionally Extinct (RE)	1 (0)	1 (0)
Threatened categories	Critically Endangered (CR)	19 (18)	18 (17)
	Endangered (EN)	22 (18)	17 (13)
	Vulnerable (VU)	25 (16)	20 (15)
	Near Threatened (NT)	26 (13)	21 (11)
	Least Concern (LC)	313 (45)	305 (27)
	Data Deficient (DD)	166 (78)	139 (45)
	Total number of species assessed	**572 (188)**	**521 (128)**

* This table does not include the Not Applicable species in Europe and/or the EU (species introduced after AD 1500 or species of marginal occurrence). For the EU 27 assessment the Not Evaluated species (species which do not occur in the EU) are also excluded.

Figure 12. Red List status of CWR in Europe

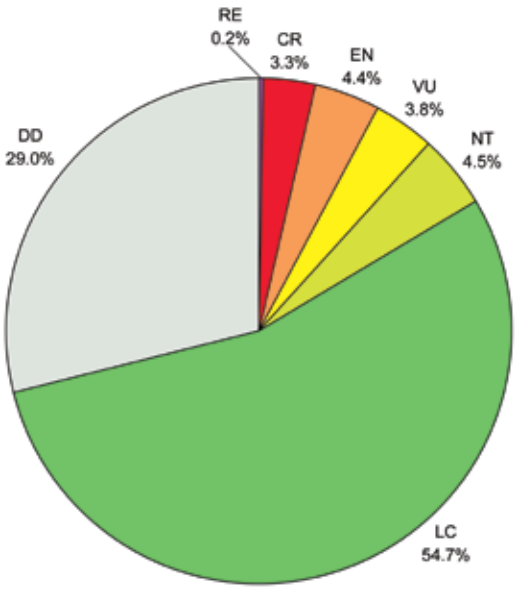


Figure 13. Red List status of CWR in the EU 27

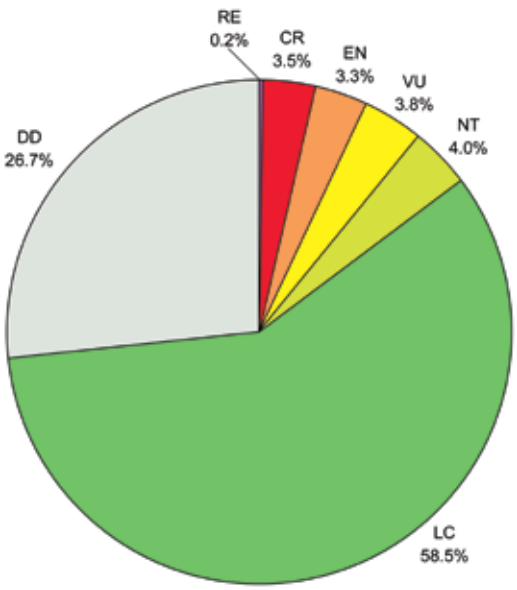


Table 6. Threatened and extinct CWR at the European and EU 27 level

Family	Species	Red List Status Europe	Red List Status EU 27	Endemic to Europe?
ALLIACEAE	*Allium jubatum*	RE	RE	
ALLIACEAE	*Allium corsicum*	CR	CR	Yes
CHENOPODIACEAE	*Beta patula*	CR	CR	Yes
CRUCIFERAE	*Brassica macrocarpa*	CR	CR	Yes
CRUCIFERAE	*Crambe feuillei*	CR	CR	Yes
CRUCIFERAE	*Crambe sventenii*	CR	CR	Yes
CRUCIFERAE	*Crambe tamadabensis*	CR	CR	Yes
CRUCIFERAE	*Crambe wildpretii*	CR	CR	Yes
CRUCIFERAE	*Diplotaxis siettiana*	CR	CR	Yes
CRUCIFERAE	*Diplotaxis vicentina*	CR	CR	Yes
CRUCIFERAE	*Lepidium turczaninowii*	CR	NE	Yes
LEGUMINOSAE	*Medicago citrina*	CR	CR	Yes
LEGUMINOSAE	*Medicago fischeriana*	CR	NE	
CHENOPODIACEAE	*Patellifolia webbiana*	CR	CR	Yes
ROSACEAE	*Pyrus magyarica*	CR	CR	Yes
CRUCIFERAE	*Rorippa valdes-bermejoi*	CR	CR	Yes
CRUCIFERAE	*Sinapidendron angustifolium*	CR	CR	Yes
CRUCIFERAE	*Sinapidendron rupestre*	CR	CR	Yes
LEGUMINOSAE	*Vicia costae*	CR	CR	Yes
LEGUMINOSAE	*Vicia ferreirensis*	CR	CR	Yes
GRAMINEAE	*Aegilops tauschii*	EN	NE	
GRAMINEAE	*Agropyron cimmericum*	EN	NE	Yes
GRAMINEAE	*Agropyron dasyanthum*	EN	NE	Yes
ALLIACEAE	*Allium pervestitum*	EN	NE	Yes
ASPARAGACEAE	*Asparagus fallax*	EN	EN	Yes
ASPARAGACEAE	*Asparagus nesiotes*	EN	EN	Yes
GRAMINEAE	*Avena insularis*	EN	EN	
GRAMINEAE	*Avena murphyi*	EN	EN	
CRUCIFERAE	*Barbarea lepuznica*	EN	CR	Yes
CHENOPODIACEAE	*Beta macrocarpa*	EN	EN	
CRUCIFERAE	*Brassica hilarionis*	EN	EN	Yes
LEGUMINOSAE	*Cicer canariense*	EN	EN	Yes
LEGUMINOSAE	*Cicer graecum*	EN	EN	Yes
CRUCIFERAE	*Crambe laevigata*	EN	EN	Yes
CRUCIFERAE	*Crambe microcarpa*	EN	EN	Yes
CRUCIFERAE	*Crambe pritzelii*	EN	EN	Yes
CRUCIFERAE	*Crambe scoparia*	EN	EN	Yes
COMPOSITAE	*Lactuca watsoniana*	EN	EN	Yes
LEGUMINOSAE	*Lathyrus cassius*	EN	EN	
LEGUMINOSAE	*Medicago cretacea*	EN	NE	
LEGUMINOSAE	*Medicago rupestris*	EN	NE	
LEGUMINOSAE	*Medicago saxatilis*	EN	NE	Yes
CRUCIFERAE	*Sinapidendron frutescens*	EN	EN	Yes
CRUCIFERAE	*Sinapidendron sempervivifolium*	EN	EN	Yes
LEGUMINOSAE	*Vicia capreolata*	EN	EN	Yes
GRAMINEAE	*Aegilops bicornis*	VU	VU	
ALLIACEAE	*Allium exaltatum*	VU	VU	Yes
ALLIACEAE	*Allium pardoi*	VU	VU	Yes
ALLIACEAE	*Allium pyrenaicum*	VU	VU	Yes
ALLIACEAE	*Allium schmitzii*	VU	VU	Yes
ASPARAGACEAE	*Asparagus arborescens*	VU	VU	Yes
ASPARAGACEAE	*Asparagus pastorianus*	VU	VU	
ASPARAGACEAE	*Asparagus plocamoides*	VU	VU	Yes

Family	Species	Red List Status Europe	Red List Status EU 27	Endemic to Europe?
CHENOPODIACEAE	*Beta adanensis*	VU	VU	
CHENOPODIACEAE	*Beta nana*	VU	VU	Yes
CRUCIFERAE	*Brassica glabrescens*	VU	VU	Yes
CRUCIFERAE	*Crambe arborea*	VU	VU	Yes
CRUCIFERAE	*Crambe aspera*	VU	NE	
CRUCIFERAE	*Crambe gomerae*	VU	VU	Yes
CRUCIFERAE	*Crambe scaberrima*	VU	VU	Yes
CRUCIFERAE	*Isatis platyloba*	VU	VU	Yes
COMPOSITAE	*Lactuca singularis*	VU	VU	Yes
COMPOSITAE	*Lactuca tetrantha*	VU	VU	Yes
LEGUMINOSAE	*Medicago glandulosa*	VU	NE	
LEGUMINOSAE	*Medicago kotovii*	VU	NE	Yes
ROSACEAE	*Prunus lusitanica*	VU	VU	
ROSACEAE	*Prunus ramburii*	VU	VU	Yes
GRAMINEAE	*Elymus fibrosus*	DD	VU	

Beta macrocarpa is a primary wild relative of cultivated beets and is a potential donor of salt tolerant genes. The diploid type is distributed in the Mediterranean Basin but the unique tetraploid type is endemic to the Canary Islands and has been proposed for reclassification as a separate taxon. The species grows in dry coastal sites, often in salt marshes and beside salt pans and is threatened by aquaculture, development for tourism, recreation and urbanization. *B. macrocarpa* is regionally assessed as Endangered; however, the Canary Island subpopulation warrants global assessment due to its unique genetic diversity. Photograph © Arnoldo Santos Guerra.



It should be noted that the percentages of threatened CWR mentioned above represent minimum estimates. If we consider only those species that are surviving and for which we have enough data to assess the risk of extinction (excluding DD, EX and RE species), we might receive a more realistic value, assuming that the percentage of threat among DD species is similar to the overall percentage of threatened species within this group. In this case, 16.3% of the assessed CWR are threatened at European level and 14.4% at the EU 27 level.

Table 7 shows the Red List status of the selected European CWR species by crop gene pool/group and the percentages of species assessed as threatened. Note that re-evaluation of the species assessed as Data Deficient may increase these percentages; further, the species assessed as Near Threatened are those that are likely to become threatened in the near future unless remedial action is implemented that alleviates the threats to these populations and negates any declines. None of the crop gene pools/groups are endemic to Europe; therefore, this is not a comparison of the Red List status between

Table 7. Red List status of selected CWR species by crop gene pool/group, showing the percentages of the species assessed as threatened

Crop gene pool/group	No. of species assessed[9]	Red List status of species assessed							% threatened
		RE	CR	EN	VU	NT	LC	DD	
Brassica complex	137	0	11	8	6	7	61	44	18.2%
Onion, leek, garlic etc.	115	1	1	1	4	4	42	62	5.2%
Legume forages[10]	89	0	2	3	2	6	69	7	7.9%
Wheat	33	0	0	3	1	1	22	6	12.1%
Lettuce	27	0	0	1	2	3	14	7	11.1%
Faba bean/vetch[11]	21	0	2	1	0	1	17	0	14.3%
Asparagus	19	0	0	2	3	0	9	5	26.3%
Grass pea[12]	19	0	0	1	0	3	14	1	5.3%
Stone fruits and almond	16	0	0	0	2	0	5	9	12.5%
Grass forages	14	0	0	0	0	0	14	0	0.0%
Oat	13	0	0	2	0	0	7	4	15.4%
Carrot	12	0	0	0	0	0	8	4	0.0%
Pear	11	0	1	0	0	0	3	7	9.1%
Cultivated beets	10	0	2	1	2	0	3	2	50.0%
Barley	7	0	0	0	0	0	6	1	0.0%
Lentil	5	0	0	0	0	0	5	0	0.0%
Apple	5	0	0	0	0	0	1	4	0.0%
Chickpea	4	0	0	2	0	0	2	0	50.0%
Chicory	3	0	0	0	0	0	2	1	0.0%
Strawberry	3	0	0	0	0	0	3	0	0.0%
Rye	2	0	0	0	0	0	2	0	0.0%
Other forages	2	0	0	0	0	0	2	0	0.0%
Garden pea	2	0	0	0	0	1	1	0	0.0%
Olive	2	0	0	0	0	0	0	2	0.0%
Grape	1	0	0	0	0	0	1	0	0.0%
Totals	**572**	**1**	**19**	**25**	**22**	**26**	**313**	**166**	**16.3%**

9 Excluding species evaluated as Not Applicable.
10 Only species listed in Annex I of the ITPGRFA.
11 Only species in GP1b, TG1b, GP2, TG2 and five species for which data were readily available were assessed.
12 Only species in GP1b, TG1b, GP2 and TG2 were assessed.

entire crop gene pools/groups because only species that are native to Europe were assessed (see Table 4) and the species that are not endemic to Europe were regionally (not globally) assessed. Further, not all species native to Europe were assessed in each genus – for the legume forages, only species listed in Annex I of the ITPGRFA were assessed and due to the large numbers of species in *Lathyrus* and *Vicia*, only species in Gene Pool (GP)1b, Taxon Group (TG)1b, GP2, TG2 (i.e., the closest wild relatives – see Maxted *et al.* 2006) were assessed[13]. However, these results provide an indication of the crop gene pools or complexes that are under greatest threat of extinction in Europe.

It is particularly notable that five of the ten species assessed in the beet gene pool are threatened – three globally and two regionally. The centre of diversity of the beet gene pool is in Europe, with ten out of the 13 species native to Europe; therefore, we know that at least 30% of the species in the gene pool are threatened with extinction. The brassica complex is also of particular concern as 27% (137) of the species are native to Europe and more than 18% (25) of these are threatened (24 globally and one regionally), with a further 5% (7) considered to be Near Threatened. The threat status of the wheat, oat and lettuce gene pools are also of considerable concern because, like beet and brassica crops, these are also highly economically important crops in Europe which have a relatively large proportion of their gene pools native to the region. Furthermore, they contain a comparatively high number of species evaluated as Data Deficient.

Since the goal of CWR conservation is to conserve the widest pool of genetic diversity as possible, we are not only interested in the percentage of threatened species per crop gene pool or complex, but also in the percentage of threatened genetic diversity. It cannot be assumed that the percentage of threatened species in a gene pool is equivalent to the percentage of threatened genetic diversity; however, in the absence of genetic data to prove otherwise, it is necessary to take the precautionary approach and assume that in percentage terms, the risk of extinction to genetic diversity at least equates to the risk of extinction to taxonomic diversity (Kell *et al.* 2011a). In fact, Maxted *et al.* (1997a) and Maxted (2003) pointed out that while it is difficult, if not impossible, to quantify the loss of genetic diversity within CWR species, it must be faster than the loss of species, because there will be some genetic erosion (loss of genetic diversity) from the species that remain extant and complete loss of genetic diversity from those that become extinct, given that both extant and extinct species face the same threats. Therefore, if we assume that genetic diversity is strongly correlated with occurrences of species at particular localities and that some of those occurrences are threatened, then we may validly infer that the percentage of threatened species in a gene pool could signify a greater level of threat to overall genetic diversity in the gene pool than to taxonomic diversity (Kell *et al.* 2011a).

Table 8. Number of assessed CWR species in the 27 current EU Member States (based only on the sample of CWR assessed and excluding species evaluated as Not Applicable).

Country	Number of CWR species assessed
Austria	123
Belgium	89
Bulgaria	226
Cyprus	140
Czech Republic	100
Denmark	53
Estonia	60
Finland	44
France	236
Germany	106
Greece	291
Hungary	125
Ireland	53
Italy	280
Latvia	55
Lithuania	60
Luxembourg	80
Malta	157
Netherlands	81
Poland	84
Portugal	191
Romania	177
Slovakia	111
Slovenia	145
Spain	283
Sweden	80
United Kingdom	77

13 An additional five species of *Vicia* were also assessed for which data were readily available.

Figure 14. Species richness of European CWR (based on the sample included in the European Red List, excluding species assessed as Not Applicable and Data Deficient)

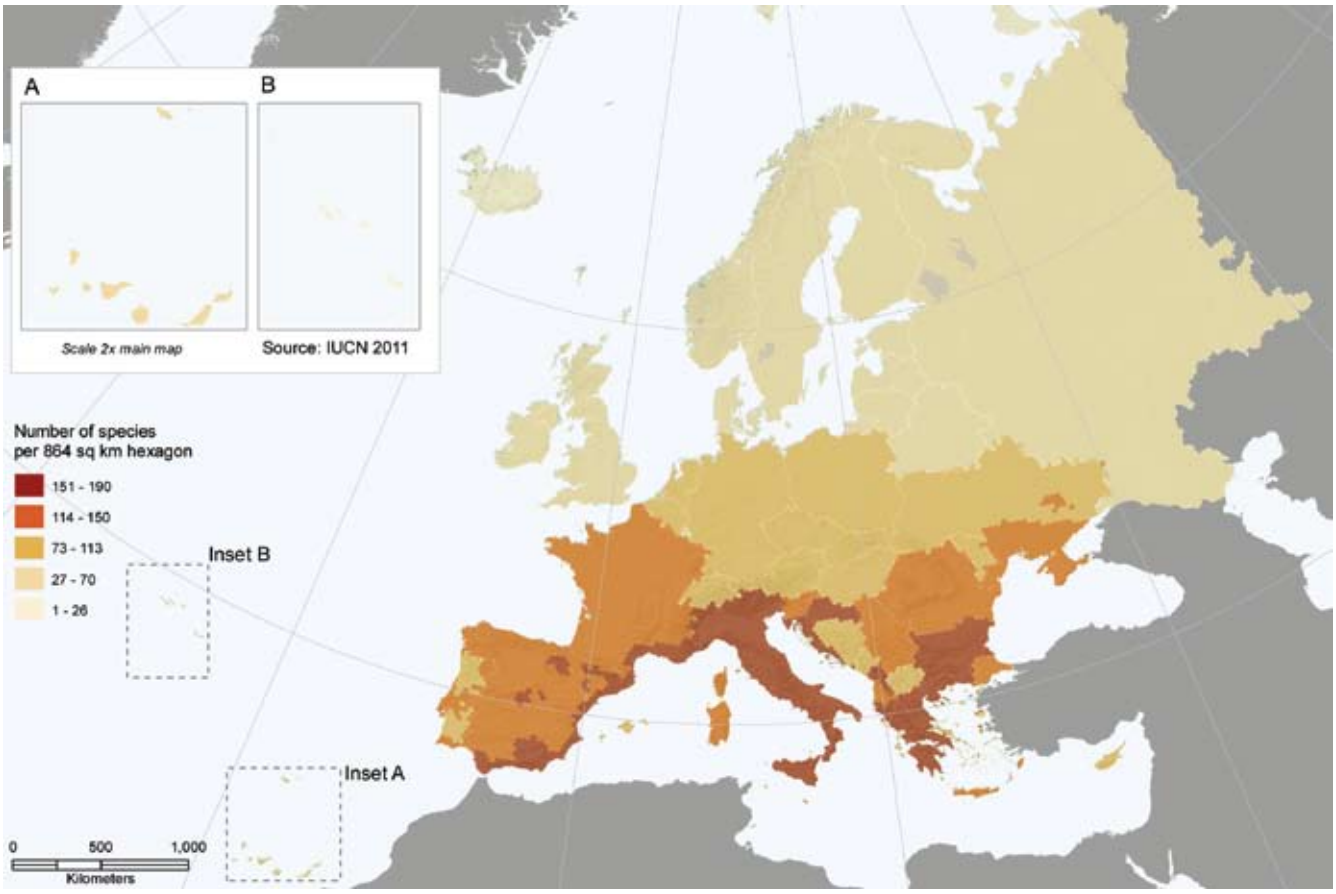
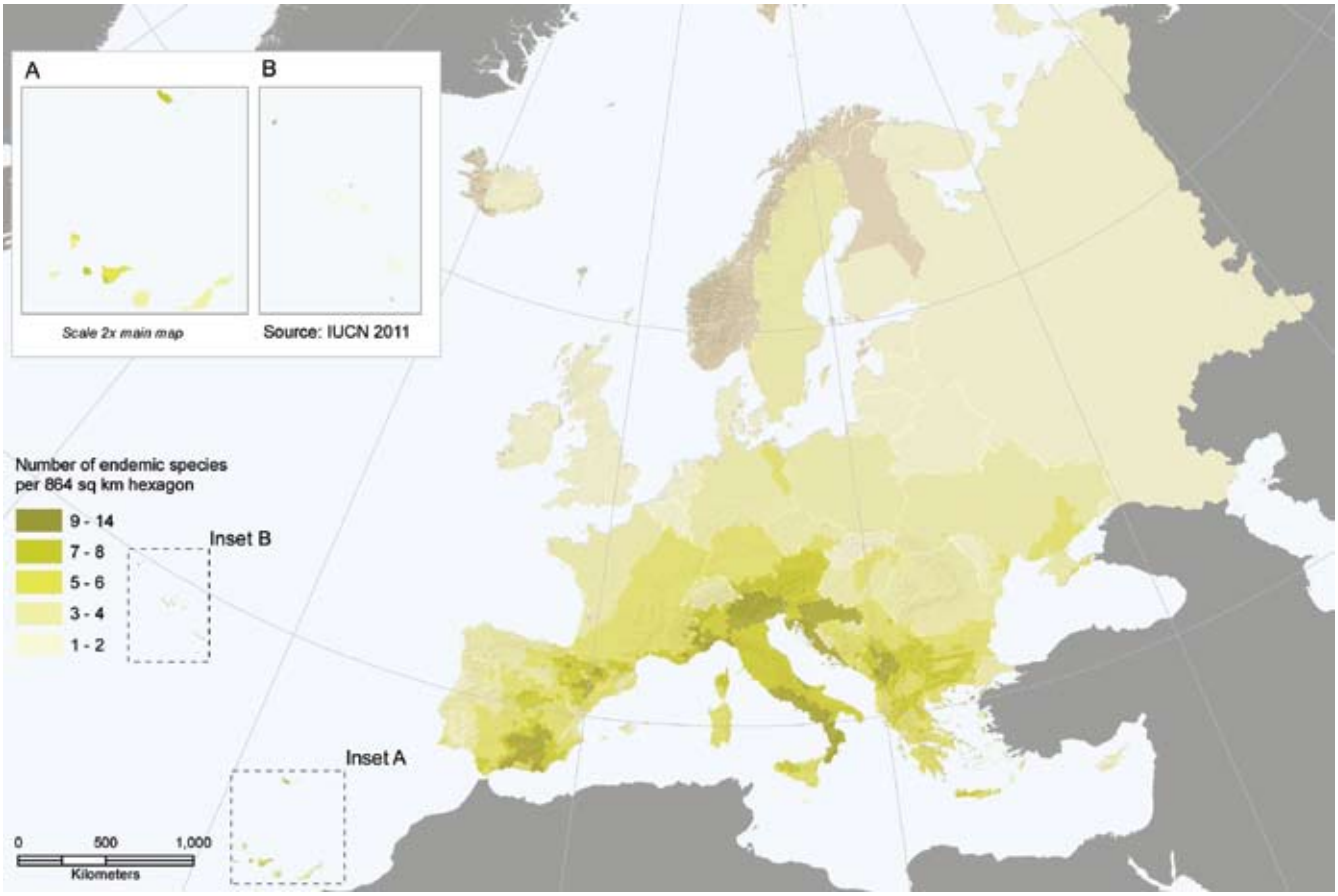


Figure 15. Species richness of European CWR endemic to Europe (based on the sample included in the European Red List, excluding species assessed as Not Applicable and Data Deficient)



4.4 Spatial distribution of species

4.4.1 Species richness

Figure 14 shows the geographic distribution of species richness of the sample of CWR assessed (excluding species evaluated as Data Deficient and Not Applicable). As expected, species richness is highest in those areas of the region that are floristically rich – the countries of southwestern and southeastern Europe. The Eastern Mediterranean was recognized as a global Centre of Crop Diversity by Vavilov (1926); therefore, it is not surprising that as indicated in Figure 14, this area has a particularly high concentration of CWR species. Species richness in the countries of the EU (including species evaluated as Data Deficient) is shown in Table 8. The top five countries in terms of species richness are: Greece, Spain, Italy, France and Bulgaria.

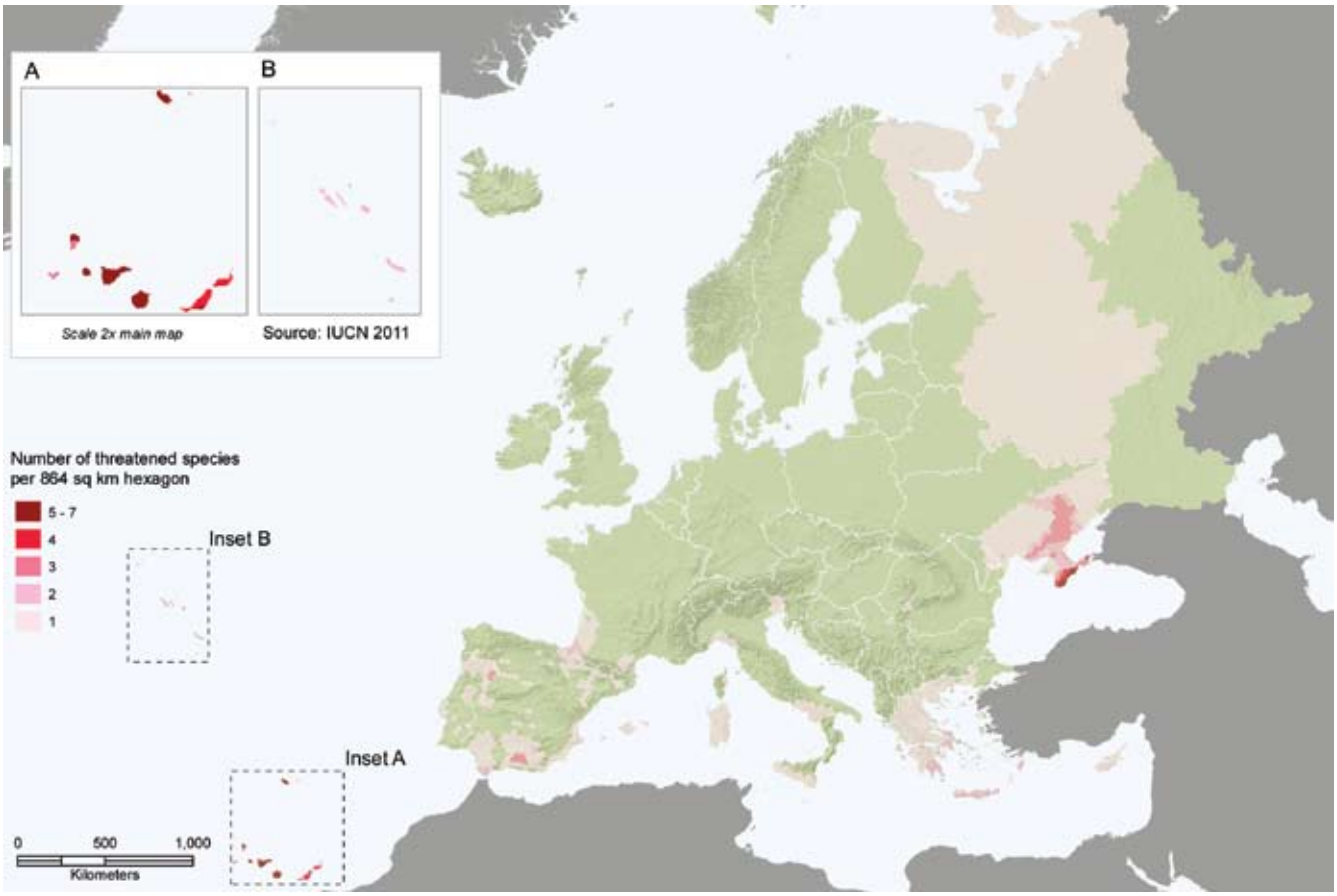
4.4.2 Endemic species richness

Figure 15 shows the numbers and distribution of the species endemic to Europe (excluding species evaluated as Data Deficient and Not Applicable). Of the sample of CWR assessed, 188 are endemic to Europe (Table 5) and of these, 119 are single country endemics. Endemism is highest in the Spanish territories (37 species), Greece (22), Italy (15) and the Portuguese territories (14). Many of these nationally endemic species occur in the Canary Islands and Balearics (Spain), Sicily (Italy) and Madeira (Portugal). Cyprus is also a hotspot of endemism of CWR species – although only six national endemics were included in this sample, the level of endemism is high taking into account the size of the country. Crimea also exhibits a high degree of endemism which is due to the geographical isolation of the land mass – the main area of diversity being on the south side of the escarpment. As is the case for other wild plant species, mountainous regions are also rich in endemic CWR species – for example, in Greece, Italy and Spain.

4.4.3 Distribution of threatened species

Figure 16 shows the distribution of threatened CWR species in the sample assessed. As might be expected, the highest numbers of threatened species are found in the countries of southern and eastern Europe which are known to have comparatively large floras and thus a large number of CWR species. It is notable that many of the

Figure 16. Distribution of threatened CWR species in Europe (based on the sample included in the European Red List)



threatened species are endemic to the Canary Islands and to the Madeira and Azores archipelagos, as well as to Sicily – this is of course no surprise, since not only do these islands have a high degree of endemism, but many island habitats are highly degraded, fragmented and fragile (Kell *et al.* 2008a).

4.5 Major threats to CWR in Europe

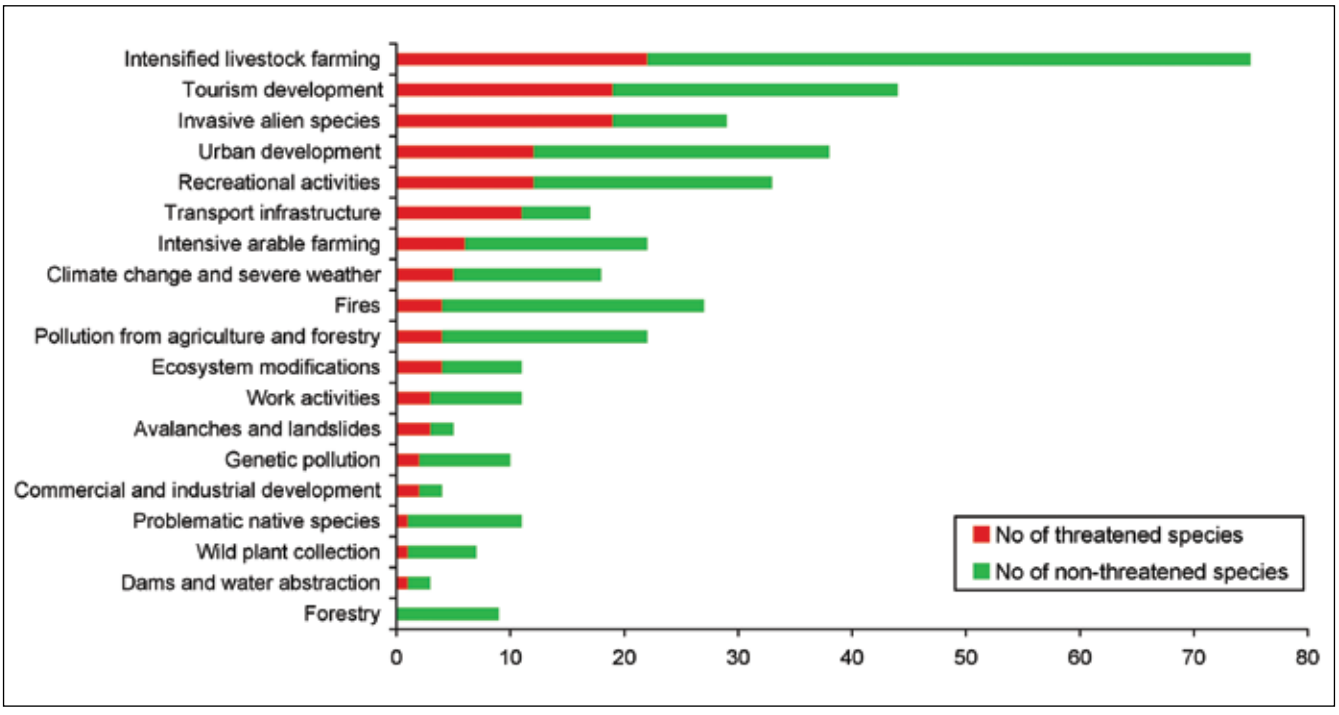
The major threats to each CWR species were coded using the IUCN Threats Classification Scheme. Threats were reported for 279 (49%) of the CWR species assessed and for 223 of these species, they were recorded to be ongoing. A summary of the relative importance of the most threatening processes is shown in Figure 17[14].

Intensified livestock farming in the form of overgrazing is indicated to have by far the greatest impact on CWR in Europe, affecting 22 out of 66 threatened species and 75 species in total. Intensive arable farming was reported as a threat to 22 species, six of which are threatened – an associated threat is the use of herbicides and pesticides which was reported for 22 species (four species were coded for both of these threats, three of which are threatened). However, we should not conclude from these results that all types of farming are threatening CWR diversity; in fact, farmed areas (including arable land and pasture) are one of the primary habitats of CWR species. It is intensive and unsustainable farming practices, such as severe overgrazing, conversion of land to monocultures and the over-use of fertilizers, herbicides and pesticides that are the major threats to CWR that grow in agricultural areas – this includes grazing in semi-natural habitats such as Mediterranean maquis (Kell *et al.* 2011a).

Development for tourism and recreation is also a major threat to European CWR, impacting 19 out of 66 threatened species and 44 species overall. This is affecting species throughout Europe but is concentrated in Greece, Ukraine, Cyprus, Portugal, Spain and Italy. Coastal development in these countries is particularly pervasive and is having a severe impact on populations that grow in coastal habitats. Housing and urban development is also a significant threat, affecting 38 species, 12 of which are threatened.

Other threats having a major impact on CWR diversity in Europe include invasive alien species (impacting nearly 29% of threatened species), recreational activities (affecting more than 18% of threatened species), transport infrastructure development (affecting

Figure 17. Major threats to CWR species in Europe



14 Based only on threats reported to be ongoing (i.e., not those that have affected the species in the past, are expected to affect them in the future or those for which the timing was reported as 'unknown').

more than 16% of threatened species), an increase in fire frequency or intensity (or sometimes also fire suppression), severe weather events, such as drought and flooding, and intensive forestry (including pollutants from forestry activities).

Although Figure 17 shows intensified livestock farming as the most widespread threat to CWR species, if the proportion of threatened to non-threatened species is considered, only 29% of CWR impacted by livestock farming are assessed as threatened. The opposite is the case for the impact of alien invasive species on CWR, where 66% of species impacted are threatened. This may lead to the conclusion that in Europe alien invasive species are a more pernicious threat to CWR species than livestock farming; however, this result has to be interpreted with care. Firstly, overall more threatened and Near Threatened species are affected by intensified livestock farming (32 species) than by invasive species (21 species). Secondly, many species are affected by more than one threat and it might be a certain combination of threats that increases the species' risk of extinction. These potential cumulative effects have not been analysed. Further, the Red List assessments are only a measure of the threatened status of species as entities (i.e., taxonomic diversity), not of intra-specific diversity. Livestock farming and indeed many of the other threats impacting CWR could be causing significant levels of genetic erosion; however, without regular and long-term monitoring of genetic diversity within and between a broad range of CWR species, we cannot make any supported assumptions.

Climate change is also a significant threatening factor for CWR species. It is predicted to increase average temperatures by 2–4°C over the next 50 years and cause considerable changes in regional and seasonal patterns of precipitation (IPCC 2007). Within Europe, Thuiller *et al.* (2005) predict that by 2080 climate change will result in a 27–42% loss of species, with potential extremes ranging from 2.5–86% loss of current floristic diversity. There have been few studies of the likely impact on CWR diversity; however, Jarvis *et al.* (2008) undertook a comparative study of three crop gene pools – *Arachis*, *Solanum* and *Vigna* – and compared current distribution

Beta patula is a primary wild relative of cultivated beets and is an important gene source for enhancing drought and virus resistance. It is endemic to two small, uninhabited islets in the Madeira archipelago – Ilhéu do Desembarcadouro and Ilhéu Chão – where it grows in dry, rocky places by the sea. It is threatened by invasive alien species, rabbit grazing and an increase in the seagull population, and is globally assessed as Critically Endangered. *B. patula* is listed in Annex II of the EU Habitats Directive and the islands on which it occurs are part of the Parque Natural da Madeira which is designated as a Special Area of Conservation (SAC) and Special Protected Area (SPA); however, special management measures are needed to ensure the survival of this species. Photograph © Brian Ford-Lloyd.



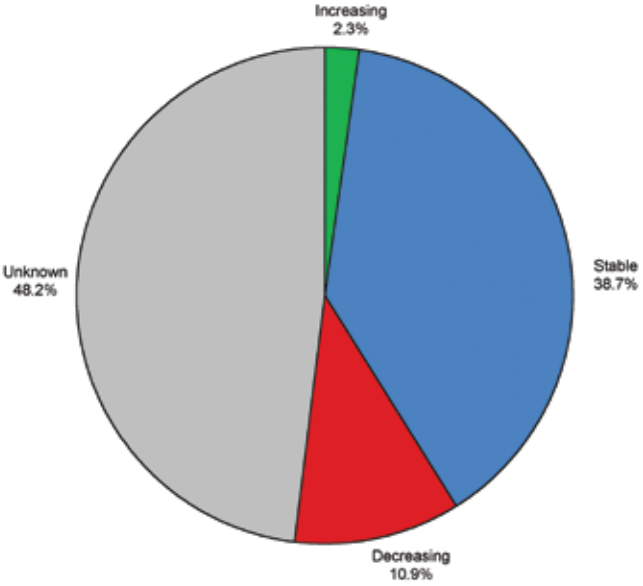
with the predicted range in 2055. Their results indicated that for the three genera, 16–22% of species would go extinct; the majority of species showed greater than 50% loss of distributional range and the range that remained was highly fragmented, placing the extant species under greater threat of genetic erosion or extinction. The loss of such a high number of species is extremely disturbing; however, the potential range decreases of 85–94% for extant *Arachis* spp. reported by the authors are also a grave concern because although it is unlikely that range loss is directly correlated to genetic diversity, range loss of this magnitude must question the viability of populations in terms of retaining sufficient genetic diversity to maintain the long-term survival of the species. Although this study was of non-European crop gene pools, it is likely that the impact on CWR diversity in Europe could be similarly catastrophic.

4.6 Population trends

At least 10.9% (62) of the species assessed are in decline, while for 38.7% (221) of the species the populations are considered to be stable and for a small percentage (13 species) they are thought to be increasing; however, the population trend for the majority of species (48.2%) is unknown (Figure 18).

Forty-eight of the 92 species assessed as threatened or Near Threatened are reported to have a decreasing population trend and 21 are thought to be stable – for 23 of these species, the population trend is unknown. It is clear that the 48 species assessed as threatened or Near Threatened with a decreasing population trend should be flagged up as an urgent priority for conservation action – particularly those endemic to Europe. Those with unknown population trends should have monitoring programmes put in place immediately and the species reported to be stable should also be closely monitored to ensure that potential changes in the trend can be reported.

Figure 18. Population trends of 571 European CWR species



Lepidium turczaninowii is a wild relative of brassica crops and garden cress, *L. sativum*. It is endemic to the surroundings of Feodosija in eastern Crimea where it grows on sea bluffs and slopes. It is ecologically sensitive as it is adapted to permanent erosion of soils, moisture deficit and open plant communities. Competition from other plant species, housing developments and slope stabilization work are its main threats and it is globally assessed as Critically Endangered. Photograph © Viktor Melnyk.



5. European aquatic plants – selection and results

5.1 Species selection

Aquatic plants provide a wide range of functions in freshwater ecosystems. They supply water with oxygen, fix atmospheric carbon, recycle nutrients, regulate water temperature and light, protect against erosion in flowing water and where the banks or margins are threatened by backwash from boat traffic (García Murillo *et al.* 2009). They also provide vital habitat and food for fish and aquatic invertebrates, which themselves support other animals and humans.

The aim of this assessment is to review the conservation condition of around 400 species of vascular plants which occur in Europe and are dependent upon standing or flowing fresh or at most slightly salty water for their survival. The main difficulty with this process was the adoption of a definition of what constitutes an "aquatic plant" which would include the target species and be unambiguous. One of the most important issues is that of obligation or tolerance. A large number of vascular plants, such as most linear-leaved pondweeds (*Potamogeton* subgenus *graminifolii*) cannot survive out of water and may be considered obligate aquatics. Conversely many species including species of dandelion (*Taraxacum*), thistle (*Cirsium*) and even brambles (*Rubus*) can tolerate even quite long submersion and may be considered facultative aquatics or not aquatic at all. Clearly it was critical to include the former but exclude the latter from this assessment. However the situation is further complicated by taxa which either germinate and initially grow under water, but flower and fruit in the air (termed "emergent") and those which are dependent upon temporary or ephemeral water bodies, often remaining dormant beneath standing water and germinating as water levels drop.

Ranunculus fluitans, an obligate aquatic with emergent flowers, R. Creuse, Indre, France. Photograph © Richard V. Lansdown.



The following definition was considered the most clear and unambiguous available: "Vascular aquatic plants are interpreted as all Pteridophytina and Spermatophytina whose photosynthetically active parts are permanently or, at least, for several months each year submerged in water or float on the surface of water" (Cook 1996). The only ambiguous element of this definition is the duration of inundation, details of which are unknown for the majority of plants. Following this definition, we consider the group of aquatic plants comprehensively assessed at European and EU 27 level.

The growth forms of aquatic vascular plants include taxa which are:

- Always completely submerged (obligate submerged aquatics) such as the naiads (Najadaceae).
- Submerged with sexually reproductive parts emergent (held above the water), such as water-fan (*Aldrovanda vesiculosa*) and the bladderworts (*Utricularia*).
- Emergent, where the roots and base of the plant are submerged, but some photosynthetic parts and sexually reproductive parts are emergent, such as most of the Cyperaceae, including sedges (*Carex*), spike-rushes (*Eleocharis*) and club-rushes (*Schoenoplectus*).
- Floating, without roots or with roots hanging in the water column, such as rigid hornwort (*Ceratophyllum demersum*), floating fern (*Salvinia natans*) and duckweeds (Lemnaceae).
- Amphibious, growing from the land over the water or adopting a variety of the above forms, such as amphibious bistort (*Persicaria amphibia*).

All obligate submerged aquatics and those with their sexually reproductive parts emergent were assessed, as were all floating plants. Most emergent or amphibious species were also included, but those which are equally capable of surviving in seasonally inundated habitats were mainly excluded to make the scale of the assessment more practical. The following taxa were also excluded from the assessment:

- Taxa known or suspected to not be native to Europe; a few cases required individual consideration, for example the decision was taken to include *Lemna turionifera* because specimens have been found from Scandinavia dating from the 1800s, however this species certainly appears to be an alien in most European countries.
- Hybrids and taxa below species level.
- Two species; *Schoenoplectus corymbosus* and *Persicaria lanigera* were considered Not Applicable because European populations represent only a very small proportion of the global population.

There are many areas of taxonomic uncertainty affecting aquatic plants, in particular, the taxonomy of *Ranunculus* subgenus *Batrachium* is very poorly elucidated and

Salvinia natans, a floating aquatic, remnant of the former Amik Gölü, Turkey. Photograph © Richard V. Lansdown.



the subject of three different concurrent treatments (Lansdown 2007). Similarly, the taxonomy of the water-chestnuts (*Trapa*) is very complex with at least 20 named taxa only one of which is widely recognised. Where the information was available, the taxonomic treatment by the World Checklist of Selected Plant Families (The Board of Trustees of the Royal Botanic Gardens, Kew 2010) was followed. In cases where genera had not yet been treated by this checklist, appropriate authorities, such as Flora Iberica (Castroviejo *et al.* 1986-2001), Flora Nordica (e.g. Jonsell, 2000) and Flora Europea (Tutin *et al.* 1964-1980) were followed. In general, Med Checklist (now included in Euro+Med Plantbase 2006-2011) was considered too iconoclastic and not sufficiently generally accepted and was not followed. The initial species list comprised 400 species but during the review process five had to be omitted for various reasons and the final list in this publication includes 395 species.

5.2 Threat status of aquatic plants

The status of aquatic plants was assessed at two regional levels: geographical Europe and the EU 27. At the European level, at least 6.6% of the species (26 species) are considered threatened with extinction, with at least 1.3% of them being Critically Endangered, 2% Endangered and 3.3% Vulnerable (Table 9 and Figures 19 and 20). A further 7.4% (29 species) are classified as Near Threatened. Within the EU 27, at least 7.2% of aquatic plants (27 species) are threatened with extinction, of which at least 1.3% are Critically Endangered, 2.4% Endangered and 3.5% Vulnerable. In addition, 8.6% (32 species) are considered

Table 9. Summary of numbers of European aquatic plant species within each category of threat

	IUCN Red List categories	No. species Europe (no. endemic species)	No. species EU 27 (no. endemic species)
	Extinct (EX)	1 (1)	0
	Extinct in the Wild (EW)	0	0
	Regionally Extinct (RE)	0	0
Threatened categories	Critically Endangered (CR)	5 (4)	5 (4)
	Endangered (EN)	8 (5)	9 (4)
	Vulnerable (VU)	13 (7)	13 (6)
	Near Threatened (NT)	29 (6)	32 (4)
	Least Concern (LC)	274 (17)	273 (11)
	Data Deficient (DD)	63 (23)	40 (5)
	Total number of species assessed	**393 (63)**	**372 (34)**

* This table does not include the Not Applicable species in Europe and/or the EU (species introduced after AD 1500 or species of marginal occurrence). For the EU 27 assessment the Not Evaluated species (species which do not occur in the EU) are also excluded.

Figure 19. Red List status of aquatic plants in Europe

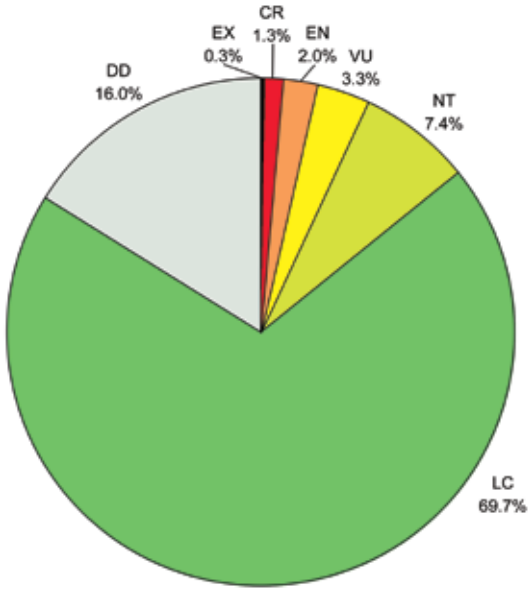
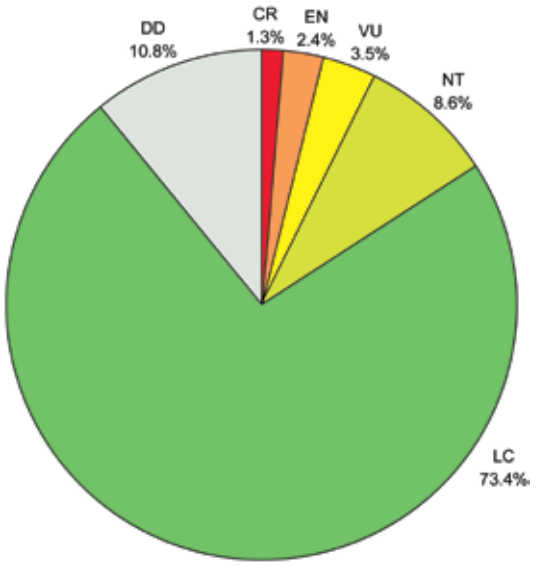


Figure 20. Red List status of aquatic plants in the EU 27



Near Threatened. One species is Extinct at the European level, the Serbian endemic *Trapa annosa*; however the taxonomy of the genus *Trapa* is far from clear and it is not certain that *T. annosa* is a good species. The Greek endemic *Isoetes heldreichii*, is listed as Critically Endangered/ Possibly Extinct as it has not been seen since 1885, in spite of searches in the type locality, however there is also a need to resolve the taxonomic status of this species, particularly in relation to populations recently found on the island of Lesvos (I. Bazos pers. comm. 2010).

Finally, it should be noted that the percentages of threatened aquatic plants mentioned above represent minimum estimates. A more realistic value may be calculated based only on the surviving species which have been assessed for their extinction risk (i.e. omitting DD and EX from the total). In this case, 7.9% of aquatic plants are threatened at European level and 8.1% at EU 27 level. The Extinct and threatened species (Critically Endangered, Endangered, and Vulnerable) at European and EU 27 level are listed in Table 10.

A temporary pool on karstic limestone which supports half of the European population of *Callitriche pulchra*, Gavdos Island, Greece Photograph © Richard V. Lansdown.



Table 10. Threatened and Extinct aquatic plants at the European and EU 27 level

Family	Species	Red List Status Europe	Red List Status EU 27	Endemic to Europe?
TRAPACEAE	*Trapa annosa*	EX	NE	Yes
CALLITRICHACEAE	*Callitriche pulchra*	CR	CR	
CRUCIFERAE	*Rorippa valdes-bermejoi*	CR	CR	Yes
ISOETACEAE	*Isoetes heldreichii*	CR	CR	Yes
ISOETACEAE	*Isoetes malinverniana*	CR	CR	Yes
UMBELLIFERAE	*Apium bermejoi*	CR	CR	Yes
CALLITRICHACEAE	*Callitriche regis-jubae*	EN	EN	
CALLITRICHACEAE	*Callitriche transvolgensis*	EN	NE	Yes
ISOETACEAE	*Isoetes boryana*	EN	EN	Yes
ISOETACEAE	*Isoetes fluitans*	EN	EN	Yes
LYTHRACEAE	*Lythrum thesioides*	EN	EN	
MARSILEACEAE	*Marsilea batardae*	EN	EN	Yes
MARSILEACEAE	*Pilularia minuta*	EN	EN	
UMBELLIFERAE	*Eryngium viviparum*	EN	EN	Yes
ALISMATACEAE	*Alisma wahlenbergii*	VU	EN	Yes
ALISMATACEAE	*Damasonium polyspermum*	VU	VU	
ALLIACEAE	*Allium schmitzii*	VU	VU	Yes
CONVOLVULACEAE	*Ipomoea sagittata*	VU	VU	
CYPERACEAE	*Cyperus cyprius*	VU	VU	Yes
ELATINACEAE	*Elatine brochonii*	VU	VU	
HYDROCHARITACEAE	*Najas flexilis*	VU	VU	
ISOETACEAE	*Isoetes azorica*	VU	VU	Yes
LENTIBULARIACEAE	*Pinguicula mundi*	VU	VU	Yes
MARSILEACEAE	*Marsilea azorica*	VU	VU	Yes
MARSILEACEAE	*Marsilea strigosa*	VU	VU	
PRIMULACEAE	*Anagallis crassifolia*	VU	VU	
UMBELLIFERAE	*Thorella verticillato-inundata*	VU	VU	Yes
HIPPURIDACEAE	*Hippuris tetraphylla*	LC	VU	
HYDROCHARITACEAE	*Najas tenuissima*	DD	EN	

5.3 Spatial distribution of species

5.3.1 Species richness

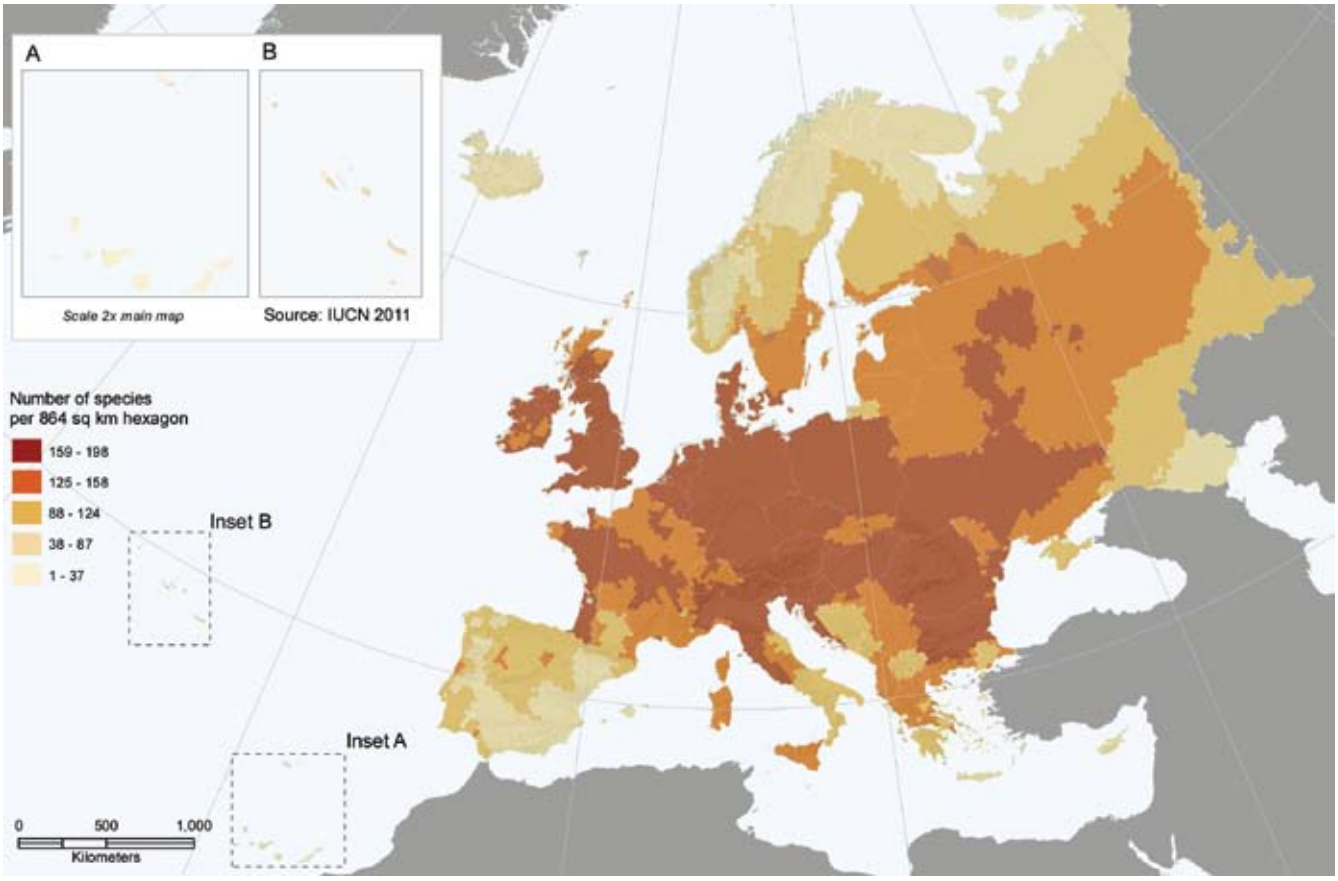
Figure 21 shows the geographic distribution of aquatic plant species across Europe; it does not include Data Deficient species although these are included in Table 11. To interpret this map it is necessary to know that detailed distribution data were available for some countries (such as Spain, France and Fennoscandia) whereas for others the only data available were presence or absence at a national level and therefore the map was created by selecting the whole country (Balkan states and Central and East Europe). This gives a false impression of a high density over very large areas in the centre and southeast of Europe.

In fact, the top five EU countries in terms of aquatic plant species richness (in descending order) are: France, Italy, Spain, Germany and Poland (Table 11). It is notable, that most aquatic plants have a very wide distribution, occurring in a large number of countries. Perhaps the most remarkable is *Potamogeton pusillus* which has an almost cosmopolitan distribution, from Europe through Russia east to eastern Russia, Japan and the Korean Peninsula, south through the Ryukyu Islands to Papua New Guinea,

Table 11. Number of aquatic plant species in the 27 current EU Member States (excluding introduced species)

Country	Total number of species
Austria	217
Belgium	203
Bulgaria	207
Cyprus	59
Czech Republic	215
Denmark	193
Estonia	161
Finland	179
France	288
Germany	244
Greece	205
Hungary	200
Ireland	181
Italy	270
Latvia	153
Lithuania	156
Luxembourg	176
Malta	66
Netherlands	202
Poland	223
Portugal	207
Romania	214
Slovakia	182
Slovenia	202
Spain	261
Sweden	210
United Kingdom	210

Figure 21. Species richness of aquatic plant species in Europe (excluding species assessed as Not Applicable and Data Deficient)



through Africa north and south of the Sahara and more or less throughout the Americas, the only places where it is absent are Australia, New Zealand and islands in the Pacific and Indian Oceans. Of the 27 EU countries only seven support fewer than 200 species and the main correlation appears to be that south of Fennoscandia, it is the size of the country that has the greatest influence over the number of aquatic species which a country supports. Of the 395 species assessed, 38 are found in only one country, of which 17 (45%) belong to genera known to have taxonomic problems; *Isoetes*, *Trapa* or *Zannichellia* many of which may, in time, be shown to simply be forms of other taxa; 24 occur in two countries; 307 (approximately three quarters) occur in five or more countries and 197 (approximately half) occur in 20 or more countries.

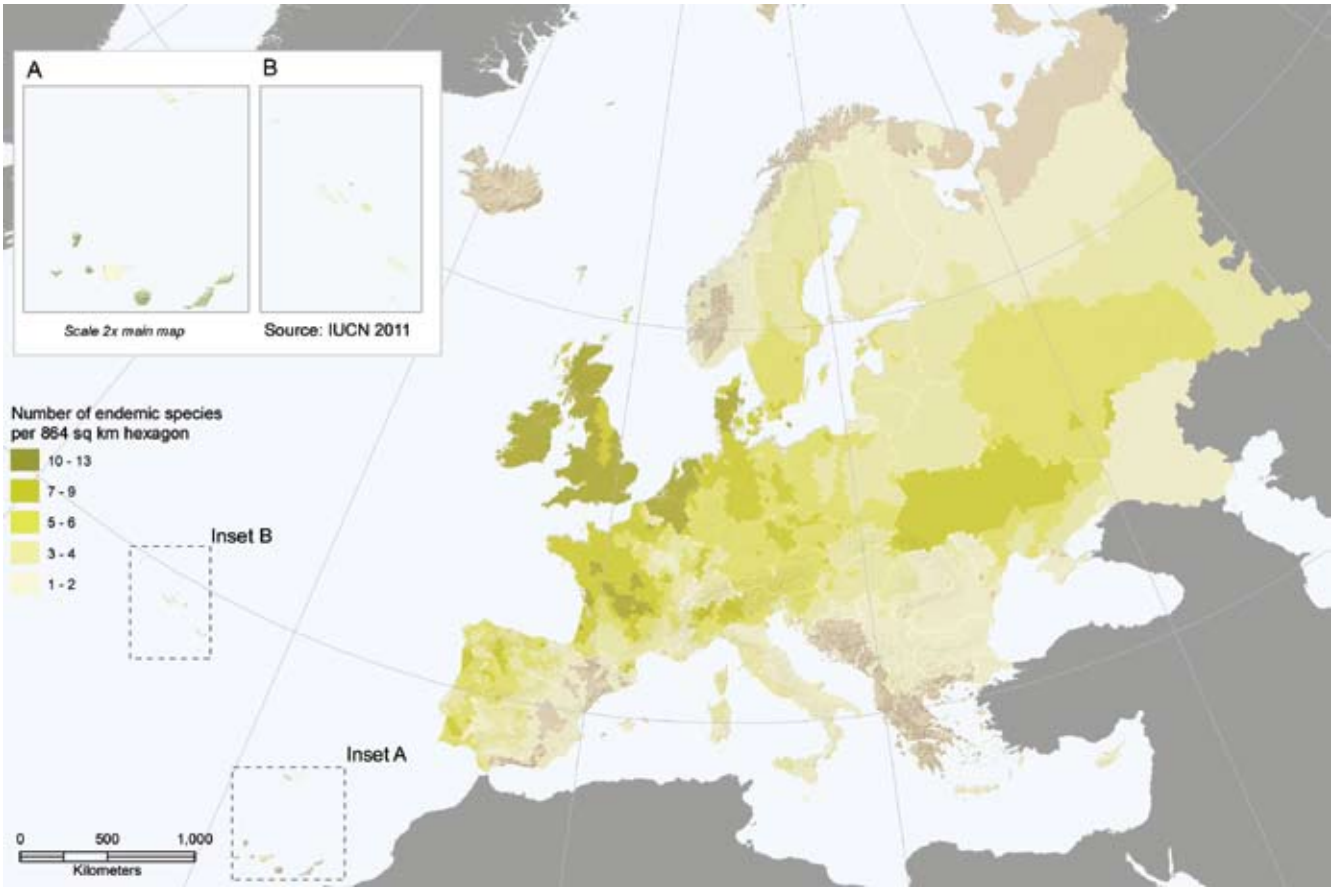
5.3.2 Endemic species richness

Figure 22 shows the distribution of endemic aquatic plant species (e.g. those that are unique to Europe and are found nowhere else in the world). The distribution of endemic plants shows that there is a high rate of endemism in the north and west of the Iberian Peninsula, central and northern France, Belgium and the Netherlands with the UK, Germany and Denmark as well as Ukraine and Russia. Regarding the size of the areas covered by endemic species, the same caveat as in Figure 21 applies.

5.3.3 Distribution of threatened species

Of the 26 threatened aquatic plant species, most are found in the Atlantic region, the Iberian Peninsula and other parts of the Mediterranean, with only a few occurring in northern countries. The importance of the Iberian Peninsula for threatened species can be seen in Figure 23. Two threatened species *Eryngium viviparum* and *Thorella verticillato-inundata* can be considered to fall within the Atlantic region. Six threatened species are endemic to the Iberian Peninsula: *Apium bermejoi*, *Rorippa valdes-bermejoi* (Critically Endangered); *Isoetes fluitans*. *Marsilea batardae* (Endangered), *Allium schmitzii* and *Pinguicula mundi* (Vulnerable). Two threatened species are endemic to the Azores: *Isoetes azorica* and *Marsilea azorica* (both Vulnerable), although it has recently been suggested that the latter is in fact *M. hirsuta*, probably introduced from Australia. Fourteen threatened species can be considered predominantly Mediterranean in distribution, of which four are mainly eastern: *Trapa annosa* (Extinct, Serbia), *Callitriche pulchra*, *Isoetes heldreichii* (Critically Endangered, Greece) and *Cyperus cyprius* (Vulnerable, Cyprus); six

Figure 22. Distribution of endemic aquatic plant species in Europe (excluding species assessed as Not Applicable and Data Deficient)



are mainly western: *Isoetes malinverniana* (Critically Endangered, Italy), *Isoetes boryana* (Endangered, France), *Elatine brochonii* (Vulnerable, France and Spain), *Anagallis crassifolia* and *Marsilea strigosa* (Vulnerable, France, Italy and the Iberian Peninsula) and three occurring more or less throughout: *Pilularia minuta* (Endangered), *Damasonium polyspermum* and *Ipomoea sagittata* (Vulnerable).

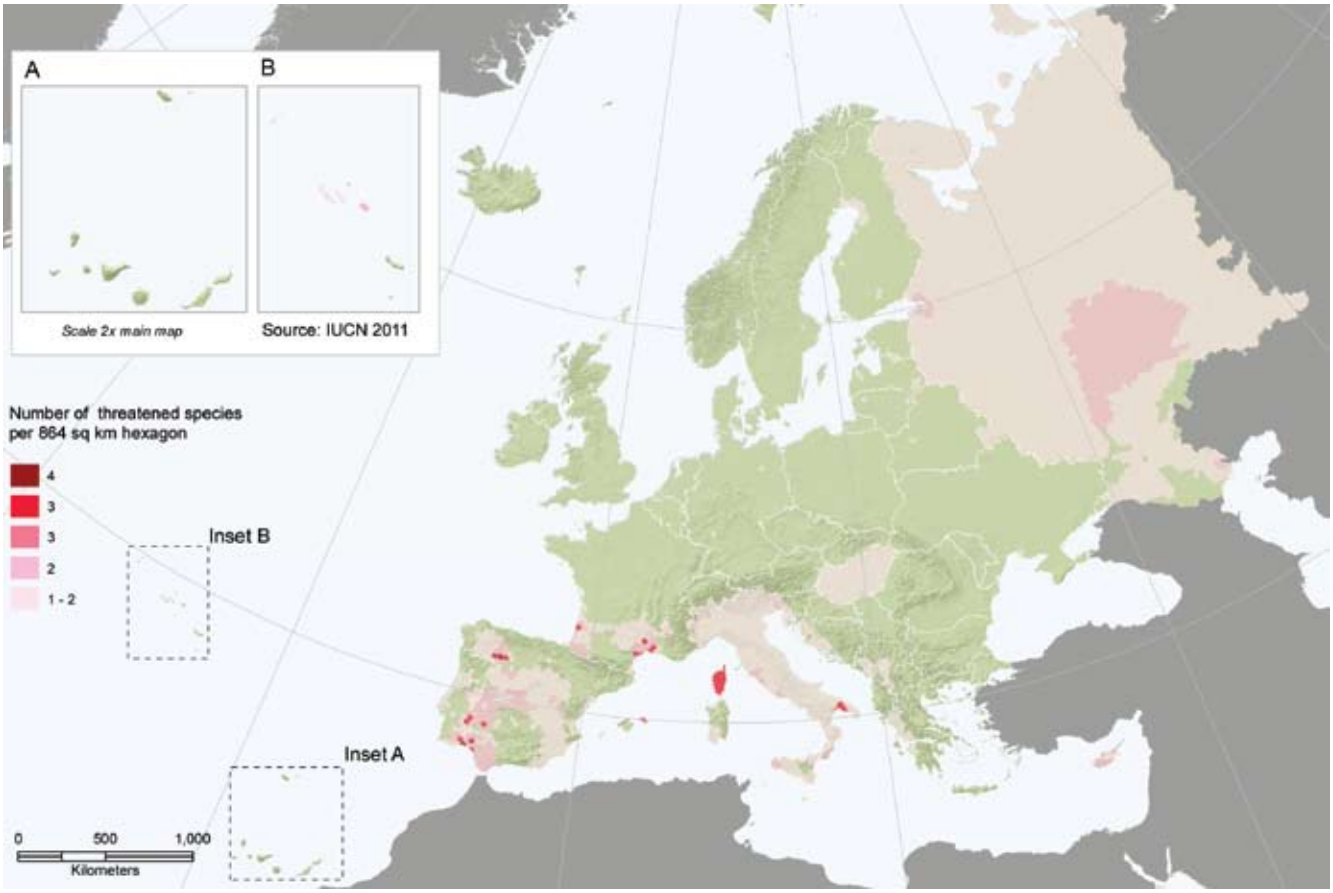
Only four threatened species have a predominantly northern distribution, *Alisma wahlenbergii* (Vulnerable in Europe, Endangered in the EU 27), *Hippuris tetraphylla* (Vulnerable in the EU 27) and *Najas tenuissima* (Vulnerable) are more or less restricted to Scandinavia and Russia, while *Najas flexilis* occurs from Ireland, east to Poland, and north through Scandinavia and Russia. *Lythrum thesioides* (Endangered) has a curious distribution, occurring in France, Italy, Hungary and Russia. It seems likely that the major gaps in its distribution must be due to under-recording or taxonomic confusion.

The concentration of threatened aquatic plants in the Iberian Peninsula and the Mediterranean is more a consequence of the combination of the high diversity of threatened plants, particularly endemic species, and the distribution of the most vulnerable habitat types, mainly ephemeral pools.

Wetland with *Schoenoplectus corymbosus*, Parque Nacional Coto de Doñana, Spain. Photograph © Richard V. Lansdown.



Figure 23. Distribution of threatened aquatic plants in Europe



5.4 Major threats to aquatic plants in Europe

The major threats to each species were coded using the IUCN Threats Classification Scheme. A summary of the relative importance of the different threatening processes is shown in Figure 24.

The biggest threat to aquatic plants in Europe is direct habitat loss; individual wetlands and parts or all of wetland complexes are still drained for development, agriculture or even pasture throughout the region. This is significant not only when it affects large wetlands and wetland complexes, but equally when it involves small superficially unimportant sites, such as seasonally inundated field corners, wet hollows in pasture and stock ponds. In the UK, for example pressure on land use has led to a general tidying up of the landscape, resulting in the loss of damp habitats in fields, seasonally wet tracks and ephemeral ponds, with a consequent decline in many species which were formerly abundant or are still abundant elsewhere, such as *Damasonium alisma*, *Limosella aquatica*, *Mentha pulegium* and *Ranunculus tripartitus*.

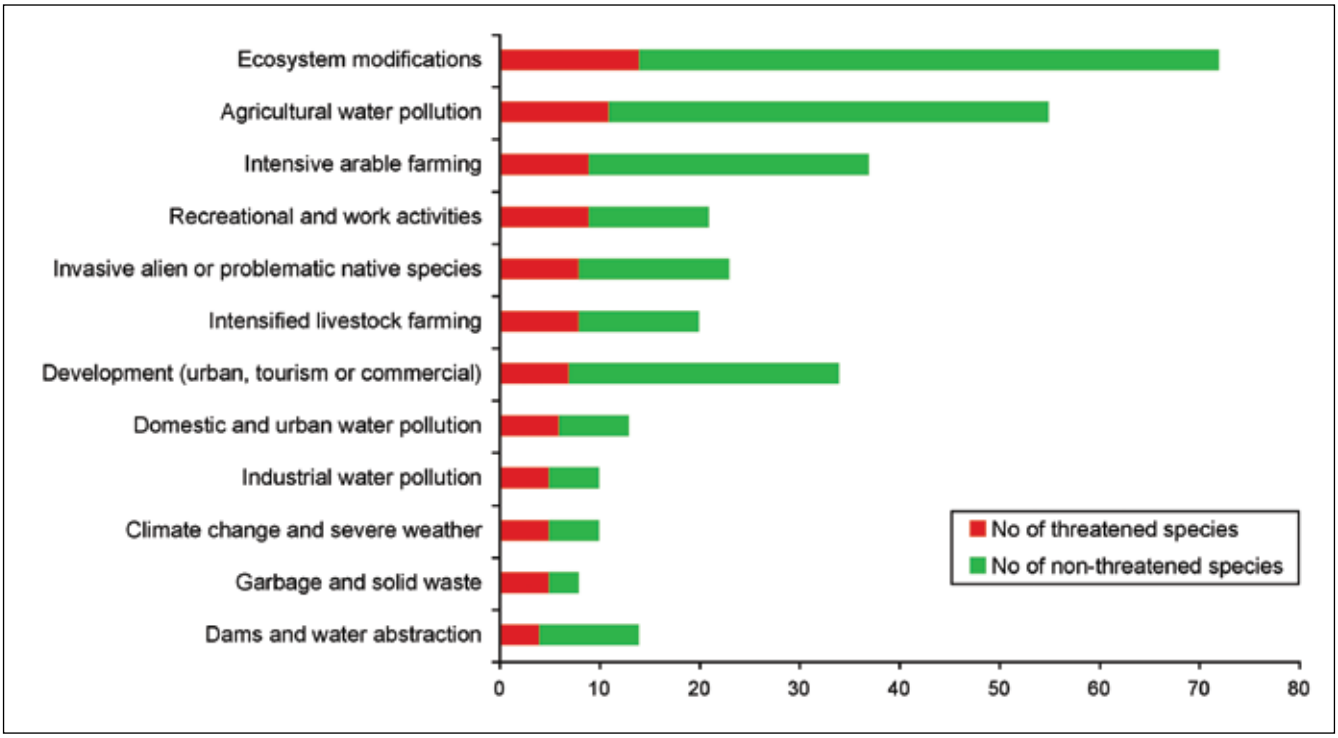
Species which do not spend their whole life cycle within the water often depend upon fluctuating water levels to supress more aggressive taxa such as the larger grasses, including *Glyceria maxima*, *Phalaris arundinacea* and *Phragmites australis*. Stabilisation of water levels which may be achieved simply by raising a bund or installing a sluice or which may involve the construction of major dams, can eradicate entire populations of these species. *Zannichellia obtusifolia* appears to be declining because water levels in some sites where it occurs are stabilised to increase the biomass to attract more hunters to the area.

Surface or groundwater abstraction can similarly have a significant adverse impact on aquatic plants, for example, *Carex cretica*, which is endemic to Crete, is threatened by the abstraction of water for irrigation. Many wetland systems, such as rivers and streams in limestone catchments, soligenous fens and naturally fluctuating

Glyceria maxima, entirely covering the margins of a large ditch, Spalding, Lincolnshire, UK. Photograph © Richard V. Lansdown.



Figure 24. Major threats to aquatic plants in Europe



meres, have level and flow regimes tied to the behaviour of the water table. Abstraction of water from the ground, both for potable supply and agricultural use, is known to affect both the levels and the periodicity of fluctuation of water tables which in turn affect the timing and quantity of supply to natural springs and seepages upon which these wetland and river plants depend. The abstraction of water from rivers and lakes leads as well to ecological change with various consequences including the decrease of surface area of flooded wetlands and the duration of flooding.

Rivers and other wetlands have been modified since humans first started to grow crops and keep livestock, from minor diversions to form stock ponds up to hard defences, channelization and damming of major rivers. In many countries, even the smallest high altitude flushes and headwaters have been modified. In the uplands of the UK, for example, sheep farmers routinely dam and divert the small streams which will eventually become our main rivers; in many areas unregulated exploitation of river gravels destroys the structure and vegetation of river floodplains. It appears likely that in much of Europe the vegetation of rivers has been in severe decline for hundreds of years and it is difficult to establish which species natural river systems would have supported.

Most wetland types are naturally highly dynamic, resulting from natural processes at the ecosystem level, e.g. seasonal and non-seasonal fluctuations of water levels, succession to other habitats, the lateral movement of rivers and the actions of large herbivores. Many aquatic and wetland plant populations appear to function as dynamic metapopulations; these populations are linked by exchange of genetic material (e.g. pollen, propagules or even plant fragments) thus increasing their resilience to natural changes in the availability of suitable habitats. Modification of wetland systems and complexes disrupts connections between populations within metapopulations by increasing the distance between patches further enhancing the probability of extinction. Fragmentation of wetland habitats also leads to the decrease in the total surface area and thus in the total size of populations, as well as the size of the remaining habitat patches which increases their vulnerability.

Aquatic plants are often sensitive to changes in their freshwater environments such as increases in nutrients, changes in salinity, pH, temperature, etc. and they may be important as indicators of ecosystem health. It is therefore not surprising that pollution is a big threat and the main cause is the use of fertilisers and herbicides or pesticides in agricultural landscapes. Nutrient levels in wetlands are increasing, through run-off from agriculture, sediment leaching in from various practices which break up the soil surface, from fish-farming and from atmospheric deposition. Whilst the evidence for direct impacts of increased nutrient loads on aquatic and wetland plants is scant, they are extremely vulnerable to the knock-on effects of increased nutrient loads, developing from an increase in productivity and the replacement of oligotrophic species (which are often rare, such as *Eryngium viviparum* and *Thorella verticillato-inundata*) by meso- and eutrophic-species including aggressive colonial perennial grasses and exotic invasive species; if enrichment continues, most higher plants disappear, displaced by algal mats, phytoplankton and eventually anoxic crises. Eutrophication of large water bodies tends to slow down or decrease in developed countries; however eutrophication of headwaters is often increasing as is use of xenobiotic pollutants such as herbicides. Pollution from domestic or industrial sources and garbage disposal is affecting the ecosystem in similar ways.

Recreational use of water bodies is another threat factor; plants can suffer from excessive trampling due to recreational activities or from work activities such as removal of vegetation while "cleaning up" water bodies. Similarly, water sports have, for example, been described as a threat to *Isoetes boryana* which grows in shallow water on the margins of large lakes

The invasion of exotic species such as *Crassula helmsii*, *Ludwigia* species and *Sagittaria subulata* leads to increased competition for space with native aquatic plants and affects most threatened aquatic plant species. Climate change and particularly an increase in droughts pose a problem for aquatic plants especially in the Mediterranean countries. The direct effect is that less suitable habitat will be available but this be aggravated by higher demand on the existing water resources in times of drought. Several consecutive dry years may also adversely affect the reproduction capacity of some species.

5.5 Population trends

In addition to the complexities of definition of aquatic plants and taxonomic issues, there are fundamental problems with attempts to quantify population trends for aquatic plants. Many, if not most aquatic plants reproduce mainly by vegetative means, either through fragmentation followed by rooting of fragments, such as water-starworts (*Callitriche*), or by turions, such as pondweeds (*Potamogeton*); they may also reproduce by self-

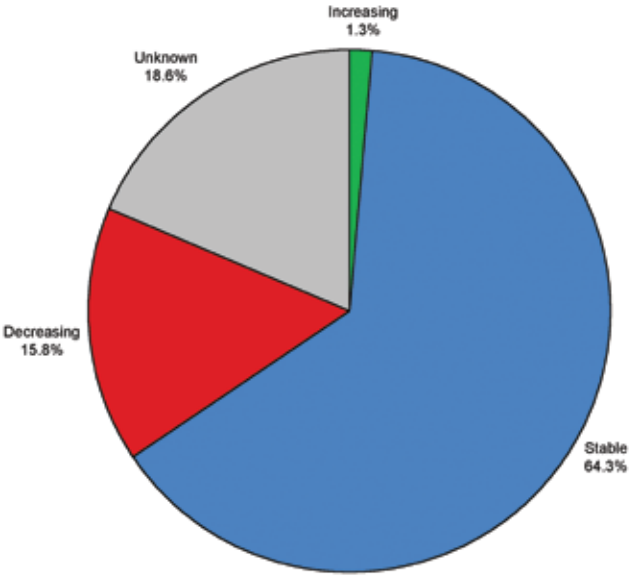
fertilisation. As a consequence many plant populations are clonal, such that the same genetic individual may extend over kilometres or even throughout entire river systems. This likelihood has been supported by the fact that all plants of some alien taxa such as nuttall's and Canadian waterweed (*Elodea nuttallii* and *E. canadensis*) in the UK are female and most derive from a very small number of introductions, but they have been capable of spreading more or less throughout the region. The capacity of plants to spread by creeping stems and stolons, combined with their capacity to spread by vegetative methods, means that it is difficult or impossible to delineate a single plant. Without this capacity it is almost impossible to assess the size of a population, let alone measure trends.

This lack of genetic variation also means that it is difficult to interpret abundance in terms of the potential survival of the species. For example, in the UK it appears likely that the population of floating water-plantain (*Luronium natans*) in the Montgomery Canal, which numbers millions of plants, is genetically identical or at least shows very low genetic diversity, in contrast, populations in natural water bodies in the Welsh mountains appear to be very genetically diverse (Kay *et al.* 1999), but they are much smaller. Without genetic data, it might be concluded that the species is not of conservation concern because of the presence of vast populations, however in genetic terms, the high altitude populations are small and highly vulnerable and represent most of the genetic diversity of the species in the UK.

For most aquatic plant taxa we lack both the numerical data that would enable trend analysis and genetic information that would enable assessment of the relative importance of different populations and so decisions on the conservation status of populations have in many cases been made simply based on the number of sites from which a taxon is recorded. There are many aquatic plant taxa in Europe which are known to be declining in some areas, but appear to be frequent in other areas. Without numerical data it has been impossible to interpret this in relation to the IUCN classes and these species are generally listed as Least Concern.

The information collected at species level shows that about 16% of the European aquatic plants are considered to be declining whereas around two thirds (64.3%) of them seem to have stable populations. A small fraction (1.3%) has an increasing population trend and the trend of about one fifth (18.6%) is unknown (Figure 25).

Figure 25. Population trends of European aquatic plants



Nymphaea candida is widespread in Europe with stable populations and is currently assessed as Least Concern. Photograph © Richard V. Lansdown.



6. Discussion

6.1 Status and population trends of European vascular plants

Three groups of vascular plant species were assessed at European and EU 27 regional level: species listed under European and international policy instruments, crop wild relatives and aquatic plants. In total, 1,826 species and subspecies have been assessed which is a sample of around 8% of the European flora. Although the selected plant groups are very different in their scope, there are similarities in the threats that they are facing. Moreover, some of the species selected belong to more than one group: 24 species are crop wild relatives listed under the Habitats Directive or Bern Convention annexes, 29 species are aquatic plants listed under the policy instruments, and five species are crop wild relatives that grow in aquatic habitats. The following discussion will look for similarities in the results but will also underline specific issues of the different groups and accentuate their specific needs.

The group of policy species comprises 891 species and subspecies in total. Not surprisingly, a high proportion of them are threatened as they have already been identified as being in need of conservation attention. At the European level, at least 44.9% (400) of the species are considered as threatened. Of those, at least 11.9% are Critically Endangered, 17.2% Endangered and 15.8% Vulnerable. A further 9.5% (85) of species are classified as Near Threatened as they are significantly declining in parts of their range and need monitoring or are conservation dependent. Within the EU 27 the proportion of threatened plants is higher with at least 47.3% of the plants (405 species) being threatened, of which at least 12.6% are Critically Endangered, 18.4% Endangered and 16.2% Vulnerable. In addition, 10.9% of species are considered as Near Threatened.

Within the CWR group, regional assessments were carried out for 591 species. At the European level, at least 11.5% (66) of the species are considered threatened, with at least 3.3% of them being Critically Endangered, 4.4% Endangered and 3.8% Vulnerable – a further 4.5% of the species are classified as Near Threatened. Within the EU 27, the percentage of threatened species is slightly lower with at least 10.5% (55) of the CWR species assessed as threatened, of which at least 3.5% are Critically Endangered, 3.3% Endangered and 3.8% Vulnerable – in addition, 4.0% of the species are considered as Near Threatened.

The assessment of 395 aquatic plants shows us that at the European level, at least 6.6% (26) of the species are considered threatened with extinction, with at least 1.3% of them being Critically Endangered, 2.0% Endangered and 3.3% Vulnerable. A further 7.4% are classified as Near Threatened. Within the EU 27 the level of threat is slightly higher as at least 7.2% of aquatic plants (27 species) are threatened, of which at least 1.3% are Critically Endangered, 2.4% Endangered and 3.5% Vulnerable. In addition, 8.6% are considered Near Threatened.

The results of the three groups above compare to the risk of extinction of other taxa assessed at European level. It is known that 44% of freshwater molluscs, 37% of freshwater fishes, 23% of amphibians, 19% of reptiles, 15% of mammals and dragonflies, 13% of birds, and 9% of butterflies are threatened, groups that have been comprehensively assessed in Europe. Additional European Red Lists assessing a selection from species groups have shown that 20% of terrestrial molluscs and 11% of the saproxylic beetles are also threatened.

The proportion of threat for the three plant groups can not be summarized in form of a percentage as they are very different in their scope. They were selected by either being listed in a policy instrument, providing a specific service to livelihoods or being defined by their ecology. Although there are species from every geographic region in Europe, the selected plant species are not a representative sample of the European flora. It will therefore not be attempted to state a percentage of threat out of all species assessed but we do know that at least 467 species are threatened with extinction at European level, with 124 being Critically Endangered, 178 Endangered and 165 Vulnerable. The total number of Near Threatened species is 135. Of the plant species assessed, 863 are endemic to Europe and of these, 408 are threatened. We have a global responsibility for the conservation of these species and the diversity they present.

Two policy species are Regionally Extinct at the EU 27 level: *Veronica euxina* and *Mandragora officinarum*. Three species are considered Extinct in Europe and globally: *Centaurea pseudoleucolepis*, *Euphrasia mendoncae* and *Viola cryana*. A further three European endemic

plant species are classed as Extinct in the Wild: the grasses *Bromus bromoideus* and *Bromus interruptus*, and *Lysimachia minoricensis*. One CWR species, *Allium jubatum*, is Regionally Extinct within Europe and the EU. Furthermore, one aquatic species is Extinct at the European and global level, the Serbian endemic *Trapa annosa*; however it is not certain that *T. annosa* is a valid species. Two aquatic plant species and 19 CWR that are of marginal occurrence in Europe were considered in this assessment, but were classed as Not Applicable.

The relatively high percentage of species assessed as Data Deficient (CWR: 29%, policy species: 20.3%, aquatic plants: 16%) is attributable to three main factors: a) insufficient knowledge of the species to apply the Red List criteria, b) difficulties in accessing data for some countries, and c) taxonomic issues. In many cases, knowledge of the species' distribution was available, but there was little, if any information about the population size, structure or trend. General knowledge about the habitats of the species, where known, could often be used to make inferences about threats to the species, but this is not enough to make a reasoned judgement about its threat status. The Data Deficient Category had to be applied to a number of species that showed declines in several countries, had been listed as threatened on national red lists, and had no evidence of a stronghold or centre of abundance anywhere. In those cases it would have been necessary to calculate an overall rate of decline within the last three generations or ten years – this type of information was simply not available and more research is needed to define the regional extinction risk of these species. Moreover, knowledge in the plant expert community in Europe extends mainly to populations within one single country and there are few botanists familiar with a species throughout its whole range. This causes two problems: firstly, data need to be collected from every national red list or other national sources and experts for each individual country need to be contacted which is complex and very time consuming. Secondly, different countries store data in different ways and national red lists do not necessarily provide more data than just the threat category and do not always follow the IUCN Red List Categories and Criteria. Data collected from each country was often so diverse that it was difficult to combine it in one assessment. Moreover, when experts where contacted via email or in a workshop, it proved difficult to review widespread species as most experts only wanted to provide a judgement at national level but were hesitant to do so for the European range of a species. It is clear that more work needs to be done to improve our knowledge of the threatened and conservation status of these species and that the network of European botanists needs to be strengthened.

Mandragora officinarum, is Regionally Extinct in the EU 27 but hosts small populations in Croatia and Bosnia and Herzegovina and is therefore assessed as Endangered in Europe. It has been used in traditional medicine and is a mythical plant that was associated with witchcraft and magic. Photograph © Michaela Wernisch.



Looking at the population trends, 38.4% of the policy species, 16.0% of the European aquatic plants and at least 10.9% of the CWR species assessed are in decline. Stable populations have been reported for 21.8% of the policy species, 38.7% of the CWR species, and nearly two thirds (64.3%) of the aquatic plants. The percentage of species that have expanding populations is very low in each of the groups. The percentage of populations with an unknown population trend is notable: no population trend could be determined for nearly half of the CWR species (48.2%), compared to more than one third of the policy species (36.7%) and nearly one fifth (18.6%) of the aquatic plants. However, policy species are more likely to be monitored and therefore more population data were available. The population trend analysis in this report was based in many cases on survey data from only a small part of the species range or on subjective assessments based on known threats or habitat decline. It must be recognised that in many cases, particularly with wetland-dependent taxa, population counts are meaningless, either because plants mainly undergo vegetative and therefore clonal reproductions, are annuals (and therefore capable of achieving populations in excess of a thousand individuals in the space of one or two generations) or because much of their growth is subterranean and it is not possible to define a single individual. In such cases we are obliged to fall back on weak definitions of populations or a measure of presence at a site. Better monitoring of the plants assessed is urgently needed, especially for those with an unknown and declining trend and those classed as threatened, Near Threatened and Data Deficient.

The results of the assessment of CWR show that a significant proportion of species are threatened with extinction and that many are also likely to become threatened in the near future unless immediate remedial action is taken. Crop complexes that are of particular concern include beet, brassicas, oat, lettuce and wheat. Although a significant proportion of the species assessed are thought to have a stable population trend, a major concern is that for almost half of the species assessed, the population trend is unknown, underlining our lack of knowledge of the status of these species in the wild. More than half of the species evaluated as threatened or Near Threatened are in decline and are therefore in urgent need of conservation attention. This loss of plant diversity can occur at both taxonomic (species) and genetic level. It is difficult, if not impossible, to quantify the loss of genetic diversity within CWR species; however, it must be faster than the loss of species, because there will be some genetic erosion from the species that remain extant and complete loss of genetic diversity from those species that become extinct (Maxted *et al.* 1997c, 2003). It therefore seems likely that virtually all CWR species are currently suffering loss of genetic diversity to varying degrees. Maxted *et al.* (1997c) estimated that 25–35% of plant genetic diversity would be lost between the ratification of the CBD in 1993 and the 2010 Biodiversity Target date. Loss of any genetic diversity means that plants may not be able to adapt to changing conditions quite so readily in the future – in a time of ecosystem instability this is a serious concern, since many of these species form the basis of our future food security. Further, in terms of the raison d'etre for singling out CWR as a specific group of plants, it is their utility to plant breeders and the maximum range of CWR genetic diversity that breeders require, so any loss of diversity impacts on their potential utility and thus their value as a natural resource.

At first sight, the level of threat in the aquatic plants group appears low, especially compared to other species groups bound to aquatic habitats. Aquatic animal species are among the most threatened in Europe with 44% of freshwater molluscs, 37% of all freshwater fish and 23% of amphibians being threatened with extinction. The main reason for the low percentage of threat in aquatic plants is that they are mostly widespread and the number of restricted endemics is low compared to the other groups. Among aquatic plants there are species that are adapted to survive periods without water – this is not the case for freshwater molluscs or fishes. Some plants are also quite mobile by using seed distribution via birds or wind. However, it is notable that the most widespread threat for freshwater species is water pollution, in particular from agriculture, although this is not necessarily the most serious threat.

6.2 Major threats to European vascular plants

Vascular plants are subject to the same threats as any other wild species, which, fundamentally, are caused by the conflict between supply and demand for natural resources (Stuart and Adams 1990). The species assessed are therefore mainly affected by loss, degradation and/or increased fragmentation of their habitats that result from unsustainable human mismanagement of the environment.

Intensified livestock farming and in particular intensive grazing activities were identified as the major threats to the policy species and CWR. Many of the species assessed require a certain level of grazing to keep the habitat open and to protect the species from the encroachment by plants that compete more aggressively for resources and light; therefore, while intensive grazing poses a major threat, a lack of grazing is also a threat to some European plant populations. This has important implications for the conservation of those species as they require careful habitat management. The second major threat to the policy species and CWR is posed by recreational activities and infrastructure development related to tourism and urbanisation. Whereas the first leads to species disturbance such as trampling and habitat degradation, the latter causes actual habitat loss. The spread of invasive alien species is the third most serious threat for those two groups. Policy plants are also seriously affected by problematic native species, often in the form of overgrazing. Collection of wild plant species is causing a loss of species and a reduction of their reproductive success, this has been identified as an important threat for the policy plants in particular. Some species are used as medicinal plants or for food, others are collected for their beauty. If species are known to become rare or threatened with extinction, it seems to increase their value for collectors and increases the pressure on those species which in the end proves detrimental to their survival.

Aquatic plants are also affected by the threats named above, but ecosystem modifications poses an overall more severe threat. Drainage and the abandonment of traditional grazing activities fall under this category. The transformation of wetland habitats into agricultural fields and an intensification of agricultural activities have severe effects on aquatic plants. Intensification is accompanied by a higher input of nutrients and pesticides which get

into water bodies as run-off and cause eutrophication. The main impacts of pollution are the secondary effects of inputs from domestic or industrial sources, which contribute to the imbalance of aquatic ecosystems.

European CWR are increasingly threatened by genetic erosion and extinction due to habitat fragmentation, over-exploitation and adverse agro-policy interventions (Maxted *et al.* 1997c, Maxted 2003); further, intensification of agricultural systems has led to the loss of prime habitats for a number of CWR species that favour disturbed habitats and are now restricted to field margins (Maxted *et al.* 2008a).

Plant populations that occur on islands are extremely vulnerable to genetic erosion because of the disruption caused by human colonization and associated biological invasions, as highlighted by Kell *et al.* (2008a) for CWR, and an additional pressure on island populations is the degradation and fragmentation of their habitats due to development for tourism and recreation, particularly in coastal areas. Island ecosystems are more vulnerable to invasion by alien species and many of the Macaronesian island species on this Red List are declining due to invasive plants or animals.

In the longer term, climate change is predicted to become a significant threatening factor to plant species – most significantly for CWR. Changes in temperature and more importantly in water availability are likely to result in alterations in species distribution and assemblages and in strong selection pressure for more adaptive genotypes (Maxted *et al.* 2008a). It is ironic that the very resources that humans may increasingly rely on for ecosystem stability and food security in the face of climate change are also severely affected by its deleterious impacts.

6.3 Protection of habitats and species in Europe

European countries and EU member states are not only signatories to the aforementioned 1979 Bern Convention on the Conservation of European Wildlife and Natural Habitats and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) but also the 1992 Convention on Biological Diversity (CBD) (UNEP 1992). In addition, many European countries and their regions afford vascular plants some form of protective species legislation.

The CBD promotes biodiversity conservation, sustainable use of its components and the equitable sharing of the benefits arising from the use of biodiversity. Specifically, in relation to plants, the Global Strategy for Plant Conservation (GSPC) (CBD 2002a) was adopted by the CBD at its sixth conference of the parties; and updated at the tenth conference. The GSPC sets targets and objectives for the period 2011-2020 (CBD 2010a) which are of direct relevance to the groups of species assessed. Notable, Target 2 demands "an assessment of the conservation status of all known plant species, as far as possible, to guide conservation action". The assessments published in the course of this project are one step to fulfill this target and will act as a baseline for the fulfillment of other targets such as Target 5 on the establishment of Important Plant Areas, and Targets 7 and 8 which deal with *in situ* and *ex situ* conservation of threatened species. Of particular relevance to CWR species is Target 9: "70 per cent of the genetic diversity of crops including their wild relatives and other socio-economically valuable plant species conserved, while respecting, preserving and maintaining associated indigenous and local knowledge" (note the explicit mention of conserving the genetic diversity of CWR species). Target 11 states "no species of wild flora endangered by international trade" and the current assessment of all European plants listed on CITES will support monitoring under this target.

The CBD 2010 Biodiversity Target (CBD 2002b), committed the parties "to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth" – a target that has not been achieved. More recently, the CBD Strategic Plan agreed in Nagoya, Japan (CBD 2010b) established a further 20 target actions. Of particular relevance are target 12: "By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained" and target 13 that stipulates: "By 2020, the loss of genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species is maintained and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity".

European countries and the EU have made the commitment to reduce (or halt) the loss of biodiversity within Europe. This means that not only should extinctions be prevented, but population declines should also be reversed and populations restored. The result of this Red List shows that this is a great challenge. The

CBD targets for 2010 were not met, but these baseline data will aid efforts to meet the new targets for 2020.

In order to coordinate the implementation of the GSPC at regional level, the European Strategy for Plant Conservation (ESPC) was adopted. The first European Strategy was developed in 2001 by Planta Europa and the Council of Europe (2001) and was valid until 2007. At the fifth Planta Europa Conference, the Strategy was reviewed and renewed and has set targets for the period 2008-2014 (Planta Europa 2008) which are aligned to the GSPC. Target 2 is again of major relevance as it requests "A preliminary assessment of the conservation status of all known plant species at national, regional and international levels". In more detail, sub-target ESPC 2.1 states that "European Red Lists produced by 2014 (review of progress in 2011), vascular plants completed by 2010." This project contributed to fulfilling the target by providing an assessment of 1,826 European plant species. It will also be of vital use for the completion of Target ESPC 7.1 "60% of species of European conservation priority plant* and fungal species, including crop wild relatives, conserved *in situ* by 2014 through the implementation of national strategies for conserving priority species (*prioritised according to their inclusion in regional and national legislation, including the EC Habitats and Species Directive, the Bern Convention and IPA programmes, and with reference to European Red Lists for all taxonomic groups as they are developed)". It furthermore provides baseline information for the achievement of Targets 8 and 11 at European level. ESPC Target 9.1 stipulates by 2014: "Establishment of 25 European crop wild relative genetic reserves covering the major hotspots of species and genetic diversity". This will involve:

- Establishing a baseline of genetic diversity for priority crop complexes of European socio-economically important wild species;
- Assessing genetic diversity change against time for these species;
- Creating a preliminary list of CWR *in situ* hotspots of species and genetic diversity at national and European levels;
- Gap analysis review of *ex situ* holdings of European CWR species;
- Preparation of a priority list of European CWR;
- Promotion of the Crop Wild Relative Information System (CWRIS) (PGR Forum 2005, Kell *et al.* 2008b, Moore *et al.* 2008).

The FAO Global Plan of Action for the Conservation and Sustainable Utilization of PGRFA (FAO 1996) and International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) (FAO 2001) both highlight the need to conserve CWR diversity. The ITPGRFA has as its objective the "conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use". Article 5 states that each contracting party shall: "Survey and inventory plant genetic resources for food and agriculture, taking into account the status and degree of variation in existing populations, including those that are of potential use and, as feasible, assess any threats to them. . . . Promote *in situ* conservation of wild crop relatives and wild plants for food production, including in protected areas". Focusing explicitly on CWR conservation and use, in 2005 the Global Strategy for CWR Conservation and Use was proposed at the First International Conference on Crop Wild Relative Conservation and Use in Agrigento, Sicily (Heywood *et al.* 2008); it established 12 objectives and associated targets that would further enhance systematic CWR conservation and use. To address these targets, along with the requirements of other relevant international, regional and national strategies and legislation, we need to be able to assess biodiversity change and threats, which for CWR requires precise knowledge of what diversity exists and to what extent it is threatened – only then can we effectively plan its conservation and sustainable exploitation.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) regulates the international trade in endangered species and is legally binding to its parties. It provides a framework for countries to establish national legislation to implement the convention. The trade for all the species listed in Appendix II should be controlled in the form of export permits and re-export certificates being required. For Europe there are only species listed under Appendix II. A total, of 157 species of which 146 belong to the orchid family have been assessed, but information on a further nine Cyclamen species is missing. More information on those species can be found in chapter 3.1.

The Bern Convention is a binding international agreement that aims to conserve wild flora and fauna and their natural habitats and to promote European cooperation towards that objective. There are 612 plant species listed on the Bern Convention and an assessment of all of them has been attempted in this project. Taxonomic changes in recent years made some of the species listed under Appendix I redundant (e.g. *Pharbitis preauxii* or *Gladiolus felicis*) and a taxonomic review of the Appendix is recommended. This project revealed that 327 species on

the list are threatened but it also showed a high number of Data Deficient species (122) which means that more field work, monitoring and data collection is needed for those plants.

6.4 Protection of habitats and species in the EU

EU nature conservation policy is based on two main pieces of legislation – the EU Birds Directive of 1979[15] and the EU Habitats Directive of 1992[16]. The main aim of this nature conservation policy is to ensure the favourable conservation status of the habitats and species found in the EU (see Box 1). One of the main tools to enhance and maintain this status is the Natura 2000 network of protected areas, which is made of sites designated and protected under both directives.

The Natura 2000 network has grown over the last 25 years and now includes more than 26,000 protected areas in all Member States combined, with a total area of around 850,000 km^2 – covering more than 17.5% of total EU land territory[17].

EU nature conservation policy also foresees the integration of its protection requirements into other EU sectoral policies such as agriculture, regional development and transport. The Habitats Directive, which aims to protect wildlife species and habitats, applies to both terrestrial and marine regions. Each Member State is required to identify sites of European importance and is encouraged to put in place a special management plan to protect them, combining long-term conservation with economic and social activities as part of a sustainable development strategy. These sites, together with those of the Birds Directive, make up the Natura 2000 network – the cornerstone of EU nature conservation policy.

The Habitats Directive contains a series of Annexes that identify habitats and species of European Community concern. Each member state is required to prepare and propose a national list of sites for evaluation in order to form a European network of sites of community importance (SCIs). Once adopted, these are designated by member states as special areas of conservation (SACs) and, along with special protection areas (SPAs) classified under the EC Birds Directive, form a network of protected areas known as Natura 2000. Species listed on Annex II require the designation of a SAC; Annex IV species are those in need of strict protection (all plant species listed in Annex II are also listed in Annex IV). Annex V lists plants that require management measures for their collection from the wild and exploitation. Appendix 2 in this publication indicates whether a plant species on this Red List is included in any of the Annexes of the Habitats Directive or Appendix I of the Bern Convention. Target 7.1a of the European Strategy for Plant Conservation deals with the updating of legislation and recommends to "Identify species which should be included on the EC Habitats and Species Directive Annexes (and identify which particular annex (II, IV, V) based on the latest results of the European Red List for vascular plants and Red Lists of other taxonomic groups by 2011)" (Planta Europa 2008). In total, 602 plant species listed in the Habitats Directive Annexes were assessed in this project. Compared to all species assessed, 149 that were identified as threatened or extinct at EU 27 level are not listed in the annexes of the Habitats Directive. Of those, 42 are CWR, 14 are aquatic plants, and two species, *Rorippa valdes-bermejoi* (CR) and *Allium schmitzii* (VU), are aquatic CWR. A total of 55 species are threatened or extinct but neither included in the Annexes of the Habitats Directive,

Box 1. Selected provisions of the EU Habitats Directive (92/43/EEC)

Article 1(i) defines the conservation status of a species as "the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations in the European territory of the Member States". It states that a species' conservation status will be taken as Favourable when:

- Population dynamics data on the species concerned suggests that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- The natural range of the species is neither being reduced nor is likely to be reduced for the considerable future; and
- There is, and probably will continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

15 Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds.
16 Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna.
17 Source: http://ec.europa.eu/environment/nature/index_en.htm, downloaded November 2009.

the Bern Convention, CITES or the EU Wildlife Trade regulation. It is notable that very few CWR of important food crops are listed in the Habitats Directive annexes – a strong indication that *in situ* CWR conservation of the most important groups is still not being adequately addressed (Kell *et al.* 2008a).

In coming years, the EU's Water Framework Directive, adopted in 2000, is expected to become a major driver for achieving sustainable water management throughout Europe. It requires that all inland and coastal waters within defined river basins shall reach a good ecological status by 2015 (i.e. that they have the biological community that would be expected in conditions of minimal anthropogenic impact). The directive includes requirements for increased monitoring of aquatic ecology by the EU Member States, and improved protection and recovery of European waterways. In particular, Member States are expected to tackle any remaining water pollution problems. It deals with surface and groundwater quality and quantity, and aims to enforce sustainable levels of water abstraction. As such, the Water Framework Directive is an important complement to the EU Habitats Directive requirements for direct species and habitats protection.

6.5 Conservation management of vascular plants in the EU

The EU's LIFE+ programme offers financial support for species and habitats conservation projects throughout the EU. In particular, LIFE+ supports the implementation of the Birds and Habitats Directives and the establishment of the Natura 2000 network. Projects involve a variety of actions including habitat restoration, site purchases, communication and awareness-raising, protected area infrastructure and conservation planning. LIFE is the EU's financial instrument supporting environmental and nature conservation projects throughout the EU as well as in some candidate, acceding and neighbouring countries.

Since 1992, LIFE has co-financed over 3,115 projects with a total budget of over €2 billion. According to the LIFE project database[18], 90 LIFE Nature projects have implemented concrete conservation actions targeting vascular plant species in the EU. The majority of these projects are aimed at habitat or site level restoration and conservation, although 10 are species specific projects, targeting 23 species of which 12 are threatened (e.g. *Abies nebrodensis* or *Viola hispida*).

Regarding the establishment of protected areas for vascular plant conservation, the identification of Important Plant Areas (IPAs)[19] plays an important role. Whilst the role of IPAs is obviously more important for countries outside of the EU, IPA data can also provide valuable information for priority setting for site conservation inside the EU 27, either by pointing out existing gaps in the current Natura 2000 network of sites (for plant species listed in Annex II of the EU Habitats Directive), or by identifying sites for threatened plant species not listed in Annex II of the EU Habitats Directive. Currently, 1,771 IPAs have been identified in 16 countries of Europe, 10 of which EU Member states (Plantlife International 2010). One of the criteria for identifying an IPA is the presence of globally or regionally threatened species (Andersson 2002) and the IUCN Global Red List as well as the European Red List are excellent references for this criterion.

Plant Micro-reserves (PMRs) are another valuable tool for conserving small populations with restricted ranges and several hundred such micro-reserves have already been set up in the EU to date (Planta Europa 2008), notably through several LIFE and LIFE+ projects.

A significant proportion of Europe's CWR are undoubtedly found in the extensive protected area network (Maxted *et al.* 2000); however, the conservation focus is usually on conserving rare and/or threatened species or the habitat itself, not on conserving the CWR or other target species found at the site (Hoyt 1988, Maxted *et al.* 2000, Cooper *et al.* 2001). Therefore, environmental trends affecting CWR populations are probably not being recorded and the necessary management measures are not being adopted (Maxted 2003). The need for active *in situ* management of CWR genetic diversity has been recognized and promoted for more than four decades (Jain 1975, Williams 1991, Maxted *et al.* 1997b, Heywood *et al.* 2008, Iriondo *et al.* 2008); however, in practical terms, relatively little has been achieved until recently, both within Europe and globally (Maxted *et al.* 2008a, Iriondo *et al.* 2008, Maxted and Kell 2009, Maxted *et al.* 2010, Hunter and Heywood 2011). The concept of genetic reserves was first proposed by Maxted *et al.* (1997b) who defined genetic reserve conservation as "the location, management and monitoring of genetic diversity

18 http://ec.europa.eu/environment/life/project/Projects/index.cfm, accessed on 2 August 2011

19 IPAs are natural or semi-natural sites exhibiting exceptional botanical richness and/or supporting an outstanding assemblage of rare, threatened and/or endemic plant species and/or vegetation of high botanical value (Plantlife International 2004).

in natural populations within defined areas designated for long-term conservation". The concept involves *in situ* conservation with active management and a long-term approach. The rationale for this type of conservation is that it is a) applicable to all plant species, b) allows for continued evolution and c) allows for multiple-taxon conservation; moreover, it conserves the genetic diversity of the target taxon in a dynamic way, as well as its habitat and all existing biotic and abiotic interactions (including humans) (Maxted *et al.* 1997b).

Genetic reserve conservation of CWR has recently been the focus of the EU-funded project, 'An integrated European *in situ* management work plan: implementing genetic reserves and on farm concepts (AEGRO[20]). This initiative has resulted in the development of a methodology for identifying priority CWR genetic reserves sites (Kell *et al.* 2011b), recommendations for the establishment of a seed network of CWR genetic reserves for high priority species in the oat, beet, brassica and sweet cherry gene pools (Parra-Quijano *et al.* 2011), as well as a set of quality standards for genetic reserve conservation of CWR (Iriondo *et al.* 2011). However, the same institutes undertaking this research cannot take direct responsibility for translating the recommended actions into policy. It will ultimately be the responsibility of the European Union member states to lobby for action to put these strategies into place, working closely with the national and European protected area and farming communities.

While *in situ* conservation is the primary means of conserving the broad range of CWR genetic diversity inherent in wild populations, *ex situ* conservation is also vital as a back-up measure, as well as for providing easy access to germplasm for characterization and evaluation and for breeders' use in crop improvement programmes (Maxted *et al.* 1997d). Of the two conservation strategies (*in situ* and *ex situ*), the highest proportion of CWR diversity is actively conserved *ex situ*; although the coverage is far from systematic and both CWR taxonomic and genetic diversity is seriously under-conserved (Maxted *et al.* 2008a, 2011). By analysing data extracted from EURISCO[21] (2010), Kell *et al.* (2011a) found that there are large gaps in the *ex situ* conservation of some of the highest priority CWR in Europe – furthermore, most species are represented by very few accessions, are reported by only one gene bank, and have been collected from only a small part of the species' range.

Information on the *ex situ* conservation of policy or aquatic plant species has not been consistently collected during this project and no comprehensive analysis can be provided here. Botanic Gardens Conservation International (BGCI) compiled a database of the most threatened plants of Europe from all available national plant red lists and other sources (Sharrock and Jones 2009). The aim of this elaborate exercise was to gain information on whether the most threatened plant species in Europe are adequately preserved *ex situ* in botanic gardens and seed bank collections. Of a total of 1,917 species and subspecies identified as threatened at European level, 42% are maintained in *ex situ* collections (Sharrock and Jones 2009). This list contains 217 of the policy species assessed in this project of which 44 do not have any *ex situ* conservation measures in place. At least all the species marked as threatened and Extinct in the Wild in this European Red List should be conserved in botanic gardens and genetic material of those species should be collected for storage in seed banks.

6.6 Extinction risk versus conservation status

The IUCN Red List Criteria classify species solely on the basis of their relative extinction risk (IUCN 2001). However, Unfavourable Conservation Status according to the EU Habitats Directive has a much broader definition. This is identified clearly in Article 1 of the Directive (see Box 1). No species meeting the IUCN Red List Criteria for one of the threatened categories at a regional level can be considered to have a Favourable conservation status in the EU. To be classified as Vulnerable (the lowest of the three IUCN threatened categories) a species must undergo a reduction in population size of at least 30% over ten years or three generations (or have a very small or small and declining population or geographic range; see the 2001 IUCN Red List Categories and Criteria version 3.1[22]). It is difficult to claim that a species experiencing a decline of this magnitude is maintaining its population, that its range is stable, and that it remains a viable component of its habitat. Crucially, however, this does not mean that the opposite is true: species that are not threatened as defined by IUCN Red List Criteria do not necessarily have a Favourable Conservation Status (BirdLife International 2004a). Guidelines issued by the European Commission on the protection of species under the Habitats Directive reinforce this message that 'the fact that a habitat or species is not threatened (i.e. not

20 http://aegro.bafz.de/
21 http://eurisco.ecpgr.org
22 http://www.iucnredlist.org/technical-documents/categories-and-criteria

faced by any direct extinction risk) does not necessarily mean that it has a favourable conservation status' (Anon. 2007).

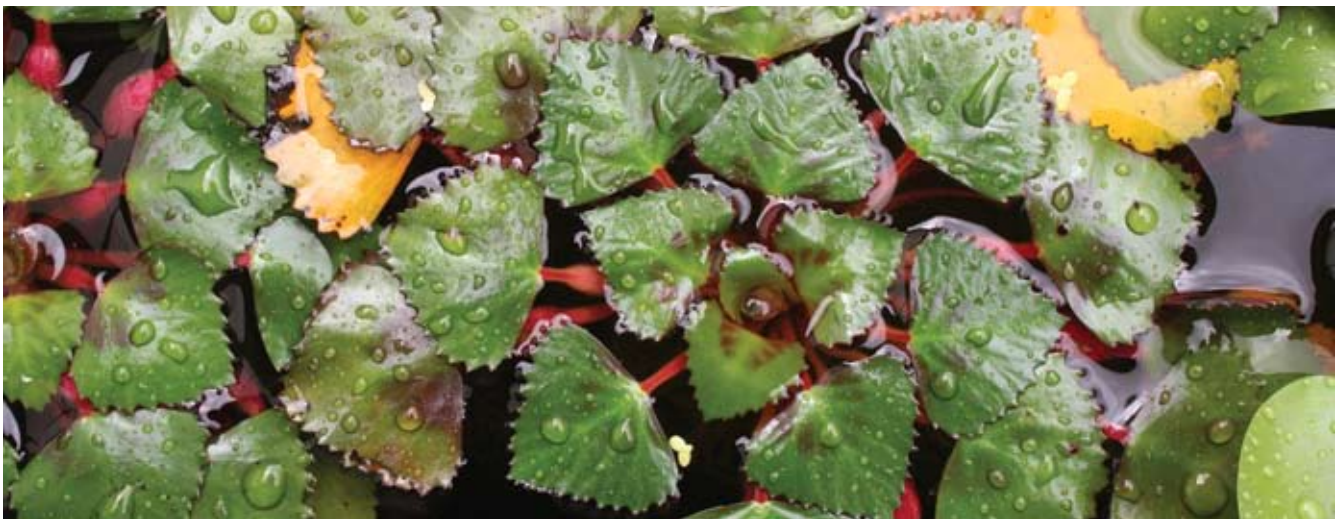
Of the vascular plants assessed 467 species were assigned a threatened category and 436 have a declining population trend. Although intensified livestock farming, recreational activities, tourism and urban development, wild plant collection, invasive alien species, natural system modification and pollution have been identified as the main causes of decline in vascular plants within the three groups assessed, the results of this assessment are not representative of the overall threat status of vascular plants in Europe. Special emphasis needs to be placed on Data Deficient species, especially as some are known to be in a critical state of decline, but the lack of information from the entire range of these species meant that a threat category could not be assigned. These species could not be regarded as having Favourable Conservation Status.

The species assessed as Least Concern should also not be ignored. If they are not already adequately conserved, both *in situ* and *ex situ*, the Least Concern assessment should be carefully interpreted as it does not necessarily mean that the species is not in need of conservation action – at minimum, population monitoring is likely to be needed. As emphasized various times in this publication, the Red List assessment does not include genetic diversity within and between subpopulations – it is based on population size and range. As the goal of CWR conservation (and indeed vascular plant conservation in general) is to maximize the conservation of genetic diversity, it is vital that sufficient subpopulations are conserved, both *in situ* and *ex situ*, to provide the best possible sample of total genetic diversity (Maxted *et al.* 2008a,b). Knowledge of the intrinsic pattern of genetic diversity is lacking for the majority of species as sampling and molecular analysis is resource intensive; therefore, it is necessary to ensure that as wide a range of ecogeographic diversity is sampled and conserved as possible – ecogeographic diversity being used as a proxy for genetic diversity (see Kell *et al.* 2011b). This means that conservation of even the most widespread species is of concern, both at regional and national levels.

6.7 Red List versus priority for conservation action

Assessment of extinction risk and setting conservation priorities are two related but different processes. Assessment of extinction risk, such as the assignment of IUCN Red List Categories, generally precedes the setting of conservation priorities. The purpose of the Red List categorization is to produce a relative estimate of the likelihood of extinction of a taxon. Setting conservation priorities, on the other hand, normally includes the assessment of extinction risk, but also takes into account other factors such as ecological, phylogenetic, historical, economical, or cultural preferences for some taxa over others, as well as the probability of success of conservation actions, availability of funds or personnel, cost-effectiveness, and legal frameworks for conservation of threatened taxa. In the context of regional risk assessments, a number of additional pieces of information are valuable for setting conservation priorities. For example, it is important to consider not only conditions within the region but also the status of the taxon from a global perspective and the proportion of the global population that occurs within the region. A decision on how these three variables, as well as other factors, are used for establishing conservation priorities is a matter for the regional authorities to determine.

Trapa natans, Water Chestnut, is an aquatic plant that was consumed widely in Europe and still is in Asia. It is protected under the Bern Convention and is listed as Near Threatened in Europe. Photograph © Richard V. Lansdown.





Greater Pasque Flower (*Pulsatilla grandis*) is a true European endemic and although classed as Least Concern for the moment it is declining in most of its range. Photograph © Dana Turoňová.

7. Recommendations

7.1 Overview and recommendations for conservation measures

This is the first step towards a European Red List of Vascular Plants, providing information on the threat status of 1,826 selected plant species. Plants are of major importance to ecosystems and livelihoods supplying the planet and humankind with essential resources such as oxygen, food and medicines. Aquatic plants are fundamental for the functioning of freshwater ecosystems. Crop wild relatives have a critical role in food security and economic stability, given the growing problem of global food insecurity resulting from climate change and other threats (as well as the global inter-dependence of nations in terms of food security). In order to improve the conservation status of European vascular plants and to halt the loss of diversity, a number of conservation measures are urgently needed. In particular:

Integrate European vascular plant conservation actions and requirements into policy and legislation

- Use this European Red List of Vascular Plants when revising relevant European, regional and national legislation, to improve the conservation status of threatened species.
- Improve policy measures to reduce the impact of habitat degradation, fragmentation and isolation, in particular related to future urban and tourism development, and to conserve wildlife habitats in Europe, especially the Common Agricultural Policy.
- Improve the integration of biodiversity and agrobiodiversity conservation activities to ensure better knowledge and implementation.

Expand the knowledge base on European vascular plants

- Conduct further research on threatened European species and ensure the adequate management of their habitats to underpin conservation programmes and identify gaps in conservation actions.
- Reassess threatened plant species regularly and when new information becomes available.
- Prioritise fieldwork and data collection for Data Deficient species to determine whether they are in need of conservation attention.
- Establish a co-ordinated system of vascular plant recording and monitoring in every European country to improve future priority assessments and assess the impact of conservation measures and future environmental change.
- Undertake research on the potential impacts of climate change, which presents a new degree of threat, in particular to food security.

Ensure that European vascular plants are appropriately conserved *in situ* and *ex situ*

- Undertake systematic gap analysis of all threatened and priority species to ensure adequate *in situ* and *ex situ* conservation of plant diversity.
- Draw up Species Action (Recovery) Plans to cover all threatened European vascular plant species.
- Improve the protection of habitats throughout Europe to include key individual sites and whole landscapes. In particular, protect and manage the network of Important Plant Areas that have been identified in European countries that are not all members of the EU 27 and integrate those sites into the Natura 2000 network, as well as coordinate the establishment of a network of CWR genetic reserves (where possible based on existing Natura 2000 sites).
- Identify specific geographical and agricultural areas within which there is a need to maintain traditional land management practices such as low intensity grazing.
- Develop adequate *ex situ* conservation as a back-up measure for threatened species by preserving them in botanic gardens or gene bank collections. Inter- and intra-specific genetic diversity should be systematically taken into account. The material collected should be accessible to plant breeders, conservationists, researchers and other non-commercial stakeholders.

Improve capacity-building and awareness

- Strengthen the network of European plant experts by providing training and improving communication, including the mobilisation of financial resources. Specialist Groups play a vital role in the plant expert network.

- Raise the profile of CWR as they are often overlooked as an element of biodiversity, ensuring that they are systematically conserved and that the conserved germplasm is made available to the user stakeholder community.

7.2 Application of project outputs

This European Red List of Vascular Plants is part of a wider project aimed at comprehensively assessing several taxonomic groups (mammals, amphibians, reptiles, freshwater fish, freshwater molluscs, dragonflies, butterflies), and selected beetles and terrestrial molluscs. In conjunction with the data on European birds published by BirdLife International (BirdLife International 2004a,b), the European Red List of Vascular Plants provides key resources for decision-makers, policy-makers, resources managers, environmental planners and NGOs. It has gathered large amounts of data on the population, ecology, habitats, threats and recommended conservation measures for each species assessed. These data are freely available on the IUCN Red List website (www.iucnredlist.org), on the European Commission website (http://ec.europa.eu/environment/nature/conservation/species/redlist) and through paper publications (see the list of European Red Lists published at the end of this report).

This Red List is a dynamic tool that will evolve with time as species are reassessed according to new information or situations. It is aimed at stimulating and supporting research, monitoring and conservation action at local, regional and international levels, especially for threatened, Near Threatened and Data Deficient species.

Each species assessment lists the major threats affecting the specific plant as well as conservation measures in place or needed. This will be useful to inform the application of conservation measures for each species. The outputs of this project can be applied to inform policy, to identify priority sites and species to include in research and monitoring programmes and to identify internationally important areas for biodiversity. It also contributes to broaden the coverage of plants on the global IUCN Red List as many species assessed during this project are endemic to the European region.

7.3 Future work

As this European Red List of Vascular Plants covers only about 8% of Europe's flora, we are only at the starting point of understanding the threat status of European plants. With potentially at least 18,000 more species to be assessed, careful planning is needed to prioritise further groups of plants. There are several possibilities to increase the coverage of the European Red List. One would be to continue identifiying groups of special interest such as medicinal plants due to their importance for human survival and potential overexploitation. Or grassland species as overgrazing and the lack of grazing have already been identfied as major threats to other plant species and because a loss of traditional land use and agricultural intensification can be observed throughout Europe. Plant species restricted to mountains might also be of interest, as they are likely to be particularly affected by climate change in the near future.

Another strategy would be to pre-identify potentially threatened species and carry out full Red List assessments of those. The list of threatened European plants compiled by BGCI (Sharrock and Jones 2009), identified 1,917 priority taxa and should be compared with the list of species in this project. Assessing those species would be an excellent addition to the current Red List as it would ensure that the most threatened species are included and the additional documentation required for a red list assessment could improve the application of adequate conservation measures for those species. Another option is the RapidList Tool which could be applied to all known plant species that have not been assessed and help identify which ones are potentially threatened and would require a full Red List assessment. There is a need to extend the application of the Red List Categories and Criteria to a greater number of CWR species in Europe as well as ephemeral wetland species and to re-evaluate the species assessed as Data Deficient in this study.

It will be difficult to identify the ideal way forward which will also be determined by available financial resources and donor interest. But funding is the key to get an overview of the state of Europe's flora and to fulfil Target 2 of the European Strategy for Plant Conservation (Planta Europa 2008).

Through the process of gathering and compiling plant data across Europe, several knowledge gaps have been identified. There are in particular significant geographical and taxonomical biases in the quality and quantity of data available on the distribution and status of species. The importance of intra-specific genetic diversity has been stressed in this report but the IUCN Red List Categories and Criteria currently have a limited application regarding the assessment of threat to genetic diversity. One possibility would be the assessment of distinct

subpopulations, something that has been practised for various animal species. Means of taking into account genetic diversity in the assessment process should be explored and developed, either to complement or extend the applicability of the existing system.

Future work should focus on strengthening the plant expert network at European level. Ressources for workshops, training, and meetings will be needed which will be beneficial in the long-term goal of conserving plant diversity. If the plant assessments are periodically updated, they will enable the changing status of these species to be tracked through time via the production of a Red List Index (Butchart *et al.* 2004, 2005, 2006, 2007). To date, this indicator has been produced for birds, mammals, amphibians and reptiles at the European regional level and has been adopted as one of the headline biodiversity indicators to monitor progress towards halting biodiversity loss in Europe by 2020 (European Environment Agency 2007). By regularly updating the data presented here we will be able to track the changing fate of European plants to 2020 and beyond.

Argyranthemum winteri, listed in Annex II of the Habitats Directive, is restricted to the Jandia Peninsula in the south of Fuerteventura. It is found at three locations only which occupy not more than 4 km^2. It is listed as Critically Endangered. Photograph © Stephan Scholz.



References

Anderson, S. 2002. *Identifying Important Plant Areas*. Plantlife International, London.

Arnell, N.W. 2004. Climate change and global water resources: SRES emissions and socio-economic scenarios. *Global Environmental Change* 14(2004): 31–52.

BirdLife International. 2004a. *Birds in Europe: population estimates, trends, and conservation status*. BirdLife International, Cambridge, UK.

BirdLife International. 2004b. *Birds in the European Union: a status assessment*. BirdLife International, Wageningen, The Netherlands.

Butchart, S.H.M, Stattersfield, A.J., Bennun, L.A., Shutes, S.M., Akcakaya, H.R., *et al*. 2004. Measuring global trends in the status of biodiversity: Red List Indices for birds. *PLoS Biology* 2: e383.

Butchart, S.H.M., Akcakaya, H.R., Chanson, J., Baillie, J.E.M., Collen, B., *et al.* 2007. Improvements to the Red List Index. *PLoS ONE* 2(1): e140. doi:10.1371/journal. pone.0000140.

Butchart, S.H.M., Akcakaya, H.R., Kennedy, E., Hilton-Taylor, C. 2006. Biodiversity indicators based on trends in conservation status: strengths of the IUCN Red List Index. *Conservation Biology* 20: 579–581.

Butchart, S.H.M., Stattersfield, A.J., Baillie, J.E.M., Bennun, L.A., Stuart, S.N., *et al*. 2005. Using Red List Indices to measure progress towards the 2010 target and beyond. *Philosophical Transactions of the Royal Society of London B* 360: 255–268.

Castroviejo, S., Aedo, C., Lainz, M., Morales, R., Muñoz Garmendia, F., Nieto Feliner, G. and Paiva, J. (eds). 1986-2001. *Flora Iberica. Plantas vasculares de la Península Ibérica e Islas Baleares.* Real Jardin Botanico, C.S.I.C., Madrid

Castroviejo, S. 2010. La flora española: una riqueza en biodiversidad de primer orden aún en exploración. El proyecto Flora Ibérica. Documentación Administrativa, 278-279: 23-38.

CBD. 2002a. *Global Strategy for Plant Conservation*. Secretariat of the Convention on Biological Diversity, Montreal, Quebec, Canada.

CBD. 2002b. *2010 Biodiversity Target*. Secretariat of the Convention on Biological Diversity, Montreal, Quebec, Canada.

CBD. 2010a. *Updated Global Strategy for Plant Conservation 2011–2020*. Secretariat of the Convention on Biological Diversity, Montreal, Quebec, Canada.

CBD. 2010b. *Strategic Plan for Biodiversity 2011–2020, including Aichi Biodiversity Targets*. Secretariat of the Convention on Biological Diversity, Montreal, Quebec, Canada.

Central Intelligence Agency. 2009. *The World Factbook*. https://www.cia.gov/library/publications/the-worldfactbook/.

CITES Secretariat. 2011. *Convention on International Trade in Endangered Species of Wild Fauna and Flora*. Available at: http://www.cites.org/ (accessed May 2011).

Conti, F., Abbate, G., Alessandrini, A., Blasi, C. 2005. *An Annotated Check-List of the Italian Vascular Flora*. Palombi Editore, Roma, Italy

Cook, C.D.K. 1996. *Aquatic and wetland plants of India*. Oxford University Press, Oxford

Cooper, H.D., Spillane, C. and Hodgkin, T. 2001. *Broadening the Genetic Base of Crop Production*. CABI Publishing, Wallingford, UK.

Council of Europe. 1979. *Convention on the Conservation of European Wildlife and Natural Habitats*. Bern, Switzerland. Available at: http://conventions.coe.int/Treaty/EN/Treaties/Html/104.htm.

Council of Europe and Planta Europa. 2001. *European Plant Conservation Strategy*. Plantlife International, Salisbury, UK.

Cox, N.A. and Temple, H.J. 2009. *European Red List of Reptiles*. Office for Official Publications of the European Communities, Luxembourg.

Cuttelod, A., García, N., Abdul Malak, D., Temple, H. & Katariya, V. 2008. The Mediterranean: a biodiversity hotspot under threat. In: J.-C. Vié, C. Hilton-Taylor and S.N. Stuart (eds). *The 2008 Review of the IUCN Red List of Threatened Species*. IUCN Gland, Switzerland.

Cuttelod, A., Seddon, M. and E. Neubert. 2011. *European Red List of Non-marine Molluscs*. Publications Office of the European Union, Luxembourg.

Dulloo, M.E., Kell, S.P. and Jones, C.G. 2002. Impact and control of invasive alien species on small islands. *International Forestry Review* 4(4): 277–285.

EURISCO Catalogue. 2010. Available at: http://eurisco.ecpgr.org/home_page/home.php. (accessed May 2011).

Euro+Med PlantBase. 2006. *Euro+Med PlantBase – the information resource for Euro-Mediterranean Plant Diversity, Version 2006*. Berlin.

Euro+Med PlantBase. 2006–2011. *Euro+Med PlantBase – the information resource for Euro-Mediterranean Plant Diversity,* Available at: http://www.emplantbase.org/home.html.

European Communities. 1995–2007. *Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora*. Available at: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm (accessed May 2011).

European Communities. 1995–2009. *Eurostat. European Commission*. Available at: http://epp.eurostat.ec.europa.eu (accessed May 2011).

European Environment Agency. 2007. *Halting the loss of biodiversity by 2010: proposal for a first set of indicators to monitor progress in Europe*. EEA Technical Report No. 11/2007.

FAO. 1996. *Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture*. Food and Agriculture Organization of the United Nations, Available at: http://www.globalplanofaction.org/ (accessed May 2011).

FAO. 1998. *The State of the World's Plant Genetic Resources for Food and Agriculture*. Food and Agriculture Organization of the United Nations, Rome, Italy

FAO. 2001. *International Treaty on Plant Genetic Resources for Food and Agriculture*. Food and Agriculture Organization of the United Nations. Available at: http://www.planttreaty.org/ (accessed May 2011).

FAO. 2008. *Climate Change and Biodiversity for Food and Agriculture*. Food and Agriculture Organization of the United Nations, Rome, Italy

FAO. 2009. *FAOSTAT*. Food and Agriculture Organization of the United Nations, Rome, Italy. Available at: http://faostat.fao.org/ (accessed May 2011).

FAO. 2010. *Second report on the State of the World's Plant Genetic Resources for Food and Agriculture*. Food and Agriculture Organization of the United Nations, Rome, Italy. Available at http://www.fao.org/agriculture/seed/sow2/en/ (accessed May 2011).

Fauna Europaea Web Service. 2004. *Fauna Europaea version 1.1.* Available at: http://www.faunaeur.org

Frankel, O. 1970. Genetic conservation of plants useful to man. *Botanical Conservation* 2: 162–169.

Freyhof, J. and Brooks, E. 2011. *European Red List of Freshwater Fishes*. Publications Office of the European Union, Luxembourg.

García Murillo, P., Fernández Zamudio, R. and Cirujano Bracamonte, S. 2009. *Habitantes del agua. Macrófitos*. Agencia Andaluza del Agua, Consejeria de Medio Ambiente, Junta de Andalucia.

Gass, T. and Thormann, I. 1999. Implementation in Europe of the Global Plan of Action for Food and Agriculture. In: Gass, T., Frese, F., Begemann, F. and Lipman, E. (compilers). *Implementation of the Global Plan of Action in Europe – Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture. Proceedings of the European Symposium, 30 June–3 July 1998, Braunschweig, Germany.* IPGRI, Rome, Italy, pp. 22–34.

Groombridge, B. and Jenkins, M.D. 2002. *World Atlas of Biodiversity*. Prepared by the UNEP World Conservation Monitoring Centre. University of California Press, Berkeley, California.

Hajjar, R. and Hodgkin, T. 2007. The use of wild relatives in crop improvement: a survey of developments over the last 20 years. *Euphytica* 156: 1–13.

Hamilton, A. and Hamilton, P. 2006. *Plant Conservation. An Ecosystem Approach.* Earthscan, London.

Hanelt, P. and IPK Gatersleben (eds). 2001. *Mansfeld's Encyclopedia of Agricultural and Horticultural Crops*. 6 vols. 1st English edition. Springer, Berlin/Heidelberg/New York, pp. 3645.

Heywood, V.H., Kell, S.P. and Maxted, N. 2008. Towards a global strategy for the conservation and use of crop wild relatives. In: Maxted, N., Ford-Lloyd, B.V., Kell, S.P., Iriondo, J.M., Dulloo, E. and Turok, J. (eds). *Crop Wild Relative Conservation and Use*. CAB International, Wallingford, UK, pp. 653–662.

Heywood, V.H. 1999. The role of botanic gardens in *ex situ* conservation of agrobiodiversity. In: Gass, T., Frese, L., Begemann, F. and Lipman, L. (compilers) *Implementation of the Global Plan of Action in Europe – Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture. Proceedings of the European Symposium, 30 June–3 July 1998, Braunschweig, Germany.* IPGRI, Rome, Italy, pp. 102–107.

Hodgkin, T. and Hajjar, R. 2008. Using crop wild relatives for crop improvement: trends and perspectives. In: Maxted, N., Ford-Lloyd, B.V., Kell, S.P., Iriondo, J., Dulloo, E. and Turok, J. (eds). *Crop Wild Relative Conservation and Use*. CABI Publishing, Wallingford, UK, pp. 535–548.

Hoyt, E. 1988. *Conserving the Wild Relatives of Crops*. IBPGR / IUCN / WWF, Rome, Italy.

Hunter, D. and Heywood, V. (eds). 2011. *Crop Wild Relatives, a Manual of In Situ Conservation.* Issues in Agricultural Biodiversity. Earthscan, London, Washington.

Invasive Species Specialist Group (ISSG). 2011. *Global Invasive Species Database*. Available at: http://www.issg.org/database

IPCC. 2007. *Fourth Assessment Report Climate Change 2007: Synthesis Report*. Intergovernmental Panel on Climate Change, Geneva, Switzerland.

IPGRI. 1993. *Diversity for Development*. International Plant Genetic Resources Institute, Rome, Italy.

IPK Gatersleben. 2003. *Mansfeld's World Database of Agricultural and Horticultural Crops*. Leibniz Institute of Plant Genetics and Crop Plant Research, Gatersleben, Germany. Available at: http://mansfeld.ipk-gatersleben.de/mansfeld/mf-inf_e.htm (accessed May 2011)

Iriondo, J.M., Maxted, N. and Dulloo, M.E. (eds). 2008. *Conserving Plant Genetic Diversity in Protected Areas*. CAB International, Wallingford, UK, pp. 212.

Iriondo, J.M., Maxted, N., Kell, S.P., Ford-Lloyd, B., Lara-Romero, C., Labokas, J. and Magos Brehm, J. 2011. Identifying quality standards for genetic reserve conservation of CWR. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds). *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford, UK.

IUCN. 2001. *IUCN Red List Categories and Criteria: Version 3.1*. IUCN Species Survival Commission. IUCN, Gland, Switzerland.

IUCN. 2003. Guidelines for application of IUCN Red List Criteria at Regional Levels: Version 3.0. IUCN Species Survival Commission. IUCN, Gland, Switzerland.

IUCN 2011. *2011 IUCN Red List of Threatened Species.* Available at: www.iucnredlist.org.

Jain, S.K. 1975. Genetic reserves. In: Frankel, O.H. and Hawkes, J.G. (eds). *Crop genetic resources for today and tomorrow*. Cambridge University Press, Cambridge, UK, pp. 379–396.

Jarvis, A., Lane, A. and Hijmans, R.J. 2008. The effect of climate change on crop wild relatives. *Agriculture, Ecosystems and Environment* 126(1): 13–23.

Jonsell, B. 2000. *Flora Nordica: Lycopodiaceae to Polygonaceae.* The Bergius Foundation, The Royal Swedish Academy of Sciences, Stockholm.

Kalkman, V.J., Boudot, J-P., Bernard, R., Conze, K-J., De Knijf, G., Dyatlova, E., Ferreira, S., Jović, M., Ott, J., Riservato E. and Sahlén, G. 2010. *European Red List of Dragonflies.* Office for Official Publications of the European Communities, Luxembourg.

Kay, Q.O.N., John, R.F. and Jones, R.A. 1999 Biology, genetic variation and conservation of *Luronium natans* (L.) Raf. in Britain and Ireland. *Watsonia* 22(4): 301-315.

Kell, S.P., Knüpffer, H., Jury, S.L., Ford-Lloyd, B.V. and Maxted, N. 2008a. Crops and wild relatives of the Euro-Mediterranean region: making and using a conservation catalogue. In: Maxted, N., Ford-Lloyd, B.V., Kell, S.P., Iriondo, J., Dulloo, E. and Turok, J. (eds). *Crop Wild Relative Conservation and Use*. CAB International, Wallingford, UK, pp. 69–109.

Kell, S.P., Knüpffer, H., Jury, S.L., Maxted, N. and Ford-Lloyd, B.V. 2005. *Catalogue of Crop Wild Relatives for Europe and the Mediterranean*. University of Birmingham, Birmingham, UK. Available at: http://www.pgrforum.org/cwris/cwris.asp and on CD-ROM.

Kell, S.P., Maxted, N. and Bilz, M. 2011a. *European crop wild relative threat assessment: knowledge gained and lessons learnt*. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds). *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford, UK.

Kell, S.P., Maxted, N., Ford-Lloyd, B.V. and Magos Brehm, J. In prep. Broadening the base, narrowing the task: setting priorities for the conservation of crop wild relative diversity.

Kell, S.P., Maxted, N., Frese, L. and Iriondo, J.M. 2011b. *In situ* conservation of crop wild relatives: a strategy for identifying priority genetic reserve sites. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds). *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford, UK.

Kell, S.P., Moore, J.D., Iriondo, J.M., Scholten, M.A., Ford – Lloyd, B.V. and Maxted, N. 2008b. CWRIS: an information management system to aid crop wild relative conservation and sustainable use. In: Maxted, N., Ford – Lloyd, B.V., Kell, S.P., Iriondo, J., Dulloo, E. and Turok, J. (eds). *Crop Wild Relative Conservation and Use.* CABI Publishing, Wallingford, UK, pp. 469–489.

Kottelat, M. and Freyhof, J. 2007. *Handbook of European freshwater fishes*. Kottelat, Cornol, Switzerland and Freyhof, Berlin, Germany.

Lansdown, R.V. 2007. *The identity of* Ranunculus *subgenus* Batrachium *in the River Itchen*. Environment Agency, Southern Region.

Mabberley, D.J. 2008. *The Plant-Book. A Portable Dictionary of the Vascular Plants*. Cambridge University Press, Cambridge, UK.

Mathew, B. 1996. *A review of* Allium *section* Allium. Royal Botanic Gardens, Kew, UK.

Maxted, N. 2003. Conserving the genetic resources of crop wild relatives in European protected areas. *Biological Conservation* 113(3): 411–417.

Maxted, N. and Kell, S. 2009. *Establishment of a Network for the* In Situ *Conservation of Crop Wild Relatives: Status and Needs*. Commission on Genetic Resources for Food and Agriculture. Food and Agriculture Organization of the United Nations, Rome, Italy, pp. 211.

Maxted, N., Tan, A., Amri, A. and Valkoun, J. 2000. *In situ* genetic conservation. In: Maxted, N. and Bennett, S. (eds). *The Plant Genetic Resources of Legumes in the Mediterranean*. Kluwer, Dordrecht, pp. 292–310.

Maxted, N., Ford-Lloyd, B. and Hawkes, J. (eds). 1997a. *Plant Genetic Conservation: The* In Situ *Approach*. Chapman and Hall, London, UK.

Maxted, N., Ford-Lloyd, B.V. and Kell, S.P. 2008a. Crop wild relatives: establishing the context. In: Maxted, N., Ford – Lloyd, B.V., Kell, S.P., Iriondo, J., Dulloo, E. and Turok, J. (eds). *Crop Wild Relative Conservation and Use*. CAB International, Wallingford, UK, pp. 3–30.

Maxted, N., Ford-Lloyd, B.V., and Hawkes, J.G. 1997d. Complementary conservation strategies. In: Maxted, N., Ford-Lloyd, B.V. and Hawkes, J.G. (eds). *Plant genetic conservation: the* in situ *approach*. Chapman and Hall, London, UK, pp. 15–39.

Maxted, N., Ford-Lloyd, B.V., Jury, S.L., Kell, S.P. and Scholten, M.A. 2006. Towards a definition of a crop wild relative. *Biodiversity and Conservation* 15(8): 2673–2685.

Maxted, N., Hawkes, J.G., Ford-Lloyd, B.V. and Williams, J.T. 1997b. A practical model for *in situ* genetic conservation. In: Maxted, N., Ford-Lloyd, B.V. and Hawkes, J.G. (eds). *Plant genetic conservation: the* in situ *approach*. Chapman and Hall, London, UK, pp. 339–367.

Maxted, N., Hawkes, J.G., Guarino, L. and Sawkins, M. 1997c. The selection of taxa for plant genetic conservation. *Genetic Resources and Crop Evolution* 44: 337–348.

Maxted, N., Iriondo, J.M., Dulloo, M.E and Lane, A. 2008b. Introduction: the integration of PGR conservation with protected area management. In: Iriondo, J.M., Maxted, N. and Dulloo, M.E. (eds). *Conserving Plant Genetic Diversity in Protected Areas*. CAB International, Wallingford, UK, pp. 1–22.

Maxted, N., Kell, S. and Magos Brehm, J. 2011. Options to promote food security: on-farm management and in situ conservation of plant genetic resources for food and agriculture. Food and Agriculture Organization of the United Nations, Rome, Italy.

Maxted, N., Kell, S., Ford-Lloyd, B. and Stolten, S. 2010. Food stores: protected areas conserving crop wild relatives and securing future food stocks. In: Stolten, S. and Dudley, N. (eds). *Arguments for Protected Areas: Multiple Benefits for Conservation and Use*. Earthscan, London and Washington DC, pp. 53–69.

Meilleur, B.A. and Hodgkin, T. 2004. *In situ* conservation of crop wild relatives. *Biodiversity and Conservation* 13: 663–684.

Mittermeier, R.A., Robles Gil, P., Hoffmann, M., Pilgrim, J., Brooks, T., Mittermeier, C.G., Lamoreux, J. and Fonseca, G.A.B. 2004. *Hotspots Revisited: Earth's Biologically Richest and Most Endangered Terrestrial Ecoregions.* CEMEX, Conservation International and Agrupación Sierra Madre, Mexico City.

Moore, J.D., Kell, S.P., Maxted, N., Iriondo, J.M. and Ford-Lloyd, B.V. 2008. CWRML: representing crop wild relative conservation and use data in XML. *BMC Bioinformatics* 9: 116. doi:10.1186/1471-2105-9-116.

Nieto, A. and Alexander, K.N.A. 2009. *European Red List of Saproxylic Beetles*. Office for Official Publications of the European Communities, Luxembourg.

Parra-Quijano, M., Iriondo, J.M., Frese, L. and Torres, E. 2011. Spatial and ecogeographic approaches for selecting genetic reserves. In: Maxted, N., Dulloo, M.E., Ford-Lloyd, B.V., Frese, L., Iriondo, J.M. and Pinheiro de Carvalho, M.A.A. (eds). *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford, UK.

PGR Forum. 2005. *Crop Wild Relative Information System (CWRIS)*. University of Birmingham, Birmingham, UK. Available at: http://www.pgrforum.org/cwris/cwris.asp (accessed May 2011).

Phillips, O.L. and Meilleur, B. 1998. Usefulness and economic potential of the rare plants of the United States: a status survey. *Economic Botany* 52(1): 57–67.

Pimentel, D., Wilson, C., McCullum, C., Huang, R., Dwen, P., Flack, J., Tran, Q., Saltman, T. and Cliff. B. 1997. Economic and environmental benefits of biodiversity. *BioScience* 47: 747–757.

Planta Europa. 2008. *A Sustainable Future for Europe; the European Strategy for Plant Conservation 2008–2014*. Plantlife International, Salisbury, UK and the Council of Europe, Strasbourg, France.

Plantlife International. 2004. Identifying and Protecting the World's Most Important Plant Areas: A Guide to Implementing Target 5 of the Global Strategy for Plant Conservation. Plantlife International, Salisbury, UK. Available at http://www.plantlife.org.uk/publications/

identifying_and_protecting_the_worlds_most_important_plant_areas/ (accessed May 2011).

Plantlife International. 2010. Important Plant Areas in Europe (2002-2010). Priority sites for plants and people. Plantlife International, Salisbury, UK.

Prescott-Allen, R. and Prescott Allen, C. 1986. *The first resource: wild species in the North American economy*. Yale University, New Haven, USA.

Sharrock, S. and Jones, M. 2009. *Conserving Europe's threatened plants: Progress towards Target 8 of the Global Strategy for Plant Conservation.* Botanic Gardens Conservation International, Richmond, UK.

Stolton, S., Maxted, N., Ford-Lloyd, B., Kell, S.P. and Dudley, N. 2006. *Food Stores: Using Protected Areas to Secure Crop Genetic Diversity*. WWF Arguments for protection series. WWF, Gland, Switzerland.

Strid, A. and Tan, K. (eds). 1997. *Flora Hellenica. Volume 1.* Koeltz Scientific Books, Königstein, Germany.

Stuart, S.N. and Adams, R.J. 1990. Biodiversity in Sub-Saharan Africa and its Islands: Conservation, Management and Sustainable Use. IUCN, Gland, Switzerland.

Temple, H.J. and Cox, N.A. 2009. *European Red List of Amphibians*. Office for Official Publications of the European Communities, Luxembourg.

Temple, H.J. and Terry, A. 2007. *The status and distribution of European mammals*. Office for Official Publications of the European Communities, Luxembourg.

Temple, H.J. and Terry, A. 2009. European Mammals: Status, trends and conservation priorities. *Folia Zoologica* 58: 248-269.

The Board of Trustees of the Royal Botanic Gardens, Kew. 2010. *World Checklist of Selected Plant Families*. Available at: http://www.kew.org/wcsp/.

The Plant List. 2010-2011. *The Plant List. Version 1.* Royal Botanic Gardens, Kew, UK and Missouri Botanical Garden, USA. Available at: http://www.theplantlist.org/.

Thuiller, T., Lavorel, S., Araújo, M.B., Sykes M.T. and Prentice, I.C. 2005. Climate change threats to plant diversity in Europe. *Proceedings of the National Academy of Sciences of the United States of America* 102(23): 8245–8250.

Tutin, T.G., Heywood, V.H., Burges, N.A., Valentine, D.H., Walters, S.M. and Webb, D.A. (eds). 1964-1980. *Flora Europaea*. Cambridge University Press, Cambridge, UK.

UNEP. 1992. *Convention on Biological Diversity*. Secretariat of the Convention on Biological Diversity, Montreal, Quebec, Canada.

USDA, ARS, National Genetic Resources Program. 2009. *Germplasm Resources Information Network – (GRIN)* [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. Available at: http://www.ars-grin.gov/cgi-bin/npgs/html/wep.pl?language=en&chapter=econ1 (accessed May 2011)

van Swaay, C., Cuttelod, A., Collins, S., Maes, D., López Munguira, M., Šašić, M., Settele, J., Verovnik, R., Verstrael, T., Warren, M., Wiemers, M. and Wynhoff, I. 2010. *European Red List of Butterflies*. Office for Official Publications of the European Communities, Luxembourg.

Vavilov, N.I. 1926. Studies on the origin of cultivated plants. *Bulletin of Applied Botany, Genetics and Plant Breeding* 16: 1–248.

Walter, K.S. and Gillett, H.J. (eds). 1998. *1997 IUCN Red List of Threatened Plants*. Compiled by the World Conservation Monitoring Centre. IUCN – The World Conservation Union, Gland, Switzerland and Cambridge, UK, pp. 862.

Williams, J.T. 1991. The time has come to clarify and implement strategies for plant conservation. *Diversity* 7: 37–39.

WWF and IUCN. 1994. Centres of plant diversity. A guide and strategy for their conservation. Volume 1. Europe, Africa, South West Asia and the Middle East. IUCN Publications Unit, Cambridge, UK.

WWF. 2007. Europe 2007: Gross Domestic Product and Ecological Footprint. World Wide Fund for Nature.

Appendix 1. Threatened and extinct policy plants at the European and EU 27 level

Family	Species	Red List Status		Endemic to Europe?
		Europe	EU 27	
COMPOSITAE	*Centaurea pseudoleucolepis*	EX	NE	Yes
SCROPHULARIACEAE	*Euphrasia mendoncae*	EX	EX	Yes
VIOLACEAE	*Viola cryana*	EX	EX	Yes
GRAMINEAE	*Bromus bromoideus*	EW	EW	Yes
GRAMINEAE	*Bromus interruptus*	EW	EW	Yes
PRIMULACEAE	*Lysimachia minoricensis*	EW	EW	Yes
PINACEAE	*Abies nebrodensis*	CR	CR	Yes
CRASSULACEAE	*Aichryson dumosum*	CR	CR	Yes
COMPOSITAE	*Andryala crithmifolia*	CR	CR	Yes
COMPOSITAE	*Anthemis glaberrima*	CR	CR	Yes
SCROPHULARIACEAE	*Antirrhinum charidemi*	CR	CR	Yes
UMBELLIFERAE	*Apium bermejoi*	CR	CR	Yes
CRUCIFERAE	*Arabis kennedyae*	CR	CR	Yes
CARYOPHYLLACEAE	*Arenaria nevadensis*	CR	CR	Yes
COMPOSITAE	*Argyranthemum winteri*	CR	CR	Yes
PLUMBAGINACEAE	*Armeria berlengensis*	CR	CR	Yes
PLUMBAGINACEAE	*Armeria helodes*	CR	CR	Yes
COMPOSITAE	*Artemisia insipida*	CR	CR	Yes
LEGUMINOSAE	*Astragalus macrocarpus* ssp. *lefkarensis*	CR	CR	Yes
LEGUMINOSAE	*Astragalus maritimus*	CR	CR	Yes
LEGUMINOSAE	*Astragalus tremolsianus*	CR	CR	Yes
LEGUMINOSAE	*Astragalus verrucosus*	CR	CR	Yes
UMBELLIFERAE	*Athamanta cortiana*	CR	CR	Yes
ROSACEAE	*Bencomia brachystachya*	CR	CR	Yes
ROSACEAE	*Bencomia sphaerocarpa*	CR	CR	Yes
CHENOPODIACEAE	*Beta patula*	CR	CR	Yes
DIOSCOREACEAE	*Borderea chouardii*	CR	CR	Yes
CRUCIFERAE	*Brassica macrocarpa*	CR	CR	Yes
UMBELLIFERAE	*Bupleurum dianthifolium*	CR	CR	Yes
UMBELLIFERAE	*Bupleurum kakiskalae*	CR	CR	Yes
CAMPANULACEAE	*Campanula bohemica* ssp. *gelida*	CR	CR	Yes
COMPOSITAE	*Centaurea akamantis*	CR	CR	Yes
COMPOSITAE	*Centaurea heldreichii*	CR	CR	Yes
COMPOSITAE	*Cheirolophus crassifolius*	CR	CR	Yes
COMPOSITAE	*Cheirolophus duranii*	CR	CR	Yes
COMPOSITAE	*Cheirolophus metlesicsii*	CR	CR	Yes
COMPOSITAE	*Cheirolophus santos-abreui*	CR	CR	Yes
RANUNCULACEAE	*Consolida samia*	CR	CR	Yes
CONVOLVULACEAE	*Convolvulus argyrothamnos*	CR	CR	Yes
CRUCIFERAE	*Coronopus navasii*	CR	CR	Yes
CRUCIFERAE	*Crambe sventenii*	CR	CR	Yes

Family	Species	Red List Status		Endemic to Europe?
		Europe	EU 27	
CHENOPODIACEAE	*Cremnophyton lanfrancoi*	CR	CR	Yes
LEGUMINOSAE	*Cytisus aeolicus*	CR	CR	Yes
RANUNCULACEAE	*Delphinium caseyi*	CR	CR	Yes
CRUCIFERAE	*Diplotaxis siettiana*	CR	CR	Yes
CRUCIFERAE	*Diplotaxis vicentina*	CR	CR	Yes
BORAGINACEAE	*Echium handiense*	CR	CR	Yes
ORCHIDACEAE	*Epipactis condensata*	CR	CR	
GERANIACEAE	*Erodium astragaloides*	CR	CR	Yes
CRUCIFERAE	*Erucastrum palustre*	CR	CR	Yes
EUPHORBIACEAE	*Euphorbia margalidiana*	CR	CR	Yes
EUPHORBIACEAE	*Euphorbia stygiana*	CR	CR	Yes
GERANIACEAE	*Geranium maderense*	CR	CR	Yes
GLOBULARIACEAE	*Globularia ascanii*	CR	CR	Yes
ORCHIDACEAE	*Goodyera macrophylla*	CR	CR	Yes
CISTACEAE	*Helianthemum bystropogophyllum*	CR	CR	Yes
CISTACEAE	*Helianthemum teneriffae*	CR	CR	Yes
COMPOSITAE	*Helichrysum melitense*	CR	CR	Yes
COMPOSITAE	*Hypochaeris oligocephala*	CR	CR	Yes
IRIDACEAE	*Iris boissieri*	CR	CR	Yes
ISOETACEAE	*Isoetes malinverniana*	CR	CR	Yes
SCROPHULARIACEAE	*Isoplexis chalcantha*	CR	CR	Yes
OLEACEAE	*Jasminum azoricum*	CR	CR	Yes
COMPOSITAE	*Jurinea fontqueri*	CR	CR	Yes
SANTALACEAE	*Kunkeliella psilotoclada*	CR (PE)	CR (PE)	Yes
SANTALACEAE	*Kunkeliella subsucculenta*	CR	CR	Yes
COMPOSITAE	*Lamyropsis microcephala*	CR	CR	Yes
UMBELLIFERAE	*Laserpitium longiradium*	CR	CR	Yes
CRUCIFERAE	*Lepidium turczaninowii*	CR	NE	Yes
PLUMBAGINACEAE	*Limonium dendroides*	CR	CR	Yes
PLUMBAGINACEAE	*Limonium spectabile*	CR	CR	Yes
PLUMBAGINACEAE	*Limonium sventenii*	CR	CR	Yes
LEGUMINOSAE	*Lotus eremiticus*	CR	CR	Yes
LEGUMINOSAE	*Lotus kunkelii*	CR	CR	Yes
LEGUMINOSAE	*Lotus maculatus*	CR	CR	Yes
LEGUMINOSAE	*Lotus pyranthus*	CR	CR	Yes
LABIATAE	*Micromeria glomerata*	CR	CR	Yes
CRASSULACEAE	*Monanthes wildpretii*	CR	CR	Yes
UMBELLIFERAE	*Monizia edulis*	CR	CR	Yes
MYRICACEAE	*Myrica rivas-martinezii*	CR	CR	Yes
UMBELLIFERAE	*Naufraga balearica*	CR	CR	Yes
SCROPHULARIACEAE	*Odontites granatensis*	CR	CR	Yes
COMPOSITAE	*Onopordum carduelium*	CR	CR	Yes
COMPOSITAE	*Onopordum nogalesii*	CR	CR	Yes
COMPOSITAE	*Pericallis hadrosoma*	CR	CR	Yes
COMPOSITAE	*Pericallis malvifolia*	CR	CR	Yes
PITTOSPORACEAE	*Pittosporum coriaceum*	CR	CR	Yes
PLANTAGINACEAE	*Plantago almogravensis*	CR	CR	Yes
PLANTAGINACEAE	*Plantago famarae*	CR	CR	Yes

Family	Species	Red List Status		Endemic to Europe?
		Europe	EU 27	
DRYOPTERIDACEAE	*Polystichum drepanum*	CR	CR	Yes
PRIMULACEAE	*Primula egaliksensis*	CR (PE)	NE	
ROSACEAE	*Pyrus magyarica*	CR	CR	Yes
GROSSULARIACEAE	*Ribes sardoum*	CR	CR	Yes
LABIATAE	*Salvia herbanica*	CR	CR	Yes
LABIATAE	*Salvia veneris*	CR	CR	Yes
HYACINTHACEAE	*Scilla morrisii*	CR	CR	Yes
LABIATAE	*Sideritis cystosiphon*	CR	CR	Yes
LABIATAE	*Sideritis discolor*	CR	CR	Yes
LABIATAE	*Sideritis marmorea*	CR	CR	Yes
LABIATAE	*Sideritis serrata*	CR	CR	Yes
CARYOPHYLLACEAE	*Silene nocteolens*	CR	CR	Yes
CRUCIFERAE	*Sinapidendron rupestre*	CR	CR	Yes
SOLANACEAE	*Solanum lidii*	CR	CR	Yes
COMPOSITAE	*Sonchus gandogeri*	CR	CR	Yes
ROSACEAE	*Sorbus maderensis*	CR	CR	Yes
COMPOSITAE	*Tanacetum oshanahanii*	CR	CR	Yes
LEGUMINOSAE	*Teline nervosa*	CR	CR	Yes
LEGUMINOSAE	*Teline salsoloides*	CR	CR	Yes
LABIATAE	*Teucrium abutiloides*	CR	CR	Yes
SCROPHULARIACEAE	*Veronica oetaea*	CR	CR	Yes
LEGUMINOSAE	*Vicia bifoliolata*	CR	CR	Yes
VIOLACEAE	*Viola hispida*	CR	CR	Yes
AMARYLLIDACEAE	*Acis nicaeensis*	EN	EN	Yes
LEGUMINOSAE	*Adenocarpus ombriosus*	EN	EN	Yes
CRASSULACEAE	*Aeonium gomerense*	EN	EN	Yes
LEGUMINOSAE	*Anagyris latifolia*	EN	EN	Yes
BORAGINACEAE	*Anchusa crispa*	EN	EN	Yes
COLCHICACEAE	*Androcymbium rechingeri*	EN	EN	Yes
RANUNCULACEAE	*Anemone uralensis*	EN	NE	Yes
SCROPHULARIACEAE	*Antirrhinum lopesianum*	EN	EN	Yes
RANUNCULACEAE	*Aquilegia pyrenaica* ssp. *cazorlensis*	EN	EN	Yes
COMPOSITAE	*Argyranthemum lidii*	EN	EN	Yes
COMPOSITAE	*Argyranthemum thalassophilum*	EN	EN	Yes
PLUMBAGINACEAE	*Armeria pseudarmeria*	EN	EN	Yes
PLUMBAGINACEAE	*Armeria soleirolii*	EN	EN	Yes
COMPOSITAE	*Artemisia granatensis*	EN	EN	Yes
COMPOSITAE	*Aster pyrenaeus*	EN	EN	Yes
COMPOSITAE	*Aster sorrentinii*	EN	EN	Yes
LEGUMINOSAE	*Astragalus physocalyx*	EN	EN	
COMPOSITAE	*Atractylis arbuscula*	EN	EN	Yes
COMPOSITAE	*Atractylis preauxiana*	EN	EN	Yes
SOLANACEAE	*Atropa baetica*	EN	EN	
CAMPANULACEAE	*Azorina vidalii*	EN	EN	Yes
CHENOPODIACEAE	*Bassia saxicola*	EN	EN	Yes
CRUCIFERAE	*Brassica hilarionis*	EN	EN	Yes
UMBELLIFERAE	*Bupleurum handiense*	EN	EN	Yes
ASCLEPIADACEAE	*Caralluma burchardii*	EN	EN	

Family	Species	Red List Status		Endemic to Europe?
		Europe	EU 27	
COMPOSITAE	*Carduus myriacanthus*	EN	EN	
COMPOSITAE	*Carlina diae*	EN	EN	Yes
COMPOSITAE	*Centaurea borjae*	EN	EN	Yes
COMPOSITAE	*Centaurea horrida*	EN	EN	Yes
COMPOSITAE	*Centaurea princeps*	EN	EN	Yes
VALERIANACEAE	*Centranthus trinervis*	EN	EN	Yes
ORCHIDACEAE	*Cephalanthera cucullata*	EN	EN	Yes
ASCLEPIADACEAE	*Ceropegia dichotoma* ssp. *krainzii*	EN	EN	Yes
SCROPHULARIACEAE	*Chaenorhinum serpyllifolium* ssp. *lusitanicum*	EN	EN	Yes
COMPOSITAE	*Cheirolophus falcisectus*	EN	EN	Yes
COMPOSITAE	*Cheirolophus ghomerythus*	EN	EN	Yes
COMPOSITAE	*Cheirolophus junonianus*	EN	EN	Yes
COMPOSITAE	*Cheirolophus massonianus*	EN	EN	Yes
LEGUMINOSAE	*Cicer canariense*	EN	EN	Yes
CISTACEAE	*Cistus chinamadensis*	EN	EN	Yes
CRUCIFERAE	*Cochlearia polonica*	EN	EN	Yes
CRUCIFERAE	*Coincya rupestris*	EN	EN	Yes
CONVOLVULACEAE	*Convolvulus lopezsocasii*	EN	EN	Yes
CRUCIFERAE	*Crambe laevigata*	EN	EN	Yes
CRUCIFERAE	*Crambe scoparia*	EN	EN	Yes
COMPOSITAE	*Crepis crocifolia*	EN	EN	Yes
COMPOSITAE	*Crepis granatensis*	EN	EN	Yes
COMPOSITAE	*Crepis tectorum* ssp. *nigrescens*	EN	EN	Yes
ORCHIDACEAE	*Dactylorhiza kalopissii*	EN	EN	Yes
CARYOPHYLLACEAE	*Dianthus diutinus*	EN	EN	Yes
LEGUMINOSAE	*Dorycnium spectabile*	EN	EN	Yes
DRACAENACEAE	*Dracaena draco*	EN	EN	
BORAGINACEAE	*Echium pininana*	EN	EN	Yes
ORCHIDACEAE	*Epipactis greuteri*	EN	EN	Yes
ORCHIDACEAE	*Epipactis placentina*	EN	EN	Yes
ORCHIDACEAE	*Epipactis tallosii*	EN	EN	Yes
ORCHIDACEAE	*Epipactis troodi*	EN	EN	
ORCHIDACEAE	*Epipactis veratrifolia*	EN	EN	
COMPOSITAE	*Erigeron frigidus*	EN	EN	Yes
GERANIACEAE	*Erodium paularense*	EN	EN	Yes
UMBELLIFERAE	*Eryngium viviparum*	EN	EN	Yes
UMBELLIFERAE	*Ferula sadleriana*	EN	EN	Yes
LILIACEAE	*Fritillaria conica*	EN	EN	Yes
LILIACEAE	*Fritillaria epirotica*	EN	EN	Yes
LILIACEAE	*Fritillaria obliqua*	EN	EN	Yes
LILIACEAE	*Fritillaria rhodocanakis*	EN	EN	Yes
AMARYLLIDACEAE	*Galanthus peshmenii*	EN	EN	
RUBIACEAE	*Galium viridiflorum*	EN	EN	Yes
ORCHIDACEAE	*Gennaria diphylla*	EN	EN	
ORCHIDACEAE	*Gymnadenia archiducis-joannis*	EN	EN	Yes
ORCHIDACEAE	*Gymnadenia lithopolitanica*	EN	EN	Yes
ORCHIDACEAE	*Gymnadenia stiriaca*	EN	EN	Yes
ORCHIDACEAE	*Gymnadenia widderi*	EN	EN	Yes

Family	Species	Red List Status		Endemic to Europe?
		Europe	EU 27	
CARYOPHYLLACEAE	*Gypsophila papillosa*	EN	EN	Yes
CISTACEAE	*Helianthemum caput-felis*	EN	EN	
COMPOSITAE	*Helichrysum monogynum*	EN	EN	Yes
ILLECEBRACEAE	*Herniaria latifolia* ssp. *litardierei*	EN	EN	Yes
ILLECEBRACEAE	*Herniaria lusitanica* ssp. *berlengiana*	EN	EN	Yes
ORCHIDACEAE	*Himantoglossum affine*	EN	EN	
ORCHIDACEAE	*Himantoglossum comperianum*	EN	EN	
ORCHIDACEAE	*Himantoglossum metlesicsianum*	EN	EN	Yes
ISOETACEAE	*Isoetes boryana*	EN	EN	Yes
SCROPHULARIACEAE	*Isoplexis isabelliana*	EN	EN	Yes
CAMPANULACEAE	*Jasione lusitanica*	EN	EN	Yes
COMPOSITAE	*Lactuca watsoniana*	EN	EN	Yes
HYACINTHACEAE	*Leopoldia gussonei*	EN	EN	Yes
COMPOSITAE	*Leuzea longifolia*	EN	EN	
PLUMBAGINACEAE	*Limonium fruticans*	EN	EN	Yes
PLUMBAGINACEAE	*Limonium preauxii*	EN	EN	Yes
PLUMBAGINACEAE	*Limonium strictissimum*	EN	EN	Yes
SCROPHULARIACEAE	*Linaria hellenica*	EN	EN	
SCROPHULARIACEAE	*Linaria tonzigii*	EN	EN	Yes
BORAGINACEAE	*Lithodora nitida*	EN	EN	Yes
LEGUMINOSAE	*Lotus callis-viridis*	EN	EN	Yes
LYTHRACEAE	*Lythrum thesioides*	EN	EN	
SOLANACEAE	*Mandragora officinarum*	EN	RE	
ROSACEAE	*Marcetella maderensis*	EN	EN	Yes
MARSILEACEAE	*Marsilea batardae*	EN	EN	Yes
LABIATAE	*Micromeria leucantha*	EN	EN	Yes
LABIATAE	*Micromeria taygetea*	EN	EN	Yes
GRAMINEAE	*Micropyropsis tuberosa*	EN	EN	
CARYOPHYLLACEAE	*Moehringia fontqueri*	EN	EN	Yes
CARYOPHYLLACEAE	*Moehringia tommasinii*	EN	EN	Yes
CAMPANULACEAE	*Musschia wollastonii*	EN	EN	Yes
BORAGINACEAE	*Myosotis rehsteineri*	EN	EN	Yes
AMARYLLIDACEAE	*Narcissus longispathus*	EN	EN	Yes
AMARYLLIDACEAE	*Narcissus nevadensis*	EN	EN	Yes
ORCHIDACEAE	*Neottianthe cucullata*	EN	EN	
BORAGINACEAE	*Onosma tornensis*	EN	EN	Yes
ORCHIDACEAE	*Ophrys atlantica*	EN	EN	
ORCHIDACEAE	*Orchis patens*	EN	EN	
ORCHIDACEAE	*Orchis sitiaca*	EN	EN	Yes
PAEONIACEAE	*Paeonia parnassica*	EN	EN	Yes
COMPOSITAE	*Picris willkommii*	EN	EN	Yes
MARSILEACEAE	*Pilularia minuta*	EN	EN	
LENTIBULARIACEAE	*Pinguicula nevadensis*	EN	EN	Yes
PLANTAGINACEAE	*Plantago algarbiensis*	EN	EN	Yes
ORCHIDACEAE	*Platanthera algeriensis*	EN	EN	
ORCHIDACEAE	*Platanthera micrantha*	EN	EN	Yes
GRAMINEAE	*Poa riphaea*	EN	EN	Yes
POLYGONACEAE	*Polygonum praelongum*	EN	EN	

Family	Species	Red List Status		Endemic to Europe?
		Europe	EU 27	
PRIMULACEAE	*Primula palinuri*	EN	EN	Yes
ROSACEAE	*Prunus lusitanica* ssp. *azorica*	EN	EN	Yes
GRAMINEAE	*Pseudarrhenatherum pallens*	EN	EN	Yes
LABIATAE	*Rosmarinus tomentosus*	EN	EN	Yes
UMBELLIFERAE	*Rouya polygama*	EN	EN	
PAPAVERACEAE	*Rupicapnos africana*	EN	EN	
RUTACEAE	*Ruta microcarpa*	EN	EN	Yes
CAPRIFOLIACEAE	*Sambucus nigra* ssp. *palmensis*	EN	EN	Yes
SAXIFRAGACEAE	*Saxifraga presolanensis*	EN	EN	Yes
SAXIFRAGACEAE	*Saxifraga tombeanensis*	EN	EN	Yes
COMPOSITAE	*Senecio elodes*	EN	EN	Yes
COMPOSITAE	*Senecio lagascanus* ssp. *lusitanicus*	EN	EN	Yes
UMBELLIFERAE	*Seseli intricatum*	EN	EN	Yes
CARYOPHYLLACEAE	*Silene hifacensis*	EN	EN	Yes
CARYOPHYLLACEAE	*Silene holzmannii*	EN	EN	Yes
CARYOPHYLLACEAE	*Silene orphanidis*	EN	EN	Yes
CRUCIFERAE	*Sinapidendron sempervivifolium*	EN	EN	Yes
BORAGINACEAE	*Solenanthus albanicus*	EN	EN	Yes
COMPOSITAE	*Stemmacantha cynaroides*	EN	EN	Yes
ORCHIDACEAE	*Steveniella satyrioides*	EN	NE	
GRAMINEAE	*Stipa styriaca*	EN	EN	Yes
GRAMINEAE	*Stipa veneta*	EN	EN	Yes
COMPOSITAE	*Sventenia bupleuroides*	EN	EN	Yes
COMPOSITAE	*Tanacetum ptarmiciflorum*	EN	EN	Yes
LEGUMINOSAE	*Teline rosmarinifolia*	EN	EN	Yes
CUPRESSACEAE	*Tetraclinis articulata*	EN	EN	
LABIATAE	*Teucrium lepicephalum*	EN	EN	Yes
COMPOSITAE	*Tolpis glabrescens*	EN	EN	Yes
CISTACEAE	*Tuberaria major*	EN	EN	Yes
LILIACEAE	*Tulipa cypria*	EN	EN	Yes
COMPOSITAE	*Wagenitzia lancifolia*	EN	EN	Yes
ULMACEAE	*Zelkova abelicea*	EN	EN	Yes
RANUNCULACEAE	*Aconitum corsicum*	VU	VU	Yes
CRASSULACEAE	*Aeonium balsamiferum*	VU	VU	Yes
CRASSULACEAE	*Aeonium saundersii*	VU	VU	Yes
ALISMATACEAE	*Alisma wahlenbergii*	VU	EN	Yes
CRUCIFERAE	*Alyssum pyrenaicum*	VU	VU	Yes
ORCHIDACEAE	*Anacamptis boryi*	VU	VU	Yes
COLCHICACEAE	*Androcymbium gramineum*	VU	VU	
COLCHICACEAE	*Androcymbium psammophilum*	VU	VU	Yes
COMPOSITAE	*Argyranthemum pinnatifidum* ssp. *succulentum*	VU	VU	Yes
PLUMBAGINACEAE	*Armeria sampaioi*	VU	VU	Yes
ARACEAE	*Arum purpureospathum*	VU	VU	Yes
ASPHODELACEAE	*Asphodelus bento-rainhae*	VU	VU	Yes
LEGUMINOSAE	*Astragalus setosulus*	VU	NE	Yes
LEGUMINOSAE	*Astragalus tanaiticus*	VU	NE	Yes
CAMPANULACEAE	*Asyneuma giganteum*	VU	VU	Yes
GRAMINEAE	*Avenula hackelii*	VU	VU	Yes

Family	Species	Red List Status		Endemic to Europe?
		Europe	EU 27	
ROSACEAE	*Bencomia exstipulata*	VU	VU	Yes
CHENOPODIACEAE	*Beta adanensis*	VU	VU	
CRUCIFERAE	*Biscutella neustriaca*	VU	VU	Yes
CRUCIFERAE	*Biscutella vincentina*	VU	VU	Yes
CRUCIFERAE	*Brassica glabrescens*	VU	VU	Yes
CRUCIFERAE	*Braya linearis*	VU	VU	
UMBELLIFERAE	*Bupleurum capillare*	VU	VU	Yes
CAMPANULACEAE	*Campanula sabatia*	VU	VU	Yes
COMPOSITAE	*Canariothamnus hermosae*	VU	VU	Yes
COMPOSITAE	*Carlina onopordifolia*	VU	VU	Yes
COMPOSITAE	*Carthamus balearicus*	VU	VU	Yes
COMPOSITAE	*Centaurea attica* ssp. *megarensis*	VU	VU	Yes
COMPOSITAE	*Centaurea corymbosa*	VU	VU	Yes
COMPOSITAE	*Centaurea dubjanskyi*	VU	NE	Yes
COMPOSITAE	*Centaurea gadorensis*	VU	VU	Yes
COMPOSITAE	*Centaurea immanuelis-loewii*	VU	VU	Yes
COMPOSITAE	*Centaurea jankae*	VU	VU	Yes
COMPOSITAE	*Centaurea kalambakensis*	VU	VU	Yes
COMPOSITAE	*Centaurea niederi*	VU	VU	Yes
COMPOSITAE	*Centaurea peucedanifolia*	VU	VU	Yes
COMPOSITAE	*Centaurea pulvinata*	VU	VU	Yes
GENTIANACEAE	*Centaurium somedanum*	VU	VU	Yes
ORCHIDACEAE	*Cephalanthera epipactoides*	VU	VU	
CARYOPHYLLACEAE	*Cerastium dinaricum*	VU	VU	Yes
ROSACEAE	*Chamaemeles coriacea*	VU	VU	Yes
COMPOSITAE	*Cheirolophus sataratensis*	VU	VU	Yes
COMPOSITAE	*Cheirolophus tagananensis*	VU	VU	Yes
CRUCIFERAE	*Cochlearia tatrae*	VU	VU	Yes
COLCHICACEAE	*Colchicum corsicum*	VU	VU	Yes
CONVOLVULACEAE	*Convolvulus fernandesii*	VU	VU	Yes
CONVOLVULACEAE	*Convolvulus massonii*	VU	VU	Yes
CRUCIFERAE	*Crambe arborea*	VU	VU	Yes
COMPOSITAE	*Crepis purpurea*	VU	NE	Yes
IRIDACEAE	*Crocus cyprius*	VU	VU	Yes
IRIDACEAE	*Crocus hartmannianus*	VU	VU	Yes
ORCHIDACEAE	*Dactylorhiza iberica*	VU	VU	
THYMELAEACEAE	*Daphne rodriguezii*	VU	VU	Yes
ROSACEAE	*Dendriopoterium pulidoi*	VU	VU	Yes
CARYOPHYLLACEAE	*Dianthus cintranus* ssp. *cintranus*	VU	VU	Yes
CARYOPHYLLACEAE	*Dianthus hypanicus*	VU	VU	Yes
BORAGINACEAE	*Echium gentianoides*	VU	VU	Yes
ORCHIDACEAE	*Epipactis nordeniorum*	VU	VU	Yes
ORCHIDACEAE	*Epipactis pontica*	VU	VU	
GERANIACEAE	*Erodium rupicola*	VU	VU	Yes
CRUCIFERAE	*Erysimum pieninicum*	VU	VU	Yes
EUPHORBIACEAE	*Euphorbia bourgeana*	VU	VU	Yes
EUPHORBIACEAE	*Euphorbia handiensis*	VU	VU	Yes
SCROPHULARIACEAE	*Euphrasia marchesettii*	VU	VU	Yes

Family	Species	Red List Status		Endemic to Europe?
		Europe	EU 27	
UMBELLIFERAE	*Ferula latipinna*	VU	VU	Yes
GRAMINEAE	*Festuca brigantina*	VU	VU	Yes
LILIACEAE	*Fritillaria drenovskii*	VU	VU	Yes
LILIACEAE	*Fritillaria euboeica*	VU	VU	Yes
LILIACEAE	*Fritillaria obliqua* ssp. *tuntasia*	VU	VU	Yes
AMARYLLIDACEAE	*Galanthus ikariae*	VU	VU	Yes
AMARYLLIDACEAE	*Galanthus reginae-olgae*	VU	VU	Yes
RUBIACEAE	*Galium cracoviense*	VU	VU	Yes
RUBIACEAE	*Galium sudeticum*	VU	VU	Yes
LEGUMINOSAE	*Genista benehoavensis*	VU	VU	Yes
LEGUMINOSAE	*Genista tetragona*	VU	NE	Yes
GENTIANACEAE	*Gentianella bohemica*	VU	VU	Yes
GLOBULARIACEAE	*Globularia sarcophylla*	VU	VU	Yes
GLOBULARIACEAE	*Globularia stygia*	VU	VU	Yes
CISTACEAE	*Helianthemum alypoides*	VU	VU	Yes
COMPOSITAE	*Helichrysum gossypinum*	VU	VU	Yes
ILLECEBRACEAE	*Herniaria algarvica*	VU	VU	Yes
CRUCIFERAE	*Iberis runemarkii*	VU	VU	Yes
ISOETACEAE	*Isoetes azorica*	VU	VU	Yes
JUNCACEAE	*Juncus valvatus*	VU	VU	
CUPRESSACEAE	*Juniperus brevifolia*	VU	VU	Yes
MALVACEAE	*Kosteletzkya pentacarpa*	VU	VU	
COMPOSITAE	*Leontodon microcephalus*	VU	VU	Yes
LILIACEAE	*Lilium rhodopeum*	VU	VU	Yes
PLUMBAGINACEAE	*Limonium perezii*	VU	VU	Yes
SCROPHULARIACEAE	*Linaria pseudolaxiflora*	VU	VU	Yes
LINACEAE	*Linum muelleri*	VU	VU	Yes
MARSILEACEAE	*Marsilea azorica*	VU	VU	Yes
MARSILEACEAE	*Marsilea strigosa*	VU	VU	
CHENOPODIACEAE	*Microcnemum coralloides*	VU	VU	
CARYOPHYLLACEAE	*Moehringia hypanica*	VU	NE	Yes
BORAGINACEAE	*Myosotis azorica*	VU	VU	Yes
HYDROCHARITACEAE	*Najas flexilis*	VU	VU	
BORAGINACEAE	*Omphalodes kuzinskyanae*	VU	VU	Yes
BORAGINACEAE	*Onosma polyphylla*	VU	NE	
ORCHIDACEAE	*Ophrys argolica*	VU	VU	Yes
ORCHIDACEAE	*Orchis punctulata*	VU	CR	
LABIATAE	*Origanum cordifolium*	VU	VU	Yes
LEGUMINOSAE	*Oxytropis deflexa*	VU	NE	
PAEONIACEAE	*Paeonia clusii* ssp. *rhodia*	VU	VU	Yes
PAPAVERACEAE	*Papaver laestadianum*	VU	NT	Yes
CRUCIFERAE	*Parolinia schizogynoides*	VU	VU	Yes
CARYOPHYLLACEAE	*Petrocoptis grandiflora*	VU	VU	Yes
CARYOPHYLLACEAE	*Petrocoptis pseudoviscosa*	VU	VU	Yes
GRAMINEAE	*Phalaris maderensis*	VU	VU	Yes
ORCHIDACEAE	*Platanthera obtusata*	VU	EN	
ORCHIDACEAE	*Platanthera obtusata* ssp. *oligantha*	VU	EN	
ROSACEAE	*Potentilla delphinensis*	VU	VU	Yes
PRIMULACEAE	*Primula apennina*	VU	VU	Yes

Family	Species	Red List Status		Endemic to Europe?
		Europe	EU 27	
GRAMINEAE	*Puccinellia pungens*	VU	VU	Yes
RANUNCULACEAE	*Pulsatilla vulgaris* ssp. *gotlandica*	VU	VU	Yes
RANUNCULACEAE	*Ranunculus kykkoensis*	VU	VU	Yes
RANUNCULACEAE	*Ranunculus weyleri*	VU	VU	Yes
POLYGONACEAE	*Rumex rupestris*	VU	VU	Yes
CHENOPODIACEAE	*Salicornia veneta*	VU	VU	Yes
COMPOSITAE	*Santolina elegans*	VU	VU	Yes
SAXIFRAGACEAE	*Saxifraga berica*	VU	VU	Yes
SAXIFRAGACEAE	*Saxifraga osloënsis*	VU	VU	Yes
SAXIFRAGACEAE	*Saxifraga portosanctana*	VU	VU	Yes
CRASSULACEAE	*Sedum brissemoretii*	VU	VU	Yes
COMPOSITAE	*Senecio caespitosus*	VU	VU	Yes
COMPOSITAE	*Senecio nevadensis*	VU	VU	
LABIATAE	*Sideritis cypria*	VU	VU	Yes
LABIATAE	*Sideritis infernalis*	VU	VU	Yes
LABIATAE	*Sideritis javalambrensis*	VU	VU	Yes
CARYOPHYLLACEAE	*Silene hicesiae*	VU	VU	Yes
CRUCIFERAE	*Sisymbrium cavanillesianum*	VU	VU	Yes
PRIMULACEAE	*Soldanella villosa*	VU	VU	Yes
GRAMINEAE	*Stipa bavarica*	VU	VU	Yes
BORAGINACEAE	*Symphytum cycladense*	VU	VU	Yes
COMPOSITAE	*Tephroseris longifolia* ssp. *moravica*	VU	VU	Yes
LABIATAE	*Teucrium turredanum*	VU	VU	Yes
UMBELLIFERAE	*Thorella verticillato-inundata*	VU	VU	Yes
SCROPHULARIACEAE	*Verbascum litigiosum*	VU	VU	Yes
SCROPHULARIACEAE	*Veronica micrantha*	VU	VU	Yes
ASCLEPIADACEAE	*Vincetoxicum pannonicum*	VU	VU	Yes
VIOLACEAE	*Viola athois*	VU	VU	Yes
SCROPHULARIACEAE	*Veronica euxina*	DD	RE	Yes
GRAMINEAE	*Puccinellia phryganodes*	LC	CR	
COMPOSITAE	*Artemisia laciniata*	DD	CR	
HYACINTHACEAE	*Scilla litardierei*	DD	CR	Yes
GRAMINEAE	*Arctophila fulva*	LC	EN	
CRUCIFERAE	*Aurinia uechtritziana*	DD	EN	
HYDROCHARITACEAE	*Najas tenuissima*	DD	EN	
ERICACEAE	*Vaccinium arctostaphylos*	DD	EN	
SCROPHULARIACEAE	*Veronica turrilliana*	DD	EN	Yes
PRIMULACEAE	*Primula scandinavica*	NT	VU	Yes
CRUCIFERAE	*Draba cinerea*	LC	VU	
AMARYLLIDACEAE	*Galanthus plicatus*	LC	VU	
HIPPURIDACEAE	*Hippuris tetraphylla*	LC	VU	
COMPOSITAE	*Artemisia pancicii*	DD	VU	Yes
CAMPANULACEAE	*Campanula lanata*	DD	VU	Yes
CRUCIFERAE	*Draba cacuminum*	DD	VU	Yes
RUBIACEAE	*Galium rhodopeum*	DD	VU	Yes
LEGUMINOSAE	*Genista holopetala*	DD	VU	Yes
GRAMINEAE	*Stipa zalesskii*	DD	VU	
LABIATAE	*Teucrium lamiifolium*	DD	VU	

Appendix 2. Red List status of selected European vascular plants

Species are sorted alphabetically by genus and species.

[1] Species marked this way are included under a different name in the Habitats Directive or Bern Convention annexes. An overview table of the name changes is included in Table 1.

Species were considered to be Not Applicable (NA) if they were judged to be of marginal occurrence in the region. Species were regarded as of marginal occurrence if it was estimated that less than 1% of their global range lies within Europe and if the European populations are not disjunct of the main species range. Species that did not occur in any of the EU 27 member states are marked as Not Evaluated (NE). Higher plant taxonomy other than families was not included in this list for reasons explained in chapter 2.2.

Family	Species	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe?	Endemic to EU 27?	Habitats Directive Annexes	Bern Convention Annexes	CITES Annexes	EU Wildlife Trade Regulation	Aquatic species?	Crop wild relative?
PINACEAE	*Abies nebrodensis*	CR	D	CR	D	Yes	Yes	II/IV	I				
COMPOSITAE	*Achillea glaberrima*	LC		NE		Yes			I				
COMPOSITAE	*Achillea thracica*	DD		DD		Yes	Yes		I				
AMARYLLIDACEAE	*Acis nicaeensis*[1]	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)	Yes	Yes	II/IV	I				
RANUNCULACEAE	*Aconitum corsicum*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
RANUNCULACEAE	*Aconitum firmum* ssp. *moravicum*	NT		NT		Yes	Yes	II/IV					
RANUNCULACEAE	*Aconitum napellus* ssp. *fissurae*	DD		DD					I				
RANUNCULACEAE	*Aconitum variegatum* ssp. *valesiacum*	DD		DD					I				
LEGUMINOSAE	*Adenocarpus ombriosus*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes		I				
CAMPANULACEAE	*Adenophora lilifolia*	LC		LC				II/IV					
RANUNCULACEAE	*Adonis cyllenea*	DD		DD					I				
RANUNCULACEAE	*Adonis distorta*	DD		DD		Yes	Yes	II/IV	I				
RANUNCULACEAE	*Adonis vernalis*	LC		LC						II	B		
GRAMINEAE	*Aegilops bicornis*	VU	B1ab(iii,v)+2ab(iii,v)	VU	B1ab(iii,v)+2ab(iii,v)								Yes
GRAMINEAE	*Aegilops biuncialis*	LC		LC									Yes
GRAMINEAE	*Aegilops caudata*	LC		LC									Yes
GRAMINEAE	*Aegilops columnaris*	LC		LC									Yes
GRAMINEAE	*Aegilops comosa*	LC		LC									Yes
GRAMINEAE	*Aegilops contracta*	DD		DD									Yes

Family	Species	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe?	Endemic to EU 27?	Habitats Directive Annexes	Bern Convention Annexes	CITES Annexes	EU Wildlife Trade Regulation	Aquatic species?	Crop wild relative?
GRAMINEAE	*Aegilops cylindrica*	LC		LC									Yes
GRAMINEAE	*Aegilops geniculata*	LC		LC									Yes
GRAMINEAE	*Aegilops kotschyi*	NA		NA									Yes
GRAMINEAE	*Aegilops neglecta*	LC		LC									Yes
GRAMINEAE	*Aegilops peregrina*	LC		LC									Yes
GRAMINEAE	*Aegilops speltoides*	LC		LC									Yes
GRAMINEAE	*Aegilops tauschii*	EN	B2ab(ii,iii)	NE									Yes
GRAMINEAE	*Aegilops triuncialis*	LC		LC									Yes
GRAMINEAE	*Aegilops umbellulata*	LC		LC									Yes
GRAMINEAE	*Aegilops uniaristata*	LC		LC									Yes
GRAMINEAE	*Aegilops ventricosa*	LC		LC									Yes
CRASSULACEAE	*Aeonium balsamiferum*	VU	D2	VU	D2	Yes	Yes		I				
CRASSULACEAE	*Aeonium gomerense*	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)	Yes	Yes	II/IV	I				
CRASSULACEAE	*Aeonium saundersii*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
ROSACEAE	*Agrimonia pilosa*	LC		LC				II/IV					
GRAMINEAE	*Agropyron cimmericum*	EN	B1ab(iii,v)+ 2ab(iii,v);C2a(i)	NE		Yes							Yes
GRAMINEAE	*Agropyron cristatum*	LC		LC									Yes
GRAMINEAE	*Agropyron dasyanthum*	EN	B2ab(ii,iii)	NE		Yes							Yes
GRAMINEAE	*Agropyron desertorum*	LC		NE									Yes
GRAMINEAE	*Agropyron fragile*	DD		NE									Yes
GRAMINEAE	*Agropyron tanaiticum*	NT		NE		Yes							Yes
GRAMINEAE	*Agrostis canina*	LC		LC								Yes	
GRAMINEAE	*Agrostis stolonifera*	LC		LC								Yes	Yes
CRASSULACEAE	*Aichryson dumosum*	CR	B2ab(iii)	CR	B2ab(iii)	Yes	Yes	II/IV	I				
DROSERACEAE	*Aldrovanda vesiculosa*	DD		DD				II/IV	I			Yes	
ALISMATACEAE	*Alisma gramineum*	LC		LC								Yes	
ALISMATACEAE	*Alisma lanceolatum*	LC		LC								Yes	
ALISMATACEAE	*Alisma plantago-aquatica*	LC		LC								Yes	
ALISMATACEAE	*Alisma wahlenbergii*	VU	B2b(iii,iv,v)c(iv)	EN	B2b(iii,iv,v)c(iv)	Yes		II/IV	I			Yes	
ALLIACEAE	*Allium acutiflorum*	LC		LC		Yes	Yes						Yes
ALLIACEAE	*Allium aethusanum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium aflatunense*	NA		NE									Yes
ALLIACEAE	*Allium albidum*	DD		DD									Yes
ALLIACEAE	*Allium albiflorum*	NT		NE									Yes

Family	Species	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe?	Endemic to EU 27?	Habitats Directive Annexes	Bern Convention Annexes	CITES Annexes	EU Wildlife Trade Regulation	Aquatic species?	Crop wild relative?
ALLIACEAE	*Allium albotunicatum*	NA		NE									Yes
ALLIACEAE	*Allium amethystinum*	LC		LC									Yes
ALLIACEAE	*Allium ampeloprasum*	LC		LC									Yes
ALLIACEAE	*Allium angulosum*	LC		LC									Yes
ALLIACEAE	*Allium atropurpureum*	LC		LC									Yes
ALLIACEAE	*Allium atroviolaceum*	DD		DD									Yes
ALLIACEAE	*Allium autumnale*	LC		LC		Yes	Yes						Yes
ALLIACEAE	*Allium baeticum*	LC		LC									Yes
ALLIACEAE	*Allium bornmuelleri*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium bourgeaui*	DD		DD									Yes
ALLIACEAE	*Allium breviradium*	DD		DD		Yes							Yes
ALLIACEAE	*Allium callimischon*	DD		DD									Yes
ALLIACEAE	*Allium carinatum*	LC		LC									Yes
ALLIACEAE	*Allium cassium*	LC		LC									Yes
ALLIACEAE	*Allium chamaemoly*	DD		DD									Yes
ALLIACEAE	*Allium chamaespathum*	DD		DD		Yes							Yes
ALLIACEAE	*Allium chrysonemum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium circinnatum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium commutatum*	DD		DD									Yes
ALLIACEAE	*Allium convallarioides*	NT		NE									Yes
ALLIACEAE	*Allium corsicum*	CR	B1ab(ii,iii,v)+ 2ab(ii,iii,v)	CR	B1ab(ii,iii,v)+ 2ab(ii,iii,v)	Yes	Yes						Yes
ALLIACEAE	*Allium cupani*	DD		DD									Yes
ALLIACEAE	*Allium curtum*	LC		LC									Yes
ALLIACEAE	*Allium cyrilli*	DD		DD									Yes
ALLIACEAE	*Allium decipiens*	LC		NE									Yes
ALLIACEAE	*Allium ericetorum*	DD		DD		Yes							Yes
ALLIACEAE	*Allium erubescens*	DD		NE									Yes
ALLIACEAE	*Allium exaltatum*	VU	D1+2	VU	D1+2	Yes	Yes						Yes
ALLIACEAE	*Allium favosum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium flavum*	LC		LC									Yes
ALLIACEAE	*Allium frigidum*	DD		DD									Yes
ALLIACEAE	*Allium fuscum*	LC		LC									Yes
ALLIACEAE	*Allium gomphrenoides*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium grosii*	LC		LC		Yes	Yes	II/IV	I				Yes

Family	Species	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe?	Endemic to EU 27?	Habitats Directive Annexes	Bern Convention Annexes	CITES Annexes	EU Wildlife Trade Regulation	Aquatic species?	Crop wild relative?
ALLIACEAE	*Allium guttatum*	LC		LC									Yes
ALLIACEAE	*Allium heldreichii*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium horvatii*	DD		NE		Yes							Yes
ALLIACEAE	*Allium hymettium*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium inaequale*	DD		DD									Yes
ALLIACEAE	*Allium incensiodorum*	DD		NE		Yes							Yes
ALLIACEAE	*Allium insubricum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium integerrimum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium jubatum*	RE		RE									Yes
ALLIACEAE	*Allium junceum*	LC		LC									Yes
ALLIACEAE	*Allium kermesinum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium lehmannii*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium lineare*	DD		DD									Yes
ALLIACEAE	*Allium lojaconoi*	NT		NT		Yes	Yes						Yes
ALLIACEAE	*Allium longanum*	DD		DD									Yes
ALLIACEAE	*Allium lopadusanum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium luteolum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium macedonicum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium marschalianum*	DD		DD		Yes							Yes
ALLIACEAE	*Allium massaessylum*	LC		LC									Yes
ALLIACEAE	*Allium melanantherum*	LC		LC		Yes							Yes
ALLIACEAE	*Allium melananthum*	NT		NT		Yes	Yes						Yes
ALLIACEAE	*Allium meteoricum*	DD		DD		Yes							Yes
ALLIACEAE	*Allium moly*	LC		LC		Yes	Yes						Yes
ALLIACEAE	*Allium moschatum*	LC		LC									Yes
ALLIACEAE	*Allium myrianthum*	NA		NE									Yes
ALLIACEAE	*Allium narcissiflorum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium neapolitanum*	LC		LC									Yes
ALLIACEAE	*Allium nigrum*	LC		LC									Yes
ALLIACEAE	*Allium obliquum*	DD		DD									Yes
ALLIACEAE	*Allium obtusiflorum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium oleraceum*	LC		LC									Yes
ALLIACEAE	*Allium orientale*	LC		LC									Yes
ALLIACEAE	*Allium palentinum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium pallens*	DD		DD									Yes

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ALLIACEAE	*Allium paniculatum*	LC		LC									Yes
ALLIACEAE	*Allium parciflorum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium pardoi*	VU	C1	VU	C1	Yes	Yes						Yes
ALLIACEAE	*Allium parnassicum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium pendulinum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium permixtum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium pervestitum*	EN	B1ab(iii,iv)+2ab(iii,iv)	NE		Yes							Yes
ALLIACEAE	*Allium phthioticum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium pilosum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium podolicum*	DD		DD		Yes							Yes
ALLIACEAE	*Allium polyanthum*	DD		DD									Yes
ALLIACEAE	*Allium proponticum*	DD		NE									Yes
ALLIACEAE	*Allium pruinatum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium pyrenaicum*	VU	B1ab(iii)+2ab(iii)	VU	B1ab(iii)+2ab(iii)	Yes	Yes						Yes
ALLIACEAE	*Allium regelianum*	DD		NE					I				Yes
ALLIACEAE	*Allium reuterianum*	DD		DD									Yes
ALLIACEAE	*Allium roseum*	LC		LC									Yes
ALLIACEAE	*Allium rouyi*	LC		LC		Yes	Yes						Yes
ALLIACEAE	*Allium rubrovittatum*	LC		LC		Yes	Yes						Yes
ALLIACEAE	*Allium rupestre*	DD		DD									Yes
ALLIACEAE	*Allium saxatile*	LC		LC									Yes
ALLIACEAE	*Allium scaberrimum*	DD		DD		Yes	Yes						Yes
ALLIACEAE	*Allium schmitzii*	VU	B2ab(iii)	VU	B2ab(iii)	Yes	Yes					Yes	Yes
ALLIACEAE	*Allium schoenoprasum*	LC		LC									Yes
ALLIACEAE	*Allium scorodoprasum*	LC		LC									Yes
ALLIACEAE	*Allium scorzonerifolium*	LC		LC									Yes
ALLIACEAE	*Allium scythicum*	DD		NE		Yes							Yes
ALLIACEAE	*Allium senescens*	LC		LC									Yes
ALLIACEAE	*Allium sipyleum*	DD		DD									Yes
ALLIACEAE	*Allium sphaerocephalon*	LC		LC									Yes
ALLIACEAE	*Allium stamineum*	LC		LC									Yes
ALLIACEAE	*Allium staticiforme*	DD		DD									Yes
ALLIACEAE	*Allium stearnii*	LC		LC		Yes	Yes						Yes
ALLIACEAE	*Allium suaveolens*	LC		LC		Yes							Yes
ALLIACEAE	*Allium subhirsutum*	DD		DD									Yes

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ALLIACEAE	*Allium subvillosum*	DD		DD									Yes
ALLIACEAE	*Allium talijevii*	DD		NE		Yes							Yes
ALLIACEAE	*Allium tardans*	LC		LC		Yes	Yes						Yes
ALLIACEAE	*Allium trifoliatum*	DD		DD									Yes
ALLIACEAE	*Allium triquetrum*	DD		DD									Yes
ALLIACEAE	*Allium ursinum*	LC		LC									Yes
ALLIACEAE	*Allium victorialis*	LC		LC									Yes
ALLIACEAE	*Allium vineale*	LC		LC									Yes
ALLIACEAE	*Allium willeanum*	LC		LC		Yes	Yes						Yes
GRAMINEAE	*Alopecurus aequalis*	LC		LC								Yes	
GRAMINEAE	*Alopecurus geniculatus*	LC		LC								Yes	
GRAMINEAE	*Alopecurus pratensis*	LC		LC									Yes
ZANNICHELLIACEAE	*Althenia filiformis*	DD		DD								Yes	
ZANNICHELLIACEAE	*Althenia orientalis*	DD		DD								Yes	
CRUCIFERAE	*Alyssum akamasicum*	DD		DD		Yes	Yes		I				
CRUCIFERAE	*Alyssum borzaeanum*	DD		DD					I				
CRUCIFERAE	*Alyssum pintodasilvae*	DD		DD		Yes	Yes	V					
CRUCIFERAE	*Alyssum pyrenaicum*	VU	D1+2	VU	D1+2	Yes	Yes	II/IV	I				
APOCYNACEAE	*Amsonia orientalis*	DD		DD					I				
ORCHIDACEAE	*Anacamptis boryi*	VU	B1ab(iii)	VU	B1ab(iii)	Yes	Yes			II			
ORCHIDACEAE	*Anacamptis collina*	LC		LC						II			
ORCHIDACEAE	*Anacamptis coriophora*	LC		LC						II			
ORCHIDACEAE	*Anacamptis laxiflora*	LC		LC						II			
ORCHIDACEAE	*Anacamptis morio*	NT		NT						II			
ORCHIDACEAE	*Anacamptis papilionacea*	LC		LC						II			
ORCHIDACEAE	*Anacamptis pyramidalis*[1]	LC		LC				II/IV		II	B		
ORCHIDACEAE	*Anacamptis sancta*	NT		NT						II			
PRIMULACEAE	*Anagallis crassifolia*	VU	B2ab(iii,v)	VU	B2ab(iii,v)							Yes	
LEGUMINOSAE	*Anagyris latifolia*	EN	B2ab(iii,iv,v);C2a(i)	EN	B2ab(iii,iv,v);C2a(i)	Yes	Yes	II/IV	I				
SCROPHULARIACEAE	*Anarrhinum longipedicellatum*	NT		NT		Yes	Yes	V					
BORAGINACEAE	*Anchusa crispa*	EN	B2ab(iii,iv,v)	EN	B2ab(iii,iv,v)	Yes	Yes	II/IV	I				
COLCHICACEAE	*Androcymbium gramineum*[1]	VU	B1ab(i,ii,iii,iv)+2ab(i,ii,iii,iv)	VU	B1ab(i,ii,iii,iv)+2ab(i,ii,iii,iv)			IV	I				
COLCHICACEAE	*Androcymbium psammophilum*	VU	B2ac(iv)	VU	B2ac(iv)	Yes	Yes	II/IV	I				
COLCHICACEAE	*Androcymbium rechingeri*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				

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PRIMULACEAE	*Androsace cylindrica*	LC		LC		Yes	Yes	IV	I				
PRIMULACEAE	*Androsace mathildae*	DD		DD		Yes	Yes	II/IV	I				
PRIMULACEAE	*Androsace pyrenaica*	LC		LC		Yes	Yes	II/IV	I				
COMPOSITAE	*Andryala crithmifolia*	CR	B2ac(iv);C2b	CR	B2ac(iv);C2b	Yes	Yes	II/IV	I				
COMPOSITAE	*Andryala laevitomentosa*	DD		DD		Yes	Yes		I				
RANUNCULACEAE	*Anemone uralensis*	EN	A2c	NE		Yes			I				
UMBELLIFERAE	*Angelica heterocarpa*	LC		LC		Yes	Yes	II/IV	I				
UMBELLIFERAE	*Angelica palustris*	DD		DD				II/IV	I				
COMPOSITAE	*Anthemis glaberrima*	CR	B1ac(iv)+2ac(iv)	CR	B1ac(iv)+2ac(iv)	Yes	Yes	II/IV	I				
COMPOSITAE	*Anthemis trotzkiana*	DD		NE					I				
LEGUMINOSAE	*Anthyllis lemanniana*	DD		DD		Yes	Yes	II/IV	I				
LEGUMINOSAE	*Anthyllis lusitanica*	DD		DD		Yes	Yes	V					
SCROPHULARIACEAE	*Antirrhinum charidemi*	CR	B1ab(i,ii,v)	CR	B1ab(i,ii,v)	Yes	Yes	II/IV	I				
SCROPHULARIACEAE	*Antirrhinum lopesianum*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes	IV					
UMBELLIFERAE	*Apium bermejoi*	CR	B1ab(v)c(iv)+2ab(v) c(iv);C2a(i);D	CR	B1ab(v)c(iv)+2ab(v) c(iv);C2a(i);D	Yes	Yes	II/IV	I			Yes	
UMBELLIFERAE	*Apium crassipes*	NT		NT								Yes	
UMBELLIFERAE	*Apium graveolens*	LC		LC								Yes	
UMBELLIFERAE	*Apium inundatum*	LC		LC		Yes	Yes					Yes	
UMBELLIFERAE	*Apium nodiflorum*	LC		LC								Yes	
UMBELLIFERAE	*Apium repens*	NT		NT				II/IV	I			Yes	
RANUNCULACEAE	*Aquilegia alpina*	LC		LC		Yes		IV					
RANUNCULACEAE	*Aquilegia bertolonii*	LC		LC		Yes	Yes	II/IV	I				
RANUNCULACEAE	*Aquilegia kitaibelii*	DD		DD		Yes		II/IV	I				
RANUNCULACEAE	*Aquilegia ottonis* ssp. *taygetea*	DD		DD		Yes	Yes		I				
RANUNCULACEAE	*Aquilegia pyrenaica* ssp. *cazorlensis*	EN	B2ab(iii)	EN	B2ab(iii)	Yes	Yes	II/IV	I				
CRUCIFERAE	*Arabis kennedyae*	CR	B1ab(iii)c(iv)+2ab(iii) c(iv); C2a(i)	CR	B1ab(iii)c(iv)+2ab(iii) c(iv); C2a(i)	Yes	Yes	II/IV	I				
CRUCIFERAE	*Arabis sadina*	DD		DD		Yes	Yes	II/IV					
CRUCIFERAE	*Arabis scopoliana*	DD		DD		Yes		II/IV					
GRAMINEAE	*Arctagrostis latifolia*	LC		NT				II/IV					
GRAMINEAE	*Arctophila fulva*	LC		EN	B2ab(iii)			II/IV					
ERICACEAE	*Arctostaphylos uva-ursi*	LC		LC							D		
CARYOPHYLLACEAE	*Arenaria ciliata* ssp. *pseudofrigida*	LC		LC				II/IV					
CARYOPHYLLACEAE	*Arenaria humifusa*	NT		NT				II/IV					

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CARYOPHYLLACEAE	*Arenaria nevadensis*	CR	B1ac(iii,iv)+2ac(iii,iv)	CR	B1ac(iii,iv)+2ac(iii,iv)	Yes	Yes	II/IV	I				
CARYOPHYLLACEAE	*Arenaria provincialis*	NT		NT		Yes	Yes	II/IV	I				
COMPOSITAE	*Argyranthemum lidii*	EN	B2ab(iii)c(iv)	EN	B2ab(iii)c(iv)	Yes	Yes	II/IV	I				
COMPOSITAE	*Argyranthemum pinnatifidum* ssp. *succulentum*	VU	D1	VU	D1	Yes	Yes	IV	I				
COMPOSITAE	*Argyranthemum thalassophilum*	EN	D	EN	D	Yes	Yes	II/IV					
COMPOSITAE	*Argyranthemum winteri*	CR	B2ab(iii,v)	CR	B2ab(iii,v)	Yes	Yes	II/IV	I				
PLUMBAGINACEAE	*Armeria berlengensis*	CR	B2ab(iii,v)	CR	B2ab(iii,v)	Yes	Yes	II/IV					
PLUMBAGINACEAE	*Armeria helodes*	CR	B1ab(iii,v);C2a(i);D	CR	B1ab(iii,v);C2a(i);D	Yes	Yes	II/IV					
PLUMBAGINACEAE	*Armeria neglecta*	DD		DD		Yes	Yes	II/IV					
PLUMBAGINACEAE	*Armeria pseudarmeria*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
PLUMBAGINACEAE	*Armeria rouyana*	NT		NT		Yes	Yes	II/IV	I				
PLUMBAGINACEAE	*Armeria sampaioi*	VU	D1	VU	D1	Yes	Yes	V					
PLUMBAGINACEAE	*Armeria soleirolii*	EN	B1ab(i,ii,iii,iv,v)+2ab(i ,ii,iii,iv,v)	EN	B1ab(i,ii,iii,iv,v)+2ab(i ,ii,iii,iv,v)	Yes	Yes	II/IV	I				
CRUCIFERAE	*Armoracia macrocarpa*	DD		DD		Yes			I				Yes
CRUCIFERAE	*Armoracia rusticana*	LC		LC		Yes							Yes
COMPOSITAE	*Arnica montana*	LC		LC		Yes		V			D		
GRAMINEAE	*Arrhenatherum elatius*	LC		LC									Yes
COMPOSITAE	*Artemisia campestris* ssp. *bottnica*	NT		NT		Yes		II/IV					
COMPOSITAE	*Artemisia eriantha*	LC		LC		Yes		V					
COMPOSITAE	*Artemisia genipi*	LC		LC		Yes		V					
COMPOSITAE	*Artemisia granatensis*	EN	A2ad	EN	A2ad	Yes	Yes	II/IV	I				
COMPOSITAE	*Artemisia insipida*	CR	D	CR	D	Yes	Yes		I				
COMPOSITAE	*Artemisia laciniata*	DD		CR	D			II/IV	I				
COMPOSITAE	*Artemisia oelandica*	NT		NT		Yes		II/IV					
COMPOSITAE	*Artemisia pancicii*	DD		VU	B2ab(iii,iv)	Yes		II/IV	I				
ARACEAE	*Arum purpureospathum*	VU	D1+2	VU	D1+2	Yes	Yes		I				
GRAMINEAE	*Arundo donax*	LC		LC								Yes	
GRAMINEAE	*Arundo plinii*	LC		LC								Yes	
ASPARAGACEAE	*Asparagus acutifolius*	LC		LC									Yes
ASPARAGACEAE	*Asparagus albus*	LC		LC									Yes
ASPARAGACEAE	*Asparagus aphyllus*	LC		LC									Yes
ASPARAGACEAE	*Asparagus arborescens*	VU	B2ab(ii,iii,iv)	VU	B2ab(ii,iii,iv)	Yes	Yes						Yes
ASPARAGACEAE	*Asparagus brachyphyllus*	DD		DD									Yes
ASPARAGACEAE	*Asparagus fallax*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes						Yes

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ASPARAGACEAE	*Asparagus horridus*	LC		LC									Yes
ASPARAGACEAE	*Asparagus kasakstanicus*	DD		NE									Yes
ASPARAGACEAE	*Asparagus litoralis*	DD		NE		Yes							Yes
ASPARAGACEAE	*Asparagus maritimus*	DD		DD									Yes
ASPARAGACEAE	*Asparagus nesiotes*	EN	B2ab(ii,v)	EN	B2ab(ii,v)	Yes	Yes						Yes
ASPARAGACEAE	*Asparagus officinalis*	LC		LC									Yes
ASPARAGACEAE	*Asparagus pastorianus*	VU	B1ab(ii,iii,iv)+ 2ab(ii,iii,iv)	VU	B1ab(ii,iii,iv)+ 2ab(ii,iii,iv)								Yes
ASPARAGACEAE	*Asparagus plocamoides*	VU	B1ab(iii,v)+2ab(iii,v)	VU	B1ab(iii,v)+2ab(iii,v)	Yes	Yes						Yes
ASPARAGACEAE	*Asparagus pseudoscaber*	DD		DD		Yes							Yes
ASPARAGACEAE	*Asparagus scoparius*	LC		LC									Yes
ASPARAGACEAE	*Asparagus tenuifolius*	LC		LC									Yes
ASPARAGACEAE	*Asparagus umbellatus*	LC		LC		Yes	Yes						Yes
ASPARAGACEAE	*Asparagus verticillatus*	LC		LC									Yes
ASPHODELACEAE	*Asphodelus bento-rainhae*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
ASPLENIACEAE	*Asplenium adulterinum*	LC		LC				II/IV					
ASPLENIACEAE	*Asplenium hemionitis*	LC		LC				IV	I				
ASPLENIACEAE	*Asplenium jahandiezii*	NT		NT		Yes	Yes	II/IV	I				
COMPOSITAE	*Aster pyrenaeus*	EN	B2ab(i,ii)	EN	B2ab(i,ii)	Yes	Yes	II/IV	I				
COMPOSITAE	*Aster sorrentinii*	EN	D	EN	D	Yes	Yes	II/IV					
LEGUMINOSAE	*Astracantha arnacantha* ssp. *aitosensis*[1]	DD		DD		Yes	Yes		I				
LEGUMINOSAE	*Astragalus algarbiensis*	DD		DD				II/IV	I				
LEGUMINOSAE	*Astragalus alopecurus*[1]	DD		LC				II/IV	I				
LEGUMINOSAE	*Astragalus aquilanus*	DD		DD		Yes	Yes	II/IV	I				
LEGUMINOSAE	*Astragalus arenarius*	LC		LC		Yes							Yes
LEGUMINOSAE	*Astragalus cicer*	LC		LC									Yes
LEGUMINOSAE	*Astragalus macrocarpus* ssp. *lefkarensis*	CR	B2ab(v)	CR	B2ab(v)	Yes	Yes	II/IV	I				
LEGUMINOSAE	*Astragalus maritimus*	CR	B1ab(iii,v) c(iv)+2ab(iii,v) c(iv);C2a(ii)b	CR	B1ab(iii,v) c(iv)+2ab(iii,v) c(iv);C2a(ii)b	Yes	Yes	II/IV	I				
LEGUMINOSAE	*Astragalus peterfii*	DD		DD		Yes	Yes	II/IV	I				
LEGUMINOSAE	*Astragalus physocalyx*	EN	B2ab(iv,v)	EN	B2ab(iv,v)				I				
LEGUMINOSAE	*Astragalus pseudopurpureus*	DD		DD		Yes	Yes		I				
LEGUMINOSAE	*Astragalus setosulus*	VU	B1ab(iii)	NE		Yes			I				
LEGUMINOSAE	*Astragalus tanaiticus*	VU	B2ab(iii,iv)	NE		Yes			I				

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LEGUMINOSAE	*Astragalus tremolsianus*	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
LEGUMINOSAE	*Astragalus verrucosus*	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
LEGUMINOSAE	*Astragalus wolgensis*	DD		NE					I				
CAMPANULACEAE	*Asyneuma giganteum*	VU	D1+2	VU	D1+2	Yes	Yes	II/IV	I				
UMBELLIFERAE	*Athamanta cortiana*	CR	B1ab(i,iii,v)c(iv)	CR	B1ab(i,iii,v)c(iv)	Yes	Yes	II/IV	I				
COMPOSITAE	*Atractylis arbuscula*	EN	B2ab(ii,iii)	EN	B2ab(ii,iii)	Yes	Yes	II/IV	I				
COMPOSITAE	*Atractylis preauxiana*	EN	B2ab(iii,iv,v)	EN	B2ab(iii,iv,v)	Yes	Yes	II/IV	I				
CHENOPODIACEAE	*Atriplex halimus*	LC		LC									Yes
SOLANACEAE	*Atropa baetica*	EN	B2ab(iii,iv);D	EN	B2ab(iii,iv);D			II/IV	I				
CRUCIFERAE	*Aurinia uechtritziana*	DD		EN	B1ab(ii,iii,iv,v)+B2ab(ii,iii,iv,v)				I				
GRAMINEAE	*Avena barbata*	LC		LC									Yes
GRAMINEAE	*Avena brevis*	DD		DD									Yes
GRAMINEAE	*Avena canariensis*	LC		LC		Yes	Yes						Yes
GRAMINEAE	*Avena clauda*	LC		LC									Yes
GRAMINEAE	*Avena eriantha*	LC		LC									Yes
GRAMINEAE	*Avena fatua*	LC		LC									Yes
GRAMINEAE	*Avena hybrida*	DD		DD									Yes
GRAMINEAE	*Avena insularis*	EN	B2ab(iii)	EN	B2ab(iii)								Yes
GRAMINEAE	*Avena longiglumis*	DD		DD									Yes
GRAMINEAE	*Avena murphyi*	EN	B2ab(i,ii,iii,iv,v)	EN	B2ab(i,ii,iii,iv,v)								Yes
GRAMINEAE	*Avena sterilis*	LC		LC									Yes
GRAMINEAE	*Avena ventricosa*	LC		LC									Yes
GRAMINEAE	*Avena volgensis*	DD		NE		Yes							Yes
GRAMINEAE	*Avenula hackelii*	VU	B2ab(iii)	VU	B2ab(iii)	Yes	Yes	II/IV	I				
CAMPANULACEAE	*Azorina vidalii*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes	II/IV	I				
ALISMATACEAE	*Baldellia alpestris*	NT		NT		Yes	Yes					Yes	
ALISMATACEAE	*Baldellia ranunculoides*	NT		NT								Yes	
ALISMATACEAE	*Baldellia repens*	NT		NT								Yes	
CRUCIFERAE	*Barbarea balcana*	LC		LC		Yes							Yes
CRUCIFERAE	*Barbarea bosniaca*	DD		NE		Yes							Yes
CRUCIFERAE	*Barbarea bracteosa*	DD		DD		Yes							Yes
CRUCIFERAE	*Barbarea conferta*	DD		DD		Yes	Yes						Yes
CRUCIFERAE	*Barbarea intermedia*	DD		DD									Yes
CRUCIFERAE	*Barbarea lepuznica*	EN	D	CR	C2a(i)	Yes							Yes

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CRUCIFERAE	*Barbarea longirostris*	DD		DD		Yes							Yes
CRUCIFERAE	*Barbarea macrophylla*	DD		DD		Yes	Yes						Yes
CRUCIFERAE	*Barbarea rupicola*	LC		LC		Yes	Yes						Yes
CRUCIFERAE	*Barbarea sicula*	DD		DD		Yes	Yes						Yes
CRUCIFERAE	*Barbarea stricta*	LC		LC									Yes
CRUCIFERAE	*Barbarea verna*	DD		DD		Yes							Yes
CRUCIFERAE	*Barbarea vulgaris*	LC		LC									Yes
CHENOPODIACEAE	*Bassia saxicola*	EN	D	EN	D	Yes	Yes	II/IV	I				
GRAMINEAE	*Beckmannia eruciformis*	DD		DD								Yes	
GRAMINEAE	*Beckmannia syzigachne*	DD		NE								Yes	
HYACINTHACEAE	*Bellevalia dubia* ssp. *hackelii*[1]	LC		LC		Yes	Yes	IV					
HYACINTHACEAE	*Bellevalia webbiana*	EN	A2c	EN	A2c	Yes	Yes						
ROSACEAE	*Bencomia brachystachya*	CR	B2ab(iii,iv,v)	CR	B2ab(iii,iv,v)	Yes	Yes	II/IV	I				
ROSACEAE	*Bencomia exstipulata*	VU	D2	VU	D2	Yes	Yes		I				
ROSACEAE	*Bencomia sphaerocarpa*	CR	D	CR	D	Yes	Yes	II/IV	I				
BERBERIDACEAE	*Berberis maderensis*	DD		DD		Yes	Yes	IV	I				
UMBELLIFERAE	*Berula erecta*	LC		LC								Yes	
CHENOPODIACEAE	*Beta adanensis*	VU	C1+2a(i)	VU	C1+2a(i)				I				Yes
CHENOPODIACEAE	*Beta hybrida*	DD		NE		Yes							Yes
CHENOPODIACEAE	*Beta macrocarpa*	EN	B2ab(iv,v)	EN	B2ab(iv,v)								Yes
CHENOPODIACEAE	*Beta nana*	VU	D2	VU	D2	Yes	Yes						Yes
CHENOPODIACEAE	*Beta patula*	CR	B1ab(iii,iv)+2ab(iii,iv)	CR	B1ab(iii,iv)+2ab(iii,iv)	Yes	Yes	II/IV					Yes
CHENOPODIACEAE	*Beta trigyna*	DD		DD									Yes
CHENOPODIACEAE	*Beta vulgaris*	LC		LC									Yes
ARACEAE	*Biarum davisii*	NT		NT		Yes	Yes				D		
COMPOSITAE	*Bidens cernua*	LC		LC								Yes	
COMPOSITAE	*Bidens radiata*	LC		LC								Yes	
COMPOSITAE	*Bidens tripartita*	LC		LC								Yes	
CRUCIFERAE	*Biscutella neustriaca*	VU	B1ab(iii)+2ab(iii)	VU	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
CRUCIFERAE	*Biscutella vincentina*	VU	D2	VU	D2	Yes	Yes	II/IV					
CYPERACEAE	*Bolboschoenus glaucus*	LC		LC								Yes	
CYPERACEAE	*Bolboschoenus laticarpus*	LC		LC								Yes	
CYPERACEAE	*Bolboschoenus maritimus*	LC		LC								Yes	
CYPERACEAE	*Bolboschoenus planiculmis*	LC		LC								Yes	
CYPERACEAE	*Bolboschoenus yagara*	LC		LC								Yes	

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CRUCIFERAE	*Boleum asperum*	LC		LC		Yes	Yes	II/IV	I				
DIOSCOREACEAE	*Borderea chouardii*	CR	B2ab(iii,v)	CR	B2ab(iii,v)	Yes	Yes	II/IV	I				
OPHIOGLOSSACEAE	*Botrychium matricariifolium*	NT		NT					I				
OPHIOGLOSSACEAE	*Botrychium multifidum*	DD		DD					I				
OPHIOGLOSSACEAE	*Botrychium simplex*	NT		NT				II/IV	I				
GRAMINEAE	*Brachiaria eruciformis*	LC		LC								Yes	
CRUCIFERAE	*Brassica balearica*	LC		LC		Yes	Yes						Yes
CRUCIFERAE	*Brassica barrelieri*	LC		LC									Yes
CRUCIFERAE	*Brassica cadmea*	DD		DD		Yes	Yes						Yes
CRUCIFERAE	*Brassica cossoniana*	DD		DD									Yes
CRUCIFERAE	*Brassica cretica*	LC		LC									Yes
CRUCIFERAE	*Brassica elongata*	DD		DD									Yes
CRUCIFERAE	*Brassica fruticulosa*	LC		LC									Yes
CRUCIFERAE	*Brassica glabrescens*	VU	D1	VU	D1	Yes	Yes	II/IV	I				Yes
CRUCIFERAE	*Brassica gravinae*	DD		DD									Yes
CRUCIFERAE	*Brassica hilarionis*	EN	B1ab(iii,v)+2ab(iii,v); C2a(i)	EN	B1ab(iii,v)+2ab(iii,v); C2a(i)	Yes	Yes	II/IV	I				Yes
CRUCIFERAE	*Brassica incana*	DD		DD		Yes							Yes
CRUCIFERAE	*Brassica insularis*	NT		NT				II/IV	I				Yes
CRUCIFERAE	*Brassica macrocarpa*	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				Yes
CRUCIFERAE	*Brassica montana*	LC		LC		Yes	Yes						Yes
CRUCIFERAE	*Brassica nigra*	LC		LC									Yes
CRUCIFERAE	*Brassica nivalis*	LC		LC		Yes	Yes						Yes
CRUCIFERAE	*Brassica oleracea*	DD		DD		Yes	Yes						Yes
CRUCIFERAE	*Brassica oxyrrhina*	LC		LC									Yes
CRUCIFERAE	*Brassica rapa*	DD		DD									Yes
CRUCIFERAE	*Brassica repanda*	LC		LC									Yes
CRUCIFERAE	*Brassica rupestris*	NT		NT		Yes	Yes						Yes
CRUCIFERAE	*Brassica souliei*	DD		DD									Yes
CRUCIFERAE	*Brassica tournefortii*	LC		LC									Yes
CRUCIFERAE	*Brassica villosa*	NT		NT		Yes	Yes						Yes
CRUCIFERAE	*Braya linearis*	VU	B2ab(iii)c(iv)	VU	B2ac(iv)			II/IV					
CRUCIFERAE	*Braya purpurascens*	LC		NE					I				
GRAMINEAE	*Bromus bromoideus*	EW		EW		Yes	Yes		I				
GRAMINEAE	*Bromus grossus*	DD		DD		Yes		II/IV	I				

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GRAMINEAE	*Bromus interruptus*	EW		EW		Yes	Yes		I				
GRAMINEAE	*Bromus moesiacus*[1]	DD		DD		Yes			I				
UMBELLIFERAE	*Bunium brevifolium*	DD		DD		Yes	Yes	IV	I				
UMBELLIFERAE	*Bupleurum capillare*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
UMBELLIFERAE	*Bupleurum dianthifolium*	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	Yes		I				
UMBELLIFERAE	*Bupleurum handiense*	EN	B1ab(i,ii,iv,v)+ 2ab(i,ii,iv,v)	EN	B1ab(i,ii,iv,v)+ 2ab(i,ii,iv,v)	Yes	Yes	II/IV	I				
UMBELLIFERAE	*Bupleurum kakiskalae*	CR	B1ac(iv)+2ac(iv)	CR	B1ac(iv)+2ac(iv)	Yes	Yes	II/IV	I				
BUTOMACEAE	*Butomus umbellatus*	LC		LC								Yes	
GRAMINEAE	*Calamagrostis chalybaea*	LC		LC		Yes		II/IV					
ALISMATACEAE	*Caldesia parnassifolia*	NT		NT				II/IV	I			Yes	
COMPOSITAE	*Calendula maderensis*	LC		LC		Yes	Yes	II/IV	I				
ARACEAE	*Calla palustris*	LC		LC								Yes	
RANUNCULACEAE	*Callianthemum kernerianum*	CR	B1ab(iii,v)	CR	B1ab(iii,v)	Yes	Yes						
CALLITRICHACEAE	*Callitriche brutia*	LC		LC								Yes	
CALLITRICHACEAE	*Callitriche cophocarpa*	LC		LC		Yes						Yes	
CALLITRICHACEAE	*Callitriche cribrosa*	NT		NT								Yes	
CALLITRICHACEAE	*Callitriche hermaphroditica*	LC		LC								Yes	
CALLITRICHACEAE	*Callitriche lenisulca*	LC		LC								Yes	
CALLITRICHACEAE	*Callitriche lusitanica*	NT		NT								Yes	
CALLITRICHACEAE	*Callitriche obtusangula*	LC		LC								Yes	
CALLITRICHACEAE	*Callitriche palustris*	LC		LC								Yes	
CALLITRICHACEAE	*Callitriche platycarpa*	LC		LC		Yes						Yes	
CALLITRICHACEAE	*Callitriche pulchra*	CR	B2ab(iii)c(iv)	CR	B2ab(iii)c(iv)							Yes	
CALLITRICHACEAE	*Callitriche regis-jubae*	EN	B2ab(iii,iv);C2a(ii)	EN	B2ab(iii,iv);C2a(ii)							Yes	
CALLITRICHACEAE	*Callitriche stagnalis*	LC		LC								Yes	
CALLITRICHACEAE	*Callitriche transvolgensis*	EN	B1ab(iii)+2ab(iii)	NE		Yes						Yes	
CALLITRICHACEAE	*Callitriche truncata*	LC		LC								Yes	
RANUNCULACEAE	*Caltha palustris*	LC		LC								Yes	
ORCHIDACEAE	*Calypso bulbosa*	NT		NT				II/IV		II			
CRUCIFERAE	*Camelina alyssum*	DD		DD									Yes
CRUCIFERAE	*Camelina microcarpa*	LC		LC									Yes
CRUCIFERAE	*Camelina rumelica*	LC		LC									Yes
CRUCIFERAE	*Camelina sativa*	DD		DD									Yes
CAMPANULACEAE	*Campanula asperuloides*[1]	DD		DD		Yes	Yes		I				

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CAMPANULACEAE	*Campanula bohemica*	NT		NT		Yes	Yes	II/IV					
CAMPANULACEAE	*Campanula bohemica* ssp. *gelida*[1]	CR	D	CR	D	Yes	Yes	II/IV	I				
CAMPANULACEAE	*Campanula lanata*	DD		VU	B1ab(ii,iii)	Yes			I				
CAMPANULACEAE	*Campanula morettiana*	LC		LC		Yes	Yes	IV	I				
CAMPANULACEAE	*Campanula patula* ssp. *abietana*	DD		DD		Yes			I				
CAMPANULACEAE	*Campanula romanica*	DD		DD		Yes	Yes	II/IV	I				
CAMPANULACEAE	*Campanula sabatia*	VU	C1	VU	C1	Yes	Yes	II/IV	I				
CAMPANULACEAE	*Campanula serrata*	LC		LC		Yes		II/IV					
COMPOSITAE	*Canariothamnus hermosae*[1]	VU	D2	VU	D2	Yes	Yes		I				
ASCLEPIADACEAE	*Caralluma burchardii*	EN	B2ab(iii,v)	EN	B2ab(iii,v)			II/IV	I				
CRUCIFERAE	*Cardamine amara*	LC		LC								Yes	
CRUCIFERAE	*Cardamine pratensis*	LC		LC								Yes	
COMPOSITAE	*Carduus myriacanthus*	EN	B2ab(i,ii,iii,iv,v)	EN	B2ab(i,ii,iii,iv,v)			II/IV	I				
CYPERACEAE	*Carex acuta*	LC		LC								Yes	
CYPERACEAE	*Carex acutiformis*	LC		LC								Yes	
CYPERACEAE	*Carex appropinquata*	LC		LC								Yes	
CYPERACEAE	*Carex aquatilis*	LC		LC								Yes	
CYPERACEAE	*Carex atherodes*	DD		DD								Yes	
CYPERACEAE	*Carex canescens*	LC		LC								Yes	
CYPERACEAE	*Carex chordorrhiza*	LC		LC								Yes	
CYPERACEAE	*Carex cretica*	NT		NT		Yes	Yes					Yes	
CYPERACEAE	*Carex disticha*	LC		LC								Yes	
CYPERACEAE	*Carex elata*	LC		LC								Yes	
CYPERACEAE	*Carex holostoma*	LC		LC				II/IV					
CYPERACEAE	*Carex lasiocarpa*	LC		LC								Yes	
CYPERACEAE	*Carex limosa*	LC		LC								Yes	
CYPERACEAE	*Carex malato-belizii*	LC		LC		Yes	Yes	II/IV	I				
CYPERACEAE	*Carex paniculata*	LC		LC								Yes	
CYPERACEAE	*Carex panormitana*	LC		LC		Yes	Yes	II/IV					
CYPERACEAE	*Carex pseudocyperus*	LC		LC								Yes	
CYPERACEAE	*Carex recta*	DD		DD								Yes	
CYPERACEAE	*Carex riparia*	LC		LC								Yes	
CYPERACEAE	*Carex rostrata*	LC		LC								Yes	
CYPERACEAE	*Carex secalina*	DD		DD					I				
CYPERACEAE	*Carex troodi*	NT		NT		Yes	Yes					Yes	

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CYPERACEAE	*Carex vesicaria*	LC		LC								Yes	
COMPOSITAE	*Carlina diae*	EN	B1ab(v)+2ab(v);C2a(i)	EN	B1ab(v)+2ab(v);C2a(i)	Yes	Yes		I				
COMPOSITAE	*Carlina onopordifolia*	VU	B2ab(iii)	VU	D2	Yes		II/IV	I				
COMPOSITAE	*Carthamus balearicus*[1]	VU	D2	VU	D2	Yes	Yes	II/IV	I				
UMBELLIFERAE	*Carum verticillatum*	LC		LC		Yes	Yes					Yes	
GRAMINEAE	*Catabrosa aquatica*	LC		LC								Yes	
COMPOSITAE	*Centaurea akamantis*	CR	B1ab(v)+2ab(v)	CR	B1ab(v)+2ab(v)	Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea attica* ssp. *megarensis*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea borjae*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea citricolor*	NT		NT		Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea corensis*	CR	B1ab(i,iii,v)+2ab(i,iii,v)	CR	B1ab(i,iii,v)+2ab(i,iii,v)	Yes	Yes						
COMPOSITAE	*Centaurea corymbosa*	VU	D1+2	VU	D1+2	Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea dubjanskyi*	VU	D2	NE		Yes			I				
COMPOSITAE	*Centaurea fraylensis*[1]	DD		DD		Yes	Yes	II/IV					
COMPOSITAE	*Centaurea gadorensis*	VU	B2ab(iii,v);D2	VU	B2ab(iii,v);D2	Yes	Yes	II/IV					
COMPOSITAE	*Centaurea heldreichii*[1]	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea hermannii*	DD		NE					I				
COMPOSITAE	*Centaurea horrida*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea immanuelis-loewii*	VU	B1ab(iii)+2ab(iii)	VU	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV					
COMPOSITAE	*Centaurea jankae*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea kalambakensis*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea kartschiana*	DD		DD		Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea lactiflora*	NT		NT		Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea micrantha* ssp. *herminii*	LC		LC		Yes	Yes	II/IV					
COMPOSITAE	*Centaurea niederi*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea peucedanifolia*	VU	D1+2	VU	D1+2	Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea pineticola*	DD		NE		Yes			I				
COMPOSITAE	*Centaurea pinnata*	NT		NT		Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea pontica*	DD		DD		Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea princeps*[1]	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea pseudoleucolepis*	EX		NE		Yes			I				
COMPOSITAE	*Centaurea pulvinata*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
COMPOSITAE	*Centaurea rothmalerana*	DD		DD		Yes	Yes	II/IV					
GENTIANACEAE	*Centaurium somedanum*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
VALERIANACEAE	*Centranthus longiflorus* ssp. *kellereri*	DD		DD		Yes	Yes		I				

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VALERIANACEAE	*Centranthus trinervis*	EN	D	EN	D	Yes	Yes	II/IV	I				
ORCHIDACEAE	*Cephalanthera cucullata*	EN	B1ab(iii,v)+2ab(iii,v); C2a(i)	EN	B1ab(iii,v)+2ab(iii,v); C2a(i)	Yes	Yes	II/IV	I	II	A		
ORCHIDACEAE	*Cephalanthera damasonium*	LC		LC						II			
ORCHIDACEAE	*Cephalanthera epipactoides*	VU	B1ab(iii,v)+2ab(iii,v); D2	VU	B1ab(iii,v)+2ab(iii,v); D2					II			
ORCHIDACEAE	*Cephalanthera longifolia*	LC		LC						II			
ORCHIDACEAE	*Cephalanthera rubra*	LC		LC						II			
CARYOPHYLLACEAE	*Cerastium alsinifolium*	DD		DD		Yes	Yes	II/IV	I				
CARYOPHYLLACEAE	*Cerastium dinaricum*	VU	D2	VU	D2	Yes	Yes	II/IV					
CERATOPHYLLACEAE	*Ceratophyllum demersum*	LC		LC								Yes	
CERATOPHYLLACEAE	*Ceratophyllum platyacanthum*	DD		DD								Yes	
CERATOPHYLLACEAE	*Ceratophyllum submersum*	LC		LC								Yes	
CERATOPHYLLACEAE	*Ceratophyllum tanaiticum*	DD		NE		Yes						Yes	
ASCLEPIADACEAE	*Ceropegia dichotoma* ssp. *krainzii*[1]	EN	D	EN	D	Yes	Yes	II/IV	I				
SCROPHULARIACEAE	*Chaenorhinum serpyllifolium* ssp. *lusitanicum*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes	II/IV					
ROSACEAE	*Chamaemeles coriacea*	VU	D1	VU	D1	Yes	Yes	II/IV	I				
ORCHIDACEAE	*Chamorchis alpina*	LC		LC		Yes				II			
COMPOSITAE	*Cheirolophus crassifolius*[1]	CR	B1ab(i,ii,iii,iv,v)	CR	B1ab(i,ii,iii,iv,v)	Yes	Yes	II/IV	I				
COMPOSITAE	*Cheirolophus duranii*	CR	B2ab(iii,v)	CR	B2ab(iii,v)	Yes	Yes	II/IV	I				
COMPOSITAE	*Cheirolophus falcisectus*	EN	B2b(iii)c(iv)	EN	B2b(iii)c(iv)	Yes	Yes		I				
COMPOSITAE	*Cheirolophus ghomerythus*	EN	B1ab(iii,iv,v)+ 2b(iii,iv,v)	EN	B1ab(iii,iv,v)+ 2b(iii,iv,v)	Yes	Yes	II/IV	I				
COMPOSITAE	*Cheirolophus junonianus*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
COMPOSITAE	*Cheirolophus massonianus*	EN	D	EN	D	Yes	Yes	II/IV					
COMPOSITAE	*Cheirolophus metlesicsii*	CR	B2ab(iii,v)	CR	B2ab(iii,v)	Yes	Yes		I				
COMPOSITAE	*Cheirolophus santos-abreui*	CR	B2ab(iii,v)	CR	B2ab(iii,v)	Yes	Yes		I				
COMPOSITAE	*Cheirolophus sataratae nsis*	VU	B2ab(iii);D2	VU	B2ab(iii);D2	Yes	Yes		I				
COMPOSITAE	*Cheirolophus tagananensis*	VU	D2	VU	D2	Yes	Yes		I				
LEGUMINOSAE	*Cicer canariense*	EN	B2ac(iv)	EN	B2ac(iv)	Yes	Yes		I				Yes
LEGUMINOSAE	*Cicer graecum*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)	Yes	Yes						Yes
LEGUMINOSAE	*Cicer incisum*	LC		LC									Yes
LEGUMINOSAE	*Cicer montbretii*	LC		LC									Yes
COMPOSITAE	*Cichorium intybus*	LC		LC									Yes
COMPOSITAE	*Cichorium pumilum*	LC		LC									Yes

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COMPOSITAE	*Cichorium spinosum*	DD		DD									Yes
UMBELLIFERAE	*Cicuta virosa*	LC		LC								Yes	
GRAMINEAE	*Cinna latifolia*	LC		LC				II/IV					
COMPOSITAE	*Cirsium brachycephalum*	LC		LC		Yes		II/IV					
COMPOSITAE	*Cirsium latifolium*	LC		LC		Yes	Yes	II/IV					
CISTACEAE	*Cistus chinamadensis*	EN	B2ab(ii,iii)	EN	B2ab(ii,iii)	Yes	Yes	II/IV	I				
CISTACEAE	*Cistus palhinhae*	DD		DD		Yes	Yes	II/IV					
CYPERACEAE	*Cladium mariscus*	LC		LC								Yes	
CRUCIFERAE	*Cochlearia polonica*	EN	B2ab(v)	EN	B2ab(v)	Yes		II/IV	I				
CRUCIFERAE	*Cochlearia tatrae*	VU	B2ab(iii)	VU	B2ab(iii)	Yes	Yes	II/IV					
CRUCIFERAE	*Coincya rupestris*	EN	B2b(iii)c(iv)	EN	B2b(iii)c(iv)	Yes	Yes	II/IV	I				
COLCHICACEAE	*Colchicum arenarium*	LC		LC		Yes	Yes	II/IV	I				
COLCHICACEAE	*Colchicum corsicum*	VU	D1+2	VU	D1+2	Yes	Yes	IV	I				
COLCHICACEAE	*Colchicum cupanii* ssp. *cupanii*[1]	DD		DD				IV	I				
COLCHICACEAE	*Colchicum micranthum*	DD		DD					I				
COLCHICACEAE	*Colchicum szovitsii* ssp. *szovitsii*[1]	DD		DD					I				
GRAMINEAE	*Coleanthus subtilis*	LC		LC				II/IV	I			Yes	
RANUNCULACEAE	*Consolida samia*	CR	D	CR	D	Yes	Yes	II/IV	I				
CONVOLVULACEAE	*Convolvulus argyrothamnos*	CR	D	CR	D	Yes	Yes	II/IV	I				
CONVOLVULACEAE	*Convolvulus caput-medusae*	NT		NT		Yes	Yes	II/IV	I				
CONVOLVULACEAE	*Convolvulus fernandesii*	VU	D2	VU	D2	Yes	Yes	II/IV					
CONVOLVULACEAE	*Convolvulus lopezsocasii*	EN	B2ab(v)	EN	B2ab(v)	Yes	Yes	II/IV	I				
CONVOLVULACEAE	*Convolvulus massonii*	VU	D1	VU	D1	Yes	Yes	II/IV	I				
ORCHIDACEAE	*Corallorhiza trifida*	LC		LC						II			
CRUCIFERAE	*Coronopus navasii*	CR	B1b(iv,v)c(iv)+2b(iv,v) c(iv)	CR	B1b(iv,v)c(iv)+2b(iv,v) c(iv)	Yes	Yes	II/IV	I				
PAPAVERACEAE	*Corydalis gotlandica*	NT		NT		Yes	Yes	II/IV					
CRUCIFERAE	*Crambe arborea*	VU	D2	VU	D2	Yes	Yes	II/IV	I				Yes
CRUCIFERAE	*Crambe aspera*	VU	B2ab(ii,iii,iv)	NE									Yes
CRUCIFERAE	*Crambe feuillei*	CR	B1ab(iii,v)+2ab(iii,v)	CR	B1ab(iii,v)+2ab(iii,v)	Yes	Yes						Yes
CRUCIFERAE	*Crambe filiformis*	LC		LC									Yes
CRUCIFERAE	*Crambe fruticosa*	NT		NT		Yes	Yes						Yes
CRUCIFERAE	*Crambe gomerae*	VU	D2	VU	D2	Yes	Yes						Yes
CRUCIFERAE	*Crambe grandiflora*	DD		NE		Yes							Yes
CRUCIFERAE	*Crambe hispanica*	LC		LC									Yes

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CRUCIFERAE	*Crambe koktebelica*	DD		NE		Yes			I				Yes
CRUCIFERAE	*Crambe laevigata*	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)	Yes	Yes	II/IV	I				Yes
CRUCIFERAE	*Crambe maritima*	LC		LC									Yes
CRUCIFERAE	*Crambe microcarpa*	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)	Yes	Yes						Yes
CRUCIFERAE	*Crambe pritzelii*	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)	Yes	Yes						Yes
CRUCIFERAE	*Crambe santosii*	LC		LC		Yes	Yes						Yes
CRUCIFERAE	*Crambe scaberrima*	VU	B1ab(iii)+2ab(iii)	VU	B1ab(iii)+2ab(iii)	Yes	Yes						Yes
CRUCIFERAE	*Crambe scoparia*	EN	B2ab(ii,iii)	EN	B2ab(ii,iii)	Yes	Yes		I				Yes
CRUCIFERAE	*Crambe steveniana*	DD		NE									Yes
CRUCIFERAE	*Crambe strigosa*	LC		LC		Yes	Yes						Yes
CRUCIFERAE	*Crambe sventenii*	CR	B2ab(iii,v)	CR	B2ab(iii,v)	Yes	Yes	II/IV					Yes
CRUCIFERAE	*Crambe tamadabensis*	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	Yes						Yes
CRUCIFERAE	*Crambe tataria*	LC		LC				II/IV	I				Yes
CRUCIFERAE	*Crambe wildpretii*	CR	C2a(i);D	CR	C2a(i);D	Yes	Yes						Yes
CRASSULACEAE	*Crassula aquatica*	DD		DD								Yes	
CHENOPODIACEAE	*Cremnophyton lanfrancoi*	CR	B1ab(i,ii,iii,iv,v)	CR	B1ab(i,ii,iii,iv,v)	Yes	Yes	II/IV	I				
COMPOSITAE	*Crepis crocifolia*	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)	Yes	Yes	II/IV	I				
COMPOSITAE	*Crepis granatensis*	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)	Yes	Yes	II/IV	I				
COMPOSITAE	*Crepis purpurea*	VU	B1ab(iii)	NE		Yes			I				
COMPOSITAE	*Crepis pusilla*	DD		DD				II/IV					
COMPOSITAE	*Crepis tectorum* ssp. *nigrescens*	EN	B1ab(iii)+2ab(iii);D	EN	B1ab(iii)+2ab(iii);D	Yes	Yes	II/IV					
IRIDACEAE	*Crocus cyprius*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
IRIDACEAE	*Crocus etruscus*	NT		NT		Yes	Yes	IV	I				
IRIDACEAE	*Crocus hartmannianus*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
DICKSONIACEAE	*Culcita macrocarpa*	NT		NT		Yes	Yes	II/IV	I				
PRIMULACEAE	*Cyclamen coum*	LC		LC					I	II	B		
CYPERACEAE	*Cyperus cyprius*	VU	D2	VU	D2	Yes	Yes					Yes	
CYPERACEAE	*Cyperus difformis*	LC		LC								Yes	
CYPERACEAE	*Cyperus fuscus*	LC		LC								Yes	
CYPERACEAE	*Cyperus glaber*	LC		LC								Yes	
CYPERACEAE	*Cyperus glomeratus*	LC		LC								Yes	
CYPERACEAE	*Cyperus longus*	LC		LC								Yes	
CYPERACEAE	*Cyperus michelianus*	NT		NT								Yes	
CYPERACEAE	*Cyperus pannonicus*	LC		LC								Yes	
CYPERACEAE	*Cyperus rotundus*	LC		LC								Yes	

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CYPERACEAE	*Cyperus serotinus*	LC		LC								Yes	
ORCHIDACEAE	*Cypripedium calceolus*	NT		NT				II/IV	I	II	A		
LEGUMINOSAE	*Cytisus aeolicus*	CR	B1ab(ii,iv)+2ab(ii,iv)	CR	B1ab(ii,iv)+2ab(ii,iv)	Yes	Yes	II/IV	I				
ORCHIDACEAE	*Dactylorhiza baumanniana*	NT		NT		Yes	Yes			II			
ORCHIDACEAE	*Dactylorhiza cordigera*	LC		LC		Yes				II			
ORCHIDACEAE	*Dactylorhiza elata*	LC		LC						II			
ORCHIDACEAE	*Dactylorhiza foliosa*	LC		LC		Yes	Yes			II			
ORCHIDACEAE	*Dactylorhiza fuchsii*	LC		LC						II			
ORCHIDACEAE	*Dactylorhiza iberica*	VU	B2ab(iii)	VU	B2ab(iii)					II			
ORCHIDACEAE	*Dactylorhiza incarnata*	LC		LC						II			
ORCHIDACEAE	*Dactylorhiza kalopissii*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes	II/IV		II			
ORCHIDACEAE	*Dactylorhiza lapponica*	LC		LC		Yes	Yes			II			
ORCHIDACEAE	*Dactylorhiza maculata*	LC		LC						II			
ORCHIDACEAE	*Dactylorhiza majalis*	LC		LC						II			
ORCHIDACEAE	*Dactylorhiza romana*	LC		LC						II			
ORCHIDACEAE	*Dactylorhiza russowii*	LC		LC						II			
ORCHIDACEAE	*Dactylorhiza saccifera*	LC		LC						II			
ORCHIDACEAE	*Dactylorhiza sambucina*	LC		LC		Yes				II			
ORCHIDACEAE	*Dactylorhiza traunsteineri*	LC		LC						II			
ORCHIDACEAE	*Dactylorhiza viridis*	LC		LC						II			
ALISMATACEAE	*Damasonium alisma*	NT		NT								Yes	
ALISMATACEAE	*Damasonium bourgaei*	NT		NT								Yes	
ALISMATACEAE	*Damasonium polyspermum*	VU	B2ab(iii,iv)	VU	B2ab(iii,iv)							Yes	
THYMELAEACEAE	*Daphne arbuscula*	DD		DD		Yes	Yes	II/IV	I				
THYMELAEACEAE	*Daphne petraea*	LC		LC		Yes	Yes	II/IV	I				
THYMELAEACEAE	*Daphne rodriguezii*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
THYMELAEACEAE	*Daphne sophia*	EN	B2ab(iii,iv)	NE		Yes							
UMBELLIFERAE	*Daucus aureus*	DD		DD									Yes
UMBELLIFERAE	*Daucus broteri*	DD		DD									Yes
UMBELLIFERAE	*Daucus carota*	LC		LC									Yes
UMBELLIFERAE	*Daucus crinitus*	LC		LC									Yes
UMBELLIFERAE	*Daucus durieua*	LC		LC									Yes
UMBELLIFERAE	*Daucus glaber*	LC		LC									Yes
UMBELLIFERAE	*Daucus guttatus*	DD		DD									Yes
UMBELLIFERAE	*Daucus halophilus*	DD		DD		Yes	Yes						Yes

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UMBELLIFERAE	*Daucus involucratus*	LC		LC									Yes
UMBELLIFERAE	*Daucus littoralis*	LC		LC									Yes
UMBELLIFERAE	*Daucus muricatus*	LC		LC									Yes
UMBELLIFERAE	*Daucus setifolius*	LC		LC									Yes
RANUNCULACEAE	*Delphinium caseyi*	CR	B1ab(iii,v)+2ab(iii,v)	CR	B1ab(iii,v)+2ab(iii,v)	Yes	Yes	II/IV	I				
COMPOSITAE	*Dendranthema zawadskii*[1]	DD		LC					I				
ROSACEAE	*Dendriopoterium pulidoi*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
GRAMINEAE	*Deschampsia maderensis*	DD		DD		Yes	Yes	II/IV	I				
CARYOPHYLLACEAE	*Dianthus arenarius* ssp. *arenarius*	LC		LC		Yes	Yes	II/IV					
CARYOPHYLLACEAE	*Dianthus arenarius* ssp. *bohemicus*	DD		DD		Yes	Yes	II/IV					
CARYOPHYLLACEAE	*Dianthus cintranus* ssp. *cintranus*	VU	D2	VU	D2	Yes	Yes	II/IV					
CARYOPHYLLACEAE	*Dianthus diutinus*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)	Yes		II/IV					
CARYOPHYLLACEAE	*Dianthus hypanicus*	VU	D2	VU	D2	Yes	Yes		I				
CARYOPHYLLACEAE	*Dianthus lumnitzeri*	DD		DD		Yes	Yes	II/IV					
CARYOPHYLLACEAE	*Dianthus marizii*	LC		LC		Yes	Yes	II/IV					
CARYOPHYLLACEAE	*Dianthus moravicus*	DD		DD		Yes	Yes	II/IV					
CARYOPHYLLACEAE	*Dianthus morisianus*	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	Yes						
CARYOPHYLLACEAE	*Dianthus nitidus*	NT		NT		Yes		II/IV	I				
CARYOPHYLLACEAE	*Dianthus plumarius* ssp. *regis-stephani*	LC		LC		Yes	Yes	II/IV					
CARYOPHYLLACEAE	*Dianthus rupicola*	NT		NT				II/IV	I				
CARYOPHYLLACEAE	*Dianthus serotinus*	DD		DD		Yes	Yes		I				
CARYOPHYLLACEAE	*Dianthus urumoffii*	DD		DD		Yes	Yes		I				
WOODSIACEAE	*Diplazium sibiricum*	LC		LC				II/IV					
CRUCIFERAE	*Diplotaxis catholica*	LC		LC									Yes
CRUCIFERAE	*Diplotaxis cretacea*	DD		NE									Yes
CRUCIFERAE	*Diplotaxis erucoides*	LC		LC									Yes
CRUCIFERAE	*Diplotaxis gomez-campoi*	LC		LC		Yes	Yes						Yes
CRUCIFERAE	*Diplotaxis harra*	LC		LC									Yes
CRUCIFERAE	*Diplotaxis ibicensis*	LC		LC		Yes	Yes	II/IV	I				Yes
CRUCIFERAE	*Diplotaxis ilorcitana*	LC		LC		Yes	Yes						Yes
CRUCIFERAE	*Diplotaxis muralis*	LC		LC									Yes
CRUCIFERAE	*Diplotaxis parvula*	DD		DD									Yes
CRUCIFERAE	*Diplotaxis siettiana*	CR	B1ab(iii)c(iv)+2ab(iii) c(iv)	CR	B1ab(iii)c(iv)+2ab(iii) c(iv)	Yes	Yes	II/IV	I				Yes
CRUCIFERAE	*Diplotaxis siifolia*	NT		NT									Yes

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CRUCIFERAE	*Diplotaxis tenuifolia*	LC		LC									Yes
CRUCIFERAE	*Diplotaxis vicentina*	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV					Yes
CRUCIFERAE	*Diplotaxis viminea*	LC		LC									Yes
CRUCIFERAE	*Diplotaxis virgata*	LC		LC									Yes
COMPOSITAE	*Doronicum plantagineum* ssp. *tournefortii*	DD		DD		Yes	Yes	V					
LEGUMINOSAE	*Dorycnium pentaphyllum* ssp. *transmontana*	DD		DD				V					
LEGUMINOSAE	*Dorycnium spectabile*	EN	B2ab(iii,v);C2a(i)	EN	B2ab(iii,v);C2a(i)	Yes	Yes	II/IV	I				
CRUCIFERAE	*Draba cacuminum*	DD		VU	D1	Yes		II/IV					
CRUCIFERAE	*Draba cinerea*	LC		VU	D1			II/IV					
CRUCIFERAE	*Draba dorneri*	DD		DD		Yes	Yes	II/IV	I				
DRACAENACEAE	*Dracaena draco*	EN	B2ab(iii,iv,v);C2a(ii)	EN	B2ab(iii,iv,v);C2a(ii)			IV	I				
LABIATAE	*Dracocephalum austriacum*	DD		DD				II/IV	I				
LABIATAE	*Dracocephalum ruyschiana*	LC		LC					I				
DRYOPTERIDACEAE	*Dryopteris corleyi**	LC		LC		Yes	Yes	II/IV	I				
DRYOPTERIDACEAE	*Dryopteris fragrans*	NT		NT				II/IV					
BORAGINACEAE	*Echium candicans*	DD		DD		Yes	Yes	II/IV					
BORAGINACEAE	*Echium gentianoides*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
BORAGINACEAE	*Echium handiense*	CR	B2ab(iii,v);C2a(ii)	CR	B2ab(iii,v);C2a(ii)	Yes	Yes		I				
BORAGINACEAE	*Echium pininana*	EN	B2ac(iv)	EN	B2ac(iv)	Yes	Yes		I				
BORAGINACEAE	*Echium russicum*	LC		LC				II/IV					
ELATINACEAE	*Elatine alsinastrum*	NT		NT								Yes	
ELATINACEAE	*Elatine ambigua*	DD		DD								Yes	
ELATINACEAE	*Elatine brochonii*	VU	B2ab(iv)	VU	B2ab(iv)							Yes	
ELATINACEAE	*Elatine gussonei*	LC		LC		Yes	Yes	II/IV				Yes	
ELATINACEAE	*Elatine hexandra*	LC		LC								Yes	
ELATINACEAE	*Elatine hungarica*	DD		NT								Yes	
ELATINACEAE	*Elatine hydropiper*	LC		LC								Yes	
ELATINACEAE	*Elatine macropoda*	DD		DD								Yes	
ELATINACEAE	*Elatine orthosperma*	LC		LC								Yes	
ELATINACEAE	*Elatine triandra*	LC		LC								Yes	
CYPERACEAE	*Eleocharis acicularis*	LC		LC								Yes	
CYPERACEAE	*Eleocharis austriaca*	LC		LC								Yes	
CYPERACEAE	*Eleocharis carniolica*	LC		LC		Yes		II/IV	I			Yes	
CYPERACEAE	*Eleocharis mamillata*	LC		LC								Yes	
CYPERACEAE	*Eleocharis multicaulis*	LC		LC								Yes	

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CYPERACEAE	*Eleocharis ovata*	LC		LC								Yes	
CYPERACEAE	*Eleocharis oxylepis*	DD		NE								Yes	
CYPERACEAE	*Eleocharis palustris*	LC		LC								Yes	
CYPERACEAE	*Eleocharis parvula*	DD		DD								Yes	
CYPERACEAE	*Eleocharis quinqueflora*	LC		LC								Yes	
CYPERACEAE	*Eleocharis uniglumis*	LC		LC								Yes	
GRAMINEAE	*Elymus alaskanus*	LC		LC									Yes
GRAMINEAE	*Elymus alopex*	LC		NE		Yes							Yes
GRAMINEAE	*Elymus caninus*	LC		LC									Yes
GRAMINEAE	*Elymus fibrosus*	DD		VU	A2ac								Yes
GRAMINEAE	*Elymus hispanicus*	LC		LC									Yes
GRAMINEAE	*Elymus macrourus*	DD		NE									Yes
GRAMINEAE	*Elymus mutabilis*	LC		LC									Yes
GRAMINEAE	*Elymus panormitanus*	LC		LC									Yes
GRAMINEAE	*Elymus sibiricus*	NA		NE									Yes
GRAMINEAE	*Elymus trachycaulus*	NA		NE									Yes
GRAMINEAE	*Elymus uralensis*	DD		DD									Yes
ORCHIDACEAE	*Epipactis albensis*	LC		LC		Yes	Yes			II			
ORCHIDACEAE	*Epipactis atrorubens*	LC		LC						II			
ORCHIDACEAE	*Epipactis condensata*	CR	D	CR	D					II			
ORCHIDACEAE	*Epipactis dunensis*	DD		DD		Yes	Yes			II			
ORCHIDACEAE	*Epipactis greuteri*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes				II			
ORCHIDACEAE	*Epipactis helleborine*	LC		LC						II			
ORCHIDACEAE	*Epipactis leptochila*	LC		LC		Yes				II			
ORCHIDACEAE	*Epipactis microphylla*	NT		NT						II			
ORCHIDACEAE	*Epipactis muelleri*	LC		LC		Yes				II			
ORCHIDACEAE	*Epipactis nordeniorum*	VU	B2ab(iii,v)	VU	B2ab(iii,v)	Yes				II			
ORCHIDACEAE	*Epipactis palustris*	LC		LC						II			
ORCHIDACEAE	*Epipactis phyllanthes*	LC		LC		Yes	Yes			II			
ORCHIDACEAE	*Epipactis placentina*	EN	B2ab(ii,iii,v)	EN	B2ab(ii,iii,v)	Yes				II			
ORCHIDACEAE	*Epipactis pontica*	VU	B2ab(ii,iii,v)	VU	B2ab(ii,iii,v)					II			
ORCHIDACEAE	*Epipactis purpurata*	LC		LC		Yes				II			
ORCHIDACEAE	*Epipactis tallosii*	EN	B2ab(ii,iii,v)	EN	B2ab(ii,iii,v)	Yes	Yes			II			
ORCHIDACEAE	*Epipactis troodi*	EN	B2ab(iii,v)	EN	B2ab(iii,v)					II			
ORCHIDACEAE	*Epipactis veratrifolia*	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)					II			

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ORCHIDACEAE	*Epipogium aphyllum*	LC		LC						II			
EQUISETACEAE	*Equisetum arvense*	LC		LC								Yes	
EQUISETACEAE	*Equisetum fluviatile*	LC		LC								Yes	
EQUISETACEAE	*Equisetum palustre*	LC		LC								Yes	
COMPOSITAE	*Erigeron frigidus*	EN	B1ab(i,ii,iii,v)+2ab(i,ii,iii,v);C2a(i);D	EN	B1ab(i,ii,iii,v)+2ab(i,ii,iii,v);C2a(i);D	Yes	Yes	II/IV	I				
ERIOCAULACEAE	*Eriocaulon aquaticum*	LC		LC								Yes	
CYPERACEAE	*Eriophorum angustifolium*	LC		LC								Yes	
CYPERACEAE	*Eriophorum brachyantherum*	LC		LC								Yes	
CYPERACEAE	*Eriophorum gracile*	NT		NT								Yes	
CYPERACEAE	*Eriophorum russeolum*	LC		LC								Yes	
CYPERACEAE	*Eriophorum scheuchzeri*	LC		LC								Yes	
CYPERACEAE	*Eriophorum triste*	LC		LC								Yes	
GERANIACEAE	*Erodium astragaloides*	CR	B1ab(iii,v)+2ab(iii,v)	CR	B1ab(iii,v)+2ab(iii,v)	Yes	Yes	II/IV	I				
GERANIACEAE	*Erodium paularense*	EN	B2ab(v)	EN	B2ab(v)	Yes	Yes	II/IV	I				
GERANIACEAE	*Erodium rupicola*	VU	C2a(i)	VU	C2a(i)	Yes	Yes	II/IV	I				
CRUCIFERAE	*Eruca pinnatifida*	DD		DD									Yes
CRUCIFERAE	*Eruca vesicaria*	LC		LC									Yes
CRUCIFERAE	*Erucastrum palustre*	CR	B1ab(i,ii,iii)+2ab(i,ii,iii)	CR	B1ab(i,ii,iii)+2ab(i,ii,iii)	Yes	Yes	II/IV	I				
UMBELLIFERAE	*Eryngium alpinum*	NT		NT		Yes	Yes	II/IV	I				
UMBELLIFERAE	*Eryngium corniculatum*	LC		LC								Yes	
UMBELLIFERAE	*Eryngium galioides*	LC		LC		Yes	Yes					Yes	
UMBELLIFERAE	*Eryngium viviparum*	EN	B2ab(i,ii,iii,iv,v)	EN	B2ab(i,ii,iii,iv,v)	Yes	Yes	II/IV	I			Yes	
CRUCIFERAE	*Erysimum pieninicum*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
EUPHORBIACEAE	*Euphorbia bourgeana*[1]	VU	D2	VU	D2	Yes	Yes	II/IV	I		A		
EUPHORBIACEAE	*Euphorbia handiensis*	VU	D2	VU	D2	Yes	Yes	II/IV	I		A		
EUPHORBIACEAE	*Euphorbia margalidiana*	CR	B1ab(v)+2ab(v)	CR	B1ab(v)+2ab(v)	Yes	Yes	II/IV	I				
EUPHORBIACEAE	*Euphorbia nevadensis*	LC		LC		Yes	Yes	IV	I				
EUPHORBIACEAE	*Euphorbia stygiana*	CR	C2a(i);D	CR	C2a(i);D	Yes	Yes	II/IV	I		A		
EUPHORBIACEAE	*Euphorbia transtagana*	LC		LC		Yes	Yes	II/IV					
SCROPHULARIACEAE	*Euphrasia genargentea*	LC		LC		Yes	Yes	II/IV					
SCROPHULARIACEAE	*Euphrasia marchesettii*	VU	B2ab(ii,iii,v)c(iv)	VU	B2ab(ii,iii,v)c(iv)	Yes	Yes	II/IV	I				
SCROPHULARIACEAE	*Euphrasia mendoncae*	EX		EX		Yes	Yes	V					
COMPOSITAE	*Eurybia sibirica*	LC		NE					I				
CAMPANULACEAE	*Favratia zoysii*[1]	LC		LC		Yes	Yes	II/IV					

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UMBELLIFERAE	*Ferula latipinna*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
UMBELLIFERAE	*Ferula orientalis*	LC		DD					I				
UMBELLIFERAE	*Ferula sadleriana*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes	II/IV	I				
GRAMINEAE	*Festuca brigantina*	VU	B2ab(iii)	VU	B2ab(iii)	Yes	Yes	II/IV					
GRAMINEAE	*Festuca duriotagana*	DD		DD		Yes	Yes	II/IV					
GRAMINEAE	*Festuca elegans*	LC		LC				II/IV					
GRAMINEAE	*Festuca henriquesii*	LC		LC		Yes	Yes	II/IV					
GRAMINEAE	*Festuca heterophylla*	LC		LC									Yes
GRAMINEAE	*Festuca ovina*	LC		LC									Yes
GRAMINEAE	*Festuca rubra*	LC		LC									Yes
GRAMINEAE	*Festuca summilusitana*	LC		LC		Yes	Yes	II/IV					
CYPERACEAE	*Fimbristylis bisumbellata*	LC		LC								Yes	
CYPERACEAE	*Fimbristylis turkestanica*	DD		DD								Yes	
ROSACEAE	*Fragaria moschata*	LC		LC									Yes
ROSACEAE	*Fragaria vesca*	LC		LC									Yes
ROSACEAE	*Fragaria viridis*	LC		LC									Yes
LILIACEAE	*Fritillaria conica*	EN	B1ab(v)+2ab(v)	EN	B1ab(v)+2ab(v)	Yes	Yes	IV	I				
LILIACEAE	*Fritillaria drenovskii*	VU	B2ab(iii)	VU	B2ab(iii)	Yes	Yes	IV	I				
LILIACEAE	*Fritillaria epirotica*	EN	C2a(i)	EN	C2a(i)	Yes	Yes		I				
LILIACEAE	*Fritillaria euboeica*	VU	B1ab(iii)+2ab(iii); D1+2	VU	B1ab(iii)+2ab(iii); D1+2	Yes	Yes		I				
LILIACEAE	*Fritillaria graeca*	DD		LC		Yes	Yes		I				
LILIACEAE	*Fritillaria gussichiae*	DD		NT		Yes		IV	I				
LILIACEAE	*Fritillaria montana*	DD		DD		Yes			I				
LILIACEAE	*Fritillaria obliqua*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes	IV	I				
LILIACEAE	*Fritillaria obliqua* ssp. *tuntasia*[1]	VU	D1	VU	D1	Yes	Yes		I				
LILIACEAE	*Fritillaria rhodocanakis*	EN	B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)	EN	B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)	Yes	Yes	IV	I				
CYPERACEAE	*Fuirena pubescens*	LC		LC								Yes	
AMARYLLIDACEAE	*Galanthus elwesii*	DD		DD						II	B		
AMARYLLIDACEAE	*Galanthus gracilis*	DD		DD						II	B		
AMARYLLIDACEAE	*Galanthus ikariae*	VU	B1ab(iii,v)	VU	B1ab(iii,v)	Yes	Yes			II	B		
AMARYLLIDACEAE	*Galanthus nivalis*	NT		NT		Yes		V		II	B		
AMARYLLIDACEAE	*Galanthus peshmenii*	EN	B1ab(iii)	EN	B1ab(iii)					II	B		
AMARYLLIDACEAE	*Galanthus plicatus*	LC		VU	D2					II	B		

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AMARYLLIDACEAE	*Galanthus reginae-olgae*	VU	B2ab(iii,v)	VU	B2ab(iii,v)	Yes				II	B		
RUBIACEAE	*Galium cracoviense*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
RUBIACEAE	*Galium litorale*	NT		NT		Yes	Yes	II/IV	I				
RUBIACEAE	*Galium moldavicum*	DD		DD		Yes		II/IV	I				
RUBIACEAE	*Galium rhodopeum*	DD		VU	B2ab(iii)	Yes			I				
RUBIACEAE	*Galium sudeticum*	VU	B2ab(iii)	VU	B2ab(iii)	Yes	Yes	II/IV					
RUBIACEAE	*Galium viridiflorum*	EN	B2b(iii)c(iv);C2b	EN	B2b(iii)c(iv);C2b	Yes	Yes	II/IV	I				
LEGUMINOSAE	*Genista benehoavensis*	VU	B2ab(iii)	VU	B2ab(iii)	Yes	Yes		I				
LEGUMINOSAE	*Genista dorycnifolia*	DD		DD		Yes	Yes	II/IV	I				
LEGUMINOSAE	*Genista holopetala*	DD		VU	D2	Yes		II/IV	I				
LEGUMINOSAE	*Genista tetragona*	VU	B1ab(iii)	NE		Yes			I				
ORCHIDACEAE	*Gennaria diphylla*	EN	B2ab(iii,v)	EN	B2ab(iii,v)					II			
GENTIANACEAE	*Gentiana ligustica*	LC		LC		Yes	Yes	II/IV	I				
GENTIANACEAE	*Gentiana lutea*	LC		LC				V			D		
GENTIANACEAE	*Gentianella anglica*	DD		DD		YEs	Yes	II/IV	I				
GENTIANACEAE	*Gentianella bohemica*	VU	B2b(iii,iv,v)c(iii,iv)	VU	B2b(iii,iv,v)c(iii,iv)	Yes	Yes	II/IV					
GERANIACEAE	*Geranium maderense*	CR	D	CR	D	Yes	Yes	II/IV	I				
ROSACEAE	*Geum bulgaricum*	LC		NT		Yes			I				
IRIDACEAE	*Gladiolus palustris*	DD		DD		Yes		II/IV					
GLOBULARIACEAE	*Globularia ascanii*	CR	B1ab(iii)+2ab(iii); C2a(i);D	CR	B1ab(iii)+2ab(iii); C2a(i);D	Yes	Yes	II/IV	I				
GLOBULARIACEAE	*Globularia sarcophylla*	VU	D1	VU	D1	Yes	Yes	II/IV	I				
GLOBULARIACEAE	*Globularia stygia*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
GRAMINEAE	*Glyceria declinata*	LC		LC								Yes	
GRAMINEAE	*Glyceria fluitans*	LC		LC								Yes	
GRAMINEAE	*Glyceria maxima*	LC		LC								Yes	
GRAMINEAE	*Glyceria nemoralis*	LC		LC								Yes	
GRAMINEAE	*Glyceria notata*	LC		LC								Yes	
ORCHIDACEAE	*Goodyera macrophylla*	CR	D	CR	D	Yes	Yes	II/IV	I	II			
ORCHIDACEAE	*Goodyera repens*	LC		LC						II			
SCROPHULARIACEAE	*Gratiola linifolia*	LC		LC								Yes	
SCROPHULARIACEAE	*Gratiola officinalis*	LC		LC								Yes	
POTAMOGETONACEAE	*Groenlandia densa*	LC		LC								Yes	
ORCHIDACEAE	*Gymnadenia archiducis-joannis*	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)	Yes	Yes			II			
ORCHIDACEAE	*Gymnadenia borealis*	DD		DD		Yes	Yes			II			

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ORCHIDACEAE	*Gymnadenia conopsea*	LC		LC						II			
ORCHIDACEAE	*Gymnadenia frivaldii*	LC		LC		Yes				II			
ORCHIDACEAE	*Gymnadenia lithopolitanica*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes			II			
ORCHIDACEAE	*Gymnadenia nigra*	LC		LC						II			
ORCHIDACEAE	*Gymnadenia odoratissima*	LC		LC		Yes				II			
ORCHIDACEAE	*Gymnadenia rhellicani*	LC		LC		Yes				II			
ORCHIDACEAE	*Gymnadenia runei*[1]	NT		NT		Yes	Yes	II/IV		II	B		
ORCHIDACEAE	*Gymnadenia stiriaca*	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)	Yes	Yes			II			
ORCHIDACEAE	*Gymnadenia widderi*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes			II			
CARYOPHYLLACEAE	*Gypsophila papillosa*	EN	D	EN	D	Yes	Yes	II/IV	I				
ORCHIDACEAE	*Habenaria tridactylites*	LC		LC		Yes	Yes			II			
GESNERIACEAE	*Haberlea rhodopensis*	LC		LC		Yes	Yes		I				
CISTACEAE	*Halimium verticillatum*	DD		DD				II/IV					
ORCHIDACEAE	*Hammarbya paludosa*	LC		LC						II			
LEGUMINOSAE	*Hedysarum coronarium*	LC		LC									Yes
LEGUMINOSAE	*Hedysarum razoumowianum*	DD		NE					I				
CISTACEAE	*Helianthemum alypoides*	VU	B2ab(i,ii,iii,v)	VU	B2ab(i,ii,iii,v)	Yes	Yes	II/IV	I				
CISTACEAE	*Helianthemum bystropogophyllum*	CR	B2ab(iii)c(iv)	CR	B2ab(iii)c(iv)	Yes	Yes	II/IV	I				
CISTACEAE	*Helianthemum caput-felis*	EN	B2ab(i,ii,iii,iv,v)	EN	B2ab(i,ii,iii,iv,v)			II/IV	I				
CISTACEAE	*Helianthemum teneriffae*	CR	B2ab(iii,v)c(iv);C2a(ii)b	CR	B2ab(iii,v)c(iv);C2a(ii)b	Yes	Yes		I				
COMPOSITAE	*Helichrysum gossypinum*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
COMPOSITAE	*Helichrysum melitense*	CR	B1ab(i,ii,iii,iv,v)	CR	B1ab(i,ii,iii,iv,v)	Yes	Yes	II/IV	I				
COMPOSITAE	*Helichrysum monogynum*	EN	B2ab(iii)	EN	B2ab(iii)	Yes	Yes	II/IV	I				
BORAGINACEAE	*Heliotropium supinum*	LC		LC								Yes	
GRAMINEAE	*Hemarthria altissima*	LC		LC								Yes	
ORCHIDACEAE	*Herminium monorchis*	DD		DD						II			
ILLECEBRACEAE	*Herniaria algarvica*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
ILLECEBRACEAE	*Herniaria latifolia* ssp. *litardierei*	EN	D	EN	D	Yes	Yes	II/IV					
ILLECEBRACEAE	*Herniaria lusitanica* ssp. *berlengiana*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV					
ILLECEBRACEAE	*Herniaria maritima*	LC		LC		Yes	Yes	II/IV	I				
ORCHIDACEAE	*Himantoglossum adriaticum*	LC		LC		Yes		II/IV		II	B		
ORCHIDACEAE	*Himantoglossum affine*	EN	B2ab(iii,v)	EN	B2ab(iii,v)					II			
ORCHIDACEAE	*Himantoglossum caprinum*	DD		NT				II/IV	I	II			
ORCHIDACEAE	*Himantoglossum comperianum*[1]	EN	B2ab(iii,v)	EN	B2ab(iii,v)				I	II			
ORCHIDACEAE	*Himantoglossum hircinum*	LC		LC						II			

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ORCHIDACEAE	*Himantoglossum metlesicsianum*[1]	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)	Yes	Yes		I	II			
ORCHIDACEAE	*Himantoglossum robertianum*	LC		LC						II			
HIPPURIDACEAE	*Hippuris tetraphylla*	LC		VU	B2ab(iii,v)			II/IV				Yes	
HIPPURIDACEAE	*Hippuris vulgaris*	LC		LC								Yes	
UMBELLIFERAE	*Hladnikia pastinacifolia*	DD		DD				II/IV					
GRAMINEAE	*Holcus setiglumis* ssp. *duriensis*	DD		DD				II/IV					
GRAMINEAE	*Hordeum bogdanii*	DD		NE									Yes
GRAMINEAE	*Hordeum brevisubulatum*	NA		NE									Yes
GRAMINEAE	*Hordeum bulbosum*	LC		LC									Yes
GRAMINEAE	*Hordeum geniculatum*	LC		LC									Yes
GRAMINEAE	*Hordeum marinum*	LC		LC									Yes
GRAMINEAE	*Hordeum murinum*	LC		LC									Yes
GRAMINEAE	*Hordeum secalinum*	LC		LC									Yes
GRAMINEAE	*Hordeum vulgare*	LC		LC									Yes
PRIMULACEAE	*Hottonia palustris*	LC		LC								Yes	
HYACINTHACEAE	*Hyacinthoides mauritanica*[1]	LC		LC				II/IV					
HYDROCHARITACEAE	*Hydrilla verticillata*	DD		DD								Yes	
HYDROCHARITACEAE	*Hydrocharis morsus-ranae*	LC		LC								Yes	
UMBELLIFERAE	*Hydrocotyle vulgaris*	LC		LC								Yes	
HYMENOPHYLLACEAE	*Hymenophyllum maderense*	DD		DD		Yes	Yes	II/IV	I				
COMPOSITAE	*Hymenostemma pseudanthemis*	DD		DD		Yes	Yes	II/IV	I				
COMPOSITAE	*Hyoseris frutescens*	DD		DD		Yes	Yes	II/IV					
GUTTIFERAE	*Hypericum corsicum*	LC		LC		Yes	Yes					Yes	
GUTTIFERAE	*Hypericum elodes*	LC		LC		Yes	Yes					Yes	
COMPOSITAE	*Hypochaeris oligocephala*	CR	B2ab(iii)c(iv)	CR	B2ab(iii)c(iv)	Yes	Yes	II/IV	I				
CRUCIFERAE	*Iberis procumbens* ssp. *microcarpa*	DD		DD		Yes	Yes	II/IV					
CRUCIFERAE	*Iberis runemarkii*[1]	VU	D2	VU	D2	Yes	Yes	II/IV	I				
CRUCIFERAE	*Ionopsidium acaule*	LC		LC		Yes	Yes	II/IV	I				
CRUCIFERAE	*Ionopsidium savianum*	NT		NT		Yes	Yes	II/IV	I				
CONVOLVULACEAE	*Ipomoea sagittata*	VU	B2ab(iii)	VU	B2ab(iii)							Yes	
IRIDACEAE	*Iris aphylla* ssp. *hungarica*	DD		DD		Yes		II/IV					
IRIDACEAE	*Iris boissieri*	CR	B2b(iii,v)c(iv)	CR	B2b(iii,v)c(iv)	Yes	Yes	IV					
IRIDACEAE	*Iris humilis*[1]	DD		DD				II/IV					
IRIDACEAE	*Iris lusitanica*	DD		DD		Yes	Yes	V					
IRIDACEAE	*Iris marsica*	DD		DD		Yes	Yes	IV	I				

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IRIDACEAE	*Iris pseudacorus*	LC		LC								Yes	
CRUCIFERAE	*Isatis allionii*	DD		DD		Yes	Yes						Yes
CRUCIFERAE	*Isatis arenaria*	DD		NE		Yes							Yes
CRUCIFERAE	*Isatis arnoldiana*	NA		NE									Yes
CRUCIFERAE	*Isatis campestris*	DD		DD									Yes
CRUCIFERAE	*Isatis costata*	LC		NE									Yes
CRUCIFERAE	*Isatis littoralis*	DD		NE		Yes							Yes
CRUCIFERAE	*Isatis lusitanica*	DD		DD									Yes
CRUCIFERAE	*Isatis maeotica*	NA		NE									Yes
CRUCIFERAE	*Isatis platyloba*	VU	B1ab(ii,iii,v)+ 2ab(ii,iii,v)	VU	B1ab(ii,iii,v)+ 2ab(ii,iii,v)	Yes	Yes						Yes
CRUCIFERAE	*Isatis praecox*	DD		DD									Yes
CRUCIFERAE	*Isatis sevangensis*	NA		NE									Yes
CRUCIFERAE	*Isatis steveniana*	DD		DD									Yes
CRUCIFERAE	*Isatis tinctoria*	LC		LC									Yes
CRUCIFERAE	*Isatis tomentella*	DD		DD		Yes							Yes
CRUCIFERAE	*Isatis vermia*	DD		DD		Yes	Yes						Yes
CRUCIFERAE	*Isatis villarsii*	DD		NE		Yes							Yes
ISOETACEAE	*Isoetes azorica*	VU	C2a(i);D2	VU	C2a(i);D2	Yes	Yes	II/IV	I			Yes	
ISOETACEAE	*Isoetes boryana*	EN	B1ab(i,ii,iii,iv,v)	EN	B1ab(i,ii,iii,iv,v)	Yes	Yes	II/IV	I			Yes	
ISOETACEAE	*Isoetes brochonii*	DD		DD		Yes	Yes					Yes	
ISOETACEAE	*Isoetes echinospora*	LC		LC								Yes	
ISOETACEAE	*Isoetes fluitans*	EN	B2ab(iii,iv)	EN	B2ab(iii,iv)	Yes	Yes					Yes	
ISOETACEAE	*Isoetes heldreichii*	CR (PE)	D	CR (PE)	D	Yes	Yes					Yes	
ISOETACEAE	*Isoetes lacustris*	LC		LC								Yes	
ISOETACEAE	*Isoetes malinverniana*	CR	A2c	CR	A2c	Yes	Yes	II/IV	I			Yes	
ISOETACEAE	*Isoetes setacea*	NT		NT								Yes	
ISOETACEAE	*Isoetes subinermis*	DD		DD		Yes	Yes					Yes	
ISOETACEAE	*Isoetes velata*	LC		LC								Yes	
CYPERACEAE	*Isolepis fluitans*	LC		LC								Yes	
SCROPHULARIACEAE	*Isoplexis chalcantha*	CR	B1ab(i,ii,iii,iv)+2ab(i ,ii,iii,iv)	CR	B1ab(i,ii,iii,iv)+2ab(i ,ii,iii,iv)	Yes	Yes	II/IV	I				
SCROPHULARIACEAE	*Isoplexis isabelliana*	EN	B2ab(iii);C2a(i)	EN	B2ab(iii);C2a(i)	Yes	Yes	II/IV	I				
GESNERIACEAE	*Jankaea heldreichii*	NT		NT		Yes	Yes	IV	I				
CAMPANULACEAE	*Jasione crispa* ssp. *serpentinica*	DD		DD		Yes	Yes	II/IV					

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CAMPANULACEAE	*Jasione lusitanica*	EN	B1ab(iii)	EN	B1ab(iii)	Yes	Yes	II/IV	I				
OLEACEAE	*Jasminum azoricum*	CR	D	CR	D	Yes	Yes	II/IV	I				
JUNCACEAE	*Juncus acutiflorus*	LC		LC								Yes	
JUNCACEAE	*Juncus acutus*	LC		LC								Yes	
JUNCACEAE	*Juncus articulatus*	LC		LC								Yes	
JUNCACEAE	*Juncus bufonius*	LC		LC								Yes	
JUNCACEAE	*Juncus bulbosus*	LC		LC								Yes	
JUNCACEAE	*Juncus effusus*	LC		LC								Yes	
JUNCACEAE	*Juncus fontanesii*	LC		LC								Yes	
JUNCACEAE	*Juncus heterophyllus*	LC		LC								Yes	
JUNCACEAE	*Juncus subnodulosus*	LC		LC								Yes	
JUNCACEAE	*Juncus tenageia*	LC		LC								Yes	
JUNCACEAE	*Juncus valvatus*	VU	B1b(iii)c(iv)+2b(iii)c(iv)	VU	B1b(iii)c(iv)+2b(iii)c(iv)			II/IV					
CUPRESSACEAE	*Juniperus brevifolia*	VU	B2ab(ii,iii)	VU	B2ab(ii,iii)	Yes	Yes		I				
COMPOSITAE	*Jurinea cyanoides*	LC		LC				II/IV	I				
COMPOSITAE	*Jurinea fontqueri*	CR	A3bc;B1ab(iii,v)+ 2ab(iii,v)	CR	A3bc;B1ab(iii,v)+ 2ab(iii,v)	Yes	Yes	II/IV	I				
CHENOPODIACEAE	*Kalidiopsis wagenitzii*	DD		DD					I				
COMPOSITAE	*Klasea lycopifolia*[1]	DD		DD		Yes		II/IV					
COMPOSITAE	*Klasea radiata* ssp. *tanaitica*	DD		NE		Yes			I				
MALVACEAE	*Kosteletzkya pentacarpa*	VU	B2ab(i,ii,iii,iv,v)	VU	B2ab(i,ii,iii,iv,v)			II/IV	I				
SANTALACEAE	*Kunkeliella psilotoclada*	CR (PE)	D	CR (PE)	D	Yes	Yes		I				
SANTALACEAE	*Kunkeliella subsucculenta*	CR	B2ab(ii,iii,v)	CR	B2ab(ii,iii,v)	Yes	Yes	II/IV	I				
COMPOSITAE	*Lactuca acanthifolia*	DD		DD									Yes
COMPOSITAE	*Lactuca alpestris*	NT		NT		Yes	Yes						Yes
COMPOSITAE	*Lactuca alpina*	LC		LC									Yes
COMPOSITAE	*Lactuca aurea*	LC		LC		Yes							Yes
COMPOSITAE	*Lactuca cyprica*	NT		NT		Yes	Yes						Yes
COMPOSITAE	*Lactuca hispida*	DD		DD									Yes
COMPOSITAE	*Lactuca intricata*	LC		LC									Yes
COMPOSITAE	*Lactuca longidentata*	DD		DD		Yes	Yes						Yes
COMPOSITAE	*Lactuca macrophylla*	DD		NE									Yes
COMPOSITAE	*Lactuca muralis*	LC		LC									Yes
COMPOSITAE	*Lactuca palmensis*	LC		LC		Yes	Yes						Yes
COMPOSITAE	*Lactuca pancicii*	LC		DD		Yes							Yes

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COMPOSITAE	*Lactuca perennis*	DD		DD		Yes							Yes
COMPOSITAE	*Lactuca plumieri*	DD		DD		Yes							Yes
COMPOSITAE	*Lactuca quercina*	LC		LC									Yes
COMPOSITAE	*Lactuca saligna*	LC		LC									Yes
COMPOSITAE	*Lactuca serriola*	LC		LC									Yes
COMPOSITAE	*Lactuca sibirica*	LC		LC									Yes
COMPOSITAE	*Lactuca singularis*	VU	B2ab(iii,v)	VU	B2ab(iii,v)	Yes	Yes						Yes
COMPOSITAE	*Lactuca tatarica*	LC		LC									Yes
COMPOSITAE	*Lactuca tenerrima*	LC		LC									Yes
COMPOSITAE	*Lactuca tetrantha*	VU	D2	VU	D2	Yes	Yes						Yes
COMPOSITAE	*Lactuca triquetra*	NT		NT									Yes
COMPOSITAE	*Lactuca tuberosa*	LC		LC									Yes
COMPOSITAE	*Lactuca viminea*	LC		LC									Yes
COMPOSITAE	*Lactuca virosa*	DD		DD									Yes
COMPOSITAE	*Lactuca watsoniana*	EN	B2ab(i,ii,iii);C2a(i)	EN	B2ab(i,ii,iii);C2a(i)	Yes	Yes	II/IV	I				Yes
COMPOSITAE	*Lamyropsis microcephala*	CR	A3c;B1ab(iii)	CR	A3c;B1ab(iii)	Yes	Yes	II/IV	I				
UMBELLIFERAE	*Laserpitium longiradium*	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
LEGUMINOSAE	*Lathyrus amphicarpos*	NT		NT									Yes
LEGUMINOSAE	*Lathyrus annuus*	LC		LC									Yes
LEGUMINOSAE	*Lathyrus cassius*	EN	B1ab(iii)+2ab(iii);D	EN	B1ab(iii)+2ab(iii);D								Yes
LEGUMINOSAE	*Lathyrus cicera*	LC		LC									Yes
LEGUMINOSAE	*Lathyrus cirrhosus*	LC		LC		Yes	Yes						Yes
LEGUMINOSAE	*Lathyrus gorgoni*	LC		LC									Yes
LEGUMINOSAE	*Lathyrus grandiflorus*	LC		LC		Yes							Yes
LEGUMINOSAE	*Lathyrus heterophyllus*	LC		LC		Yes							Yes
LEGUMINOSAE	*Lathyrus hierosolymitanus*	LC		LC									Yes
LEGUMINOSAE	*Lathyrus hirsutus*	LC		LC									Yes
LEGUMINOSAE	*Lathyrus latifolius*	LC		LC									Yes
LEGUMINOSAE	*Lathyrus ochrus*	LC		LC									Yes
LEGUMINOSAE	*Lathyrus odoratus*	NT		NT		Yes	Yes						Yes
LEGUMINOSAE	*Lathyrus rotundifolius*	NT		NE									Yes
LEGUMINOSAE	*Lathyrus stenophyllus*	LC		LC									Yes
LEGUMINOSAE	*Lathyrus sylvestris*	LC		LC									Yes
LEGUMINOSAE	*Lathyrus tingitanus*	LC		LC									Yes
LEGUMINOSAE	*Lathyrus tuberosus*	LC		LC									Yes

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LEGUMINOSAE	*Lathyrus undulatus*	DD		NE									Yes
GRAMINEAE	*Leersia oryzoides*	LC		LC								Yes	
LEMNACEAE	*Lemna gibba*	LC		LC								Yes	
LEMNACEAE	*Lemna minor*	LC		LC								Yes	
LEMNACEAE	*Lemna trisulca*	LC		LC								Yes	
LEMNACEAE	*Lemna turionifera*	DD		DD								Yes	
LEGUMINOSAE	*Lens ervoides*	LC		LC									Yes
LEGUMINOSAE	*Lens lamottei*	LC		LC									Yes
LEGUMINOSAE	*Lens nigricans*	LC		LC									Yes
LEGUMINOSAE	*Lens odemensis*	LC		LC									Yes
LEGUMINOSAE	*Lens orientalis*	LC		LC									Yes
COMPOSITAE	*Leontodon boryi*	NT		NT		Yes	Yes	II/IV	I				
COMPOSITAE	*Leontodon microcephalus*	VU	B2ab(iii,v);D2	VU	B2ab(iii,v);D2	Yes	Yes	II/IV	I				
COMPOSITAE	*Leontodon siculus*	NT		NT		Yes	Yes	II/IV	I				
HYACINTHACEAE	*Leopoldia gussonei*[1]	EN	B2ab(i,ii,iii,iv,v)	EN	B2ab(i,ii,iii,iv,v)	Yes	Yes	II/IV	I				
CRUCIFERAE	*Lepidium campestre*	LC		LC									Yes
CRUCIFERAE	*Lepidium cardamines*	LC		LC		Yes	Yes						Yes
CRUCIFERAE	*Lepidium carrerasii*	DD		DD		Yes	Yes						Yes
CRUCIFERAE	*Lepidium cartilagineum*	DD		DD									Yes
CRUCIFERAE	*Lepidium cordatum*	NA		NE									Yes
CRUCIFERAE	*Lepidium graminifolium*	LC		LC									Yes
CRUCIFERAE	*Lepidium heterophyllum*	LC		LC		Yes	Yes						Yes
CRUCIFERAE	*Lepidium hirtum*	LC		LC									Yes
CRUCIFERAE	*Lepidium latifolium*	LC		LC									Yes
CRUCIFERAE	*Lepidium lyratum*	NA		NE									Yes
CRUCIFERAE	*Lepidium perfoliatum*	LC		LC									Yes
CRUCIFERAE	*Lepidium ramburei*	DD		DD		Yes	Yes						Yes
CRUCIFERAE	*Lepidium ruderale*	LC		LC									Yes
CRUCIFERAE	*Lepidium spinosum*	DD		DD									Yes
CRUCIFERAE	*Lepidium squamatum*	DD		DD									Yes
CRUCIFERAE	*Lepidium subulatum*	LC		LC									Yes
CRUCIFERAE	*Lepidium syvaschicum*	DD		NE		Yes							Yes
CRUCIFERAE	*Lepidium turczaninowii*	CR	B1ab(iii)+2ab(iii)	NE		Yes			I				Yes
CRUCIFERAE	*Lepidium villarsii*	LC		LC		Yes	Yes						Yes
COMPOSITAE	*Leuzea longifolia*	EN	B2ab(iii,v);C2a(i)	EN	B2ab(iii,v);C2a(i)			II/IV					

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COMPOSITAE	*Leuzea rhaponticoides*	NT		NT				V					
COMPOSITAE	*Ligularia sibirica*	DD		DD				II/IV	I				
LILIACEAE	*Lilium jankae*	DD		DD		Yes			I				
LILIACEAE	*Lilium pomponium*[1]	LC		LC		Yes	Yes	V					
LILIACEAE	*Lilium rhodopeum*	VU	B1ab(ii,iii)+2ab(ii,iii)	VU	B1ab(ii,iii)+2ab(ii,iii)	Yes	Yes		I				
ORCHIDACEAE	*Limodorum abortivum*	LC		LC						II			
ORCHIDACEAE	*Limodorum trabutianum*	NT		NT						II			
PLUMBAGINACEAE	*Limonium arborescens*	NT		NT		Yes	Yes	II/IV	I				
PLUMBAGINACEAE	*Limonium calabrum*	CR	B1ab(iii)	CR	B1ab(iii)	Yes	Yes						
PLUMBAGINACEAE	*Limonium dendroides*	CR	B2ab(iii,iv,v);C2a(i);D	CR	B2ab(iii,iv,v);C2a(i);D	Yes	Yes	II/IV	I				
PLUMBAGINACEAE	*Limonium dodartii* ssp. *lusitanicum*	DD		DD		Yes	Yes	II/IV					
PLUMBAGINACEAE	*Limonium fruticans*	EN	B2ab(iii)	EN	B2ab(iii)	Yes	Yes		I				
PLUMBAGINACEAE	*Limonium insulare*	NT		NT		Yes	Yes	II/IV					
PLUMBAGINACEAE	*Limonium lanceolatum*	DD		DD				II/IV					
PLUMBAGINACEAE	*Limonium multiflorum*	LC		LC		Yes	Yes	II/IV					
PLUMBAGINACEAE	*Limonium perezii*	VU	D1+2	VU	D1+2	Yes	Yes		I				
PLUMBAGINACEAE	*Limonium preauxii*	EN	B2ab(iii)c(iv)	EN	B2ab(iii)c(iv)	Yes	Yes		I				
PLUMBAGINACEAE	*Limonium pseudolaetum*	NT		NT		Yes	Yes	II/IV					
PLUMBAGINACEAE	*Limonium sibthorpianum*	CR	B1ab(iii)+2ab(iii);D	CR	B1ab(iii)+2ab(iii);D	Yes	Yes						
PLUMBAGINACEAE	*Limonium spectabile*	CR	B2ab(ii,iii,v)	CR	B2ab(ii,iii,v)	Yes	Yes	II/IV	I				
PLUMBAGINACEAE	*Limonium strictissimum*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes	II/IV					
PLUMBAGINACEAE	*Limonium sventenii*	CR	B2ab(ii,iii,iv)	CR	B2ab(ii,iii,iv)	Yes	Yes	II/IV	I				
SCROPHULARIACEAE	*Limosella aquatica*	LC		LC								Yes	
SCROPHULARIACEAE	*Limosella tenella*	DD		DD		Yes	Yes					Yes	
SCROPHULARIACEAE	*Linaria algarviana*	LC		LC		Yes	Yes	II/IV	I				
SCROPHULARIACEAE	*Linaria coutinhoi*	DD		DD		Yes	Yes	II/IV					
SCROPHULARIACEAE	*Linaria ficalhoana*	DD		DD		Yes	Yes	II/IV	I				
SCROPHULARIACEAE	*Linaria flava*	NT		NT				II/IV	I				
SCROPHULARIACEAE	*Linaria hellenica*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)			II/IV	I				
SCROPHULARIACEAE	*Linaria loeselii*	NT		NT		Yes		II/IV	I				
SCROPHULARIACEAE	*Linaria pseudolaxiflora*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
SCROPHULARIACEAE	*Linaria ricardoi*	NT		NT		Yes	Yes	II/IV	I				
SCROPHULARIACEAE	*Linaria tonzigii*	EN	D	EN	D	Yes	Yes	II/IV					
SCROPHULARIACEAE	*Lindernia procumbens*	LC		LC				IV	I			Yes	
LINACEAE	*Linum dolomiticum*	DD		DD		Yes	Yes	II/IV	I				

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LINACEAE	*Linum muelleri*	VU	D1	VU	D1	Yes	Yes	II/IV					
ORCHIDACEAE	*Liparis loeselii*	NT		NT				II/IV	I	II	A		
BORAGINACEAE	*Lithodora nitida*	EN	B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)	EN	B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)	Yes	Yes	II/IV	I				
PLANTAGINACEAE	*Littorella uniflora*	LC		LC								Yes	
CAMPANULACEAE	*Lobelia dortmanna*	LC		LC								Yes	
GRAMINEAE	*Lolium multiflorum*	LC		LC									Yes
GRAMINEAE	*Lolium perenne*	LC		LC									Yes
GRAMINEAE	*Lolium rigidum*	LC		LC									Yes
GRAMINEAE	*Lolium temulentum*	LC		LC									Yes
LEGUMINOSAE	*Lotus callis-viridis*	EN	B2ac(ii,iv)	EN	B2ac(ii,iv)	Yes	Yes	II/IV	I				
LEGUMINOSAE	*Lotus corniculatus*	LC		LC									Yes
LEGUMINOSAE	*Lotus eremiticus*	CR	B2ab(iii,v)c(iv);C2a(i)b;D	CR	B2ab(iii,v)c(iv);C2a(i)b;D	Yes	Yes		I				
LEGUMINOSAE	*Lotus kunkelii*	CR	B2ab(iii);D	CR	B2ab(iii);D	Yes	Yes	II/IV	I				
LEGUMINOSAE	*Lotus maculatus*	CR	B2ab(iii,v);C2a(i);D	CR	B2ab(iii,v);C2a(i);D	Yes	Yes		I				
LEGUMINOSAE	*Lotus pedunculatus*	LC		LC									Yes
LEGUMINOSAE	*Lotus pyranthus*	CR	B2ab(ii,iii,v);C2a(i)	CR	B2ab(ii,iii,v);C2a(i)	Yes	Yes		I				
ONAGRACEAE	*Ludwigia palustris*	LC		LC								Yes	
LEGUMINOSAE	*Lupinus albus*	LC		LC									Yes
LEGUMINOSAE	*Lupinus angustifolius*	LC		LC									Yes
LEGUMINOSAE	*Lupinus hispanicus*	LC		LC		Yes	Yes						Yes
LEGUMINOSAE	*Lupinus luteus*	LC		LC									Yes
LEGUMINOSAE	*Lupinus micranthus*	LC		LC									Yes
ALISMATACEAE	*Luronium natans*	LC		LC		Yes	Yes	II/IV	I			Yes	
JUNCACEAE	*Luzula nivalis*[1]	LC		NT				II/IV					
LYCOPODIACEAE	*Lycopodium clavatum*	LC		LC							D		
LABIATAE	*Lycopus europaeus*	LC		LC								Yes	
LABIATAE	*Lycopus exaltatus*	LC		LC								Yes	
PRIMULACEAE	*Lysimachia dubia*	DD		DD								Yes	
PRIMULACEAE	*Lysimachia ephemerum*	LC		LC								Yes	
PRIMULACEAE	*Lysimachia minoricensis*	EW		EW		Yes	Yes		I				
PRIMULACEAE	*Lysimachia nummularia*	LC		LC								Yes	
PRIMULACEAE	*Lysimachia thyrsiflora*	LC		LC								Yes	
PRIMULACEAE	*Lysimachia vulgaris*	LC		LC								Yes	

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LYTHRACEAE	*Lythrum acutangulum*	LC		LC								Yes	
LYTHRACEAE	*Lythrum borysthenicum*	LC		LC								Yes	
LYTHRACEAE	*Lythrum flexuosum*	NT		NT		Yes	Yes	II/IV	I				
LYTHRACEAE	*Lythrum hyssopifolia*	LC		LC								Yes	
LYTHRACEAE	*Lythrum junceum*	LC		LC								Yes	
LYTHRACEAE	*Lythrum portula*	LC		LC								Yes	
LYTHRACEAE	*Lythrum salicaria*	LC		LC								Yes	
LYTHRACEAE	*Lythrum thesioides*	EN	B2ab(iii,iv,v)	EN	B2ab(iii,iv,v)				I			Yes	
LYTHRACEAE	*Lythrum thymifolia*	LC		LC								Yes	
LYTHRACEAE	*Lythrum tribracteatum*	LC		LC								Yes	
LYTHRACEAE	*Lythrum virgatum*	LC		LC								Yes	
LYTHRACEAE	*Lythrum volgense*	DD		DD								Yes	
ORCHIDACEAE	*Malaxis monophyllos*	NT		NT						II			
CRUCIFERAE	*Malcolmia lacera* ssp. *gracillima*	DD		DD		Yes	Yes	V					
ROSACEAE	*Malus crescimannoi*	DD		DD		Yes	Yes						Yes
ROSACEAE	*Malus dasyphylla*	DD		DD		Yes							Yes
ROSACEAE	*Malus florentina*	DD		DD									Yes
ROSACEAE	*Malus sylvestris*	DD		DD		Yes							Yes
ROSACEAE	*Malus trilobata*	LC		LC									Yes
SOLANACEAE	*Mandragora officinarum*	EN	B1ab(iii,v)	RE				IV	I				
ROSACEAE	*Marcetella maderensis*	EN	D	EN	D	Yes	Yes	II/IV	I				
MARSILEACEAE	*Marsilea azorica*	VU	D2	VU	D2	Yes	Yes	II/IV	I			Yes	
MARSILEACEAE	*Marsilea batardae*	EN	B2ab(ii,iii,iv,v)	EN	B2ab(ii,iii,iv,v)	Yes	Yes	II/IV	I			Yes	
MARSILEACEAE	*Marsilea quadrifolia*	NT		NT				II/IV	I			Yes	
MARSILEACEAE	*Marsilea strigosa*	VU	A2c	VU	A2c			II/IV	I			Yes	
CELASTRACEAE	*Maytenus umbellata*	LC		LC		Yes	Yes	II/IV					
LEGUMINOSAE	*Medicago aculeata*	LC		LC									Yes
LEGUMINOSAE	*Medicago arabica*	LC		LC									Yes
LEGUMINOSAE	*Medicago arborea*	LC		LC									Yes
LEGUMINOSAE	*Medicago blancheana*	LC		LC									Yes
LEGUMINOSAE	*Medicago bondevii*	LC		LC		Yes	Yes						Yes
LEGUMINOSAE	*Medicago cancellata*	NT		NE									Yes
LEGUMINOSAE	*Medicago carica*	DD		DD									Yes
LEGUMINOSAE	*Medicago carstiensis*	LC		LC		Yes							Yes
LEGUMINOSAE	*Medicago ciliaris*	LC		LC									Yes

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LEGUMINOSAE	*Medicago citrina*	CR	B2ab(iii,v)	CR	B2ab(iii,v)	Yes	Yes						Yes
LEGUMINOSAE	*Medicago constricta*	LC		LC									Yes
LEGUMINOSAE	*Medicago coronata*	LC		LC									Yes
LEGUMINOSAE	*Medicago cretacea*	EN	B1ab(ii,iii,iv)+2ab(ii,iii, iv);C2a(i)	NE									Yes
LEGUMINOSAE	*Medicago disciformis*	LC		LC									Yes
LEGUMINOSAE	*Medicago doliata*	LC		LC									Yes
LEGUMINOSAE	*Medicago fischeriana*	CR	B1ab(iii)	NE									Yes
LEGUMINOSAE	*Medicago glandulosa*	VU	B1ab(ii,iii)+2ab(ii,iii)	NE									Yes
LEGUMINOSAE	*Medicago globosa*	LC		LC									Yes
LEGUMINOSAE	*Medicago granadensis*	NA		NA									Yes
LEGUMINOSAE	*Medicago heterocarpa*	DD		DD		Yes	Yes						Yes
LEGUMINOSAE	*Medicago heyniana*	NT		NT		Yes	Yes						Yes
LEGUMINOSAE	*Medicago hybrida*	LC		LC									Yes
LEGUMINOSAE	*Medicago hypogaea*	NT		NT									Yes
LEGUMINOSAE	*Medicago intertexta*	LC		LC									Yes
LEGUMINOSAE	*Medicago italica*	LC		LC									Yes
LEGUMINOSAE	*Medicago komarovii*	NA		NE									Yes
LEGUMINOSAE	*Medicago kotovii*	VU	B2ab(ii,iii);C2a(i)	NE		Yes							Yes
LEGUMINOSAE	*Medicago laciniata*	LC		LC									Yes
LEGUMINOSAE	*Medicago lesinsii*	LC		LC									Yes
LEGUMINOSAE	*Medicago littoralis*	LC		LC									Yes
LEGUMINOSAE	*Medicago lupulina*	LC		LC									Yes
LEGUMINOSAE	*Medicago marina*	LC		LC									Yes
LEGUMINOSAE	*Medicago medicaginoides*	LC		LC									Yes
LEGUMINOSAE	*Medicago meyeri*	DD		DD									Yes
LEGUMINOSAE	*Medicago minima*	LC		LC									Yes
LEGUMINOSAE	*Medicago monspeliaca*	LC		LC									Yes
LEGUMINOSAE	*Medicago murex*	LC		LC									Yes
LEGUMINOSAE	*Medicago orbicularis*	LC		LC									Yes
LEGUMINOSAE	*Medicago phrygia*	NA		NA									Yes
LEGUMINOSAE	*Medicago pironae*	NT		NT		Yes							Yes
LEGUMINOSAE	*Medicago polyceratia*	LC		LC									Yes
LEGUMINOSAE	*Medicago polymorpha*	LC		LC									Yes
LEGUMINOSAE	*Medicago praecox*	LC		LC									Yes

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LEGUMINOSAE	*Medicago procumbens*	DD		DD									Yes
LEGUMINOSAE	*Medicago prostrata*	LC		LC		Yes							Yes
LEGUMINOSAE	*Medicago rigidula*	LC		LC									Yes
LEGUMINOSAE	*Medicago rotata*	LC		LC									Yes
LEGUMINOSAE	*Medicago rugosa*	LC		LC									Yes
LEGUMINOSAE	*Medicago rupestris*	EN	B1ab(ii,iii)+2ab(ii,iii); C2a(i)	NE									Yes
LEGUMINOSAE	*Medicago sativa*	LC		LC									Yes
LEGUMINOSAE	*Medicago saxatilis*	EN	B1ab(ii,iii)+2ab(ii,iii)	NE		Yes							Yes
LEGUMINOSAE	*Medicago scutellata*	LC		LC									Yes
LEGUMINOSAE	*Medicago secundiflora*	DD		DD									Yes
LEGUMINOSAE	*Medicago soleirolii*	DD		DD									Yes
LEGUMINOSAE	*Medicago strasseri*	NT		NT		Yes	Yes						Yes
LEGUMINOSAE	*Medicago suffruticosa*	LC		LC									Yes
LEGUMINOSAE	*Medicago tenderiensis*	DD		NE		Yes							Yes
LEGUMINOSAE	*Medicago tenoreana*	LC		LC		Yes							Yes
LEGUMINOSAE	*Medicago tornata*	LC		LC									Yes
LEGUMINOSAE	*Medicago truncatula*	LC		LC									Yes
LEGUMINOSAE	*Medicago turbinata*	LC		LC									Yes
LEGUMINOSAE	*Melilotus albus*	LC		LC									Yes
LEGUMINOSAE	*Melilotus officinalis*	LC		LC									Yes
LEGUMINOSAE	*Melilotus segetalis* ssp. *fallax*	DD		DD		Yes	Yes	II/IV					
LABIATAE	*Mentha aquatica*	LC		LC								Yes	
LABIATAE	*Mentha pulegium*	LC		LC								Yes	
LABIATAE	*Mentha spicata*	LC		LC								Yes	
MENYANTHACEAE	*Menyanthes trifoliata*	LC		LC							D	Yes	
CHENOPODIACEAE	*Microcnemum coralloides*	VU	B2b(iii)c(iii)	VU	B2b(iii)c(iii)				I				
LABIATAE	*Micromeria glomerata*	CR	B2ab(iii,iv)	CR	B2ab(iii,iv)	Yes	Yes		I				
LABIATAE	*Micromeria leucantha*	EN	B2ab(iii)	EN	B2ab(iii)	Yes	Yes		I				
LABIATAE	*Micromeria taygetea*	EN	C2a(i)	EN	C2a(i)	Yes	Yes	II/IV	I				
GRAMINEAE	*Micropyropsis tuberosa*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)			II/IV	I				
CARYOPHYLLACEAE	*Minuartia smejkalii*	DD		DD		Yes	Yes	II/IV	I				
CARYOPHYLLACEAE	*Moehringia fontqueri*	EN	B1ac(iv)+2ac(iv)	EN	B1ac(iv)+2ac(iv)	Yes	Yes	IV	I				
CARYOPHYLLACEAE	*Moehringia hypanica*	VU	D1	NE		Yes			I				
CARYOPHYLLACEAE	*Moehringia jankae*	DD		DD		Yes	Yes	II/IV	I				

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CARYOPHYLLACEAE	*Moehringia lateriflora*	LC		LC				II/IV					
CARYOPHYLLACEAE	*Moehringia tommasinii*	EN	B1ab(ii,iii,v)+ 2ab(ii,iii,v)	EN	B1ab(ii,iii,v)+ 2ab(ii,iii,v)	Yes		II/IV	I				
CARYOPHYLLACEAE	*Moehringia villosa*	DD		DD		Yes	Yes	II/IV					
CRASSULACEAE	*Monanthes wildpretii*	CR	B2ab(iii)	CR	B2ab(iii)	Yes	Yes	II/IV	I				
UMBELLIFERAE	*Monizia edulis*	CR	D	CR	D	Yes	Yes	II/IV	I				
PONTEDERIACEAE	*Monochoria korsakowii*	DD		NE								Yes	
PORTULACACEAE	*Montia fontana*	LC		LC								Yes	
CRUCIFERAE	*Murbeckiella boryi*[1]	LC		LC				V					
CRUCIFERAE	*Murbeckiella sousae*	NT		NT		Yes	Yes	IV	I				
CAMPANULACEAE	*Musschia aurea*	LC		LC		Yes	Yes	II/IV	I				
CAMPANULACEAE	*Musschia wollastonii*	EN	D	EN	D	Yes	Yes	II/IV	I				
BORAGINACEAE	*Myosotis azorica*	VU	D1	VU	D1	Yes	Yes	II/IV	I				
BORAGINACEAE	*Myosotis laxa*	LC		LC								Yes	
BORAGINACEAE	*Myosotis lusitanica*	DD		DD		Yes	Yes	II/IV					
BORAGINACEAE	*Myosotis rehsteineri*	EN	B2ab(iii)	EN	B2ab(iii)	Yes	Yes	II/IV	I				
BORAGINACEAE	*Myosotis retusifolia*	DD		DD		Yes	Yes	II/IV					
BORAGINACEAE	*Myosotis scorpioides*	LC		LC								Yes	
BORAGINACEAE	*Myosotis secunda*	LC		LC		Yes	Yes					Yes	
MYRICACEAE	*Myrica rivas-martinezii*	CR	B2ab(iii,v)	CR	B2ab(iii,v)	Yes	Yes	II/IV	I				
HALORAGACEAE	*Myriophyllum alterniflorum*	LC		LC								Yes	
HALORAGACEAE	*Myriophyllum sibiricum*	LC		LC								Yes	
HALORAGACEAE	*Myriophyllum spicatum*	LC		LC								Yes	
HALORAGACEAE	*Myriophyllum verticillatum*	LC		LC								Yes	
HYDROCHARITACEAE	*Najas flexilis*	VU	B2ab(iv)	VU	B2ab(iv)			II/IV	I			Yes	
HYDROCHARITACEAE	*Najas marina*	LC		LC								Yes	
HYDROCHARITACEAE	*Najas minor*	LC		LC								Yes	
HYDROCHARITACEAE	*Najas tenuissima*	DD		EN	B2ab(iii)			II/IV	I			Yes	
AMARYLLIDACEAE	*Narcissus assoanus*[1]	LC		LC		Yes	Yes	V					
AMARYLLIDACEAE	*Narcissus asturiensis*	LC		LC		Yes	Yes	II/IV					
AMARYLLIDACEAE	*Narcissus bulbocodium*	LC		LC				V					
AMARYLLIDACEAE	*Narcissus calcicola*	LC		LC		Yes	Yes	II/IV					
AMARYLLIDACEAE	*Narcissus cavanillesii*[1]	DD		DD				II/IV					
AMARYLLIDACEAE	*Narcissus cyclamineus*	LC		LC		Yes	Yes	II/IV					
AMARYLLIDACEAE	*Narcissus jonquilla*	DD		DD		Yes	Yes					Yes	

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AMARYLLIDACEAE	*Narcissus jonquilla* ssp. *fernandesii*	LC		LC		Yes	Yes	II/IV					
AMARYLLIDACEAE	*Narcissus longispathus*	EN	B1b(iii,v)c(iv)+2b(iii,v)c(iv)	EN	B1b(iii,v)c(iv)+2b(iii,v)c(iv)	Yes	Yes	IV	I				
AMARYLLIDACEAE	*Narcissus nevadensis*	EN	B2ab(iii)	EN	B2ab(iii)	Yes	Yes	II/IV	I				
AMARYLLIDACEAE	*Narcissus poeticus* ssp. *radiiflorus*[1]	DD		DD					I				
AMARYLLIDACEAE	*Narcissus pseudonarcissus* ssp. *nobilis*	LC		LC		Yes	Yes	II/IV					
AMARYLLIDACEAE	*Narcissus scaberulus*	LC		LC		Yes	Yes	II/IV	I				
AMARYLLIDACEAE	*Narcissus triandrus*	LC		LC		Yes	Yes	IV	I				
AMARYLLIDACEAE	*Narcissus viridiflorus*	DD		DD				II/IV	I				
UMBELLIFERAE	*Naufraga balearica*	CR	B1ab(v)+2ab(v)	CR	B1ab(v)+2ab(v)	Yes	Yes	II/IV	I				
NELUMBONACEAE	*Nelumbo nucifera*	DD		NE								Yes	
ORCHIDACEAE	*Neotinea lactea*	LC		LC						II			
ORCHIDACEAE	*Neotinea maculata*	LC		LC						II			
ORCHIDACEAE	*Neotinea tridentata*	LC		LC						II			
ORCHIDACEAE	*Neotinea ustulata*	LC		LC						II			
ORCHIDACEAE	*Neottia cordata*	LC		LC						II			
ORCHIDACEAE	*Neottia nidus-avis*	LC		LC						II			
ORCHIDACEAE	*Neottia ovata*	LC		LC						II			
ORCHIDACEAE	*Neottianthe cucullata*	EN	B2b(iii,v)c(iii,iv)	EN	B2b(iii,v)c(iii,iv)					II			
LABIATAE	*Nepeta argolica* ssp. *dirphya*[1]	NT		NT		Yes	Yes	II/IV	I				
NYMPHAEACEAE	*Nuphar lutea*	LC		LC								Yes	
NYMPHAEACEAE	*Nuphar pumila*	LC		LC								Yes	
NYMPHAEACEAE	*Nymphaea alba*	LC		LC								Yes	
NYMPHAEACEAE	*Nymphaea candida*	LC		LC								Yes	
NYMPHAEACEAE	*Nymphaea tetragona*	LC		LC								Yes	
MENYANTHACEAE	*Nymphoides peltata*	LC		LC								Yes	
SCROPHULARIACEAE	*Odontites granatensis*	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
SCROPHULARIACEAE	*Odontites hollianus*[1]	DD		DD		Yes	Yes	II/IV					
UMBELLIFERAE	*Oenanthe aquatica*	LC		LC								Yes	
UMBELLIFERAE	*Oenanthe conioides*	DD		DD		Yes	Yes	II/IV	I				
UMBELLIFERAE	*Oenanthe crocata*	LC		LC								Yes	
UMBELLIFERAE	*Oenanthe divaricata*	LC		LC		Yes	Yes	II/IV					
UMBELLIFERAE	*Oenanthe fistulosa*	LC		LC								Yes	
UMBELLIFERAE	*Oenanthe fluviatilis*	NT		NT		Yes	Yes					Yes	
OLEACEAE	*Olea europaea*	DD		DD									Yes

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OLEACEAE	*Olea maderensis*	DD		DD		Yes	Yes						Yes
BORAGINACEAE	*Omphalodes kuzinskyanae*	VU	B1ab(i,ii,iii,v)+2ab(i,ii,iii,v)	VU	B1ab(i,ii,iii,v)+2ab(i,ii,iii,v)	Yes	Yes	II/IV	I				
BORAGINACEAE	*Omphalodes littoralis*	LC		LC		Yes	Yes	II/IV	I				
LEGUMINOSAE	*Onobrychis viciifolia*	LC		LC		Yes							Yes
LEGUMINOSAE	*Ononis maweana*[1]	NT		NT		Yes	Yes		I				
COMPOSITAE	*Onopordum carduelium*	CR	B2ab(iii,iv)	CR	B2ab(iii,iv)	Yes	Yes	II/IV	I				
COMPOSITAE	*Onopordum nogalesii*	CR	B2ac(iv);C2a(ii)	CR	B2ac(iv);C2a(ii)	Yes	Yes	II/IV	I				
BORAGINACEAE	*Onosma polyphylla*	VU	B1ab(iii)	NE					I				
BORAGINACEAE	*Onosma propontica*	DD		DD		Yes	Yes		I				
BORAGINACEAE	*Onosma tornensis*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
BORAGINACEAE	*Onosma troodi*	DD		DD		Yes	Yes		I				
ORCHIDACEAE	*Ophrys apifera*	LC		LC						II			
ORCHIDACEAE	*Ophrys argolica*	VU	B1ab(iii)+2ab(iii)	VU	B1ab(iii)+2ab(iii)	Yes	Yes	IV	I	II	A		
ORCHIDACEAE	*Ophrys atlantica*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)					II			
ORCHIDACEAE	*Ophrys bertolonii*	LC		LC		Yes	Yes			II			
ORCHIDACEAE	*Ophrys bombyliflora*	LC		LC						II			
ORCHIDACEAE	*Ophrys ferrum-equinum*	LC		LC						II			
ORCHIDACEAE	*Ophrys fuciflora*	LC		LC						II			
ORCHIDACEAE	*Ophrys fusca*	LC		LC						II			
ORCHIDACEAE	*Ophrys insectifera*	LC		LC		Yes				II			
ORCHIDACEAE	*Ophrys kotschyi*	NT		NT		Yes	Yes	II/IV	I	II	B		
ORCHIDACEAE	*Ophrys lunulata*	NT		NT		Yes	Yes	II/IV	I	II			
ORCHIDACEAE	*Ophrys lutea*	LC		LC						II			
ORCHIDACEAE	*Ophrys reinholdii*	LC		LC						II			
ORCHIDACEAE	*Ophrys scolopax*	LC		LC						II			
ORCHIDACEAE	*Ophrys speculum*	LC		LC						II			
ORCHIDACEAE	*Ophrys sphegodes*	LC		LC						II			
ORCHIDACEAE	*Ophrys sphegodes* ssp. *mammosa*	LC		LC					I	II			
ORCHIDACEAE	*Ophrys tenthredinifera*	LC		LC						II			
ORCHIDACEAE	*Ophrys umbilicata*	LC		LC						II			
ORCHIDACEAE	*Orchis anatolica*	LC		LC						II			
ORCHIDACEAE	*Orchis anthropophora*	LC		LC						II			
ORCHIDACEAE	*Orchis brancifortii*	LC		LC		Yes	Yes			II			
ORCHIDACEAE	*Orchis italica*	LC		LC						II			

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ORCHIDACEAE	*Orchis mascula*	LC		LC						II			
ORCHIDACEAE	*Orchis mascula* ssp. *scopulorum*[1]	DD		DD		Yes	Yes	IV	I	II			
ORCHIDACEAE	*Orchis militaris*	LC		LC						II			
ORCHIDACEAE	*Orchis pallens*	LC		LC						II			
ORCHIDACEAE	*Orchis patens*	EN	B1ab(iii,v)	EN	B1ab(iii,v)					II			
ORCHIDACEAE	*Orchis pauciflora*	LC		LC						II			
ORCHIDACEAE	*Orchis provincialis*	LC		LC					I	II	B		
ORCHIDACEAE	*Orchis punctulata*	VU	B2ab(iii,v)	CR	C2a(i)				I	II	B		
ORCHIDACEAE	*Orchis purpurea*	LC		LC						II			
ORCHIDACEAE	*Orchis quadripunctata*	LC		LC						II			
ORCHIDACEAE	*Orchis simia*	LC		LC						II			
ORCHIDACEAE	*Orchis sitiaca*	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)	Yes	Yes			II			
ORCHIDACEAE	*Orchis spitzelii*	NT		NT						II			
LABIATAE	*Origanum cordifolium*	VU	D2	VU	D2	Yes	Yes		I				
LABIATAE	*Origanum dictamnus*	NT		NT		Yes	Yes	II/IV	I				
HYACINTHACEAE	*Ornithogalum reverchonii*	LC		LC				IV	I				
LEGUMINOSAE	*Ornithopus sativus*	LC		LC									Yes
SCROPHULARIACEAE	*Orobanche densiflora*	DD		DD				II/IV					
LEGUMINOSAE	*Oxytropis deflexa*	VU	D2	NE					I				
PAEONIACEAE	*Paeonia clusii* ssp. *rhodia*	VU	B1ab(iii,v)+2ab(iii,v)	VU	B1ab(iii,v)+2ab(iii,v)	Yes	Yes	II/IV	I				
PAEONIACEAE	*Paeonia officinalis* ssp. *banatica*	DD		DD		Yes	Yes	II/IV	I				
PAEONIACEAE	*Paeonia parnassica*	EN	C2a(i)	EN	C2a(i)	Yes	Yes	II/IV	I				
PAEONIACEAE	*Paeonia tenuifolia*	DD		DD					I				
GRAMINEAE	*Panicum repens*	LC		LC								Yes	
PAPAVERACEAE	*Papaver laestadianum*	VU	B1ab(iii,v)+2ab(iii,v)	NT		Yes		II/IV					
PAPAVERACEAE	*Papaver lapponicum*	DD		NE					I				
PAPAVERACEAE	*Papaver radicatum* ssp. *hyperboreum*	LC		NT				II/IV					
CRUCIFERAE	*Parolinia schizogynoides*	VU	D1+2	VU	D1+2	Yes	Yes	II/IV	I				
CHENOPODIACEAE	*Patellifolia patellaris*	LC		LC									Yes
CHENOPODIACEAE	*Patellifolia procumbens*	LC		LC									Yes
CHENOPODIACEAE	*Patellifolia webbiana*	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	Yes						Yes
SCROPHULARIACEAE	*Pedicularis sudetica*	DD		DD				II/IV	I				
COMPOSITAE	*Pericallis hadrosoma*	CR	B2ab(iii);C2a(i);D	CR	B2ab(iii);C2a(i);D	Yes	Yes	II/IV	I				
COMPOSITAE	*Pericallis malvifolia*	CR	B1ab(iii)	CR	B1ab(iii)	Yes	Yes		I				
POLYGONACEAE	*Persicaria amphibia*	LC		LC								Yes	

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POLYGONACEAE	*Persicaria foliosa*	NT		NT				II/IV				Yes	
POLYGONACEAE	*Persicaria hydropiper*	LC		LC								Yes	
POLYGONACEAE	*Persicaria lanigera*	NA		NA								Yes	
POLYGONACEAE	*Persicaria lapathifolia*	LC		LC								Yes	
POLYGONACEAE	*Persicaria maculosa*	LC		LC								Yes	
POLYGONACEAE	*Persicaria salicifolia*	LC		LC								Yes	
UMBELLIFERAE	*Petagnia saniculifolia*	LC		LC		Yes	Yes	II/IV	I				
CARYOPHYLLACEAE	*Petrocoptis grandiflora*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
CARYOPHYLLACEAE	*Petrocoptis montsicciana*	NT		NT		Yes	Yes	II/IV	I				
CARYOPHYLLACEAE	*Petrocoptis pseudoviscosa*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
GRAMINEAE	*Phacelurus digitatus*	DD		DD								Yes	
COMPOSITAE	*Phagnalon bennettii*	LC		LC		Yes	Yes	II/IV	I				
GRAMINEAE	*Phalaris aquatica*	LC		LC									Yes
GRAMINEAE	*Phalaris arundinacea*	LC		LC								Yes	
GRAMINEAE	*Phalaris maderensis*	VU	D1	VU	D1	Yes	Yes	II/IV	I				
GRAMINEAE	*Phleum pratense*	LC		LC									Yes
LABIATAE	*Phlomis brevibracteata*	DD		DD		Yes	Yes	II/IV	I				
LABIATAE	*Phlomis cypria*	DD		DD		Yes	Yes	II/IV	I				
GRAMINEAE	*Phragmites australis*	LC		LC								Yes	
CAMPANULACEAE	*Physoplexis comosa*	LC		LC		Yes	Yes	IV	I				
COMPOSITAE	*Picris willkommii*	EN	B2ab(i,ii,iii,v)	EN	B2ab(i,ii,iii,v)	Yes	Yes	IV	I				
MARSILEACEAE	*Pilularia globulifera*	NT		NT		Yes						Yes	
MARSILEACEAE	*Pilularia minuta*	EN	B2ab(i,ii,iii,iv,v)c(iv)	EN	B2ab(i,ii,iii,iv,v)c(iv)				I			Yes	
LENTIBULARIACEAE	*Pinguicula crystallina*	NT		NT				II/IV	I				
LENTIBULARIACEAE	*Pinguicula mundi*	VU	D2	VU	D2	Yes	Yes					Yes	
LENTIBULARIACEAE	*Pinguicula nevadensis*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes	II/IV	I				
LENTIBULARIACEAE	*Pinguicula vulgaris*	LC		LC								Yes	
LEGUMINOSAE	*Pisum fulvum*	NT		NT									Yes
LEGUMINOSAE	*Pisum sativum*	LC		LC									Yes
PITTOSPORACEAE	*Pittosporum coriaceum*	CR	D	CR	D	Yes	Yes	II/IV	I				
PLANTAGINACEAE	*Plantago algarbiensis*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes	II/IV					
PLANTAGINACEAE	*Plantago almogravensis*	CR	B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)	CR	B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)	Yes	Yes	II/IV					
PLANTAGINACEAE	*Plantago famarae*	CR	B2ab(v)	CR	B2ab(v)	Yes	Yes		I				
PLANTAGINACEAE	*Plantago malato-belizii*	DD		DD		Yes	Yes	II/IV	I				

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ORCHIDACEAE	*Platanthera algeriensis*	EN	B2ab(iii)	EN	B2ab(iii)					II			
ORCHIDACEAE	*Platanthera bifolia*	LC		LC						II			
ORCHIDACEAE	*Platanthera chlorantha*	LC		LC						II			
ORCHIDACEAE	*Platanthera hyperborea*	LC		NE						II			
ORCHIDACEAE	*Platanthera micrantha*	EN	B1ab(i,iii,v)	EN	B1ab(i,iii,v)	Yes	Yes			II			
ORCHIDACEAE	*Platanthera obtusata*	VU	D1	EN	D					II			
ORCHIDACEAE	*Platanthera obtusata* ssp. *oligantha*	VU	D1	EN	D			II/IV	I	II			
GRAMINEAE	*Pleuropogon sabinei*	LC		LC								Yes	
GRAMINEAE	*Poa alpina*	LC		LC									Yes
GRAMINEAE	*Poa granitica* ssp. *disparilis*	DD		DD		Yes		II/IV	I				
GRAMINEAE	*Poa pratensis*	LC		LC									Yes
GRAMINEAE	*Poa riphaea*	EN	D	EN	D	Yes	Yes	II/IV	I				
POLEMONIACEAE	*Polemonium boreale*	LC		NE					I				
POLYGONACEAE	*Polygonum praelongum*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)			II/IV	I				
DRYOPTERIDACEAE	*Polystichum drepanum*	CR	D	CR	D	Yes	Yes	II/IV	I				
POTAMOGETONACEAE	*Potamogeton acutifolius*	NT		NT								Yes	
POTAMOGETONACEAE	*Potamogeton alpinus*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton berchtoldii*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton coloratus*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton compressus*	DD		NT								Yes	
POTAMOGETONACEAE	*Potamogeton crispus*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton epihydrus*	NT		NT								Yes	
POTAMOGETONACEAE	*Potamogeton filiformis*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton friesii*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton gramineus*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton lucens*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton natans*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton nodosus*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton obtusifolius*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton perfoliatus*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton polygonifolius*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton praelongus*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton pusillus*	LC		LC								Yes	
POTAMOGETONACEAE	*Potamogeton rutilus*	NT		NT		Yes						Yes	
POTAMOGETONACEAE	*Potamogeton sarmaticus*	DD		NE								Yes	

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POTAMOGETONACEAE	*Potamogeton schweinfurthii*	DD		DD								Yes	
POTAMOGETONACEAE	*Potamogeton subsibiricus*	DD		NE								Yes	
POTAMOGETONACEAE	*Potamogeton trichoides*	LC		LC								Yes	
ROSACEAE	*Potentilla delphinensis*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
ROSACEAE	*Potentilla emilii-popi*	DD		DD		Yes	Yes	II/IV	I				
ROSACEAE	*Potentilla silesiaca*	DD		DD		Yes	Yes		I				
PRIMULACEAE	*Primula apennina*	VU	D1	VU	D1	Yes	Yes	II/IV	I				
PRIMULACEAE	*Primula carniolica*	LC		LC		Yes	Yes	II/IV					
PRIMULACEAE	*Primula deorum*	DD		DD		Yes	Yes		I				
PRIMULACEAE	*Primula egaliksensis*	CR (PE)	D	NE					I				
PRIMULACEAE	*Primula frondosa*	DD		DD		Yes	Yes		I				
PRIMULACEAE	*Primula glaucescens*	LC		LC		Yes	Yes	IV	I				
PRIMULACEAE	*Primula nutans*	LC		LC				II/IV					
PRIMULACEAE	*Primula palinuri*	EN	B2ab(i,ii,iii,v)	EN	B2ab(i,ii,iii,v)	Yes	Yes	II/IV	I				
PRIMULACEAE	*Primula scandinavica*	NT		VU	B2ab(ii,iii,iv,v)	Yes		II/IV					
PRIMULACEAE	*Primula spectabilis*	LC		LC		Yes	Yes	IV	I				
PRIMULACEAE	*Primula wulfeniana* ssp. *baumgarteniana*	DD		DD		Yes	Yes		I				
ROSACEAE	*Prunus avium*	LC		LC									Yes
ROSACEAE	*Prunus brigantina*	DD		DD		Yes	Yes						Yes
ROSACEAE	*Prunus cerasifera*	DD		DD									Yes
ROSACEAE	*Prunus cocomilia*	DD		DD									Yes
ROSACEAE	*Prunus discolor*	DD		DD									Yes
ROSACEAE	*Prunus fruticosa*	DD		DD									Yes
ROSACEAE	*Prunus klokovii*	DD		NE		Yes							Yes
ROSACEAE	*Prunus laurocerasus*	LC		LC									Yes
ROSACEAE	*Prunus lusitanica*	VU	B2ab(ii,v)	VU	B2ab(ii,v)								Yes
ROSACEAE	*Prunus lusitanica* ssp. *azorica*	EN	D	EN	D	Yes	Yes	II/IV	I				
ROSACEAE	*Prunus mahaleb*	LC		LC									Yes
ROSACEAE	*Prunus padus*	LC		LC									Yes
ROSACEAE	*Prunus prostrata*	DD		DD									Yes
ROSACEAE	*Prunus ramburii*	VU	C2a(i);D2	VU	C2a(i);D2	Yes	Yes						Yes
ROSACEAE	*Prunus spinosa*	LC		LC									Yes
ROSACEAE	*Prunus tenella*	DD		DD									Yes
ROSACEAE	*Prunus webbii*	DD		DD									Yes
GRAMINEAE	*Pseudarrhenatherum pallens*	EN	B2ab(iii,iv)	EN	B2ab(iii,iv)	Yes	Yes	II/IV					

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ORCHIDACEAE	*Pseudorchis albida*	LC		LC						II			
GRAMINEAE	*Puccinellia phryganodes*	LC		CR	A2ac			II/IV					
GRAMINEAE	*Puccinellia pungens*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
RANUNCULACEAE	*Pulsatilla grandis*	LC		LC		Yes	Yes	II/IV	I				
RANUNCULACEAE	*Pulsatilla patens*	DD		DD				II/IV	I				
RANUNCULACEAE	*Pulsatilla pratensis* ssp. *hungarica*	DD		DD		Yes	Yes	II/IV					
RANUNCULACEAE	*Pulsatilla slavica*	DD		DD		Yes	Yes	II/IV	I				
RANUNCULACEAE	*Pulsatilla subslavica*	DD		DD		Yes	Yes	II/IV					
RANUNCULACEAE	*Pulsatilla vulgaris* ssp. *gotlandica*	VU	D2	VU	D2	Yes	Yes	II/IV					
CYPERACEAE	*Pycreus flavescens*	LC		LC								Yes	
CYPERACEAE	*Pycreus mundtii*	LC		LC								Yes	
ROSACEAE	*Pyrus bourgaeana*	LC		LC									Yes
ROSACEAE	*Pyrus castribonensis*	DD		DD		Yes	Yes						Yes
ROSACEAE	*Pyrus communis*	LC		LC									Yes
ROSACEAE	*Pyrus cordata*	DD		DD									Yes
ROSACEAE	*Pyrus elaeagrifolia*	DD		DD									Yes
ROSACEAE	*Pyrus magyarica*	CR	D	CR	D	Yes	Yes	II/IV					Yes
ROSACEAE	*Pyrus nivalis*	DD		DD									Yes
ROSACEAE	*Pyrus sicanorum*	DD		DD		Yes	Yes						Yes
ROSACEAE	*Pyrus spinosa*	DD		DD									Yes
ROSACEAE	*Pyrus syriaca*	LC		LC									Yes
ROSACEAE	*Pyrus vallis-demonis*	DD		DD		Yes	Yes						Yes
GESNERIACEAE	*Ramonda serbica*	LC		LC		Yes		IV	I				
RANUNCULACEAE	*Ranunculus aquatilis*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus batrachioides*	NT		NT								Yes	
RANUNCULACEAE	*Ranunculus baudotii*	LC		LC		Yes						Yes	
RANUNCULACEAE	*Ranunculus circinatus*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus confervoides*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus flammula*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus fluitans*	LC		LC		Yes						Yes	
RANUNCULACEAE	*Ranunculus fontanus*	DD		DD		Yes			I				
RANUNCULACEAE	*Ranunculus hederaceus*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus kykkoensis*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
RANUNCULACEAE	*Ranunculus lapponicus*	LC		LC				II/IV					
RANUNCULACEAE	*Ranunculus lateriflorus*	LC		LC								Yes	

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RANUNCULACEAE	*Ranunculus lingua*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus ololeucos*	DD		DD		Yes	Yes					Yes	
RANUNCULACEAE	*Ranunculus omiophyllus*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus peltatus*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus penicillatus*	LC		LC		Yes						Yes	
RANUNCULACEAE	*Ranunculus polyphyllus*	DD		DD		Yes						Yes	
RANUNCULACEAE	*Ranunculus repens*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus reptans*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus revelieri*	LC		LC		Yes	Yes					Yes	
RANUNCULACEAE	*Ranunculus rionii*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus saniculifolius*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus sceleratus*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus sphaerospermus*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus trichophyllus*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus tripartitus*	LC		LC								Yes	
RANUNCULACEAE	*Ranunculus weyleri*	VU	D1+2	VU	D1+2	Yes	Yes	II/IV	I				
CRUCIFERAE	*Raphanus raphanistrum*	LC		LC									Yes
SCROPHULARIACEAE	*Rhinanthus oesilensis*	DD		DD			Yes	II/IV					
ERICACEAE	*Rhododendron luteum*	LC		NT				II/IV					
CRUCIFERAE	*Rhynchosinapis erucastrum* ssp. *cintrana*	DD		DD		Yes	Yes	II/IV					
GROSSULARIACEAE	*Ribes sardoum*	CR	B1ab(iii,v)+2ab(iii,v);C 2a(i,ii);D	CR	B1ab(iii,v)+2ab(iii,v);C 2a(i,ii);D	Yes	Yes	II/IV	I				
CRUCIFERAE	*Rorippa amphibia*	LC		LC								Yes	Yes
CRUCIFERAE	*Rorippa austriaca*	LC		LC									Yes
CRUCIFERAE	*Rorippa brachycarpa*	DD		NE									Yes
CRUCIFERAE	*Rorippa dogadovae*	LC		NE									Yes
CRUCIFERAE	*Rorippa hispanica*	DD		DD		Yes	Yes						Yes
CRUCIFERAE	*Rorippa hungarica*	DD		DD									Yes
CRUCIFERAE	*Rorippa islandica*	LC		LC									Yes
CRUCIFERAE	*Rorippa kerneri*	LC		LC		Yes							Yes
CRUCIFERAE	*Rorippa lippizensis*	LC		LC		Yes							Yes
CRUCIFERAE	*Rorippa microphylla*	LC		LC								Yes	
CRUCIFERAE	*Rorippa nasturtium-aquaticum*	LC		LC								Yes	
CRUCIFERAE	*Rorippa palustris*	LC		LC								Yes	Yes
CRUCIFERAE	*Rorippa prolifera*	NT		NT									Yes

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CRUCIFERAE	*Rorippa pyrenaica*	LC		LC									Yes
CRUCIFERAE	*Rorippa sylvestris*	LC		LC									Yes
CRUCIFERAE	*Rorippa thracica*	LC		LC									Yes
CRUCIFERAE	*Rorippa valdes-bermejoi*	CR	B1ab(iii,v)+2ab(iii,v);C 2a(i,ii);D	CR	B1ab(iii,v)+2ab(iii,v);C 2a(i,ii);D	Yes	Yes					Yes	Yes
LABIATAE	*Rosmarinus tomentosus*	EN	B1ab(iii,iv,v)+ 2ab(iii,iv,v)	EN	B1ab(iii,iv,v)+ 2ab(iii,iv,v)	Yes	Yes	IV	I				
UMBELLIFERAE	*Rouya polygama*	EN	B2ab(ii,iii,v)	EN	B2ab(ii,iii,v)			II/IV	I				
ROSACEAE	*Rubus genevieri* ssp. *herminii*	DD		DD		Yes	Yes	V					
POLYGONACEAE	*Rumex balcanicus*	DD		NT		Yes						Yes	
POLYGONACEAE	*Rumex hydrolapathum*	LC		LC								Yes	
POLYGONACEAE	*Rumex rupestris*	VU	C2a(i)	VU	C2a(i)	Yes	Yes	II/IV	I				
PAPAVERACEAE	*Rupicapnos africana*	EN	B2b(ii,iii,iv,v)c(ii)	EN	B2b(ii,iii,iv,v)c(ii)				I				
POTAMOGETONACEAE	*Ruppia cirrhosa*	LC		LC								Yes	
POTAMOGETONACEAE	*Ruppia maritima*	LC		LC								Yes	
RUSCACEAE	*Ruscus aculeatus*	LC		LC				V					
RUTACEAE	*Ruta microcarpa*	EN	B2ab(ii,iii)	EN	B2ab(ii,iii)	Yes	Yes		I				
GRAMINEAE	*Saccharum ravennae*	LC		LC								Yes	
GRAMINEAE	*Saccharum spontaneum*	LC		LC								Yes	
ALISMATACEAE	*Sagittaria natans*	LC		LC								Yes	
ALISMATACEAE	*Sagittaria sagittifolia*	LC		LC								Yes	
CHENOPODIACEAE	*Salicornia veneta*	VU	B2ab(iii)	VU	B2ab(iii)	Yes		II/IV	I				
SALICACEAE	*Salix salviifolia* ssp. *australis*	LC		LC		Yes	Yes	II/IV					
CHENOPODIACEAE	*Salsola vermiculata*	LC		LC									Yes
LABIATAE	*Salvia herbanica*	CR	B2ab(iii,v);C2a(i)	CR	B2ab(iii,v);C2a(i)	Yes	Yes		I				
LABIATAE	*Salvia veneris*	CR	B1ab(i,iii)	CR	B1ab(i,iii)	Yes	Yes	II/IV	I				
SALVINIACEAE	*Salvinia natans*	LC		LC					I			Yes	
CAPRIFOLIACEAE	*Sambucus nigra* ssp. *palmensis*[1]	EN	C2a(i)	EN	C2a(i)	Yes	Yes	II/IV	I				
PRIMULACEAE	*Samolus valerandi*	LC		LC								Yes	
ROSACEAE	*Sanguisorba dodecandra*	NT		NT		Yes	Yes						
COMPOSITAE	*Santolina elegans*	VU	D2	VU	D2	Yes	Yes	IV	I				
COMPOSITAE	*Santolina impressa*	LC		LC		Yes	Yes	II/IV					
COMPOSITAE	*Santolina semidentata*	LC		LC		Yes	Yes	II/IV					
COMPOSITAE	*Saussurea alpina* ssp. *esthonica*	DD		DD		Yes	Yes	II/IV					
SAXIFRAGACEAE	*Saxifraga berica*	VU	D1	VU	D1	Yes	Yes	II/IV	I				

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SAXIFRAGACEAE	*Saxifraga cintrana*	DD		DD		Yes	Yes	IV	I				
SAXIFRAGACEAE	*Saxifraga florulenta*	LC		LC		Yes	Yes	II/IV	I				
SAXIFRAGACEAE	*Saxifraga hirculus*	DD		DD				II/IV	I				
SAXIFRAGACEAE	*Saxifraga osloënsis*	VU	B2ab(iii,iv,v)c(iv)	VU	B2ab(iii,iv,v)c(iv)	Yes	Yes	II/IV					
SAXIFRAGACEAE	*Saxifraga portosanctana*	VU	D2	VU	D2	Yes	Yes	IV	I				
SAXIFRAGACEAE	*Saxifraga presolanensis*	EN	D	EN	D	Yes	Yes	IV	I				
SAXIFRAGACEAE	*Saxifraga tombeanensis*	EN	B1ab(iii,iv)+2ab(iii,iv)	EN	B1ab(iii,iv)+2ab(iii,iv)	Yes	Yes	II/IV	I				
SAXIFRAGACEAE	*Saxifraga valdensis*	NT		NT		Yes	Yes	IV	I				
SAXIFRAGACEAE	*Saxifraga vayredana*	LC		LC		Yes	Yes	IV	I				
CRUCIFERAE	*Schivereckia podolica*	LC		DD		Yes			I				
CYPERACEAE	*Schoenoplectiella supina*	DD		DD								Yes	
CYPERACEAE	*Schoenoplectus corymbosus*	NA		NA								Yes	
CYPERACEAE	*Schoenoplectus lacustris*	LC		LC								Yes	
CYPERACEAE	*Schoenoplectus litoralis*	LC		LC								Yes	
CYPERACEAE	*Schoenoplectus mucronatus*	LC		LC								Yes	
CYPERACEAE	*Schoenoplectus pungens*	LC		LC								Yes	
CYPERACEAE	*Schoenoplectus tabernaemontanii*	LC		LC								Yes	
CYPERACEAE	*Schoenoplectus triqueter*	LC		LC								Yes	
HYACINTHACEAE	*Scilla litardierei*	DD		CR	B1ab(iii,v)+B2ab(iii,v)	Yes		II/IV					
HYACINTHACEAE	*Scilla lochiae*[1]	DD		DD		Yes	Yes	II/IV	I				
HYACINTHACEAE	*Scilla madeirensis*	LC		LC		Yes	Yes	II/IV					
HYACINTHACEAE	*Scilla morrisii*	CR	B1ab(i,ii,iii)+2ab(i,ii,iii)	CR	B1ab(i,ii,iii)+2ab(i,ii,iii)	Yes	Yes	II/IV	I				
HYACINTHACEAE	*Scilla odorata*	DD		DD		Yes	Yes	IV	I				
HYACINTHACEAE	*Scilla ramburei*[1]	DD		DD				IV					
CYPERACEAE	*Scirpus radicans*	DD		DD								Yes	
CYPERACEAE	*Scirpus sylvaticus*	LC		LC								Yes	
GRAMINEAE	*Scolochloa festucacea*	LC		LC								Yes	
SCROPHULARIACEAE	*Scrophularia grandiflora* ssp. *grandiflora*	LC		LC		Yes	Yes	V					
SCROPHULARIACEAE	*Scrophularia herminii*	DD		DD		Yes	Yes	V					
SCROPHULARIACEAE	*Scrophularia sublyrata*	DD		DD		Yes	Yes	V					
GRAMINEAE	*Secale cereale*	NA		NE									Yes
GRAMINEAE	*Secale strictum*	LC		LC									Yes
GRAMINEAE	*Secale sylvestre*	LC		LC									Yes
LEGUMINOSAE	*Securigera varia*	LC		LC									Yes
CRASSULACEAE	*Sedum brissemoretii*	VU	D1+2	VU	D1+2	Yes	Yes	II/IV					

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COMPOSITAE	*Senecio caespitosus*	VU	D1	VU	D1	Yes	Yes	IV					
COMPOSITAE	*Senecio elodes*	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)	Yes	Yes	II/IV	I				
COMPOSITAE	*Senecio jacobaea* ssp. *gotlandicus*	DD		DD				II/IV					
COMPOSITAE	*Senecio lagascanus* ssp. *lusitanicus*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)	Yes	Yes	IV					
COMPOSITAE	*Senecio nevadensis*	VU	B2ab(ii,iii,v);D2	VU	B2ab(ii,iii,v);D2			II/IV	I				
ORCHIDACEAE	*Serapias bergonii*	DD		DD						II			
ORCHIDACEAE	*Serapias cordigera*	LC		LC						II			
ORCHIDACEAE	*Serapias lingua*	LC		LC						II			
ORCHIDACEAE	*Serapias neglecta*	NT		NT		Yes				II			
ORCHIDACEAE	*Serapias nurrica*	NT		NT		Yes	Yes			II			
ORCHIDACEAE	*Serapias olbia*	NT		NT		Yes	Yes			II			
ORCHIDACEAE	*Serapias parviflora*	LC		LC						II			
ORCHIDACEAE	*Serapias vomeracea*	LC		LC						II			
UMBELLIFERAE	*Seseli intricatum*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
UMBELLIFERAE	*Seseli leucospermum*	NT		NT		Yes	Yes	II/IV					
SCROPHULARIACEAE	*Sibthorpia peregrina*	LC		LC		Yes	Yes	II/IV					
LABIATAE	*Sideritis cypria*	VU	D1	VU	D1	Yes	Yes	II/IV	I				
LABIATAE	*Sideritis cystosiphon*	CR	B2ab(iii,iv)	CR	B2ab(iii,iv)	Yes	Yes	II/IV	I				
LABIATAE	*Sideritis discolor*	CR	B1ab(iii)c(iv)+2ab(iii) c(iv);C2a(i)b	CR	B1ab(iii)c(iv)+2ab(iii) c(iv);C2a(i)b	Yes	Yes	II/IV	I				
LABIATAE	*Sideritis infernalis*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
LABIATAE	*Sideritis javalambrensis*	VU	B1ab(iii)+2ab(iii);D2	VU	B1ab(iii)+2ab(iii);D2	Yes	Yes	II/IV	I				
LABIATAE	*Sideritis marmorea*	CR	B2ab(iii,iv)	CR	B2ab(iii,iv)	Yes	Yes	II/IV	I				
LABIATAE	*Sideritis serrata*	CR	B2ab(ii)	CR	B2ab(ii)	Yes	Yes	II/IV	I				
CARYOPHYLLACEAE	*Silene cretacea*	DD		NE					I				
CARYOPHYLLACEAE	*Silene haussknechtii*	DD		DD		Yes	Yes		I				
CARYOPHYLLACEAE	*Silene hicesiae*	VU	D2	VU	D2	Yes	Yes	II/IV					
CARYOPHYLLACEAE	*Silene hifacensis*	EN	B1ab(iv,v)+2ab(iv,v)	EN	B1ab(iv,v)+2ab(iv,v)	Yes	Yes	II/IV	I				
CARYOPHYLLACEAE	*Silene holzmannii*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes	II/IV	I				
CARYOPHYLLACEAE	*Silene involucrata* ssp. *tenella*[1]	NT		NT				II/IV	I				
CARYOPHYLLACEAE	*Silene longicilia*	LC		LC		Yes	Yes	II/IV					
CARYOPHYLLACEAE	*Silene mariana*	NT		NT		Yes	Yes	II/IV	I				
CARYOPHYLLACEAE	*Silene nocteolens*	CR	B2ab(iii)	CR	B2ab(iii)	Yes	Yes		I				
CARYOPHYLLACEAE	*Silene orphanidis*	EN	D	EN	D	Yes	Yes	II/IV	I				
CARYOPHYLLACEAE	*Silene rothmaleri*	NT		NT		Yes	Yes	II/IV	I				

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CARYOPHYLLACEAE	*Silene sangaria*	DD		NE					I				
CARYOPHYLLACEAE	*Silene velutina*	NT		NT		Yes	Yes	II/IV	I				
CRUCIFERAE	*Sinapidendron angustifolium*	CR	B1ab(iii)+2b(iii)	CR	B1ab(iii)+2b(iii)	Yes	Yes						Yes
CRUCIFERAE	*Sinapidendron frutescens*	EN	B1ab(iii)c(iii)+2ab(iii,v) c(iii)	EN	B1ab(iii)c(iii)+2ab(iii,v) c(iii)	Yes	Yes						Yes
CRUCIFERAE	*Sinapidendron gymnocalyx*	NT		NT		Yes	Yes						Yes
CRUCIFERAE	*Sinapidendron rupestre*	CR	D	CR	D	Yes	Yes	II/IV					Yes
CRUCIFERAE	*Sinapidendron sempervivifolium*	EN	D	EN	D	Yes	Yes		I				Yes
CRUCIFERAE	*Sinapis alba*	LC		LC									Yes
CRUCIFERAE	*Sinapis arvensis*	LC		LC									Yes
CRUCIFERAE	*Sinapis flexuosa*	LC		LC									Yes
CRUCIFERAE	*Sinapis pubescens*	LC		LC									Yes
CRUCIFERAE	*Sisymbrium cavanillesianum*	VU	B2ac(ii,iii,iv)	VU	B2ac(ii,iii,iv)	Yes	Yes	II/IV	I				
CRUCIFERAE	*Sisymbrium confertum*	DD		NE		Yes			I				
CRUCIFERAE	*Sisymbrium supinum*	LC		LC		Yes		II/IV	I				
UMBELLIFERAE	*Sium latifolium*	LC		LC								Yes	
UMBELLIFERAE	*Sium sisarum*	DD		DD								Yes	
SOLANACEAE	*Solanum lidii*	CR	B2ab(ii,iii);C2a(i)	CR	B2ab(ii,iii);C2a(i)	Yes	Yes	II/IV	I				
PRIMULACEAE	*Soldanella villosa*	VU	C2a(i)	VU	C2a(i)	Yes	Yes	II/IV	I				
BORAGINACEAE	*Solenanthus albanicus*	EN	B1ab(v)+2ab(v)	EN	B1ab(v)+2ab(v)	Yes	Yes	II/IV	I				
COMPOSITAE	*Sonchus gandogeri*	CR	B2ab(iii)	CR	B2ab(iii)	Yes	Yes		I				
ROSACEAE	*Sorbus maderensis*	CR	D	CR	D	Yes	Yes	II/IV					
ROSACEAE	*Sorbus teodori*	DD		DD		Yes		II/IV					
TYPHACEAE	*Sparganium angustifolium*	LC		LC								Yes	
TYPHACEAE	*Sparganium emersum*	LC		LC								Yes	
TYPHACEAE	*Sparganium erectum*	LC		LC								Yes	
TYPHACEAE	*Sparganium glomeratum*	DD		DD								Yes	
TYPHACEAE	*Sparganium gramineum*	LC		LC								Yes	
TYPHACEAE	*Sparganium hyperboreum*	LC		LC								Yes	
TYPHACEAE	*Sparganium natans*	NT		NT								Yes	
ORCHIDACEAE	*Spiranthes aestivalis*	DD		DD				IV	I	II			
ORCHIDACEAE	*Spiranthes romanzoffiana*	NT		NT						II			
ORCHIDACEAE	*Spiranthes sinensis*	LC		NE						II			
ORCHIDACEAE	*Spiranthes spiralis*	LC		LC						II			
LEMNACEAE	*Spirodela polyrhiza*	LC		LC								Yes	

Family	Species	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe?	Endemic to EU 27?	Habitats Directive Annexes	Bern Convention Annexes	CITES Annexes	EU Wildlife Trade Regulation	Aquatic species?	Crop wild relative?
COMPOSITAE	*Stemmacantha cynaroides*	EN	B2ab(v);C2a(i);D	EN	B2ab(v);C2a(i);D	Yes	Yes	II/IV	I				
AMARYLLIDACEAE	*Sternbergia colchiciflora*	LC		LC						II	B		
AMARYLLIDACEAE	*Sternbergia lutea*	LC		LC						II	B		
ORCHIDACEAE	*Steveniella satyrioides*	EN	B2ab(iii,v)	NE					I	II			
GRAMINEAE	*Stipa austroitalica*	LC		LC		Yes	Yes	II/IV	I				
GRAMINEAE	*Stipa bavarica*	VU	D2	VU	D2	Yes		II/IV	I				
GRAMINEAE	*Stipa danubialis*	DD		DD		Yes	Yes	II/IV	I				
GRAMINEAE	*Stipa styriaca*	EN	B1ab(iii);D	EN	B1ab(iii);D	Yes	Yes	II/IV	I				
GRAMINEAE	*Stipa syreistschikowii*	DD		NE					I				
GRAMINEAE	*Stipa veneta*	EN	D	EN	D	Yes	Yes	II/IV					
GRAMINEAE	*Stipa zalesskii*	DD		VU	D1+2			II/IV					
HYDROCHARITACEAE	*Stratiotes aloides*	LC		LC								Yes	
POTAMOGETONACEAE	*Stuckenia pectinata*	LC		LC								Yes	
POTAMOGETONACEAE	*Stuckenia vaginata*	NT		NT								Yes	
CRUCIFERAE	*Subularia aquatica*	LC		LC								Yes	
COMPOSITAE	*Sventenia bupleuroides*	EN	B2ab(iii)	EN	B2ab(iii)	Yes	Yes	II/IV	I				
BORAGINACEAE	*Symphytum cycladense*	VU	D2	VU	D2	Yes	Yes	II/IV	I				
OLEACEAE	*Syringa josikaea*	DD		DD		Yes		II/IV	I				
COMPOSITAE	*Tanacetum oshanahanii*	CR	B2ab(iii,v);C2a(i);D	CR	B2ab(iii,v);C2a(i);D	Yes	Yes		I				
COMPOSITAE	*Tanacetum ptarmiciflorum*	EN	B2ab(ii,iii,iv,v)	EN	B2ab(ii,iii,iv,v)	Yes	Yes	II/IV	I				
LEGUMINOSAE	*Teline nervosa*	CR	B2ab(iii,v)	CR	B2ab(iii,v)	Yes	Yes		I				
LEGUMINOSAE	*Teline rosmarinifolia*	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	Yes	II/IV	I				
LEGUMINOSAE	*Teline salsoloides*	CR	B2ab(iii,v);C2a(ii)	CR	B2ab(iii,v);C2a(ii)	Yes	Yes	II/IV	I				
COMPOSITAE	*Tephroseris longifolia* ssp. *moravica*	VU	B1ab(iii,iv)+2ab(iii,iv)	VU	B1ab(iii,iv)+2ab(iii,iv)	Yes	Yes	II/IV					
CUPRESSACEAE	*Tetraclinis articulata*	EN	B1ab(iii)+2ab(iii)	EN	B1ab(iii)+2ab(iii)				I				
LABIATAE	*Teucrium abutiloides*	CR	D	CR	D	Yes	Yes	II/IV	I				
LABIATAE	*Teucrium betonicum*	LC		LC		Yes	Yes	II/IV					
LABIATAE	*Teucrium charidemi*	NT		NT		Yes	Yes	IV	I				
LABIATAE	*Teucrium lamiifolium*	DD		VU	B1ab(iii)+B2ab(iii)				I				
LABIATAE	*Teucrium lepicephalum*	EN	A2c+4c;B1ab(i,iii,iv,v) +2ab(i,iii,iv,v)	EN	A2c+4c;B1ab(i,iii,iv,v) +2ab(i,iii,iv,v)	Yes	Yes	II/IV	I				
LABIATAE	*Teucrium salviastrum* ssp. *salviastrum*	LC		LC		Yes	Yes	V					
LABIATAE	*Teucrium scordium*	LC		LC								Yes	
LABIATAE	*Teucrium turredanum*	VU	B2ab(iii,v)	VU	B2ab(iii,v)	Yes	Yes	II/IV	I				
SANTALACEAE	*Thesium ebracteatum*	LC		LC				II/IV	I				

Family	Species	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe?	Endemic to EU 27?	Habitats Directive Annexes	Bern Convention Annexes	CITES Annexes	EU Wildlife Trade Regulation	Aquatic species?	Crop wild relative?
CRUCIFERAE	*Thlaspi jankae*	NT		NT		Yes	Yes	II/IV	I				
UMBELLIFERAE	*Thorella verticillato-inundata*	VU	B2ab(iii)	VU	B2ab(iii)	Yes	Yes	II/IV	I			Yes	
THYMELAEACEAE	*Thymelaea broteriana*	NT		NT		Yes	Yes	IV	I				
LABIATAE	*Thymus aznavourii*	DD		NE		Yes			I				
LABIATAE	*Thymus camphoratus*	NT		NT		Yes	Yes	II/IV	I				
LABIATAE	*Thymus capitellatus*	NT		NT		Yes	Yes	IV					
LABIATAE	*Thymus carnosus*	NT		NT		Yes	Yes	II/IV	I				
LABIATAE	*Thymus lotocephalus*	NT		NT		Yes	Yes	II/IV	I				
LABIATAE	*Thymus villosus* ssp. *villosus*	LC		LC		Yes	Yes	IV					
COMPOSITAE	*Tolpis glabrescens*	EN	B2ab(iii)	EN	B2ab(iii)	Yes	Yes		I				
SCROPHULARIACEAE	*Tozzia carpathica*	DD		DD		Yes	Yes	II/IV					
TRAPACEAE	*Trapa alatyrica*	DD		NE		Yes						Yes	
TRAPACEAE	*Trapa annosa*	EX		NE		Yes						Yes	
TRAPACEAE	*Trapa borysthenica*	DD		NE		Yes						Yes	
TRAPACEAE	*Trapa brevicarpa*	DD		NE		Yes						Yes	
TRAPACEAE	*Trapa danubialis*	DD		NE		Yes						Yes	
TRAPACEAE	*Trapa flerovii*	DD		NE		Yes						Yes	
TRAPACEAE	*Trapa longicarpa*	DD		DD		Yes						Yes	
TRAPACEAE	*Trapa macrorhiza*	DD		NE		Yes						Yes	
TRAPACEAE	*Trapa natans*	NT		NT					I			Yes	
TRAPACEAE	*Trapa okensis*	DD		NE		Yes						Yes	
TRAPACEAE	*Trapa pseudocolchica*	DD		NE		Yes						Yes	
TRAPACEAE	*Trapa sibirica*	DD		NE								Yes	
TRAPACEAE	*Trapa ucrainica*	DD		NE		Yes						Yes	
TRAPACEAE	*Trapa wolgensis*	DD		NE		Yes						Yes	
ORCHIDACEAE	*Traunsteinera globosa*	LC		LC									
HYMENOPHYLLACEAE	*Trichomanes speciosum*	LC		LC		Yes	Yes	II/IV	I				
LEGUMINOSAE	*Trifolium alexandrinum*	NA		NA									Yes
LEGUMINOSAE	*Trifolium alpestre*	LC		LC									Yes
LEGUMINOSAE	*Trifolium ambiguum*	LC		LC									Yes
LEGUMINOSAE	*Trifolium angustifolium*	LC		LC									Yes
LEGUMINOSAE	*Trifolium argutum*	NT		NT									Yes
LEGUMINOSAE	*Trifolium arvense*	LC		LC									Yes
LEGUMINOSAE	*Trifolium diffusum*	LC		LC									Yes
LEGUMINOSAE	*Trifolium hybridum*	LC		LC									Yes

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LEGUMINOSAE	*Trifolium incarnatum*	LC		LC		Yes							Yes
LEGUMINOSAE	*Trifolium nigrescens*	LC		LC									Yes
LEGUMINOSAE	*Trifolium pachycalyx*	DD		NE					I				
LEGUMINOSAE	*Trifolium pallidum*	LC		LC									Yes
LEGUMINOSAE	*Trifolium pratense*	LC		LC									Yes
LEGUMINOSAE	*Trifolium repens*	LC		LC									Yes
LEGUMINOSAE	*Trifolium resupinatum*	LC		LC									Yes
LEGUMINOSAE	*Trifolium saxatile*	NT		NT		Yes		II/IV	I				
LEGUMINOSAE	*Trifolium subterraneum*	LC		LC									Yes
LEGUMINOSAE	*Trifolium uniflorum*	LC		LC									Yes
LEGUMINOSAE	*Trifolium vesiculosum*	LC		LC									Yes
JUNCAGINACEAE	*Triglochin bulbosa*	LC		LC								Yes	
GRAMINEAE	*Trisetum subalpestre*	NT		NT				II/IV	I				
GRAMINEAE	*Triticum monococcum*	LC		LC									Yes
GRAMINEAE	*Triticum parvicoccum*	DD		DD									Yes
CISTACEAE	*Tuberaria major*	EN	B1ab(iii)	EN	B1ab(iii)	Yes	Yes	II/IV	I				
LILIACEAE	*Tulipa cypria*	EN	B2ab(iii)	EN	B2ab(iii)	Yes	Yes	II/IV	I				
LILIACEAE	*Tulipa hungarica*	NT		NT		Yes		II/IV	I				
TYPHACEAE	*Typha angustifolia*	LC		LC								Yes	
TYPHACEAE	*Typha domingensis*	LC		LC								Yes	
TYPHACEAE	*Typha latifolia*	LC		LC								Yes	
TYPHACEAE	*Typha laxmannii*	LC		LC								Yes	
TYPHACEAE	*Typha lugdunensis*	DD		DD								Yes	
TYPHACEAE	*Typha minima*	DD		DD					I			Yes	
TYPHACEAE	*Typha shuttleworthii*	DD		DD					I			Yes	
LEGUMINOSAE	*Ulex densus*	LC		LC		Yes	Yes	V					
URTICACEAE	*Urtica dioica*	LC		LC								Yes	
URTICACEAE	*Urtica kioviensis*	DD		DD		Yes						Yes	
LENTIBULARIACEAE	*Utricularia australis*	LC		LC								Yes	
LENTIBULARIACEAE	*Utricularia bremii*	DD		DD		Yes						Yes	
LENTIBULARIACEAE	*Utricularia gibba*	NT		NT								Yes	
LENTIBULARIACEAE	*Utricularia intermedia*	DD		DD		Yes						Yes	
LENTIBULARIACEAE	*Utricularia minor*	LC		LC								Yes	
LENTIBULARIACEAE	*Utricularia ochroleuca*	DD		DD								Yes	
LENTIBULARIACEAE	*Utricularia stygia*	DD		DD								Yes	

Family	Species	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe?	Endemic to EU 27?	Habitats Directive Annexes	Bern Convention Annexes	CITES Annexes	EU Wildlife Trade Regulation	Aquatic species?	Crop wild relative?
LENTIBULARIACEAE	*Utricularia vulgaris*	LC		LC								Yes	
ERICACEAE	*Vaccinium arctostaphylos*	DD		EN	B1ab(ii)+B2ab(ii)				I				
HYDROCHARITACEAE	*Vallisneria spiralis*	LC		LC								Yes	
SCROPHULARIACEAE	*Verbascum haussknechtii*	DD		DD					I				
SCROPHULARIACEAE	*Verbascum litigiosum*	VU	B2ab(iii)	VU	B2ab(iii)	Yes	Yes	II/IV					
SCROPHULARIACEAE	*Verbascum purpureum*	DD		DD		Yes			I				
SCROPHULARIACEAE	*Veronica anagallis-aquatica*	LC		LC								Yes	
SCROPHULARIACEAE	*Veronica anagalloides*	LC		LC								Yes	
SCROPHULARIACEAE	*Veronica beccabunga*	LC		LC								Yes	
SCROPHULARIACEAE	*Veronica catenata*	LC		LC								Yes	
SCROPHULARIACEAE	*Veronica euxina*	DD		RE		Yes			I				
SCROPHULARIACEAE	*Veronica micrantha*	VU	B2ab(ii,iii,v)	VU	B2ab(ii,iii,v)	Yes	Yes	II/IV					
SCROPHULARIACEAE	*Veronica oetaea*	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	Yes	II/IV	I				
SCROPHULARIACEAE	*Veronica repens*	LC		LC		Yes	Yes					Yes	
SCROPHULARIACEAE	*Veronica scardica*	DD		DD								Yes	
SCROPHULARIACEAE	*Veronica scutellata*	LC		LC								Yes	
SCROPHULARIACEAE	*Veronica turrilliana*	DD		EN	B2ab(ii,iv)	Yes			I				
LEGUMINOSAE	*Vicia abbreviata*	LC		LC									Yes
LEGUMINOSAE	*Vicia articulata*	LC		LC									Yes
LEGUMINOSAE	*Vicia assyriaca*	NA		NA									Yes
LEGUMINOSAE	*Vicia barbazitae*	NT		NT									Yes
LEGUMINOSAE	*Vicia bifoliolata*	CR	B1ac(iv)+2ac(iv)	CR	B1ac(iv)+2ac(iv)	Yes	Yes	II/IV	I				
LEGUMINOSAE	*Vicia bithynica*	LC		LC									Yes
LEGUMINOSAE	*Vicia capreolata*	EN	A2e;B1ab(iii)+2ab(iii)	EN	A2e;B1ab(iii)+2ab(iii)	Yes	Yes						Yes
LEGUMINOSAE	*Vicia ciliatula*	LC		NE									Yes
LEGUMINOSAE	*Vicia costae*	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	Yes						Yes
LEGUMINOSAE	*Vicia cuspidata*	LC		LC									Yes
LEGUMINOSAE	*Vicia ervilia*	LC		LC									Yes
LEGUMINOSAE	*Vicia ferreirensis*	CR	B1ab(iii)+2ab(iii);D	CR	B1ab(iii)+2ab(iii);D	Yes	Yes						Yes
LEGUMINOSAE	*Vicia grandiflora*	LC		LC									Yes
LEGUMINOSAE	*Vicia hybrida*	LC		LC									Yes
LEGUMINOSAE	*Vicia johannis*	LC		LC									Yes
LEGUMINOSAE	*Vicia lathyroides*	LC		LC									Yes
LEGUMINOSAE	*Vicia lutea*	LC		LC									Yes
LEGUMINOSAE	*Vicia melanops*	LC		LC									Yes

Family	Species	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe?	Endemic to EU 27?	Habitats Directive Annexes	Bern Convention Annexes	CITES Annexes	EU Wildlife Trade Regulation	Aquatic species?	Crop wild relative?
LEGUMINOSAE	*Vicia narbonensis*	LC		LC									Yes
LEGUMINOSAE	*Vicia oroboides*	LC		LC		Yes							Yes
LEGUMINOSAE	*Vicia pannonica*	LC		LC									Yes
LEGUMINOSAE	*Vicia sativa*	LC		LC									Yes
LEGUMINOSAE	*Vicia sepium*	LC		LC									Yes
LEGUMINOSAE	*Vicia sericocarpa*	NA		NA									Yes
ASCLEPIADACEAE	*Vincetoxicum pannonicum*	VU	D2	VU	D2	Yes	Yes	II/IV					
VIOLACEAE	*Viola athois*	VU	D2	VU	D2	Yes	Yes	IV	I				
VIOLACEAE	*Viola cryana*	EX		EX		Yes	Yes		I				
VIOLACEAE	*Viola delphinantha*	NT		NT		Yes	Yes	II/IV	I				
VIOLACEAE	*Viola hispida*	CR	B2b(iii,v)c(iv)	CR	B2b(iii,v)c(iv)	Yes	Yes	II/IV	I				
VIOLACEAE	*Viola paradoxa*	DD		DD		Yes	Yes	II/IV	I				
VIOLACEAE	*Viola rupestris* ssp. *relicta*	LC		NT		Yes		II/IV					
VITACEAE	*Vitis vinifera*	LC		LC									Yes
COMPOSITAE	*Wagenitzia lancifolia*	EN	D	EN	D	Yes	Yes	IV	I				
LEMNACEAE	*Wolffia arrhiza*	LC		LC								Yes	
BLECHNACEAE	*Woodwardia radicans*	NT		NT				II/IV	I				
ZANNICHELLIACEAE	*Zannichellia clausii*	DD		NE		Yes						Yes	
ZANNICHELLIACEAE	*Zannichellia contorta*	DD		DD								Yes	
ZANNICHELLIACEAE	*Zannichellia major*	DD		DD								Yes	
ZANNICHELLIACEAE	*Zannichellia melitensis*	LC		LC		Yes	Yes					Yes	
ZANNICHELLIACEAE	*Zannichellia obtusifolia*	NT		NT								Yes	
ZANNICHELLIACEAE	*Zannichellia palustris*	LC		LC								Yes	
ZANNICHELLIACEAE	*Zannichellia peltata*	LC		LC								Yes	
ULMACEAE	*Zelkova abelicea*	EN	D	EN	D	Yes	Yes	II/IV	I				

Appendix 3. Methodology for spatial analyses

Data were analysed using a geodesic discrete global grid system, defined on an icosahedron and projected to the sphere using the inverse Icosahedral Snyder Equal Area (ISEA) Projection (S39). This corresponds to a hexagonal grid composed of individual units (cells) that retain their shape and area (864 km^2) throughout the globe. These are more suitable for a range of ecological applications than the most commonly used rectangular grids (S40).

The range of each species was converted to the hexagonal grid for analysis purposes. Coastal cells were clipped to the coastline. Patterns of species richness (Figures 5, 14, 21) were mapped by counting the number of species in each cell (or cell section, for species with a coastal distribution). Patterns of endemic species richness were mapped by counting the number of species in each cell (or cell section for coastal species) that were flagged as being endemic to geographic Europe as defined in this project (Figures 6, 15, 22). Patterns of threatened species richness (Figures 7, 16, 23) were mapped by counting the number of threatened species (categories CR, EN, VU at the European regional level) in each cell or cell section.

Appendix 4. Example of species summary and distribution map

The species summary gives all the information collated (for each species) during this assessment, including a distribution map. You can search for and download all the summaries and distribution maps from the European Red List website and data portal available online at http://ec.europa.eu/environment/nature/conservation/species/redlist and http://www.iucnredlist.org/europe.

Saxifraga tombeanensis - Boiss. ex Engl.

PLANTAE - TRACHEOPHYTA - MAGNOLIOPSIDA - ROSALES - SAXIFRAGACEAE - Saxifraga - tombeanensis

Common Names: Sassifraga del Monte Tombea (Italian)
Synonyms: No Synonyms

Taxonomic Note:

Red List Assessment

Red List Status

EN - Endangered, B1ab(iii,iv)+2ab(iii,iv) (IUCN version 3.1)

Assessment Information

Reviewed?	Date of Evaluation:	Status:	Reasons for Rejection:	Improvements Needed:
True	2009-11-26	Passed	-	-

Assessor(s): Gentili, R., Ghidotti, B., Bertolli, A., Comini, B., Armiraglio, S. & Prosser, F.

Reviewer(s): Rossi, G. & Bilz, M.

Assessment Rationale

The extent of occurrence (EOO) and area of occupancy (AOO) are under the Endangered category thresholds of 5,000 km² and 500 km² respectively. The global population has a very small distribution range as the species grows only in a restricted region of the Alps under particular ecological conditions: carbonatic and dolomite rocky cliffs between 700 m and 2,150 m elevation.

The species was found in only two locations corresponding to the areas over and under the tree limit. We suspect a future habitat quality reduction due to a change in native species dynamics and a subsequent increasing competition of tree and shrub species. The number of subpopulations in the last 15 years has been decreasing.

Climate change expected for the alpine region may also affect the species fitness and its survival.

Distribution

Geographic Range

This plant is endemic to the Italian Alps where it can be found in Lombardia, Veneto, and Trentino Alto-Adige.

It is present in the southeastern Alps, mostly in the eastern Lombardy Pre-Alps and Raethian Alps. It can be found in the Garda Pre-Alps, particularly in the Tremalzo-Caplone-Tombea group and the Cadria-Tofino group, marginally in the Bondone-Stivo-Baldo group. Some populations are also present in the Brescia Pre-Alps (C.ma Caldoline, Sonclino) and in the Southern Rhaetian Alps (Val di Non Alps).

The extent of occurrence, measured by means of a GIS database, is 1,449 km², while the area of occupancy is 120 km².

Elevation / Depth / Depth Zones

Elevation Lower Limit (in metres above sea level): 700

Elevation Upper Limit (in metres above sea level): 2150

Biogeographic Realms

Biogeographic Realm: Palearctic

Occurrence

Countries of Occurrence

Country	Presence	Origin	Formerly Bred	Seasonality
Italy	Extant	Native	-	Resident
Italy -> Italy (mainland)	Extant	Native	-	Resident

Population

The subpopulations of *Saxifraga tombeanensis* Boiss. ex Engler are severely fragmented and the species is rare within its range. The number of subpopulations with a mutual distance of more than 500 m are less than 40. There are no quantitative data about all of the subpopulations. Some studies conducted in the Garda Pre-Alps have estimated the presence of 1,000-1,500 cushions. The estimated population size is about 5,000 mature individuals.

Habitats and Ecology

This is a chasmophytic species (cushion plant) that grows on limestone and dolomitic vertical cliffs. The cushions of this species can be found in rocky soils: rocky edges and longitudinal cracks of rocky walls. In these ecological niches *Saxifraga tombeanensis* is present along with lithophylous species, such as *Potentilla caulescens*, *Daphne petraea*, *Physoplexis comosa*, *Carex firma*, *Primula spectabilis*, and *Paederota bonarota*. Its altitudinal distribution ranges from 700 m to 2,150 m. The subpopulations growing under 1,600 m of altitude, below the present treeline, show mainly a northern exposure.

IUCN Habitats Classification Scheme

Habitat	Suitability	Major Importance?
Rocky areas (eg. inland cliffs, mountain peaks)	Suitable	Yes

Systems

System: Terrestrial

Use and Trade

General Use and Trade Information

Individuals of the species are harvested by collectors, mainly botanists for the utilization as herbarium specimen. Previous authors reported the harvesting of species individuals and seeds by gardeners for its cultivation (Webb and Gornall 1989).

Threats

This plant has a low degree of seed germination in nature and a low density of individuals within the subpopulations. Currently, a change in native species dynamics due to competitors such as *Ostrya carpinifolia*, *Pinus sylvestris*, *P. mugo* takes place in its habitat and negatively impacts the survival of this species. It is also harvested by collectors and gardeners.

Global warming is another threat to this species. The trend of global warming has regionally been measured by a strong increase of the mean annual temperature in the last 30 years, which has been recorded in the meteorological stations close to the distribution range of the species.

Conservation

Saxifraga tombeanensis is included in Appendix I of the Bern Convention and in Annex II of the Habitats Directive 43/92/CEE. The plants community where it lives is listed in Annex I of the same Directive (habitat code 8210).

The greater portion of its distribution range is included in protected areas such as the Alto Garda Bresciano Park and in several Sites of European Interest (e.g. SIC: IT2070021-Valvestino, IT2070022-Corno della Marogna, IT3120093-Crinale Pichea-Rocchetta, IT3120094-Alpe di Storo e Bondone, IT3120103-Monte Baldo di Brentonico, IT3120104-Monte Baldo – Cima Valdritta, IT3120116-Monte Malachin, IT3120127-Monti Tremalzo e Tombea, IT3210039-Monte Baldo ovest).

During a LIFE project (LIFE03NAT/IT/000147) an experimental restoration plan of the habitat of *Saxifraga tombeanensis* was carried out. The LIFE Project promoted a series of investigations to identify the main growth sites of *Saxifraga tombeanensis* with the aim to monitor their ecological characteristics and the morphological and vegetative conditions of the species.

Bibliography

Arietti, N. and Crescini, A. 1978. Gli endemismi della flora insubrica - La *Saxifraga tombeanensis* Boiss. ex Engl. Dalla scoperta alla ricostruzione dell'areale. *Natura Bresciana* 15: 15-35.

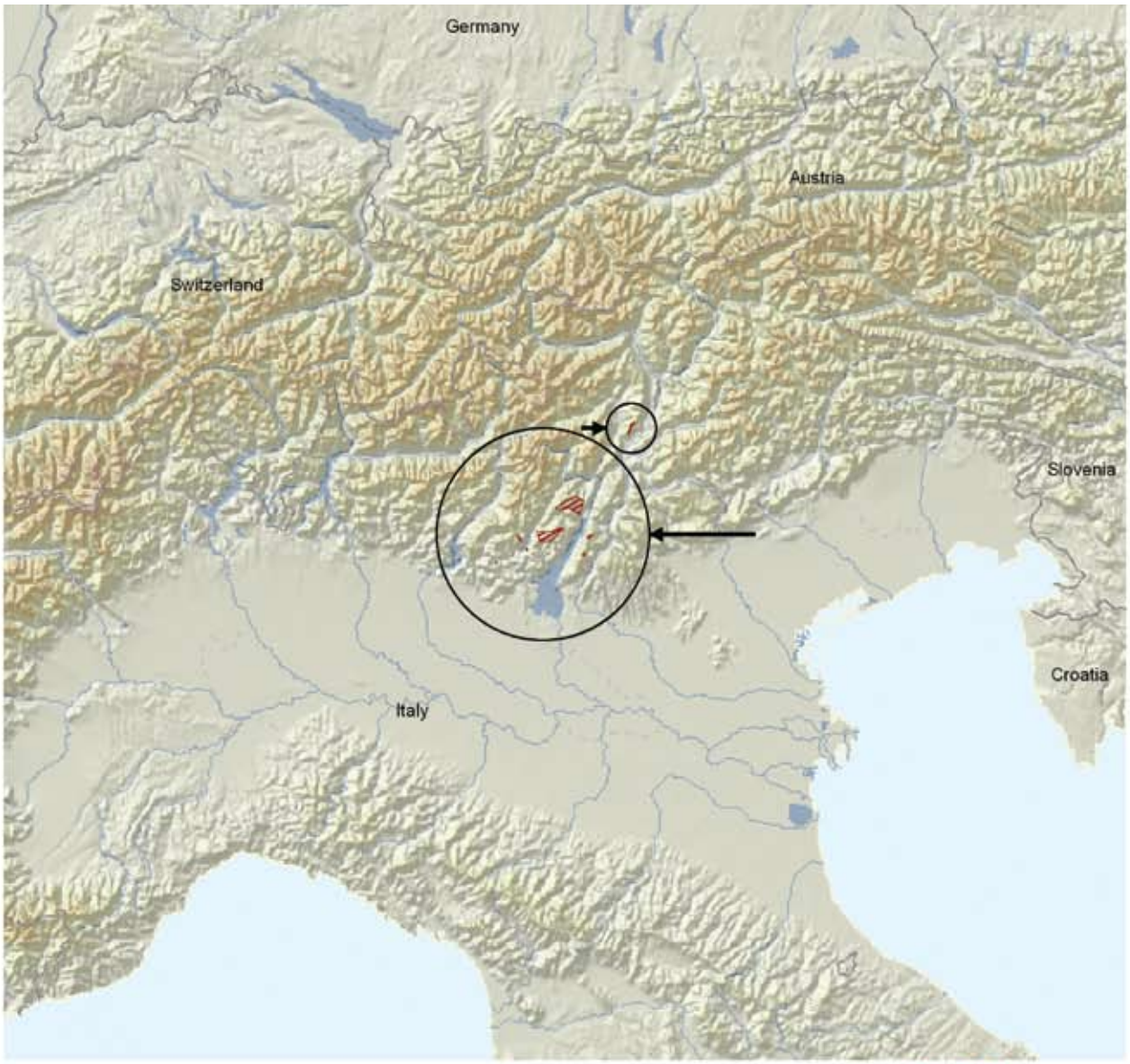
Armiraglio, S., Bertolli, A., Comini, B., Ghidotti, B., Prosser, F. and Gentili, R. 2008. *Saxifraga tombeanenis* Boiss. ex Engl. In: Flora da conservare: implementazione delle categorie e dei criteri IUCN (2001) per la redazione di nuove Liste Rosse. *Inf. Bot. It.* 40 (1 suppl.): 115-118.

IUCN. 2010. IUCN Red List of Threatened Species (ver. 2010.1). Available at: www.iucnredlist.org. (Accessed: 10 March 2010).

Prosser, F. 2000. *Lista Rossa della Flora del Trentino. Pteridofite e Fanerogame.* Museo Civico Rovereto, Edizioni Osiride.

Thuiller, W., Lavorel, S., Araújo, M.B., Sykes, M.T. and Prentice, I.C. 2005. Climate change threats to plant diversity in Europe. *PNAS* 102: 8245-8250.

Webb, D.A. and Gornall, R.J. 1989. *Saxifrages of Europe.* Cristopher Hlem, London.



Saxifraga tombeanensis

NE DD LC NT VU EN CR EW EX

azimuthal equal area central point: 0°, 0°

range type

Native (resident)

national boundaries

subnational boundaries

lakes, rivers, canals

salt pans, intermittent rivers

map created 03/03/2010

data source:
Armiraglio, S., Bertolli, A., Comini, B., Ghidotti, B., Prosser, F. & Gentili, R..

0 160

kilometer

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European Red List of Non-marine Molluscs. Annabelle Cuttelod, Eike Neubert and Mary Seddon, 2011

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This publication summarises results for a selection of Europe's native species of vascular plants. In total 1,826 vascular plant species have been assessed from the following groups: species listed on European or international policy instruments, selected priority crop wild relatives, and aquatic plant species. Of those at least 467 species are threatened with extinction. The main threats for the three groups are intensified livestock farming, recreational activities, tourism and urban development, wild plant collection, invasive alien species, natural system modifications and pollution.

The European Red List was compiled by IUCN's Global Species Programme and Regional Office for Europe and is the product of a service contract with the European Commission. It is available online at http://ec.europa.eu/environment/nature/conservation/species/redlist and http://www.iucnredlist.org/europe.

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