Natura 2000 Seminars

Alpine Region

Background Document

Wetlands - Draft 4
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NATURA 2000

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1 Introduction: the New Biogeographical Process in the Alpine Biogeographical Region

The purpose of the New Biogeographical Process is to help Member States to manage Natura 2000 as a coherent ecological network, whilst exchanging experience and best practice, addressing objectives and priorities and enhancing cooperation and synergies. The process should contribute to the achievement of Favourable Conservation Status (FCS) for those habitats and species of community interest (listed in annex one of the Habitats Directive) that have been identified as having priority within the given biogeographical region, with a special focus on the contribution of the Natura 2000 network, but without ignoring horizontal measures where necessary.

In the context of the viability of the Natura 2000 network it is important to know how to ensure that habitats also achieve a level of favourable conservation status outside Natura 2000 site boundaries, and also how to address the major threats that occur there.

The process for each biogeographical region consists of three milestone meetings:

1) Steering Committee (meetings): The Steering Committee has an essential role and each regional process starts with a meeting of the Steering Committee. It is composed of representatives of the Member States that fall in the biogeographical region and in addition the following organisations are also represented: European Commission (EC), European Environment Agency (EEA), and European Topic Centre on Biological Diversity (ETC/BD). Observers from other MS are also allowed to attend upon invitation. The Steering Committee reviews the pre-scoping document, and makes the final decision about the priority habitats and species, and the habitat groups.

2) Preparatory Workshop: The workshop is used to prepare the seminar. The workshop is a very informal working meeting that provides the basic material and preparation for the Seminar. It is informed by the Background Document but does not consider the content or technical detail of the latter; rather it provides a set of themes (crosscutting or unique to the individual habitat groups) whose elaboration in terms of solutions and actions will form the basis of the seminar document. The role of the contractor regarding the preparatory workshop is to work with the EC and to assist MS in preparation, minutes, proceedings, organising, leading discussions, and to decide with MS on themes.

3) Seminar: The Seminar is based on the Seminar Document whose content is derived from the preparatory workshop. Central to this document are a list of habitat groups related and crosscutting issues and problems whose solutions will directly contribute to achieving FCS. The seminar should draw conclusions and make recommendations regarding management and actions in relation to selected habitat types (based on the habitat specific and cross cutting issues). The seminar should result in a jointly agreed list of actions on the part of MS. As the seminar returns only once every five years, what happens in between is very important.

- Ad Hoc Expert Group Meetings can be held between the workshop and the seminar in order to address specific issues (which may be raised during the workshop or may become clear after the workshop).
- A pre-scoping document with lists of priority habitats and species is drafted by the ETC/BD. The pre-scoping document explains the selection of habitats and is posted on CIRCABC. The Contractor and partners are free to contact ETC/BD for information on the contents and composition of the pre-scoping doc.
- For each biogeographical region the pre-scoping document provides details on a selection of a manageable number of habitats and species: focusing on those habitat types where action is most needed. This first list is discussed and agreed with the Member States inside the biogeographical region during and shortly after a Steering Committee meeting.
- During any given biogeographical process, information is collected through the use of a targeted questionnaire. This is then compiled into a Background Document which informs the working groups within the preparatory workshop. The Background Document has a life beyond the seminar; it should therefore be continuously improved, modified and added to as each five-year cycle continues.
- The Seminar brings together key actors (including ministry and state institute officials, NGOs and stakeholders) from different countries for the exchange of practice and should result in the

creation of expert networks about similar habitats inside a biogeographical region. The Biogeographical Process is to be used to assess of management practices and best practices and result in the formulation of recommendations based on the process.

- Internal Communication within the process for each biogeographical region is particularly important; thus:
  - CIRCABC is currently the main internal information platform for the process: https://circabc.europa.eu;
  - In order to make the relevant documents easily accessible, special interest groups for each Biogeographical Region (BGR) are created on CIRCABC;
  - An Interest Group for the Alpine Steering Committee has already been created and is composed of representatives of the EC, the EEA, the ETC/BD and member states (MS).
  - For the moment CIRCABC is to be used to store meeting agendas, minutes, documents.

The Alpine process is led by Austria. The Steering Committee of the Alpine process is composed of representatives of the 12 Member States (AT, BG, CZ, DE, ES, FR, FI, IT, PL, SE, SI, SK) and the EEA, ETC/BD, and EC. Based on the pre-scoping document and the discussions of the Steering Committee, four focus habitat groups were selected: forests, wetlands; grasslands; freshwater. For the Alpine process, a number of species has been identified that will be covered as part of cross-cutting issues.
An internet based platform for external and internal communication is being developed as part of project. The primary target audience for the internet platform should include those people that can take action for Natura 2000 (in a first instance site managers but also policy makers, civil society, and land owners).

The drafting process of the background document

The Alpine Background Document compiles the readily available information regarding 22 selected habitat types, as selected by the MS for the Alpine Seminar Process. In its first version it contained the habitat descriptions as included in a pre-scoping document, prepared by the European Topic Centre on Biological Diversity (ETC/BD) and the EEA[1]. MS were then invited to ask their habitat experts to complete an Expert Input Form to collect additional knowledge about the different habitat types. This was integrated into the first draft and a summary of the results was provided for each habitat group. This gave rise to a second draft. MSs were then given an opportunity to correct any factual inaccuracies or clarify information that had already been submitted. A third draft was then produced to inform the workshop and provide material to be uploaded to the Communication Platform. The information that was collected in the pre-scoping document and from experts will be complemented by a selection of case studies that will illustrate specific issues. These will be highlighted in the relevant sections of the Background Document and the original Case Study Recording Forms will be uploaded to CIRCABC.

Description of the selected habitat types

This section provides overview information for each of the 22 selected priority habitat types.

The habitat types are presented in ascending order of their Natura 2000 code as introduced in Annex I of the EC Habitats Directive. The colour codes refer to the habitat groups to which they belong: freshwater (blue), grasslands (light green), wetlands (purple), forests (dark green).

CODE	HABITAT NAME
3140	Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.
3150	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation
3220	Alpine rivers and the herbaceous vegetation along their banks

[1] Available online at https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp?FormPrincipal:_idcl=FormPrincipal:_id3&FormPrincipal_SUBMIT=1&id=31d9c683-b68d-47c7-b80e-900eca33c1e0&javax.faces.ViewState=rO0ABXVyABNbTGphdmEubGFuZy5PYmplY3Q7kM5YnxBzKWwCAAB4cAAAAAN0AAEzcHQAKy9qc3AvZXh0ZW5zaW9uL3dhaS9uYXZpZ2F0aW9uL2NvbnRhaW5lci5qc3A=

CODE	HABITAT NAME
3230	Alpine rivers and their ligneous vegetation with *Myricaria germanica*
3240	Alpine rivers and their ligneous vegetation with *Salix elaeagnos*
3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco - Brometalia*) * important orchid sites
6230	Species-rich *Nardus* grasslands, on silicious substrates in mountain areas (and sub-mountain areas in Continental Europe)
6410	*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
6510	Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)
6520	Mountain hay meadows
7110	Active raised bogs
7140	Transition mires and quaking bogs
7230	Alkaline fens
91D0	Bog woodland
9130	*Asperulo-Fagetum* beech forests
9170	*Galio-Carpinetum* oak hornbeam forests
9180	*Tilio-Acerion* forests of slopes, screes and ravines
9260	*Castanea sativa* woods
9410	Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*)

Legends for the maps, figures and tables

Factual information for each habitat type is given in the form of standard tables, figures and maps presented in the pre-scoping document. Reading and interpreting the maps, figures and tables provided by the EEA / ETC/BD requires a legend for their clear understanding. The respective legends and explanations are presented here, with cross-references to the sections within each habitat type.

For each habitat type, tables represent the conservation status of species and habitats in the following manner.

code	status
FV	Favourable
U1	Unfavourable – inadequate
U2	Unfavourable – bad
XX	Unknown

Pressures/threats are driven by the habitat type and the species sharing the same pressures/threats are noted in the table as well. This means that a species may have other pressures/threats as well, which do not appear in the table. Only those pressures/threats for habitat types are taken into account when they are reported by more than 1/3 of MS where the habitat type/species is present. If a pressure/threat is reported by more than 2/3 of MS this is indicated in light blue colour. If a

pressure/threat is reported by all MS where the habitat type or species occurs, it is indicated with darker blue colour.

For each habitat type, a table presents the species that have been identified as particularly associated to the habitat type. It shows linkage at European level according to data by the ETC/BD. Where available, additional information on country level has been included.

Explanations:
HD Annex II & IV species occurring in 8-12 MS
HD Annex II & IV species occurring in 3-7 MS
BD Annex I species occurring in 8-12 MS
BD Annex I species occurring in 3-7 MS

All expert input has been collated into a series of tables for each habitat and a summary has been provided at the beginning of each section to provide a concise overview. Feedback that used the Article 17 threats/pressures codes and which linked advice between the different questions was captured first. This is reflected in the numbering of each table. So for example, threat number four will be linked to management requirement, solution and bottleneck number four in each habitat section. Please note that the numbering does not indicate the priority of specific threats and pressures. Please also note that the numbering is only sequential in the first threats and pressures table for each habitat. This is because of the need to preserve the relationships between the tables in each section and the fact that the same threat/pressure was often identified by more than one MS.

Most text, especially additional information, has been edited for grammar and simplified in some cases to convey a clearer meaning. This has been done from both an ecological and linguistic perspective. A very limited amount of elaboration has been required in some cases where input has been incomplete. This has been indicated through the use of 'review comments', as has been the case for any direct comments made by experts about the background document itself. This was done to provide an initial audit trail to help in redrafting. It is envisaged that these will not be retained in the final document once the content has been agreed by the Alpine Steering Committee. As this is a 'living document' there will be opportunities for contributors to modify their own text if the wrong meaning has been conveyed through this process.

Blue text shows general recommendations not directly linked to specific threats or pressures. Information has been aggregated if listed as separate points in the original input in order to save space. This type of input was either replicated by individual experts as a generic recommendation across more than one habitat type or was simply not linked in the individual expert input form. This is why it cannot be directly associated with particular threats or pressures and lacks specificity in some cases.

Sub-section numbering was used for recommendations that addressed a specific pressure or threat but which had sufficiently different meanings or MS specificity to remain separate. The numbering of tables, apart from the threats and pressures table, is not sequential as suggestions relating to specific threats and pressures was often lacking in the expert input form. The number of times a threat or pressure was identified or recommendation made by experts from each country is indicated so that the relative importance of different issues can be quickly evaluated by users. This information was also used to support the overall summary for each habitat group. It was necessary to make a 'value judgement' in relation to the equivalence of the input in some instances which means that this process was not entirely objective or error free which was inevitable given the nature of the input. Where the meaning was equivocal or highly specific then a precautionary approach was used and a new entry was made.

No habitat-based expert input was received from Spain or the Slovak Republic at the time this draft was completed. Blank cells indicate this fact as well as a lack of comment from individual countries in relation to specific habitats or questions. Only one country provided general comments in relation to *Castanea sativa* woodlands (9260) possibly reflecting the limited extent of N2K sites in most of the countries of the Alpine Region.

2 Wetlands

Summary

Process participation and representation

	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
Number of habitats considered	4	0	4	0	3	3	4	2	3	2	2	0
Number of participating experts	4	0	3	0	1	3	3	3	1	1	1*	0
Habitat area (1000s ha)	8.3	0.6	2.1	2.5	77.4	15	8.1	3.3	10	123	3.2	2.3
Habitats considered	all	n/a	all	n/a	7140 7230 91D0	7110 7140 7230	all	7230 91D0	7110 7140 7230	7140 7230	7140 7230	n/a
* indicates a single submission from BCE												

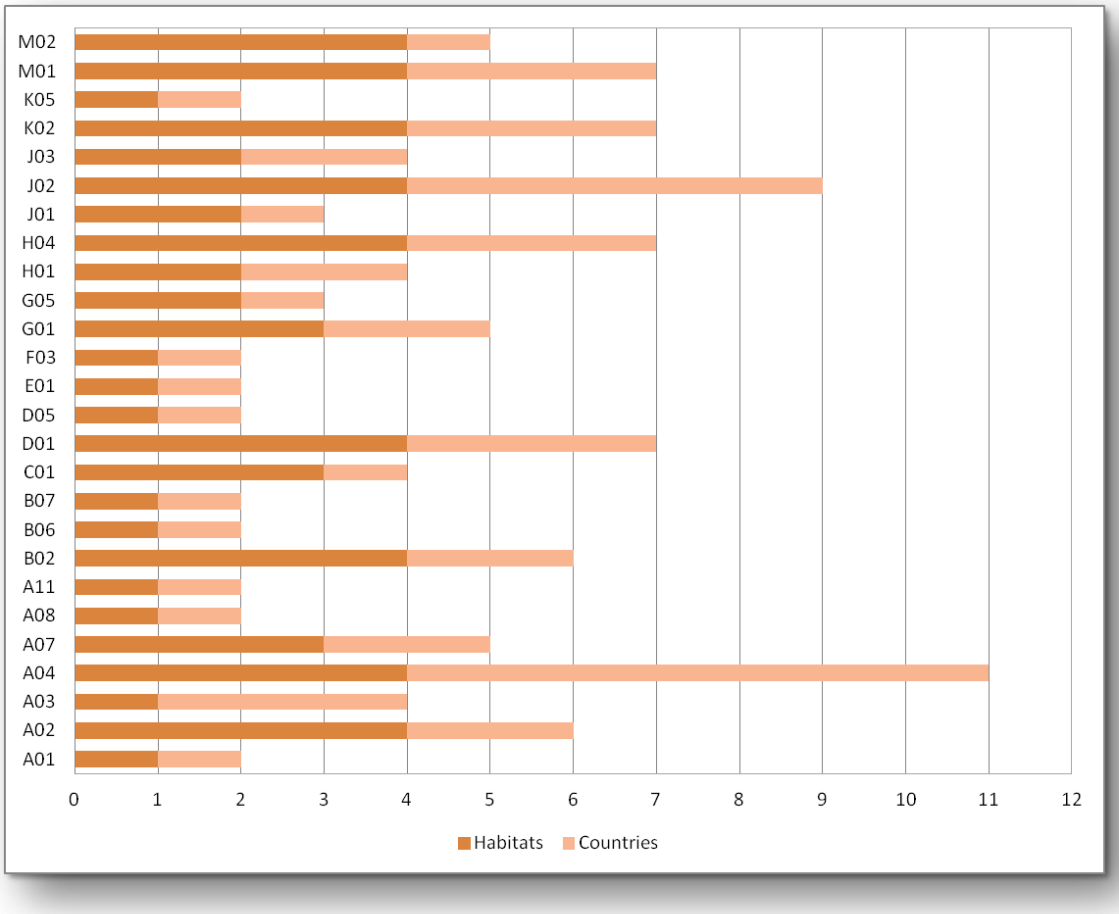
The following figures summarise the input that was provided by the country experts for the wetland habitat group that consisted of: active raised bogs (7110); transition mires and quaking bogs (7140); alkaline fens (7230); and bog woodland (91D0).

A detailed record of the submissions can be found in the following sections that show the number of experts and countries that made specific recommendations, in relation to particular threats and pressures, or more general recommendations that were either related to individual habitats or the overall habitat grouping. This section is designed to provide a rapid overview of the collated information but the figures need be interpreted with some caution because of the nature of the underlying data. This is because a number of experts applied the same comments to all the habitats which means that the number of habitats shown in the following figures may be indicating this fact in some instances rather than showing a genuinely emergent issue. The number of countries shown should also be carefully interpreted as it is directly related to the number of experts who participated in the process.

As the preceding table shows, participation was highly variable between countries. This means that an issue that is apparently only present in one country could actually be more widespread. Some experts also submitted the same input for more than one country which had the same effect as submissions that were made for multiple habitats, although this only occurred in a couple of instances.

Overall, these issues only relate to less than 25% of submissions which should still enable a valid interpretation of the stronger patterns where an issue is associated with the majority of habitats and countries (experts). These could potentially indicate areas that need to be developed further in the workshop and provide the basis for some concrete collaborative actions across the alpine biogeographical region.

Threats and pressures identified by country experts



Cultivation (**A01**); Modification of cultivation practices (**A02**); Mowing / cutting of grassland (**A03**) Grazing (**A04**); Biocides, hormones & chemicals (**A07**); Fertilisation (**A08**); Agriculture activities not referred to above (**A11**); Forest or plantation management & use (**B02**); Grazing in forests/woodland (**B06**); Forestry activities not referred to above (**B07**); Mining & quarrying (**C01**); Roads, paths and railroad (**D01**); Improved access to site (**D05**); Urbanised areas, human habitation (**E01**); Hunting & collection of wild animals (**F03**); Outdoor sports & leisure activities (**G01**); Other human intrusions & disturbances (**G05**); Pollution to surface waters (**H01**); Air pollution, air-borne pollutants (**H04**); Fire & fire suppression (**J01**); Human induced changes in hydraulic conditions (**J02**); Other ecosystem modifications (**J03**); Biocenotic evolution, succession (**K02**); Reduced fecundity/genetic depression (**K05**); Changes in abiotic conditions (**M01**); Changes in biotic conditions (**M02**).

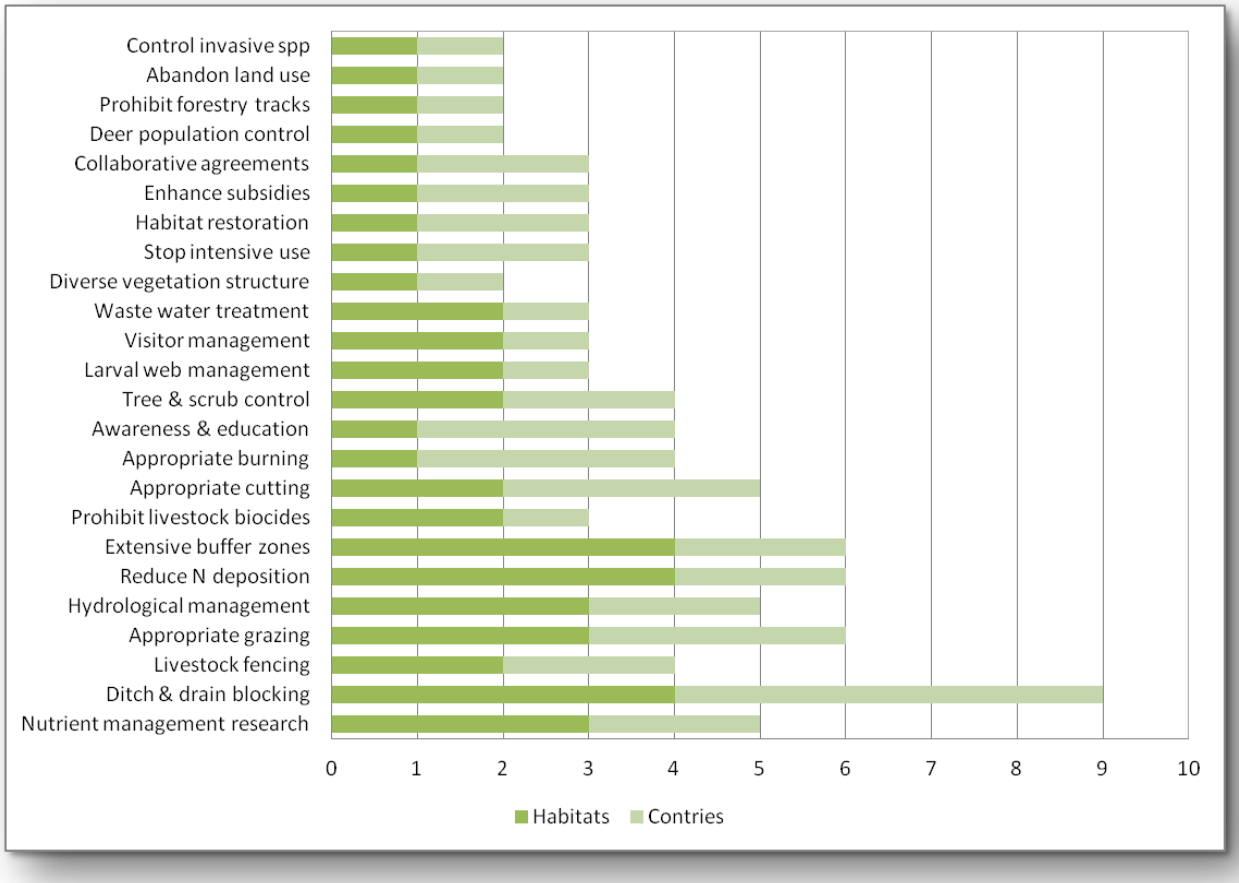
Grazing was the most frequently identified and widespread pressure for this habitat grouping. Whilst high grazing intensity was an issue across all habitats, abandonment of pastoral systems, lack of mowing and extensive (non intensive) cattle grazing was also identified as an issue for all habitats apart from bog woodland. This mixed and somewhat contradictory picture was often present in the same countries, most notably Germany and Austria. Abandonment appeared to be particularly widespread for alkaline fens where management has become uneconomic.

The cessation of traditional management practices, such as reed-cutting and the production of bog hay, has had a significant impact on the sustainability of managing this habitat. It was noted that without subsidies abandonment would become more widespread, particularly in Austria. This issue reflects wider changes to farm infrastructure and demographics in alpine areas that has led to a loss of labour, machinery and suitable livestock.

Anthropogenic changes to hydrology was the next most widely identified pressure. This was related to drainage and unsustainable water abstraction from both groundwater and surface water sources. Hydroelectric schemes were identified as a significant issue in both Austria and Italy. The need for

more sustainable tourist development was also highlighted in Germany where groundwater abstraction for public water supply is an issue, particularly during drought periods. Whilst drainage was a historical issue in some countries, e.g. France, it was clear that was still ongoing in others, e.g. Austria.

Management requirements identified by country experts



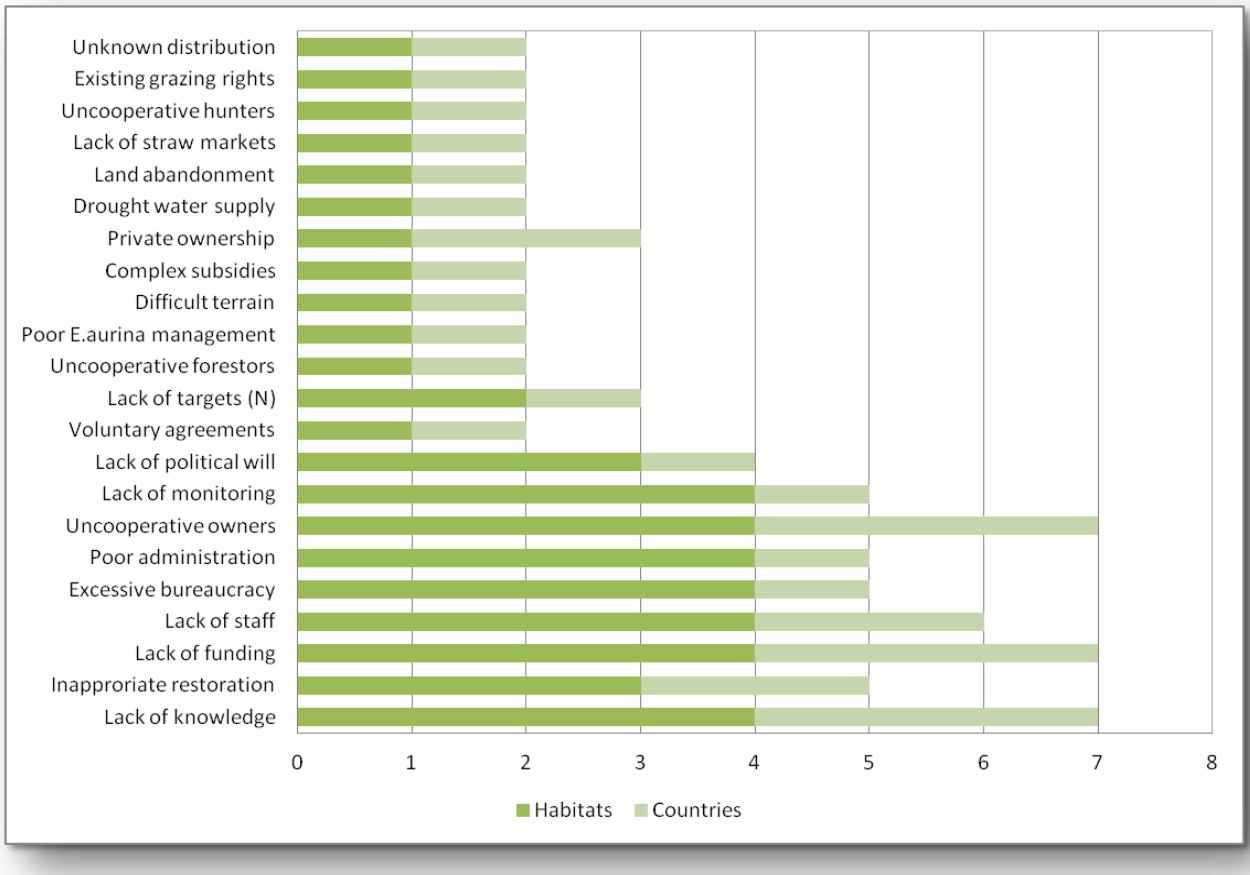
Hydrological restoration or 'rewetting' was the most widely recommended management action required to address hydrological change, although it was stressed that this should be done in a stepwise fashion to avoid negative impacts on butterfly populations and the wider biodiversity that is found on sites.

Unsurprisingly the most widespread recommendation in relation to grazing pressure was the adoption of appropriate grazing practices. This not only included recommendations to reduce stocking rates and stop the agricultural use of some habitats, e.g. active raised bog, but also the re-introduction of stock, mowing or burning where abandonment had occurred.

A number of related management practices were suggested that included livestock fencing and the introduction of extensified buffer zones around N2K sites to stop trespass grazing and reduce diffuse nutrient inputs from adjacent land. This last recommendation was most closely associated with Germany and Austria.

The need to maintain a suitable habitat structure for marsh fritillary (*E. aurinia*) in managed wetlands was also stressed. It was noted that the timing of management activities can have a significant impact on larval webs and that suitable grazing regimes need to be developed on sites that support this species.

Barriers and bottlenecks identified by country experts



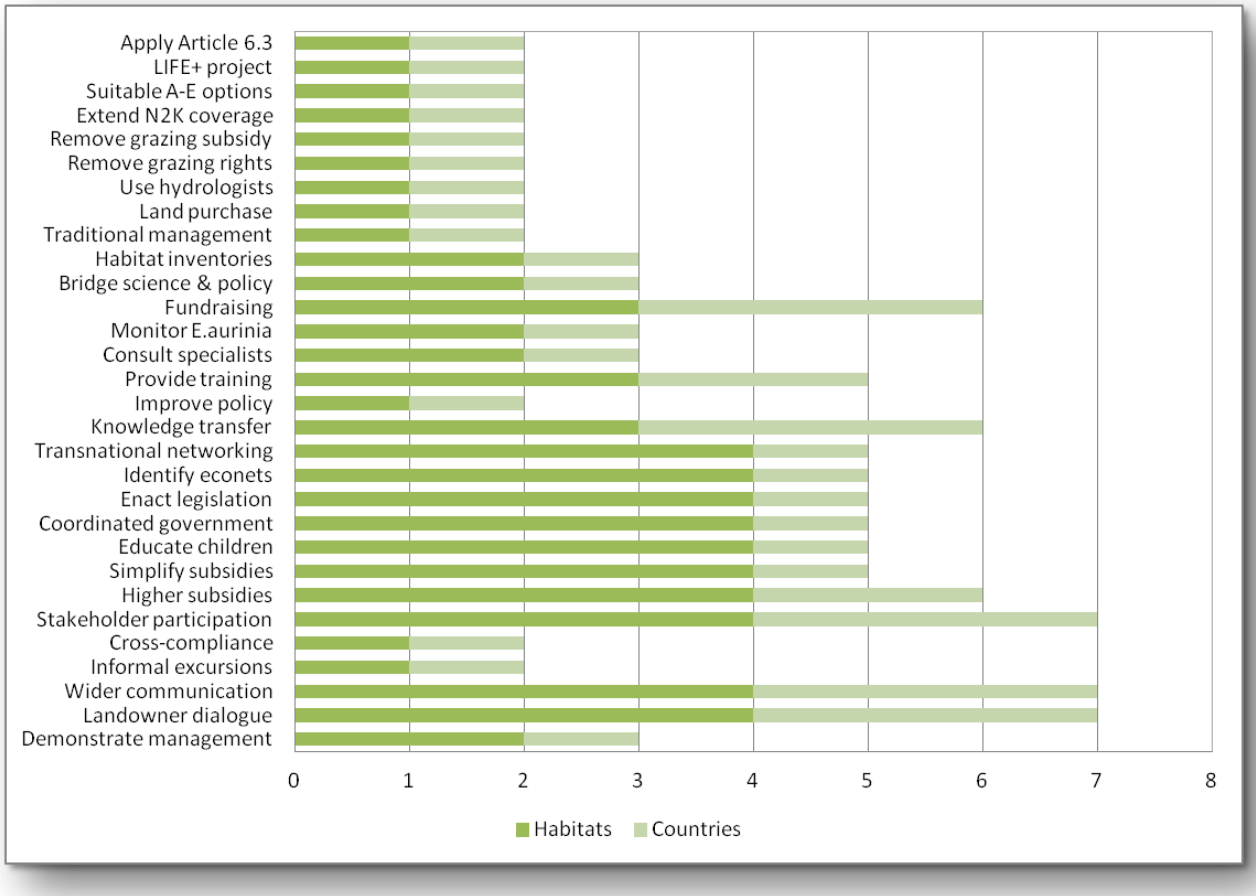
The three most widespread barriers were uncooperative land owners, a lack of funding and a lack of knowledge.

A lack of subsidy to reduce grazing pressure was identified in Austria although since 2005 all farmers receiving direct payments should be subject to compulsory cross-compliance measures. However, the main issue that was noted in relation to a lack of funding was the level of subsidy. As subsidies often fail to meet the full economic costs of managing specific habitats there is little financial incentive to encourage uptake as management activities represent a net expense to any business. The voluntary nature of agreements was also seen as an issue in France. More widely, an absence of adequate funding for habitat restoration was seen as an important issue.

Not much detail was provided in relation to uncooperative land owners. In the absence of compulsory management orders or formal notice and consent procedures for specified management practices, countering deliberate neglect or inappropriate land management practices is difficult. In UK such mechanism exists derived from national legislation. According to one contributor this is a very difficult issue. On one side are the landowners, but also the lack of political will and the limited financial resources prevent an adequate management and development program. Also different sciences of course have different goals (ornithology, entomology, botany…). Dialogue hardly exists so there is no unified approach. As previously mentioned, environmental cross-compliance can be useful under these circumstances but can clearly only be used when a management agreement is in place and there are sufficient staff resources to undertake the necessary enforcement action.

The lack of knowledge was principally associated with the management of hydrology, nutrients and species. A lack of monitoring of marsh fritillary (*E. aurinia*) was also associated with this barrier in Austria.

Solutions identified by country experts



Despite the fact that insufficient subsidies were identified as a barrier, increasing subsidies was not the most widespread solution. Across all habitats, the influencing of attitudes through awareness-raising, better communication and active dialogue with landowners was seen as important by the greatest number of experts with knowledge transfer also being important in three out of four habitats.

A lack of recognised value associated with these habitats was noted amongst both land owners and the wider community which led one country, Italy, to suggest the education of children as an early solution. In Germany the implementation of projects to demonstrate best-practice on State owned land as well as informal excursions was suggested as a potential solution.

The knowledge transfer that was stressed appeared to be related to gaining a better understanding of current thinking on habitat-specific ecosystem function and the requirements of key species. This was not only related to experiences in individual countries but also to transnational networking that could potentially be supported by study tours on specific issues. A specific need to bridge the gaps between science, policy and practice was noted in relation to the management of marsh fritillary (*E. aurinia*) in Austria.

Although stakeholder participation could be related to land owner dialogue and the drafting of mutually acceptable land management agreements, it was mainly associated with bringing different organisations and sectors together to develop more effective solutions. This also included the involvement of a wider community of experts to ensure that more informed management could take place. The Allgäuer Moorallianz (bog-alliance of the Allgäu region) and BayernNetzNatur project appeared to provide the most relevant case studies for this habitat grouping in terms of demonstrating best practice.

A number of species, listed in the following table, that require special management consideration were identified by experts for this habitat grouping. Although a significant proportion of these are butterflies, owing to the active participation of BCE in this process, the list also includes higher and lower plants, a reptile and a dragonfly. In spite of the high representation of butterflies in this list, some additional species were included in the main text of this document by BCE. Although some have been subsequently added, a number of species associated with the Romanian Carpathians remain in the main text. The specific habitats with which these species were associated has also been shown.

Species requiring special management measures

	7110	7140	7230	91D0
Azure hawker (*Aeshna caerula*)	X	X	X	
Common viper (*Vepera berus*)	X	x	X	
Marsh fritillary (*Euphydryas aurinia*)		X	X	
Violet copper (*Lycaene helle*)		X	X	
Slender green feather-moss (*Drepanocladus vernicosus*)		X		
Boreal bog sedge (*Carex paupercula*)		X		
Bog fritillary (*Proclossiana eunomia*)			X	
False ringlet (*Coenonympha oedippus*)			X	
Large heath (*Coenonympha tullia*)			X	
Alcon blue (*Phengaris alcon*)			X	
Dryad (*Minois dryas*)			X	
Tufted skipper (*Charcharodes flocciferus*)			X	
Fen orchid (*Liparis loeselii*)			X	
Moorland clouded yellow (*Colias palaeno*)	X	X		
Cranberry fritillary (*Boloria aquilonaris*)	X	X		
Cranberry blue (*Plebejus optilete*)	X	X		X

Relevant LIFE projects

LIFE09 NAT/SI/000374 (2011-2015) Conservation and management of freshwater wetlands in Slovenia (Nika Debeljak Šabec)

LIFE08 NAT/S/000268 (2010-2015) Life to ad(d)mire - Restoring drained and overgrowing wetlands in Sweden (Lisa Tenning)

LIFE07 NAT/D/000233 (2009-2014) ReHa Federseemoor - Restoration of habitats in the Federsee bog (ReHa Federseemoor) in Germany (Stefan Schwab)

LIFE03 NAT/S/000070 (2003-2008) Härjedalen - Natural pastures and hay meadows in Jämtland/Härjedalen in Sweden (Emma Bergman)

Best practice

Allgäuer Moorallianz (Ulrich Weiland); BayernNetzNatur (PAN); DSS WAMOS (Jutta Zeitz); IPBES; and the Ecological Continuum Initiative.

Toolkits

InVEST; MIMES; Wildlife Habitat Benefits Estimation Toolkit; ARIES and OE.

2.1 7110 - Active raised bogs

Habitats Manual 2007 Extract

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

In order to support the conservation of this ecosystem over its geographic range and its genetic diversity, marginal areas of lower quality as a result of damage or degradation which abut active raised bogs may need to be included, protected and, where practicable, regenerated. There are very few intact or near-intact raised bogs in Europe, except in Finland and Sweden where active raised bogs are the predominant mire complex type in hemi-boreal and southern boreal regions.

Eurola, S., Hicks, S. & Kaakinen, E. (1984) *Key to Finnish Mire Types*. **Moore, J.J. (1968).** A classification of the bogs and wet heaths of northern Europe (Oxycocco-Sphagnetea Br.-Bl. et Tx.1943). In: *Pflanzensoziologische Systematik. Bericht über das internationale Symposium in Stolzenau/Weser 1964 der Internationale Vereinigung für Vegetationskunde* (R.Tuxen, Ed.). Junk, Den Haag. 306 - 320. **Nature Conservation Council (1989)** *Guidelines for the selection of biological SSSI's*. Nature Conservation Council , Peterborough. **Oswald, H. (1923)** Die Vegetation des Hochmoores Komosse. *Sv. Växtsociol. Sällsk. Handl.* 1:1-436. **Schouten, M.C.G. (1984)** *Some aspects of the ecogeographical gradient in Irish ombrotrophic bogs.* Peat Congress, Dublin. 1: 414 - 432. **Tuxen, R., Miyawaki, A. & Fujiwara, K. (1972)** Eine erweiterte Gliederung der Oxycocco-Sphagnetea. In: *Grundfragen und Methoden in der Pflanzensoziologie*. (R.Tuxen, Ed.).
Junk, Den Haag. 500 - 520.

Raised bogs are formed by bog mosses (*Sphagnum* species) and are dependent on rainfall for their nutrients. They often form a dome with an internal water table higher than the surrounding water table. The habitat is widely distributed across northern Europe, particularly in the Atlantic, Boreal and Continental regions. Active raised bogs are those which are peat forming, disturbed bogs which are no longer active are the non-priority habitat type '7120 Degraded raised bogs capable of natural regeneration'.

Assessed as 'unfavourable -bad' in the Alpine, Atlantic, Continental, Macaronesian and Mediterranean regions. Within these regions only Germany and Italy (both for the Alpine region) have reported this habitat as 'favourable' although Spain reported Alpine, Atlantic and Mediterranean regions as 'unknown'. The United Kingdom (Atlantic) reports the habitat as 'improving' while Sweden (Continental') notes 'deteriorating. 'Unfavourable-inadequate' for the Boreal and Pannonic regions with Estonia noting that the conservation status is deteriorating.

Conservation status (CS) assessed at the Alpine region and MS level

N2K code	Habitat name		AT	DE	ES	FR	IT	PL	RO	SI	SK	REGION
7110	Active raised bogs	range	U1	FV	XX	U1	FV	FV		FV	FV	U1
		area	U2	FV	XX	U2	FV	U1		FV	U1	U2

		structure	U1	XX[2]	XX	U2	XX	U1		U1	FV	U2
		future	U1	FV	XX	U2	FV	U1		FV	U1	U2
		overall	U2	FV	XX	U2	FV	U1		U1	U1	U2

A variety of threats and pressures have been reported but many countries mention drainage, peat extraction and pollution/eutrophication. Better information required, particularly from Spain (Summary sheet of the online report on Article 17 of the Habitats Directive).

In many bogs and mires Butterfly Conservation Europe observe an increased growth of trees producing unsuitable habitat conditions for characteristic butterflies, which might be stimulated by the accumulated nutrient input from the air over many years. Even bogs with largely undisturbed hydrology are affected. Changes in *Sphagnum* species composition (with different ecology: no peat production) might play an important role (ongoing research project of ANL). Classification to 91D0 should be carefully checked; it might reflect recent growth of trees on formerly open bogs.

During restoration of bogs and mires 2 main problems for biodiversity arise:

1. Still suitable habitats for typical and endangered butterfly species (e.g. *Colias palaeno*) may only be found in parts where peat was extracted, they are thus on a lower level and may get flooded during restoration so that important species may get lost. On a long term, new habitats may develop after restoration, but if species are already lost they cannot re-colonize the site.

2. More or less dry bogs mires and fens form secondary habitats of species of dry habitats. During restoration they are not considered adequately.

On mountain pastures susceptible wet areas (especially if small) are included in grazed areas and may suffer from too heavy grazing (higher grazing pressure, animals much heavier than formerly). Such habitats should be fenced off. In the Italian Alps and probably all over the Alps negative effects of overgrazing may affect for example habitats of *Colias palaeno* and *Plebejus optilete*.

Colias palaeno lost in recent years about 50% of its localities in southern Bavaria (continental and alpine region) higher altitudes are less affected. It might be an early warning species for above described general changes. Similar declines in lower altitudes are described from other regions.
Further butterfly species that have to be considered are e.g. *Boloria aquilonaris, Plebejus optilete*.

Reported pressures and their importance to associated species

Pressure description (2nd level)	Active raised bogs
General Forestry management	x
Peat extraction	x
Outdoor sports and leisure activities	x
Pollution	x
Trampling, overuse	x
Modification of hydrographic functioning	x
Biocenotic evolution	x

Reported threats and their importance to associated species

Threats description (2nd level)	Active raised bogs
Outdoor sports and leisure activities	x
Pollution	x
Trampling, overuse	x
Modification of hydrographic functioning	x
Biocenotic evolution	x

Threats and Pressures Identified by Country Experts

[2] According to the current Art. 17 report assessment: FV (Rehklau)

		LIFE	AT	DE	ES	FI	FR	IT	PL	RO	SI	SK
1)	Groundwater abstractions for agriculture (J02)			1								
2)	Groundwater abstractions for public water supply (J02.07.02)			1								
3)	Decline or extinction of species (M02.03)			1								
4)	Human induced changes in hydraulic conditions (J02.05)	✓	2	2								
5)	Non intensive cattle grazing (A04.02.01)			1								
6)	Hand cutting of peat (C01.03.01)[3]			1								
7)	Biocenotic evolution, succession (K02)						1					
8)	Pollution to surface waters (H01)						1	1				
9)	Landfill, land reclamation and drying out, general (J02.01)							1				
10)	Intensive grazing (A04.01)		2	1			1	1				
11)	Large scale water deviation (J02.03.01)		1									
12)	Nitrogen input (H04.02)		2	1								
13)	Forest replanting (B02.01)		1									
14)	Agricultural intensification (A02.01)		1									
15)	Species composition change (succession) (K02.01)		1									
16)	Droughts and less precipitations (M01.02)		1									
17)	Roads, paths and railroad (D01)		1	1								
18)	Changes in abiotic conditions (M01)							1				
19)	Outdoor sports and leisure activities, recreational activities (G01)							1				
20)	Surface water abstractions by hydro-energy (J02.06.06)							1				
21)	Fire and fire suppression (J01)							1				
22)	Use of biocides, hormones and chemicals (A07)							1				
23)	Mechanical removal of peat (SE) (C01.03.02)[3]	✓										
24)	Trampling, overuse etc. (SI) (G05.01)	✓										

Habitat Impacts: In **Germany** groundwater abstraction and drainage leads to a less specific, dryer vegetation (e.g. with predomination of heather (*Calluna vulgaris*)). Moreover, the growth of scrub and trees also increases. In recent years, there has been an extreme decline of the moorland clouded yellow (*Colias palaeno*), which is dependent on bog bilberry (*Vaccinium uliginosum*). It is remarkable, that only populations restricted to habitats in higher elevations (approximately higher than 700 – 800 m above sea level) have been stable till now. Bearing this in mind it is very likely, that this trend is caused by climate change (**Kraus**). Changes in hydraulic conditions cause biodiversity loss and the release of greenhouse gases (**Krettinger**). The bogs (7110 & 7140) in the higher reaches (1,000-1,800 m above sea-level) are often used for cattle-pasturing which causes localised poaching of the ground which results in habitat destruction. A lot of raised bogs that were situated in the valleys and lower reaches were used for the hand cutting of peat and drainage-ditches were excavated in order to dry out the peat. Although the hand cutting of peat is no longer practiced, the drainage-ditches are still working and continue to affect site condition (**Riegel**). In **France** drainage and forest planting are not real threats anymore because they occurred in the past. Nevertheless, they are likely to be responsible for most the historical destruction of this habitat. However K02 and H01 are still active threats. The first one is endogenous and has a very long time-span. The second one is exogenous and may have short term effects for example when forest is cut around a bog (nutrient supply) or when a wetlands are surrounded by fertilised crop fields (nutrient supply) (**Mikolajczak**). It should be considered whether grazing is ecologically appropriate in this habitat and based on a precise assessment (e.g. grazing load, period, sections to be grazed, veterinary treatments etc.). All the suggested management measures can be integrated into AEM, grazing contracts between municipalities and livestock breeders and in support of mountain farming (**FNE**). In **Austria** the drawdown of water level affects the habitats in many ways. In the case of the active raised bogs mineralization occurs and colonization by trees, leading to a shift in the species composition of the moss layer. This is characterized by the increase of forest species, which have less capacity for peat accumulation. This trend is further reinforced by excess nitrogen-input. In the fens and transitional bogs there is also a strong mineralization process, which leads with the widespread eutrophication and a radical change in the structure and the species composition (through acidification). In bog woodlands the pressure from forestry is also very high (**Schröck**). In **Italy** butterflies are under

[3] Difference of opinion between experts from Germany whether or not this as a threat in Germany.

pressure from overgrazing. Indeed, trampling by cattle could strongly alter the hydrology of these habitats and destroy the vegetation, including the higher plants (e.g. *Vaccinium uliginosum*) on which butterfly species, such as *Colias palaeno* and *Plebejus optilete*, are dependent. Overgrazing, in montane humic areas could cause an increase in eutrophication, which will alter vegetation composition leading to an increase in nitrophilous species (e.g. *Rumex spp*., *Urtica spp*. etc.) and a simplification of vegetation communities. Such altered vegetation composition could strongly impact butterfly communities, reducing the availability of different types of larval host plants and nectar sources. Moreover, excessive overgrazing can also cause the complete disappearance of vegetation in localised areas (e.g. through dung and excessive trampling) with even greater negative consequences. It is likely that an increase in temperature, through the increase of herbaceous vegetation coverage and a reduction of bare ground could negatively impact both the distribution of some plant species used as larval host plant by some alpine butterfly and alter the necessary micro-habitat for the development of some butterfly species (e.g. *Colias phicomone and Hippocrepis comosa, Euphydyas aurinia glaciegenita* and *Gentiana kochiana*). Furthermore, an early vegetation onset during spring could negatively affect larval development of heliophilous spring developing butterflies even in the Alpine region, as recently observed in some lowland areas of Europe (DeVries and van Swaay, 2006). Moreover, in a recent study in the SW Italian Alps (Bonelli et al., 2011b), we observed that during the last 30 years, community composition significantly changed, probably due to the combined effect of global warming and land use changes. Recreational pressures are mainly concentrated in the Apennine region. If not properly controlled, touristic pressure can alter this habitat in a way similar to overgrazing (i.e. excessive trampling). Indeed, recreation activities are usually localized in very small areas and along selected pathways which increases the severity of impact. High levels of recreational pressure could also increase the impact of collectors who are more difficult to control through local rangers in such areas. This can lead to potentially strong impacts on small localized populations of some species, *e.g. Erebia*. In the Alps there are lots of structures to produce energy that use water. Especially in the alpine and sub alpine belt, the amount of water used for this purpose is huge. The water is reintroduced in the river some kilometres further downhill. So the alpine and subalpine wet areas are most affected by this threat. One of the most impacted species in this context could be *Parnassius phoebus*. Fires are a pressure typical of the Mediterranean part of Italy. The alpine region is only marginally affected overall but we have to remember that this can be a localised problem as is the case for Pollino Mountain in the Apennines which suffers strongly from uncontrolled fires (**Bonelli & Cerrato**).

Management Requirements Identified by Country Experts

		LIFE	AT	DE	ES	FI	FR	IT	PL	RO	SI	SK
2)	Research to understand bog development, and if recent declines of *C. palaeno* are caused by nutrient deposition from the air proves to be true, develop and apply methods to decrease influence of nutrients and change *Sphagnum* composition.		1	1								
4)	Rewetting through careful restoration, e.g. ditch blocking (that avoids impacts on butterfly populations that may be present - BCE AT). In difficult cases, where impacts are probable, a stepwise increase in water level is recommended with adequate groundwater monitoring.	✓	1	1								
10.1)	Fencing		2	1								
10.2)	**a)** Apply evidence-based approaches; **b)** Guided herding, based on local action plans for pastoralism; **c)** Reduce animal load by reducing herd size or grazing duration; **d)** Apply grazing in areas with fixed fencing; **e)** Adapt land use of parcels on basis of actual threats or based on presence of species; **f)** keep non-intervention zones (30% annually); **g)** Put sensitive grazing areas under permanent or temporary protection; and **h)** Assist the herder's work.						1					
11)	Careful restoration of the water balance.		1									
12)	Reduction of atmospheric nitrogen deposition.		1									
13)	Promoting a locally appropriate tree species composition.		1									
14)	Significant extensification of agricultural activities in the immediate vicinity.		1									

22)	Prohibit veterinary treatments on livestock that are most hazardous to this habitat and associated species (e.g. avermectins?).						1					
	Let natural processes work without constraint (e.g. drainage or nutrient enrichment).						1					
	A correct conservation policy should begin by stopping urbanization and intensive agriculture and revitalising traditional agro-pastoral activities.							1				
	Removal of trees and scrub from drained areas.	✓										

Current Management Practices Identified by Country Experts

		AT	DE	ES	FI	FR	IT	PL	RO	SI	SK
9)	Raised bogs are generally subjected to protection measures which do not allow any kind of utilization.						1				
10)	Occasional purchase of bogs.	1									
11)	Scattered bog restoration programs.	1									
15)	Management (mowing and grazing) to protect against succession.	1									
19)	Some projects (mainly LIFE projects), the humic areas have been closed to directly avoid the '*trampling effect*' of tourists.						1				
	Most measures are financially supported by Bavarian government and EU (special subsidies to land owners/farmers).		1								
	Farming management contract (MAEt).					1					
Additional Information: In **Italy**, with rare exceptions (that generally pertain to landscape protection areas), peatland habitats are situated inside of Natura 2000 sites or protected biotopes which both ensure protection. The management plans, especially in nature parks, promote the conservation management of resources (**Lasen**).											

Barriers and Bottlenecks Identified by Country Experts

		LIFE	AT	DE	ES	FI	FR	IT	PL	RO	SI	SK
2)	Lack of knowledge of recent research.		1	1								
4)	**a)** Habitat rewetting does not take biodiversity into account at a detailed enough level; and **b)** A lack of funding for restoration projects.		1	1								
6)	Preservation of 'cultural' peat mining, even in World Heritage Sites.	✓										
10.1)	Uncooperative farmers and a lack of subsidy to reduce grazing pressure.		1									
10.2)	The need for the conservation management of bogs is commonly not believed or understood.		1	1								
	The obstacles that do not permit the necessary management measures of peatland habitats are: **a)** Limited financial resources compared with the requirements; **b)** Difficult relationships with other administrations dealing with land management; **c)** Insufficient human resources to carry out the necessary supervision of land management and of specific projects; **d)** Excessive bureaucracy: European and national standards are even more onerous than the obligations imposed on private citizens by the Autonomous Province itself. Consequently, a long time is needed for the approval of environmental plans; **e)** Difficult relationships with owners: it's always difficult to explain that to preserve naturalistic values (species and habitats) some restriction is necessary, unless you are able to be more convincing in terms of cost-effectiveness.							1				

	Significant amounts of time and money required to restore this habitat.	✓										
Additional Information: In **Austria** the landowners may still maintain existing drainage ditches and keep them clear. The transition from the mires to the adjacent agricultural land is often very abrupt which causes strong eutrophication from agricultural run-off. In addition, the data on the individual mire types is often poor because of a lack of standardised recording. Interpretation is difficult as a result. There is an urgent need to revise the Austrian data for individual habitat types and species. The structure and functionality of peatlands are strongly influenced by bryophytes. For this reason, further research and management programs must involve this group of organisms (**Schröck**).												

Potential Solutions Identified by Country Experts

		LIFE	AT	DE	ES	FI	FR	IT	PL	RO	SI	SK
3)	Solutions only can be reached step-by-step by focussing on the following activities: **a)** Good examples on public ground - some of the bogs and fens is in the ownership of the Free State of Bavaria, managed by the state forest company. On these sites exemplary measures can be realized and shown as "good practice" in order to convince land owners and politicians that the measures are necessary and make good sense; **b)** Cooperation with land owners through a continuous dialogue - you can raise awareness of the demands of the nature conservation features and with suitable funding, adapt land use and realize measures such as habitat regeneration; **c)** Public relations and communication - by information and excursions you can gain support and influence political decision-makers; and **d)** Initiate projects and acquire funds for project-management and measures - the possibilities of realizing projects can be enlarged by separate projects, e.g. the "Allgäuer Moorallianz" (bog-alliance of the Allgäu region).			1								
10.1)	Show and discuss the problem with owners (farmers) and provide subsidy to reduce grazing pressure.		1									
10.2)	Ensure good group cooperation between DOCOB (action plans) and relevant stakeholders to secure a management contract that meets the long-term grazing requirements of this habitat.						1					
23)	Restrict peat mining to existing sites, i.e. no further expansion.	✓										
24)	Visitor Management (SI & DE) including: **a)** infra-red sensors to monitor visitor number; **b)** artificial paths/duckboard to keep visitors away from sensitive areas; **c)** restrict access periods; and **d)** work with guides and resort owners to ensure sustainable use.	✓										
	Better financial support for specific management measures combined with less complicated conditions (less bureaucracy) under which the farmers/land owners get this money.			1								
	The main solution for peatlands is to improve instruction through a constant ecological education starting from compulsory schooling. In order to obtain the same result for adults, it is necessary to engage with the different production sectors that includes: **a)** Better coordination between the different sectors of provincial administration dealing with land management; **b)** Enactment of legislation favouring a more naturalistic management by discouraging intensive agricultural practices (such as those related to							1				

	manure and slurry disposal); **c)** Improve the state of knowledge in various sectors by identifying high nature value areas (HNV) which should be connected by an ecological network in order to avoid the fragmentation of habitats and to promote the restoration of areas where the ecological network has already been compromised; and **d)** Allocate more effort in scientific and applied research in order to obtain appropriate and applicable management protocols.											
	a) Close dialogue with the landowners and intensive education of the general public; and **b)** Networking and lively exchange across national borders.		1									
	Better understanding of recent advances in bog ecology and new management techniques etc. and better funding.		1	1								
	Education for sure will be useful as well as help in increasing the knowledge about the huge alpine biodiversity and how to save it.							1				

Species Management Requirements Identified by Country Experts

	AT	DE	ES	FI	FR	IT	PL	RO	SI	SK
Azure hawker (*Aeshna caerula*) is a typical dragonfly of mires in higher reaches needs to have mire-pools and water bodies fenced off from pasture. Common viper (*Vipera berus*) is at risk when regenerating bogs. In lower reaches one should pay attention to wintering grounds as the filling of ditches and re-wetting in winter can drown this species (**Riegel**).		1								
The current laws in force at a provincial level do not include specific measures to conserve individual species. There are habitat protection measures within the management plans of natural parks and protected biotopes, as well as provincial laws of general landscape protection, which avoid some of the negative effects. To reverse species population declines and provide measures suitable to promote the recovery of a single species (or rare habitat) it is necessary to first invest in better knowledge. It should also be considered that if there are rules that provide for effective protection of habitats, the benefits will extend to species as well (**Lasen**).						1				
Keep nutrients (dung) away from oligotrophic species and keep cattle away from headwaters (**Gepp**).	1									

References Identified by Country Experts

Bayerisches Landesamt für Umwelt (commissioner): Ökologische Gutachten/Hubert Anwander (2007) Kartierung von Moorfaltern im Alpenvorland unter besonderer Berücksichtigung des Hochmoorgelblings (not published)

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Case Studies Identified by Country Experts

	AT	DE	ES	FI	FR	IT	PL	RO	SI	SK
Allgäuer Moorallianz http://www.moorallianz.de /24.0.html		✓								

Other Information

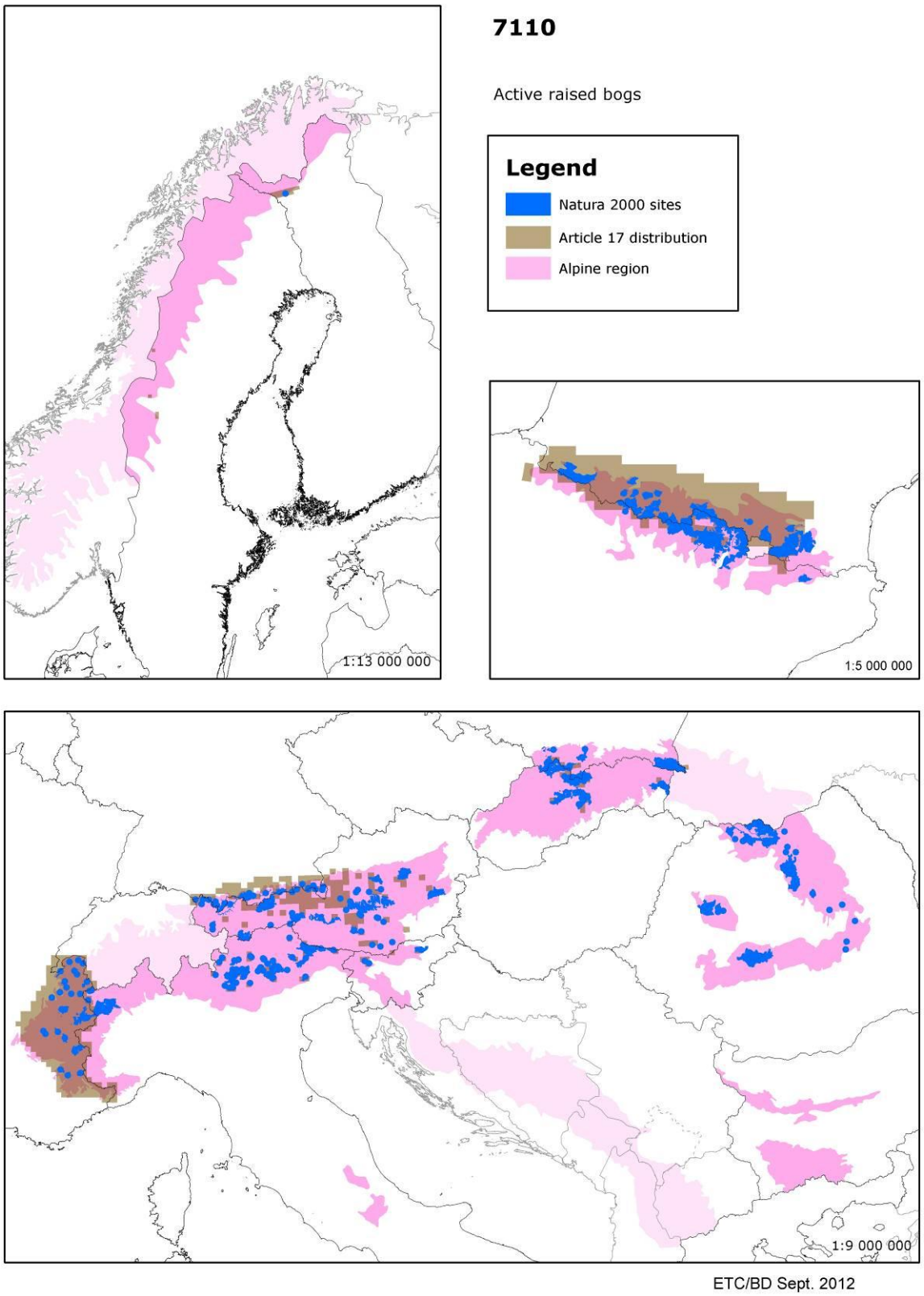
According to the ETC/BD calculations 76-100% of the area of this habitat type are within SCIs. This means that Natura 2000 network provides an important framework for the management of this habitat type.

Number of SCIs and habitat area (ha) within SCIs per Member State in the Alpine biogeographical region

	AT	DE	ES	FI	FR	IT	PL	RO	SI	SK
Number of sites	34	15	7	1	53	48	7	22	3	12
Habitat area (ha)	2351	421	407	0	3928	435	468	5037	315	78

The figures include all SCIs where the habitat type is mentioned including sites coded as D. Data source ETC/BD.

Map of Active raised bog



2.2 7140 - Transition mires and quaking bogs

Habitats Manual 2007 Extract

Peat-forming communities developed at the surface of oligotrophic to mesotrophic waters, with characteristics intermediate between soligenous and ombrogenous types. They present a large and diverse range of plant communities. In large peaty systems, the most prominent communities are swaying swards, floating carpets or quaking mires formed by medium-sized or small sedges, associated with sphagnum or brown mosses. They are generally accompanied by aquatic and amphibious communities. In the Boreal region this habitat type includes minerotrophic fens that are not part of a larger mire complex, open swamps and small fens in the transition zone between water (lakes, ponds) and mineral soil. These mires and bogs belong to the *Scheuchzerietalia palustris* order (oligotrophic floating carpets among others) and to the *Caricetalia fuscae* order (quaking communities). Oligotrophic water-land interfaces with *Carex rostrata* are included. The Habitats Manual lists the following Annex II/IV plant: *Liparis loeselii*.

Du Rietz, G. E. (1949) Huvudenheter och huvudgränser i svensk myrvegetation. *Sven. Bot. Tidskr*. 43:274-309.

Peat forming plant communities with a wide range of variation depending on local conditions and often associated with aquatic, open water habitats. Widely distributed across the European Union although more local to the south, the distribution in Spain is much greater than shown on the map.

Assessed as 'unfavourable-bad' in the Alpine, Atlantic, Continental, Mediterranean and Pannonian regions with no parameters assessed as 'favourable'. Several countries assessed the Alpine region as 'favourable' and the regional assessment is largely a result of the French report and it is possible that the French proportion of this habitat has been overestimated. Elsewhere the habitat has been assessed as 'favourable for Italy (Continental) and Czech Republic (Pannonic). Assessed as 'unfavourable-inadequate' in the Boreal and Macaronesian regions. In the Boreal region 'range' is the parameter considered 'favourable' although the habitat was assessed as 'favourable' in Latvia.

Conservation status (CS) assessed at the Alpine region and MS level

N2K code	Habitat name		AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK	REGION
7140	Transition mires and quaking bogs	range	XX		FV	XX	FV	U1	FV	FV		FV	FV	U1	U1
		area	U2		FV	XX	FV	U2	FV	U1		FV	FV	U1	U2
		structure	XX		XX[4]	XX	FV	U2	FV	U1		FV	FV	U1	U2
		future	U2		FV	XX	FV	U2	FV	U1		FV	FV	U1	U2
		overall	U2		FV	XX	FV	U2	FV	U1		FV	FV	U1	U2

A variety of threats and pressures have been reported but many countries mention changes to the water regime, peat extraction and pollution/eutrophication. Better information required, especially from Spain (Summary sheet of the online report on Article 17 of the Habitats Directive).

In many bogs and mires Butterfly Conservation Europe observe an increased growth of trees producing unsuitable habitat conditions for characteristic butterflies, which might be stimulated by the accumulated nutrient input from the air over many years. Even bogs with largely undisturbed hydrology are affected. Changes in *Sphagnum* species composition (with different ecology: no peat production) might play an important role (ongoing research project of ANL). Classification to 91D0 should be carefully checked; it might reflect recent growth of trees on formerly open bogs.

During restoration of bogs and mires 2 main problems for biodiversity arise:

1. Still suitable habitats for typical and endangered species (e.g. butterfly *Colias palaeno*) may only be found in parts where peat was extracted, they are thus on a lower level and may get flooded during restoration so that important species may get lost. On a long term, new

[4] According to the current Art. 17 report assessment: FV (Rehklau)

habitats may develop after restoration, but if species are already lost they cannot re-colonize the site.

2. More or less dry bogs mires and fens form secondary habitats of species of dry habitats. During restoration they are not considered adequately.

On mountain pastures susceptible wet areas (especially if small) are included in grazed areas and may suffer from too heavy grazing (higher grazing pressure, animals much heavier than formerly). Such habitats should be fenced off. In the Italian Alps and probably all over the Alps negative effects of overgrazing may affect for example habitats of *Colias palaeno* and *Plebejus optilete*.

Colias palaeno lost in recent years about 50% of its localities in southern Bavaria (continental and alpine region) higher altitudes are less affected. It might be an early warning species for above described general changes. Similar declines in lower altitudes are described from other regions.
Further butterfly species that have to be considered are e.g. *Boloria aquilonaris, Plebejus optilete*.

Species associated with this habitat and their CS at the Alpine region and MS level

N2K code	Species name	Group		AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK	REGION
1393	*Drepano-cladus vernicosus*	Non-vascular plants	range	U2		U1	XX	XX	FV	U1	FV		FV	FV	XX	XX
			population	U2		U1	XX	XX	U2	U1	U1		FV	XX	XX	XX
			habitat	U1		U1	XX	XX	U2	XX	U1		FV	U1	XX	XX
			future	U2		U1	XX	XX	U2	U1	U1		FV	U1	XX	XX
			overall	U2		U1 [5]	XX	XX	U2	U1	U1		FV	U1	XX	XX
1060	*Lycaena dispar*	Inverts	range	FV					FV	U1	FV			FV	FV	FV
			population	FV					XX	U1	XX			U1	FV	U1
			habitat	FV					FV	U1	FV			U1	FV	FV
			future	FV					FV	U1	FV			U1	FV	FV
			overall	FV					FV	U1	FV			U1	FV	U1
1389	*Meesia longiseta*	Non-vascular plants	range								FV		FV			FV
			population								XX		FV			FV
			habitat								XX		FV			FV
			future								XX		FV			FV
			overall								XX		FV			FV
1900	*Spiranthes aestivalis*	Vascular plants	range	FV		FV	XX		U2	FV				U1		U1
			population	U1		U1	XX		U2	FV				U1		U1
			habitat	XX		XX	XX		U2	XX				U2		XX
			future	U1		FV	XX		U2	FV				U1		U1
			overall	U1		U1 [5]	XX		U2	FV				U2		U1

Reported pressures on habitat and their importance to associated species

Pressure description (2nd level)	Transition mires and quaking bogs	*Lycaena dispar*	*Meesia longiseta*	*Drepanocladus vernicosus*	*Spiranthes aestivalis*
Grazing	x				
Modification of hydrographic functioning	x	x			
Biocenotic evolution	x				

Reported threats to habitat and their importance to associated species

Threats description (2nd level)	Transition mires and	*Lycaena dispar*	*Meesia longiseta*	*Drepanocladus vernicosus*[6]	*Spiranthes aestivalis*

[5] According to the current Art. 17 report all assessments for this species are: FV (Rehklau)
[6] Drainage & succesion are also pressures for this species in Austria (Schröck)

	quaking bogs				
Grazing	x				
Pollution	x				
Modification of hydrographic functioning	x	x			
Biocenotic evolution	x		x	x	x

Threats and Pressures Identified by Country Experts

		LIFE	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
1)	Species composition change (succession) (K02.01)		1					2						
2)	Intensive grazing (A04.01)		3		1			2	2					
3)	Human induced changes in hydraulic conditions (J02)	✓	1		2									
4)	Groundwater abstractions for agriculture (J02.07.01)				1									
5)	Groundwater abstractions for public water supply (J02.07.02)				1									
6)	Decline or extinction of species (M02.03)				1									
7)	Non intensive cattle grazing (A04.02.01)				1									
8)	Hand cutting of peat (C01.03.01)[3]				1									
9)	Nitrogen input (H04.02)		2		1							1		
10)	Sylviculture, forestry (B)	✓										1		
11)	Pollution to surface waters (H01)							1						
12)	Landfill, land reclamation and drying out, general (J02.01)								1					
13)	Diffuse pollution to surface waters due to agricultural and forestry activities (H01.05)	✓							1					
14)	Water abstractions from groundwater (J02.07) - species		1											
15)	Forest replanting (B02.01)		2											
16)	Abandonment of pastoral systems, lack of grazing (A04.03) - species	✓	1		1									
17)	Trampling, overuse (G05.01) - species		1											
18)	Large scale water deviation (J02.03.01)		1											
19)	Agricultural intensification (A02.01)		1											
20)	Droughts and less precipitations (M01.02)		1											
21)	Roads, paths and railroad (D01)		1		1									
22)	Changes in abiotic conditions (M01)	✓			1				1					
23)	Outdoor sports and leisure activities, recreational activities (G01)				1				1					
24)	Surface water abstractions by hydro-energy (J02.06.06)								1					
25)	Fire and fire suppression (J01)								1					
26)	Intensive cattle grazing (A04.01.01)				1								1	
27)	Fertilisation (A08) - species												1	
28)	Use of biocides, hormones and chemicals (A07)							1						

Habitat Impacts: In **France** many areas of this habitat are at risk from natural succession. This leads to the domination of one or two species, thus depleting plant diversity. The main issue with intensive grazing comes from the excess of nitrogen accumulating in soil and water (**Dentant**). Drainage and forest planting are not real threats anymore because they occurred in the past. Nevertheless, they are likely to be responsible for most the historical destruction of this habitat. However K02 and H01 are still active threats. The first one is endogenous and has a very long time-span. The second one is exogenous and may have short term effects for example when forest is cut around a bog (nutrient supply) or when a wetlands are surrounded by fertilised crop fields (nutrient supply) (**Mikolajczak**). It should be considered whether grazing is ecologically appropriate in this habitat and based on a precise assessment (e.g. grazing load, period, sections to be grazed, veterinary treatments etc.). All the suggested management measures can be integrated into AEM,

grazing contracts between municipalities and livestock breeders and in support of mountain farming (**FNE**). In **Germany** groundwater abstraction and drainage leads to a less specific, dryer vegetation (e.g. with predomination of heather (*Calluna vulgaris*)). Moreover, the growth of scrubs and trees also increases. In recent years, there has been an extreme decline of the moorland clouded yellow (*Colias palaeno*), which is dependent on bog bilberry (*Vaccinium uliginosum*). It is remarkable, that only populations restricted to habitats in higher elevations (approximately higher than 700 – 800 m above sea level) have been stable till now. Bearing this in mind it is very likely, that this trend is caused by climate change (**Kraus**). Changes in hydraulic conditions cause biodiversity loss and the release of greenhouse gases (**Krettinger**). The bogs (7110 & 7140) in the higher reaches (1,000-1,800 m above sea-level) are often used for cattle-pasturing which causes localised poaching of the ground which results in habitat destruction. A lot of raised bogs that were situated in the valleys and lower reaches were used for the hand cutting of peat and drainage-ditches were excavated in order to dry out the peat. Although the hand cutting of peat is no longer practiced, the drainage-ditches are still working and continue to affect site condition (**Riegel**). The fens within the affected site are very small and numerous. Changes in agricultural systems e.g. less people to manage alpine pastures, has led to a loss of suitable livestock. This either causes more intensive use or abandonment of these habitat patches. Human disturbance, particularly in the alpine areas which are not (yet) connected to public infrastructure, has led to the eutrophication and trampling of this habitat (especially on lake fronts) through high or growing recreational usage. Changes in the seasonal distribution of precipitation and temperature will lead to changes in the water balance. This will lead to ecosystem changes on the one hand but also new demands on the water supply in remote alpine regions for both agriculture (e.g. humans and cattle) and tourism (e.g. mountain huts). Some small fens are therefore used or planned to be used to meet the anticipated requirements (**Künzl**). In **Sweden** this habitat in the alpine region is most adversely affected by diffuse pressures, e.g. atmospheric deposition, or factors that influence the hydrology, such as climate change. Deposition of N increases the eutrophication which leads to alteration of species composition and an increased production of N-limited species. Forestry has more local impacts depending on the particular forestry activity but may change the hydrology of the habitat and vehicles may also destroy habitat by forming small ditches (rutting?). Altered hydrology will influence the depth of the water table and may induce drier conditions that promote the growth of trees, shrubs and tall grass; this will diminish the open area of the habitat (**von Wachenfeldt**). In **Austria** there has been a loss of suitable habitat for the marsh fritillary (*Euphydryas aurinia*) due to an increase in nutrient levels caused by a lack of mowing in springtime; a lack of burning or light grazing with very young cattle; and a lack of scrub and tree removal. An increase in intensive high nutrient farming in surrounding areas and leaving cut material on the site after mowing has led to significant nutrient enrichment and successional change. Trampling by nature tourists and scientists is an issue during summer months. Some rare, isolated patches are visited by big groups every year consisting of politicians, schools etc. Botanists also visit areas several times each year to undertake research without knowing they could damage larval webs (**Koschuh**). The draw-down of water level affects the habitats in many ways. In the case of the active raised bogs mineralization occurs and colonization by trees, leading to a shift in the species composition of the moss layer. This is characterized by the increase of forest species, which have less capacity for peat accumulation. This trend is further reinforced by excess nitrogen-input (**Schröck**). In **Finland** most mire habitats are in established wilderness or protected areas, where forestry (including drainage related to forestry measures) is not allowed and construction is restricted. Partly due to this, the conservation status of all these mire habitats is favourable and there are no significant threats and pressures threatening the viability of these habitat types in Alpine region of Finland. A marginal threat/pressure in some instances comes from intensive grazing by semi-domesticated reindeer. Fens are important summer rangelands for reindeer. Grazing can influence structure and species composition of understory vegetation in mire habitats and it can prevent the growth of birch seedlings in bog woodlands. However, the influence of grazing is not only negative. On the other hand, grazing prevents open mire habitats from overgrowing with shrubs and trees (**Pääkkö**). In **Italy** butterflies are under pressure from overgrazing. Indeed, trampling by cattle could strongly alter the hydrology of these habitats and destroy the vegetation, including the higher plants (e.g. *Vaccinium uliginosum*) on which butterfly species, such as *Colias palaeno* and *Plebejus optilete*, are dependent. Overgrazing, in montane humic areas could cause an increase in eutrophication, which will alter vegetation composition leading to an increase in nitrophilous species (e.g. *Rumex spp*., *Urtica spp*. etc.) and a simplification of vegetation communities. Such altered vegetation composition could strongly impact butterfly communities, reducing the availability of different types of larval host plants and nectar sources. Moreover, excessive overgrazing can also cause the complete disappearance of vegetation in localised areas (e.g. through dung and excessive trampling) with even greater negative consequences. It is likely that an increase in temperature, through the increase of herbaceous vegetation coverage and a reduction of bare ground could negatively impact both the distribution of some plant species used as larval host plant by some alpine

butterfly and alter the necessary micro-habitat for the development of some butterfly species (e.g. *Colias phicomone and Hippocrepis comosa, Euphydyas aurinia glaciegenita* and *Gentiana kochiana*). Furthermore, an early vegetation onset during spring could negatively affect larval development of heliophilous spring developing butterflies even in the Alpine region, as recently observed in some lowland areas of Europe (deVries and van Swaay, 2006). Moreover, in a recent study in the SW Italian Alps (Bonelli et al., 2011b), we observed that during the last 30 years, community composition significantly changed, probably due to the combined effect of global warming and land use changes. Recreational pressures are mainly concentrated in the Apennine region. If not properly controlled, touristic pressure can alter this habitat in way similar to overgrazing (i.e. excessive trampling). Indeed, recreation activities are usually localized in very small areas and along selected pathways which increases the severity of impact. High levels of recreational pressure could also increase the impact of collectors who are more difficult to control through local rangers in such areas. This can lead to potentially strong impacts on small localized populations of some species, e.g. *Erebia*. In the Alps there are lots of structures to produce energy that use water. Especially in the alpine and sub alpine belt, the amount of water used for this purpose is huge. The water is reintroduced in the river some kilometres further downhill. So the alpine and subalpine wet areas are most affected by this threat. One of the most impacted species in this context could be *Parnassius phoebus*. Fires are a pressure typical of the Mediterranean part of Italy. The alpine region is only marginally affected overall but we have to remember that this can be a localised problem as is the case for Pollino Mountain in the Apennines which suffers strongly from uncontrolled fires (**Bonelli**). In **Slovenia** the pressures on butterflies in this habitat arise from intensive grazing and fertilization on adjoining land. This can lead to changes in vegetation structure; species composition; and microclimatic through eutrophication. The main impacts on butterflies are the loss of food-plants (larval and adult stages), decreasing species diversity and a loss of genetic diversity. This habitat type is primarily associated with all oligotrophic water-land interfaces with *Carex rostrata, C. vesicaria*) (**Čelik**). The **LIFE** Project identified the main threats associated with this habitat as follows: changes to hydrology (SE); abandonment, incl. loss of horse grazing (SI); climate change (SE & DE), incl. salix development; expansion of forestry activity in the alpine region leading to a resistance to protect mires, promotion of forests and the cutting cutting of roads for logging access (SE); and pollution from cattle manure (DE).

Management Requirements Identified by Country Experts

		LIFE	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
2.1)	Find solutions in grazing management to create more areas with lower nutrient levels (e.g. burning, cutting, light cattle grazing by with one year old cattle, fencing, improved subsidies etc.) and awareness-raising.	✓	2		2			1						
2.2)	**a)** Apply evidence-based approaches; **b)** Guided herding, based on local action plans for pastoralism; **c)** Reduce animal load by reducing herd size or grazing duration; **d)** Apply grazing in areas with fixed fencing; **e)** Adapt land use of parcels on basis of actual threats or based on presence of species; **f)** Keep non-intervention zones (30% annually); **g)** Put sensitive grazing areas under permanent or temporary protection; and **h)** Assist the herder's work.							1						
3)	Rewetting through careful restoration (that avoids impacts on butterfly populations that may be present - BCE). In difficult cases (where impacts are probable) a stepwise increase in water level is recommended.		1		1									
5)	This habitat should be managed to leave the mire open, with tree canopy cover below 30%. This includes cutting of trees and also the clearance of small shrubs. In addition, the hydrology should either remain intact or be restored. Hydrological restoration by raising the water table can be done once through											1		

	the filling old ditches. More successful if used in combination with (repeated) clearance of high vegetation (trees etc.).													
9.1)	Reduction of atmospheric nitrogen deposition		1											
9.2)	Research to understand bog development, and if recent declines of *C. palaeno* are caused by nutrient deposition from the air proves to be true, develop and apply methods to decrease influence of nutrients and change *Sphagnum* composition.		1		1									
14)	Maintain groundwater-level.		1											
15)	Promoting a locally appropriate tree species composition.		2											
16)	More diverse management practice that has regard for the larval-webs of *E. aurinia.*		1											
17)	Develop new patches and create more buffer-zones.	✓	1											
18)	Careful restoration of the water balance.		2											
19)	Significant extensification of agricultural activities in the immediate vicinity.		1											
22)	**a)** Observation of changes caused through climate changes; **b)** development of scenarios on future availability of water; **c)** communication with land users; and **d)** development of alternative concepts (including new technical concepts) for supply of water.				1									
23)	Development and implementation of concepts for visitor guidance and wastewater disposal in remote alpine areas.				1									
26)	Light grazing or mowing of adjoining grasslands.												1	
28)	Prohibit veterinary treatments on livestock that are most hazardous to this habitat and associated species (e.g. avermectins?).							1						
	A few subtypes need occasional mowing.				1									
	Let natural processes work without constraint (e.g. drainage or nutrient enrichment).							1						
	Maintain a dynamic patchy mosaic of vegetation for species such as *E. aurinia.*		1											
	A correct conservation policy should begin by stopping urbanization and intensive agriculture and revitalising traditional agro-pastoral activities.								1					
Additional Information: In **Austria** the protection of *E. aurinia* can only be guaranteed in protected areas only by specialist monitoring carried out by individuals who have good experience of mapping larval-webs (**Koschuh**). In **Germany** in-depth inventories for small habitat patches and better monitoring of development impacts on their conservation status is needed (**Künzl**).														

Current Management Practices Identified by Country Experts

		AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
1)	Management (mowing and grazing) to protect against succession	1					1						
2)	Grazing contracts can be signed with sheep farmers to avoid this habitat and its margins						1						
3)	Solutions only can be reached step-by-step by focussing on the following activities: **a)** Good examples on public ground - some of the bogs and fens is in the ownership of the Free State of Bavaria, managed by the state forest company. On these sites exemplary measures can be realized and shown as "good practice" in order to convince land owners and politicians that the measures are necessary and make good sense; **b)** Cooperation with land owners through a continuous dialogue - you can raise awareness of the demands of the nature			1									

	conservation features and with suitable funding, adapt land use and realize measures such as habitat regeneration; **c)** Public relations and communication - by information and excursions you can gain support and influence political decision-makers; and **d)** Initiate projects and acquire funds for project-management and measures - the possibilities of realizing projects can be enlarged by separate projects, e.g. the "Allgäuer Moorallianz" (bog-alliance of the Allgäu region).												
5)	Information is provided by the National Board of Forestry about how to consideration sensitive ecosystems in forestry schemes.										1		
18)	Scattered bog restoration programs.	1											
22)	Concepts for supply of water have been worked out but not yet exhaustively and implementation is still missing.			1									
23)	In some projects (mainly LIFE projects) the humic areas have been closed to directly avoid the '*trampling effect*' of tourists.							1					
	Most measures are financially supported by Bavarian government and EU (special subsidies to land owners/farmers).			1									
	Farming management contract (MAEt).						1						
Additional Information: In **Italy**, with rare exceptions (that generally pertain to landscape protection areas), peatland habitats are situated inside of Natura 2000 sites or protected biotopes which both ensure protection. The management plans, especially in nature parks, promote the conservation management of resources (**Lasen**).													

Barriers and Bottlenecks Identified by Country Experts

		LIFE	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
2.1)	Contracts are voluntary so not all sheep farmers will enter into agreement.							1						
2.2)	The need for the conservation management of bogs is commonly not believed.		1		1									
2.3)	Uncooperative graziers (SI)	✓												
3)	**a)** Habitat rewetting does not take biodiversity into account at a detailed enough level; and **b)** A lack of funding for restoration projects.		1		1									
4)	Lack of national/international targets for reducing atmospheric nitrogen pollution.											1		
5)	Forestry sector generally fails to consider this habitat and reduce its negative impacts.											1		
9)	Lack of knowledge of recent research.		1		1									
	The obstacles that do not permit the necessary management measures of peatland habitats are: **a)** Limited financial resources compared with the requirements; **b)** Difficult relationships with other administrations dealing with land management; **c)** Insufficient human resources to carry out the necessary supervision of land management and of specific projects; **d)** Excessive bureaucracy: European and national standards are even more onerous than the obligations imposed on private citizens by the Autonomous Province itself. Consequently, a long time is needed for the approval of environmental plans; **e)** Difficult relationships with owners: it's always difficult to explain that to preserve naturalistic values (species and habitats) some restriction is necessary, unless you are able to								1					

	be more convincing in terms of cost-effectiveness.													
	The following prevents the effective management of *E. aurinia* in this habitat: **a)** Ignorance concerning the complex habitat requirements of this species; **b)** Creation of management plans without sufficient data and ignoring input from experienced specialists; **c)** Insufficient management; **d)** Lack of monitoring by experienced specialists (E. aurinia); **e)** Lack of practice in the implementation of long-term management programs; **f)** Insufficient experience in management due by lack of management trials and follow-up monitoring; **g)** Gaps in scientific knowledge; **h)** Missing standards for site evaluation and documentation, For example: What is intensive grazing? What is 'big stock'? No idea for bigger solutions exists; **i)** Reservations about several management solution-options; and **j)** Lack of money.		1											
	Climate change is a long-term threat to most of the Alpine habitat types. It may compromise the results of most measures taken to manage the habitat types						1						1	
	Butterflies: **a)** Insufficient funds are made available through agri-environment schemes (within National Rural Development Programme) which are not financially attractive; **b)** Lack of knowledge about species ecology and ecosystem functioning which means that suitable conservation management is not proposed in such cases; **c)** Policy frameworks/inappropriate policy in relation to: (i) lack of skills and knowledge in policy because of poor communication with scientists and experts. This also results in inappropriate AEMs (within National Rural Development Programme); (ii) very weak inspection/control over the performance of prescribed management; and (iii) sometimes any policy measures are adopted even though the policy was associated with inappropriate management actions observed in the field.												1	
	Lack of necessary resources (financial and personnel) for site management.				1									

Additional Information: In **Austria** long-term management programs for the management of *E. aurinia* are necessarily very complex. That's the reason why this issue cannot be handled through normal habitat management. Every trial to complicate it, will lead after few years to uniform scales. But a whole management cycle needs at least three to five years and maybe even ten to complete. These programs are difficult to follow and difficult to control. As a result the necessary management activities are not done and a uniform landscape, lacking vegetation structure and patchy mosaics is created. Large gains for this species are missed by ignoring the most important details (**Koschuh**). The landowners may still maintain existing drainage ditches and keep them clear. The transition from the mires to the adjacent agricultural land is often very abrupt which causes strong eutrophication from agricultural run-off. In addition, the data on the individual mire types is often poor because of a lack of standardised recording. Interpretation is difficult as a result. There is an urgent need to revise the Austrian data for individual habitat types and species. The structure and functionality of peatlands are strongly influenced by bryophytes. For this reason, further research and management programs must involve this group of organisms (**Schröck**).

Potential Solutions Identified by Country Experts

		LIFE	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
1)	Communication and partnership between institutions to promote respect of wetlands.							1						
2.1)	Communication and partnership between institutions							1						

	to promote respect of wetlands.												
2.2)	Ensure good group cooperation between DOCOB (action plans) and relevant stakeholders to secure a management contract that meets the long-term grazing requirements of this habitat.						1						
4)	Better policy-making & awareness-raising.										1		
5)	Better education, training & influencing of policies.										1		
22)	Stronger connection with climate change research topics and questions concerning the implementation of Natura 2000 network.				1								
	Better financial support for specific management measures combined with less complicated conditions (less bureaucracy) under which the farmers/land owners get this money.				1								
	The main solution for peatlands is to improve instruction through a constant ecological education starting from compulsory schooling. In order to obtain the same result for adults, it is necessary to engage with the different production sectors that includes: **a)** Better coordination between the different sectors of provincial administration dealing with land management; **b)** Enactment of legislation favouring a more naturalistic management by discouraging intensive agricultural practices (such as those related to manure and slurry disposal); **c)** Improve the state of knowledge in various sectors by identifying high nature value areas (HNV) which should be connected by an ecological network in order to avoid the fragmentation of habitats and to promote the restoration of areas where the ecological network has already been compromised; and **d)** Allocate more efforts in scientific and applied research in order to obtain appropriate and applicable management protocols.							1					
	In relation to *E. aurinia*: **a)** Undertake effective and quick monitoring by the most experienced specialists (only two in Austria); **b)** Integrate the experience of specialists in management plans before habitat deterioration and loss lead to the extinction of *E. aurinia*; **c)** Ensure that long-term, complex management actions are handled by the right experts; and **d)** Find solutions to protect large bogs and ensure sufficient financial support.		1										
	a) Close dialogue with the landowners and intensive education of the general public; and **b)** Networking and lively exchange across national borders.		1										
	Better understanding of recent advances in bog ecology and new management techniques etc. and better funding.		1		1								
	Education for sure will be useful as well as help in increasing the knowledge about the huge alpine biodiversity and how to save it.							1					
	In relation to butterflies: **a)** Awareness raising; **b)** Fund raising (financial stimulation of owners, financial support for basic studies on species ecology, ecosystem functioning and effects of specific anthropogenic activities on species / ecosystems); **c)** Better cooperation between policy-makers, owners and other stakeholders; and **d)** Better communication between policy-makers and scientist/experts.											1	
	a) Optimizing of methods and inventory coverage to				1								

	support decision-making and to encourage transparent, objective and trusted communication with land users; **b)** Specific financial funds for implementation of measures following the precautionary principle in context of climatic change; **c)** Awareness rising in policy and public for gathering additional resources; and **d)** Expert networks for optimizing methods and the exchange of experiences in meeting particular alpine challenges.													
	Monitor condition using satellite imagery (SE)	✓												
	Involvement of schools (primary or secondary) in management activities, e.g. establish an annual event (SI)	✓												
	Build access roads that cross mires with appropriate, permeable surfaces, taking care in the design to avoid erosive channelling (SE)	✓												
	Use rural development funds to promote better cooperation with the agricultural community, however, this will only work if the payments are higher sp that they become economically viable (DE)	✓												
	Insert wetland conditions into new Rural Development OP (e.g. no subsidy for cattle close to this habitat. Redirect payments to grasslands) (SI)	✓												

Species Management Requirements Identified by Country Experts

	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
Azure hawker (*Aeshna caerula*) is a typical dragonfly of mires in higher reaches needs to have mire-pools and water bodies fenced off from pasture. Common viper (*Vipera berus*) is at risk when regenerating bogs. In lower reaches one should pay attention to wintering grounds as the filling of ditches and re-wetting in winter can drown this species (**Riegel**).			1									
Count larval webs of *E. aurinia* especially on *Succisa pratensis* to inform adaptive management. Check the nutrient level in quick few by characteristically plants and analysing it with Ellenberg et al. (**Zeigerwerte**). Control the habitat quality by counting suitable *Succisa* plants. On places with *Sphagnum*, notice the condition to get information of intact water level. Create new management options for *E. aurinia* and test effectiveness on bigger populations (at a small scale) and monitor the outcome (**Koschuh & Bonelli-Cerrato**).	1						1					
A specific monitoring programme has been set up in an area touched by measures for future supply of water for the rare and endangered indicator species *Carex paupercula* in order to optimize future usage and cattle grazing (**Künzl**).			1									
For *Lycaena helle* (4038) a number of measures at the landscape level are required to support metapopulations (mosaic of suitable habitat patches, corridors). *Drepanocladus vernicosus* (1393) is not listed for 2 out of 3 French Natura 2000 sites in the Pyrenees (FR7300931 and FR7300831) which reduces 'official' representation and therefore its conservation (**FNE**).						1						

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Case Studies Identified by Country Experts

	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
Allgäuer Mooralliance http://www.mooralliance.de /24.0.html			✓									
Koschuh A. (2010) Kartierung von Euphydryas aurinia (Goldener-Schecken-Falter, 1065) in der Steiermark. Unveröffentlichter Bericht im Auftrag der Steiermärkischen Landesregierung FA-13C, Graz, 60 S.	✓											

Other Information

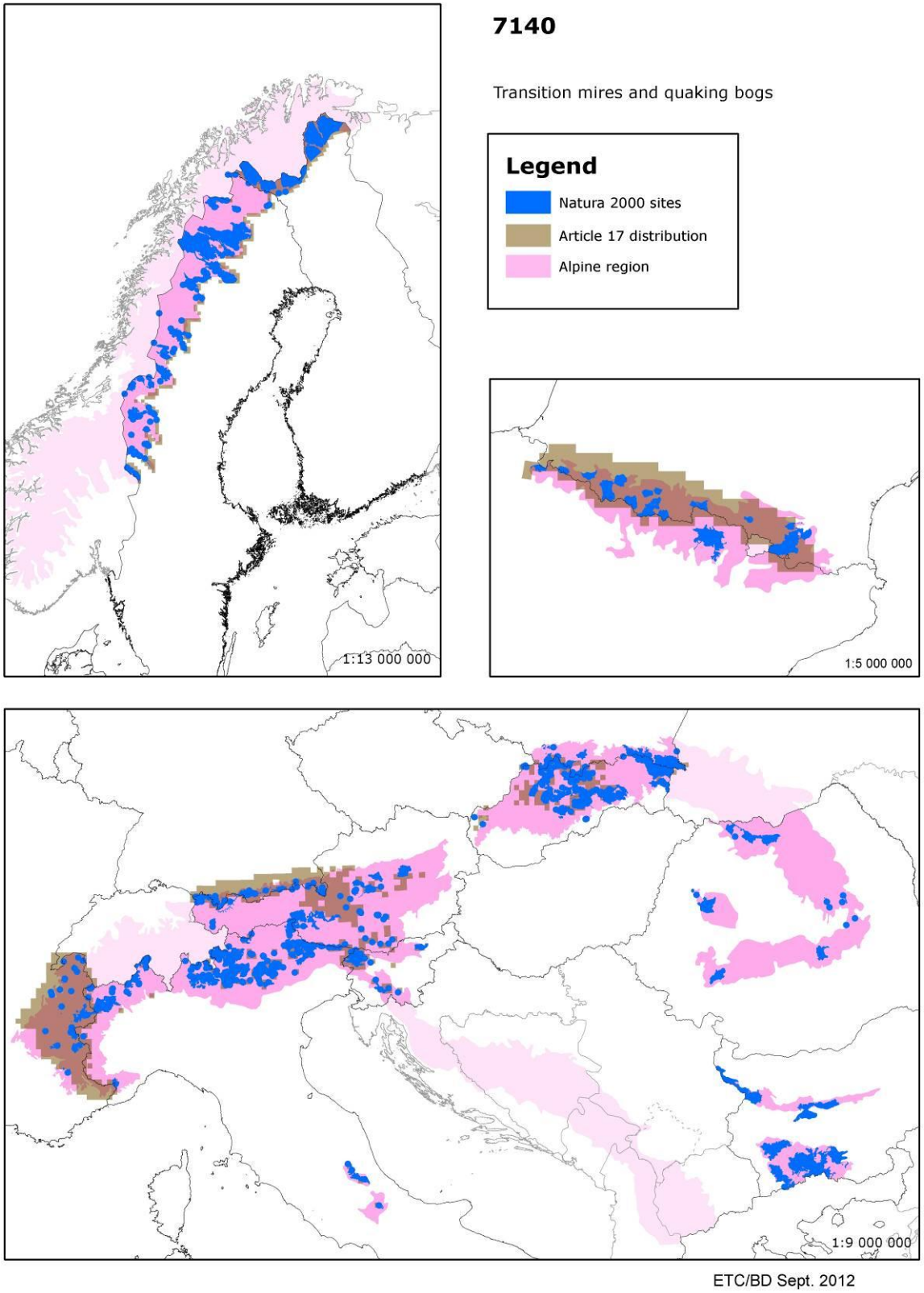
According to the ETC/BD calculations 0-50% of the area of this habitat type are within SCIs. This means that potentially important part of the management needs of this habitat types occurs outside Natura 2000 network.

Number of SCIs and habitat area (ha) within SCIs per Member State in the Alpine biogeographical region

	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
Number of sites	36	9	17	2	14	37	137	11	14	58	9	59
Habitat area (ha)	1950	525	249	90	32388	3505	3291	924	1707	72616	1205	292

The figures include all SCIs where the habitat type is mentioned including sites coded as D. Data source ETC/BD.

Map of Transition mires and quaking bogs



2.3 7230 - Alkaline fens

Habitats Manual 2007 Extract

Wetlands mostly or largely occupied by peat or tufa-producing small sedge and brown moss communities developed on soils permanently waterlogged, with a soligenous or topogenous baserich, often calcareous water supply, and with the water table at, or slightly above or below, the substratum. Peat formation, when it occurs, is infra-aquatic. Calciphile small sedges and other Cyperaceae usually dominate the mire communities, which belong to the *Caricion davallianae*, characterised by a usually prominent "brown moss" carpet formed by *Campylium stellatum*, *Drepanocladus intermedius*, *D. revolvens*, *Cratoneuron commutatum*, *Acrocladium cuspidatum*, *Ctenidium molluscum*, *Fissidens adianthoides*, *Bryum pseudotriquetrum* and others, a grasslike growth of *Schoenus nigricans*, *S. ferrugineus*, *Eriophorum latifolium*, *Carex davalliana*, *C. flava*, *C. lepidocarpa*, *C. hostiana*, *C. panicea*, *Juncus subnodulosus*, *Scirpus cespitosus*, *Eleocharis quinqueflora*, and a very rich herbaceous flora including *Tofieldia calyculata*, *Dactylorhiza incarnata*, *D. traunsteineri*, *D. traunsteinerioides*, *D. russowii*, *D. majalis* ssp.*brevifolia*, *D.cruenta*, *#Liparis loeselii*, *Herminium monorchis*, *Epipactis palustris*, *Pinguicula vulgaris*, *Pedicularis sceptrum-carolinum*, *Primula farinosa*, *Swertia perennis*. Wet grasslands (*Molinietalia caerulaea*, *e.g*. *Juncetum subnodulosi* & *Cirsietum rivularis*, 37), tall sedge beds (*Magnocaricion*,53.2), reed formations (*Phragmition*, 53.1), fen sedge beds (*Cladietum mariscae*, 53.3), may form part of the fen system, with communities related to transition mires (54.5, 54.6) and amphibious or aquatic vegetation (22.3, 22.4) or spring communities (54.1) developing in depressions.

The subunits listed in the Habitats Manual, which can, alone or in combination, and together with codes selected from the categories just mentioned, describe the composition of the fen, are understood to include the mire communities *sensu stricto* (*Caricion davallianae*), their transition to the *Molinion*, and assemblages that, although they may be phytosociologically referable to alkaline *Molinion* associations, contain a large representation of the *Caricion davallianae* species listed, in addition to being integrated in the fen system; this somewhat parallels the definition of an integrated class *Molinio-Caricetalia davallianae* in Rameau *et al*., 1989. Outside of rich fen systems, fen communities can occur as small areas in dune slack systems (16.3), in transition mires (54.5), in wet grasslands (37), on tufa cones (54.121) and in a few other situations. Rich fens are exceptionally endowed with spectacular, specialised, strictly restricted species. They are among the habitats that have undergone the most serious decline. They are essentially extinct in several regions and gravely endangered in most.

Sjörs, H. (1948) Myrvegetation i Bergslagen. *Acta Phytogeogr. Suec*. 21:1-299.

This habitat includes a wide variety of fens with alkaline groundwater, they occur where the groundwater is suitable throughout Europe but rare in the south. The vegetation is usually dominated by small sedges (*Carex* species), is often species rich and sometimes with Annex II and IV species such as the fen orchid (*Liparis loeselii*).

Assessed as 'unfavourable-inadequate' for the Alpine and Boreal regions. However in the Alpine region there is much variation between countries and the habitat is 'favourable' in the Fennoscandian sub region. Assessed as 'unfavourable-bad' for the Atlantic, Continental, Mediterranean and Pannonic regions. Within these regions only Greece (Mediterranean) and Italy (Continental and Mediterranean) assessed this habitat as 'favourable'.

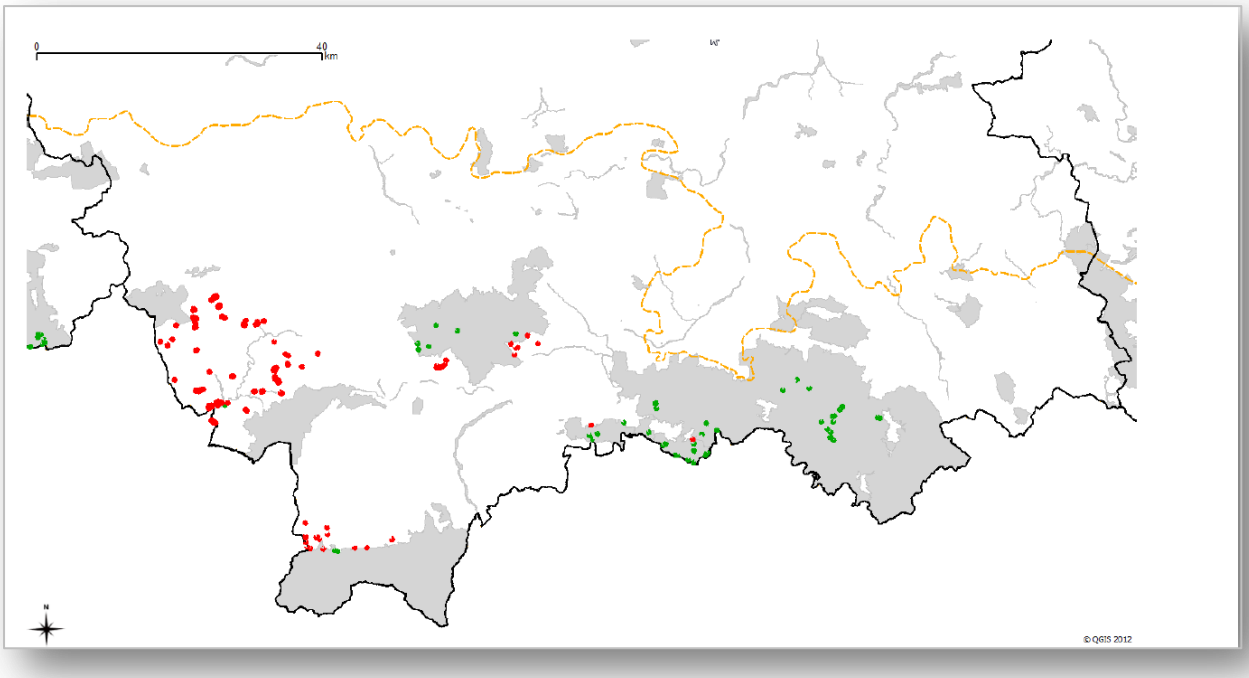
Conservation status (CS) assessed at the Alpine region and MS level:

N2K code	Habitat name		AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK	REGION
7230	Alkaline fens	range	FV		FV	XX	FV	FV	FV	FV		FV	FV	U1	FV
		area	U1		U1	XX	FV	U1	FV	FV		FV	U2	U1	U1
		structure	XX		U1	XX	FV	U1	FV	U1		FV	U1	U1	U1
		future	U2		FV	XX	FV	U1	FV	FV		FV	U1	U1	U1
		overall	U2		U1	XX	FV	U1	FV	U1		FV	U2	U1	U1

A variety of threats and pressures have been reported but many countries mention changes to the water regime, changes in agricultural practices and pollution/eutrophication. Better information

required particularly from Spain (Summary sheet of the online report on Article 17 of the Habitats Directive).

This habitat in the central part of **Polish** Carpathians is not well represented by the Natura 2000 network. The key resources in Orawa basin were not discovered until 2010 which are the best and the biggest alkaline fens in Polish Carpathians. They remain outside the Natura 2000 network and are distributed as follows:



Legend: Red = habitat not included in the N2K SCIs and green = habitat included in the SCIs (Pawlaczyk, 2013).

In the Romanian Carpathians, all HD annex species and all endemic subspecies (*Erebia manto trajanus, E. pharte romaniae, E. sudetica radnaensis, E. gorge friedericikoenigi, E. epiphron transsylvanica, E. cassioides ssp., E. pronoe regalis, E. melas carpathicola, E. melas runcensis, Boloria phales carpatomeridionalis*) need special attention. Additionally *Coenonympha tullia, Boloria titania transsylvanica, B. aquilionaris* have limits of their distribution, with important, genetically well differentiated populations and are thus of importance.

In the Slovenian Alps, such habitat is very local and mostly in small patches, therefore direct protection and specific management could be an option. Active management should be focused on threatened species and their ecological requirements, in particularly for the larval stages.

In an Italian study on the pattern of butterfly extinction, it was observed that hygrophilous and woodland species were most likely to experience population losses and most prone to disappear, even when their habitats remained apparently unchanged. This trait affects all alpine habitats. Furthermore, an early vegetation onset during spring resulting from climate change could negatively affect larval development of heliophilous spring developing butterflies even in the Alpine region, as recently observed in some lowland areas of Europe. This trait also affects all alpine habitats.

Although regularly mown to maintain the habitat, some species need short-time fallow areas (e.g. *Lycaena helle, Proclossiana eunomia*); about 20-30% should be un-mown in certain years, especially on sites of low productivity. Date of mowing is extremely important for many butterfly species. Early mowing destroys their populations. Litter mowing in end of August might be a problem for *Coenonympha tullia*. This characteristic and endangered species faces recent declines, which are not yet explicable. Widespread mowing at beginning of September (co-funded by EU) is in certain cases too early (e.g. *Phengaris alcon* on localities depending on *Gentiana asclepiadea*).

Additionally these wet habitats, when included in mountain pastures, may face too heavy grazing, especially at sites that are difficult to reach that are still afforested or abandoned and face succession. Nutrient input from neighbouring agriculture (esp. lower altitudes) and deposition from the air is a general problem of all nutrient-poor habitats, sometimes in otherwise secure areas. Fertilisation is not completely banned.

Fallow parts in the habitats are needed by species such as *Lycaena helle, Proclossiana eunomia, Coenonympha oedippus*. Well-adjusted mowing dates are generally needed for butterflies, but species such as *Coenonympha tullia* might be especially susceptible. There is a lack of knowledge for recent declines. Also *Phengaris alcon* that is dependent on *Gentiana asclepiadea* needs very late mowing. *Euphydryas aurina* is also susceptible to complete mowing and early mowing dates. Further important species with specific requirements include *Minois dryas, Carcharodes flocciferus*. Possibilities to support irregular mowing, widely spaced, every few years should be improved.

Species associated with habitat and their CS at the Alpine region and MS level

N2K code	Species name	Group		AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK	REGION
1393	*Drepano-cladus vernicosus*	Non-vascular plants	range	U2		U1	XX	XX	FV	U1	FV		FV	FV	XX	XX
			population	U2		U1	XX	XX	U2	U1	U1		FV	XX	XX	XX
			habitat	U1		U1	XX	XX	U2	XX	U1		FV	U1	XX	XX
			future	U2		U1	XX	XX	U2	U1	U1		FV	U1	XX	XX
			overall	U2		U1[7]	XX	XX	U2	U1	U1		FV	U1	XX	XX
1013	*Vertigo geyeri*	Molluscs	range	XX		XX[8]					XX		FV	XX	XX	XX
			population	XX		XX[8]					XX		FV	XX	XX	XX
			habitat	U2		U1					XX		FV	XX	XX	U1
			future	U2		U1					U1		FV	XX	XX	U1
			overall	U2		U1					U1		FV	XX	XX	U1
1014	*Vertigo angustior*	Molluscs	range	XX		FV			U2	FV	FV			FV	FV	XX
			population	XX		XX[9]			U2	FV	XX			FV	FV	XX
			habitat	U1		U1[8]			U2	FV	XX			U1	FV	XX
			future	U1		U1[8]			XX	XX	XX			U1	FV	XX
			overall	U1		U1			U2	FV	XX			U1	FV	XX
1016	*Vertigo moulinsiana*	Molluscs	range	XX			XX								XX	XX
			population	XX			XX								XX	XX
			habitat	U1			XX								XX	XX
			future	U1			XX								U1	XX
			overall	U1			XX								U1	XX
1065	*Euphydryas aurinia*	Inverts	range	FV		FV	XX		FV	FV				FV		FV
			population	FV		XX[8]	XX		FV	FV				U1		U1
			habitat	U1		FV	XX		FV	FV				U1		U1
			future	U1		FV	U1		FV	FV				U1		U1
			overall	U1		FV	U1		FV	FV				U1		U1
1528	*Saxifraga hirculus*	Vascular plants	range					FV					FV			FV
			population					FV					FV			FV
			habitat					FV					FV			FV
			future					FV					FV			FV
			overall					FV					FV			FV
1758	*Ligularia sibirica*	Vascular plants	range	FV					FV		XX				FV	U2
			population	U1					FV		U1				FV	U1

[7] According to the current Art. 17 report all assessments for this species are: FV (Rehklau)
[8] According to the current Art. 17 report assessment: FV (Rehklau)
[9] According to the current Art. 17 report assessment: U1 (Rehklau)

			habitat	U1					FV		U1				U1	U1
			future	U2					U1		XX				U1	U2
			overall	U2					U1		U1				U1	U2
1903	*Liparis loeselii*	Vascular plants	range	FV		FV			U2	FV				FV	FV	FV
			population	FV		U1			U1	FV				U1	U2	U1
			habitat	U1		XX			U2	XX				U1	U1	XX
			future	U1		FV			U2	FV				U1	FV	U1
			overall	U1		U1			U2	FV				U1	U2	U1
4038	*Lycaena helle*	Inverts	range			U2			FV				XX			U2
			population			U1			XX				XX			XX
			habitat			U1			FV				XX			U1
			future			U1			FV				XX			U1
			overall			U2 [10]			FV				XX			U2

Reported pressures on habitat and their importance to associated species

Pressure description (2nd level)	Alkaline fens	*Vertigo geyeri*	*Vertigo angustior*	*Vertigo moulinsiana*	*Euphydryas aurinia*
Cultivation	x				x
Grazing	x				x
General Forestry management	x				
Drainage	x	x	x	x	
Modification of hydrographic functioning	x	x			

Pressure description (2nd level)	*Drepanocladus vernicosus*[11]	*Saxifraga hirculus*	*Ligularia sibirica*	*Liparis loeselii*	*Lycaena helle*
Cultivation					
Grazing			x		
General Forestry management			x		
Drainage	x	x	x	x	
Modification of hydrographic functioning			x		

Reported threats to habitat and their importance to associated species

Threats description (2nd level)	Alkaline fens	*Vertigo geyeri*	*Vertigo angustior*	*Vertigo moulinsiana*	*Euphydryas aurinia*
Cultivation	x				x
Grazing	x				x
General Forestry management	x				
Drainage	x	x	x	x	
Modification of hydrographic functioning	x	x			
Biocenotic evolution	x			x	

Threats description (2nd level)	*Drepanocladus vernicosus*	*Saxifraga hirculus*	*Ligularia sibirica*	*Liparis loeselii*	*Lycaena helle*
Cultivation				x	
Grazing			x		
General Forestry management			x	x	
Drainage	x	x	x		
Modification of hydrographic functioning			x		
Biocenotic evolution	x		x		

[10] According to the current Art. 17 report all assessments for this species are: U1 (Rehklau)
[11] Succersion is also a threat to this species in Austria (Schröck)

Threats and Pressures Identified by Country Experts

		LIFE	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
1)	Abandonment and lack of mowing (A03.03)		1		1				1					
2)	Agriculture activities not referred to above (A11)		1											
3)	Modification of hydrographic functioning, general (J02.05)		1											
4)	Human induced changes in hydraulic conditions (J02)	✓			2			1						
5)	Groundwater abstractions for public water supply (J02.07.02)		1		1					1				
6)	Roads, motorways (D01.02)				1									
7)	Abandonment of pastoral systems (A04.03)		1		1				1	1		1	1	
8)	Sylviculture, forestry (B)											1		
9)	Atmospheric nitrogen deposition (H04.02)											1		
10)	Cultivation (A01)							1						
11)	Urbanisation (E01)							1						
12)	Biocenotic evolution, succession (K02)							1						
13)	Landfill, land reclamation and drying out, general (J02.01)								1					
14)	Intensive grazing (A04.01)		1		1			1	1					
15)	Forest replanting (B02.01)		2											
16)	Trampling, overuse (G05.01) - species		1											
17)	Large scale water deviation (J02.03.01)		1											
18)	Nitrogen-input (H04.02)		1											
19)	Agricultural intensification (A02.01)		1											
20)	Species composition change (succession) (K02.01)		1							1				
21)	Droughts and less precipitations (M01.02)		1											
22)	Grassland removal for arable land (A02.03) - species												1	
23)	Intensive mowing or intensification (A03.01) - species												1	
24)	Abandonment / lack of mowing (A03.03) - species												1	
25)	Anthropogenic reduction of habitat connectivity (J03.02) - species	✓											1	
26)	Reduced fecundity/ genetic depression in animals (inbreeding) (K05.01) - species												1	
27)	Intensive cattle grazing (A04.01.01)				1									
28)	Outdoor sports and leisure activities, recreational activities (G01)				1									
29)	Changes in abiotic conditions (M01)				1									
30)	Use of biocides, hormones and chemicals (A07)							1						
31)	Water abstractions from groundwater (J02.07)									1				
32)	Polderisation (J02.01.01)									1				
33)	Diffuse pollution to surface waters due to agricultural and forestry activities (SI & DE) (H01.05)	✓												

Habitat Impacts: In **Austria** most of these habitats require manual work (mowing with a mechanical mower) and farmers cannot afford to continue mowing. It is too time consuming and strenuous. As a result of the reduction in traditional management such as reed-cutting and the production of bog hay, many fens have been abandoned. Without active management, most fens are quickly colonised by scrub and trees, a process that is accelerated by nutrient enrichment and drainage around or within the site. At the moment subsidies provide an incentive but without them a lot of fens will be abandoned. Abandonment will lead to the establishment of trees and shrubs, which will inhibit any mowing in the future. Species composition will alter. Trees will also change hydrographic functions. In order to avoid manual work farmers tend to invent new methods of harvesting by preparing bale silage for example. Tractors are getting heavier resulting in soil compaction and even the destruction of the vegetation. New drainage ditches can be observed every year (**Hochegger**). There has been a loss of suitable habitat for the marsh fritillary (*Euphydryas aurinia*) due to an increase in nutrient levels caused by a lack of mowing in springtime; a lack of burning or light grazing with very young cattle; and a lack of scrub and tree removal. An increase in intensive high nutrient farming in surrounding areas and leaving cut material on the site

after mowing has led to significant nutrient enrichment and successional change. Trampling by nature tourists and scientists is an issue during summer months. Some rare, isolated patches are visited by big groups every year consisting of politicians, schools etc. Botanists also visit areas several times each year to undertake research without any idea if they could damage larval webs (**Koschuh**). In fens there is a strong mineralization process, which leads with the widespread eutrophication and a radical change in the structure and the species composition (through acidification) (**Schröck**). In **Germany** abandonment leads first of all to a species-poor predomination of tall grasses and sedges (e.g. *Phragmites, Molinia, Carex elata*) and later on to a colonisation with shrubs and trees. The succession ends with shaded woodland. Groundwater abstraction and drainage leads to a less specific, dryer vegetation (e.g. with predomination of purple moor grass (*Molinia caerulea*). Moreover, the growth of scrubs and trees also increases. The construction of roads and motorways leads to the complete destruction of this habitat (**Kraus**). Changes in hydraulic conditions cause biodiversity loss and the release of greenhouse gases (**Krettinger**). These habitats were often drained in order to facilitate mowing or grazing; as a consequence their use was intensified, for example by earlier mowing, which has led to habitat degradation and a loss of biodiversity (**Riegel**). The fens within the affected site are very small and numerous. Changes in agricultural systems e.g. less people to manage alpine pastures, has led to a loss of suitable livestock. This either causes more intensive use or abandonment of these habitat patches. Human disturbance, particularly in the alpine areas which are not (yet) connected to public infrastructure, has led to the eutrophication and trampling of this habitat (especially on lake fronts) through high or growing recreational usage. Changes in the seasonal distribution of precipitation and temperature will lead to changes in the water balance. This will lead to ecosystem changes on the one hand but also new demands on the water supply in remote alpine regions for both agriculture (e.g. humans and cattle) and tourism (e.g. mountain huts). Some small fens are therefore used or planned to be used to meet the anticipated requirements (**Künzl**). In **Sweden** alkaline fens have gone through drastic negative changes during the last century. The causes are often complex and include drainage for agricultural and forestry purposes, ceased or altered management, eutrophication and nitrogen deposition. Formerly a large proportion of rich fens were used for hay-making. An increase of trees, shrubs, tall-grown grass and *Sphagnum* spp has been the observed effect when management has ceased which means that characteristic species are outcompeted leading to a loss of diversity. In the north of Sweden this is probably the most dominant pressure. Two thirds of the rich fens of highest conservation value are also affected by drainage. Drier conditions promote growth of trees and shrubs which also leads to a loss of diversity through interspecific competition. The effect is most dominant in the southern parts of Sweden where rich fens were formerly managed more extensively. In today's intensively managed agricultural landscapes this drainage has had a dramatic effect on the small remnants of habitat that remain. These impacts have been exacerbated by nitrogen deposition and eutrophication through the use of artificial fertilizers. At higher latitudes in Sweden the fens become more and more nitrogen (N) limited. Deposition of N increases the eutrophication which produces similar results to abandonment. In addition, a major fraction of the N occurs through wet deposition, as ammonia, which adversely affects the brown mosses, which are the characteristic species for this habitat (**von Wachenfeldt**). In **France** lowland areas have experienced drastic habitat loss due to cultivation (crops and forestry), especially in large alpine valleys where alkaline fens were once common. Drainage ditches have been extensively used in both alpine valleys and other wet environments in both sub-montane and mountain areas to convert land to intensive farming. In lowland areas the remaining small patches of habitat are likely to be destroyed by urbanisation. The risk of loss increases because most of these small patches are no longer used for grazing or mowing. Even when they are not directly destroyed through urbanisation this may still occur over a longer period through biocenotic evolution that will lead to wet shrub and forest colonisation (**Mikolajczak**). It should be considered whether grazing is ecologically appropriate in this habitat and based on a precise assessment (e.g. grazing load, period, sections to be grazed, veterinary treatments etc.). All the suggested management measures can be integrated into AEM, grazing contracts between municipalities and livestock breeders and in support of mountain farming (**FNE**). In **Finland** most mire habitats are in established wilderness or protected areas, where forestry (including drainage related to forestry measures) is not allowed and construction is restricted. Partly due to this, the conservation status of all these mire habitats is favourable and there are no significant threats and pressures threatening the viability of these habitat types in Alpine region of Finland. A marginal threat/pressure in some instances comes from intensive grazing by semi-domesticated reindeer. Fens are important summer rangelands for reindeer. Grazing can influence structure and species composition of understory vegetation in mire habitats and it can prevent the growth of birch seedlings in bog woodlands. However, the influence of grazing is not only negative. On the other hand, grazing prevents open mire habitats from overgrowing with shrubs and trees (**Pääkkö**). In **Slovenia** the pressures on butterflies in this habitat arise from intensive agriculture,

abandonment, fragmentation and inbreeding. This can lead to changes in vegetation structure; species composition; and microclimatic. The main impacts on butterflies are the loss of food plants (larval and adult stages), increasing mortality of weak or non-mobile species, decreasing species diversity and a loss of genetic diversity (**Čelik**). In **Poland** water abstraction, even in small (individual farm) scale may influence and disturb the water regime, which is very fragile and crucial for the habitat status. The digging of new ditches, or even the deepening (maintenance, restoring) existing ditches may also have similar impacts (**Pawlaczyk**).

Management Requirements Identified by Country Experts

		LIFE	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
1.1)	Preservation of cultivation, mowing and cutting or in some cases extensive grazing.		2					1						
1.2)	Mowing once a year or once every two years in autumn (very few alkaline fens need any management).	✓			1									
2)	No agricultural intensification.		1					1						
3)	A simplified approach may provide sufficient understanding to inform decisions on management objectives, for example whether the fens or their sub-units are fed by rainwater, groundwater or surface water. The next step is to work out the current hydrological regime i.e. sources of water inflow and outflow.		1											
4)	You have to block the ditches to 'rewet' this habitat and reduce the intensity of land use in the fens and the surrounding areas, especially in the lower reaches. In some sites the roads should be removed and their routes should be changed in order to regenerate the hydrology of wetlands.	✓			2			1		1		1		
5)	Maintain groundwater-level.		1											
7.1)	Restoration through the clearing of high vegetation and the reintroduction of active management and grazing. This management needs to be sustainable on a long term basis.									1		1		
7.2)	More diverse management practice that has regard for the larval-webs of *E. aurinia.*		1											
14)	**a)** Apply evidence-based approaches; **b)** Guided herding, based on local action plans for pastoralism; **c)** Reduce animal load by reducing herd size or grazing duration; **d)** Apply grazing in areas with fixed fencing; **e)** Adapt land use of parcels on basis of actual threats or based on presence of species; **f)** Keep non-intervention zones (30% annually); **g)** Put sensitive grazing areas under permanent or temporary protection; and **h)** Assist the herder's work.							1						
14.1)	Prevent 'trespass grazing' on small patches									1				
15)	Promoting a locally appropriate tree species composition.		2											
16)	Develop new patches and create more buffer-zones.		1											
17)	Careful restoration of the water balance.		1											
18)	Reduction of atmospheric nitrogen deposition.		1							1				
19)	Significant extensification of agricultural activities in the immediate vicinity.		1											
27)	**a)** Elaboration of detailed grazing concepts in				1			1						

	cooperation with the land users; **b)** Subsidies for additional efforts through implementing these concepts; **c)** Monitoring of success of management concepts for further decision making; **d)** create confidence and enable positive communication and cooperation.													
28)	Development and implementation of concepts for visitor guidance and wastewater disposal in remote alpine areas.				1									
29)	**a)** Observation of changes caused through climate changes; **b)** development of scenarios on future availability of water; **c)** communication with land users; and **d)** development of alternative concepts (including new technical concepts) for supply of water.				1									
30)	Prohibit veterinary treatments on livestock that are most hazardous to this habitat and associated species (e.g. avermectins?).						1							
31)	Maintaining a stable and specific water regime, including soligenic water supply, and maintaining specific water chemistry profile.								1					
	Protection against mechanical destruction.								1					
	Take the requirements of individual species into account when timing operations.	✓												
Additional Information: In **Austria** the protection of *E. aurinia* can only be guaranteed in protected areas only by specialist monitoring carried out by individuals who have good experience of mapping larval-webs(**Koschuh**).														

Current Management Practices Identified by Country Experts

		AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
1)	A few already abandoned sites are cultivated by removing of trees and scrubs through labour input by NGOs or other organisations.	1											
3)	There are projects to raise ground water level.	2											
4)	Most of the alkaline fens are used for grazing or cutting. Both measures can be funded by the "Bayerisches Vertragsnaturschutzprogramm". The sites normally have to be used for pasture or cutting in order to conserve the high biodiversity. They are often associated with wetland-meadow complexes and are managed as an integrated system. Buffer zones that are free of fertilization are used in order to prevent nutrient enrichment.			1									
20)	Management (mowing and grazing) to protect against succession.	1							1				
29)	Concepts for supply of water have been worked out but not yet exhaustively and implementation is still missing.			1									
	Most measures are financially supported by Bavarian government and EU (special subsidies to land owners/farmers).			1									
	Land buyouts or leasing, fencing and avoiding location of water intakes in the Pieniny National Park.								1				
	Unmanaged if too wet or managed as extensive meadow with occasional hay-cutting if sufficiently dry. Both regimes may, depending on local conditions, be suitable for maintaining the habitat in favourable status.								1				
Additional Information: In **Austria** the management of fens at a landscape scale, rather than at an individual site level, can help optimise resource use and make all the difference in the viability and sustainability of management. For example, while it may be difficult to find a suitable grazier for a single small fen, grazing a number of sites in the same area on rotation may be more cost effective than cutting (**Hochegger**). In **Italy**, with rare exceptions (that generally pertain to landscape													

protection areas), peatland habitats are situated inside of Natura 2000 sites or protected biotopes which both ensure protection. The management plans, especially in nature parks, promote the conservation management of resources (**Lasen**).

Barriers and Bottlenecks Identified by Country Experts

		LIFE	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
1.1)	Land owners and stakeholders who have insufficient funds.	✓	1											
1.2)	The most frequent reasons for lack of mowing (or other management measures) are: difficult land use conditions (especially too wet or too steep); overly complex financial support systems; and uncooperative landowners.	✓			1									
4)	The sites are mostly privately owned. On the one hand many owners of fen-sites are not interested in reducing the intensity of land-use. On the other hand many of the sites are difficult to manage, e.g. you can only mow with light machinery, so they were often abandoned. Restoration on private ground is hard to realize because the value of the sites is reduced by the restoration. As the demand for land in the alpine region is high it's not possible to buy the wetlands even if the money is available, e.g. by public funds such as the Bavarian Climate Program (KliP).	✓			1					1				
5)	Need to supply households with water during drought.									1				
7)	Lack of knowledge, policy framework and insufficient funds.												1	
8)	Lack of knowledge, policy framework and insufficient funds.												1	
9)	Lack of national/international targets for reducing atmospheric nitrogen pollution.												1	
	Management is not common practice and is mainly carried out by "natural areas managers" (NGO's), directly or indirectly with support from agri-environmental schemes. Very few farmers continue mowing these meadows for their own purpose.							1						
	Finding opportunities to sell the harvested hay is difficult. Hay from wet meadow, alkaline fen and tall sedge communities are not used as food for the cattle. In the past, it was used as ground straw in stables.							1						
	The obstacles that do not permit the necessary management measures of peatland habitats are: **a)** Limited financial resources compared with the requirements; **b)** Difficult relationships with other administrations dealing with land management; **c)** Insufficient human resources to carry out the necessary supervision of land management and of specific projects; **d)** Excessive bureaucracy: European and national standards are even more onerous than the obligations imposed on private citizens by the Autonomous Province itself. Consequently, a long time is needed for the approval of environmental plans; **e)**								1					

	Difficult relationships with owners: it's always difficult to explain that to preserve naturalistic values (species and habitats) some restriction is necessary, unless you are able to be more convincing in terms of cost-effectiveness.													
	The following barriers prevent the effective management of *E. aurinia* in this habitat: **a)** Ignorance concerning the complex habitat requirements of this species; **b)** Creation of management plans without sufficient data and ignoring input from experienced specialists; **c)** Insufficient management; **d)** Lack of monitoring by experienced specialists (*E. aurinia*); **e)** Lack of practice in the implementation of long-term management programs; **f)** Insufficient experience in management due by lack of management trials and follow-up monitoring; **g)** Gaps in scientific knowledge; **h)** Missing standards for site evaluation and documentation, For example: What is intensive grazing? What is a big stock? No idea for bigger solutions exists; **i)** Reservations about several management solution-options; and **j)** Lack of money.		1											
	Climate change is a long-term threat to most of the Alpine habitat types. It may compromise the results of most measures taken to manage the habitat types						1							
	A number of barriers and bottlenecks prevent the effective management of butterfly populations that include: **a)** Insufficient funds are made available through agri-environment schemes (within National Rural Development Programme) which are not financially attractive; **b)** Lack of knowledge about species ecology and ecosystem functioning which means that suitable conservation management is not proposed in such cases; **c)** Policy frameworks/inappropriate policy in relation to: (i) lack of skills and knowledge in policy because of poor communication with scientists and experts. This also results in inappropriate AEMs (within National Rural Development Programme); (ii) very weak inspection/ control over the performance of prescribed management; and (iii) sometimes any policy measures are adopted even though the policy was associated with inappropriate management actions observed in the field.												1	
	Lack of necessary resources (financial and personnel) for site management.				1									
	Not enough knowledge on the habitat distribution – lack of habitat mapping. Detailed and careful mapping is necessary as the patches of this habitat are normally small.								1					

Additional Information: In **Austria** long-term management programs for the management of *E. aurinia* are necessarily very complex. That's the reason why this issue cannot be handled through normal habitat management. Every trial to complicate it, will lead after few years to uniform scales. But a whole management cycle needs at least three to five years and maybe even ten to complete. These programs are difficult to follow and difficult to control. As a result the necessary management activities are not done and a uniform landscape, lacking vegetation structure and patchy mosaics is created. Large gains for this species are missed by ignoring the most important details (**Koschuh**). The landowners may still maintain existing drainage ditches and keep them clear. The transition from the mires to the adjacent agricultural land is often very abrupt which causes strong eutrophication from agricultural run-off. In addition, the data on the individual mire types is often poor because of a lack of standardised recording. Interpretation is difficult as a result. There is an urgent need to revise the Austrian data for all bogs and fens and associated species. The structure and functionality of

peatlands are strongly influenced by bryophytes. For this reason, further research and management programs must involve this group of organisms (**Schröck**).

Potential Solutions Identified by Country Experts

		LIFE	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
1)	Fund raising for the maintenance of alkaline fens is necessary. For future management sustainable cultivation methods have to be developed for example extensive grazing, hay cutting by horse and other practical management techniques.	✓	1											
2)	Traditional management such as reed-cutting and the production of bog hay should be evaluated.		1											
4)	Solutions only can be reached step-by-step by focussing on the following activities: **a)** Good examples on public ground - some of the bogs and fens is in the ownership of the Free State of Bavaria, managed by the state forest company. On these sites exemplary measures can be realized and shown as "good practice" in order to convince land owners and politicians that the measures are necessary and make good sense; **b)** Cooperation with land owners through a continuous dialogue - you can raise awareness of the demands of the nature conservation features and with suitable funding, adapt land use and realize measures such as habitat regeneration; and **c)** Public relations and communication - by information and excursions you can gain support and influence political decision-makers. **d)** Initiate projects and acquire funds for project-management and measures - the possibilities of realizing projects can be enlarged by separate projects, e.g. the "Allgäuer Moorallianz" (bog-alliance of the Allgäu region).				1									
14)	Ensure good group cooperation between DOCOB (action plans) and relevant stakeholders to secure a management contract that meets the long-term grazing requirements of this habitat.							1						
31)	Detailed application of habitat assessment procedure (HD Art 6.3) is necessary, even for the smallest activities and investments capable of influencing the water regime such as small scale water abstraction projects and ditch maintenance activities.									1				
	Better financial support for specific management measures combined with less complicated conditions (less bureaucracy) under which the farmers/land owners get the payment.				1									
	Fund raising, education, communication & training.											1		
	The main solution for peatlands is to improve instruction through a constant ecological education starting from compulsory schooling. In order to obtain the same result for adults, it is necessary to engage with the different production sectors that includes: **a)** Better coordination between the different sectors of provincial administration dealing with land management; **b)** Enactment of legislation favouring a more naturalistic management by discouraging intensive agricultural practices (such as those related to manure and slurry disposal); **c)** Improve the state of knowledge in various sectors by identifying high nature value areas (HNV) which should be connected								1					

	by an ecological network in order to avoid the fragmentation of habitats and to promote the restoration of areas where the ecological network has already been compromised; and **d)** Allocate more efforts in scientific and applied research in order to obtain appropriate and applicable management protocols.													
	In relation to *E. aurinia*: **a)** Undertake effective and quick monitoring by the most experienced specialists (only two in Austria); **b)** Integrate the experience of specialists in management plans before habitat deterioration and loss lead to the extinction of *E. aurinia*; **c)** Ensure that long-term, complex management actions are handled by the right experts; and **d)** Find solutions to protect large bogs and ensure sufficient financial support.													
	a) Close dialogue with the landowners and intensive education of the general public; and **b)** Networking and lively exchange across national borders.	✓	1											
	Land buyouts or leasing, consent to carry out (potentially damaging?) treatments, cooperation with local communities and construction supervision.								1					
	In relation to **butterflies**: **a)** Awareness raising; **b)** Fund raising (financial stimulation of owners, financial support for basic studies on species ecology, ecosystem functioning and effects of specific anthropogenic activities on species/ecosystems); **c)** Better cooperation between policy-makers, owners and other stakeholders; and **d)** Better communication between policy-makers and scientist/experts.												1	
	a) Optimizing of methods and inventory coverage to support decision-making and to encourage transparent, objective and trusted communication with land users; **b)** Specific financial funds for implementation of measures following the precautionary principle in context of climatic change; **c)** Awareness rising in policy and public for gathering additional resources; and **d)** Expert networks for optimizing methods and the exchange of experiences in meeting particular alpine challenges.				1									
	Extend the Natura 2000 SCI network in the Polish Carpathians to account for newly-discovered habitat.								1					
	Agri-environmental schemes, if applied, should be "flexible", i.e. not enforcing or supporting meadow management where it is not necessary and not supporting intensive grazing in big pasture complexes containing small patches of alkaline fen which will be destroyed.								1					
	A LIFE+ application for alkaline fen conservation in the Carpathians will be made by the Naturalists Club Poland. This will be complementary to the presently implemented project on this habitat in Northern Poland.								1					
	Species specific patronage from NGOs or commercial sponsors (SI)	✓												
	Monitoring to trace sources of diffuse fertilizer pollution to identify polluters so that reposnsibility can be taken (polluter pays principle?) (DE)	✓												
Additional Information: In **Sweden** economic resources are the main limiting factor for management and hydrological restoration. It is also important to influence relevant policies. It is yet to be determined whether a single pressure/threat or a combination of them results in the greatest negative impact. However, there are established methods for improving the situation e.g.														

hydrological restoration and management. Experience from the ongoing LIFE project LIFE08 NAT/S/000268 might produce relevant practical information and identify training needs (**von Wachenfeldt**).

Species Management Requirements Identified by Country Experts

	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
Azure hawker (*Aeshna caerula*) is a typical dragonfly of mires in higher reaches needs to have mire-pools and water bodies fenced off from pasture. Common viper (*Vipera berus*) is at risk when regenerating bogs. In lower reaches one should pay attention to wintering grounds as the filling of ditches and re-wetting in winter can drown this species (**Riegel**).			1									
The current laws in force at a provincial level do not include specific measures to conserve individual species. There are habitat protection measures within the management plans of natural parks and protected biotopes, as well as provincial laws of general landscape protection, which avoid some of the negative effects. To reverse species population declines and provide measures suitable to promote the recovery of a single species (or rare habitat) it is necessary to first invest in better knowledge. It should also be considered that if there are rules that provide for effective protection of habitats, the benefits will extend to species as well (**Lasen**).							1					
Fallow parts in the habitats are needed by e.g. *Lycaena helle, Proclossiana eunomia, Coenonympha oedippus*. Well-adjusted mowing dates are generally needed for butterflies, but especially *Coenonympha tullia* might be susceptible. There is a lack of knowledge for recent declines. Also *Phengaris alcon* depending in *Gentiana asclepiadea* needs very late mowing. *Euphydryas aurina* is susceptible against complete mowing and early mowing dates. Further important species with specific requirements are e.g. *Minois dryas, Carcharodes flocciferus*. (**Dolek**).	1											
Count larval webs of *E. aurinia* especially on *Succisa pratensis* to inform adaptive management. Check the nutrient level in quick few by characteristically plants and analysing it with Ellenberg et al. (**Zeigerwerte**). Control the habitat quality by counting suitable *Succisa* plants. On places with *Sphagnum*, notice the condition to get information of intact water level. Create new management options for *E. aurinia* and test effectiveness on bigger populations (at a small scale) and monitor the outcome (**Koschuh**).	1											
Liparis loeselii (1903) is underrepresented in the 'official' lists for the Alpine region. In 3 sites the species has not been assessed (**FNE**).						1						

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Case Studies Identified by Country Experts

	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
Allgäuer Moorallianz http://www.moorallianz.de /24.0.html			✓									
Natural pastures and hay meadows in Jämtland/Härjedalen http://www2.z.lst.se/naturvard/life/index.html										✓		
Koschuh, A. (2010) Kartierung von Euphydryas aurinia (Goldener-Schecken-Falter, 1065) in der Steiermark. Unveröffentlichter Bericht im Auftrag der Steiermärkischen Landesregierung FA-13C, Graz, 60 S.	✓											
Some actions for habitat maintenance have been undertaken in								✓				

Pieniński National Park between 1993 and 2012 (National Fund of Environmental Protection and Water Management - two grants: *Protection of land ecosystems in Pieniński National Park* and *Protection of non-forest ecosystems in Pieniński National Park*)												

Other Information

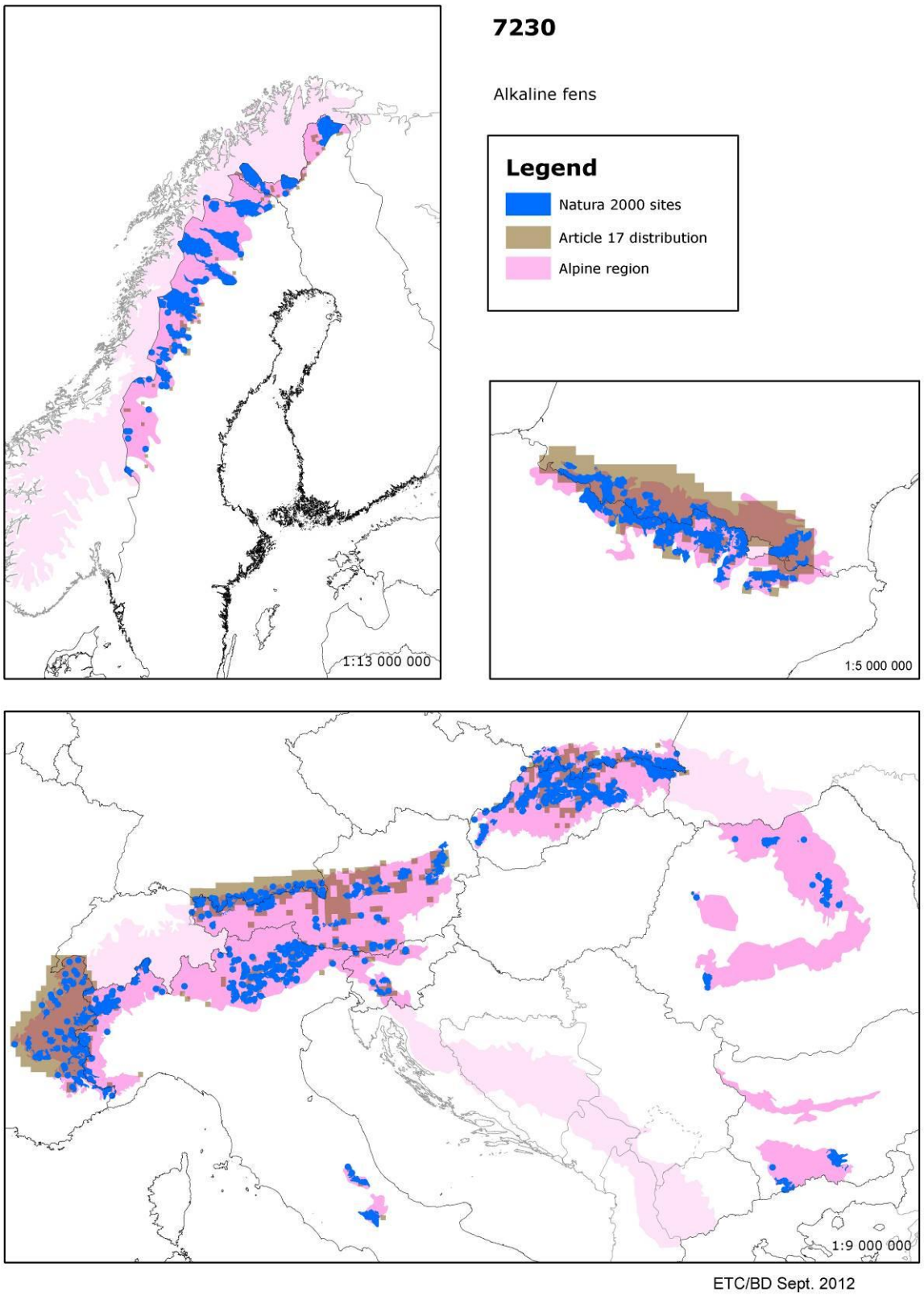
According to the ETC/BD calculations 51-75 % of the area of this habitat type are within SCIs. This means that Natura 2000 network provides an important framework for the management of this habitat type.

Number of SCIs and habitat area (ha) within SCIs per Member State in the Alpine biogeographical region

	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
Number of sites	49	3	36	23	7	74	109	16	10	38	8	79
Habitat area (ha)	1523	6	1206	1948	59	7254	3407	808	1052	7011	1178	366

The figures include all SCIs where the habitat type is mentioned including sites coded as D. Data source ETC/BD.

Map of SCIs proposed for Alkaline fens & Article 17 distribution



2.4 91D0 - Bog woodland

Habitats Manual 2007 Extract

Coniferous and broad-leaved forests on a humid to wet peaty substrate, with the water level permanently high and even higher than the surrounding water table. The water is always very poor in nutrients (raised bogs and acid fens). These communities are generally dominated by *Betula pubescens, Frangula alnus, Pinus sylvestris, Pinus rotundata* and *Picea abies*, with species specific to bogland or, more generally, to oligotrophic environments, such as *Vaccinium* spp., *Sphagnum* spp., *Carex* spp. [*Vaccinio-Piceetea*: *Piceo-Vaccinienion uliginosi* (*Betulion pubescentis, Ledo-Pinion*) i.a.]. In the Boreal region, also spruce swamp woods, which are minerotrophic mire sites along margins of different mire complexes, as well as in separate strips in valleys and along brooks.Delimtation of ombrotrophic vs. minerotrophic types is also problematic in the Alpine Region; list of differential plant taxa is too general; and site factors and hydrology require consideration (Ewald). Sub-types include: 44.A1 - Sphagnum birch woods; 44.A2 - Scots pine mire woods; 44.A3 - Mountain pine bog woods; and 44.A4 - Mire spruce woods.

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

Coniferous and broad-leaved forests on peaty soils where the water level is permanently high and the groundwater is very poor in nutrients. Downy birch (*Betula pubescens*), alder buck thorn (*Frangula alnus*), pines (*Pinus sylvestris, P. rotundata*) or spruce (*Picea abies*) form the tree layer which is often low with many stunted trees while *Vaccinium* spp., bogmosse s (*Sphagnum* spp) and sedges (*Carex* spp) form the undergrowth. This habitat is often found in association with bog habitats such as 7110 and 7140.

The conservation status in the Boreal, Alpine and Macaronesian regions is 'unfavourable -inadequate' and only assessed as 'unfavourable-bad' for the Alpine region in France. The anthropogenic pressure in these regions is lower than in the Atlantic and Continental, where the status is assessed as 'unfavourable-bad'. Structure and functions of this habitat are closely connected to the oligotrophic character of the peat and its water regime.

Conservation status (CS) assessed at the Alpine region and MS level

N2K code	Habitat name		AT	BG	DE	FI	FR	IT	PL	RO	SE	SI	SK	REGION
91D0	Bog woodland	range	FV		FV	FV	FV	FV	FV		FV	FV	U1	FV
		area	FV		FV	FV	U2	U1	U1		FV	FV	U1	U1
		structure	XX		XX[12]	FV	U1	FV	U1		FV	FV	U1	U1
		future	U1		FV[13]	FV	U1	FV	U1		FV	FV	U1	U1
		overall	U1		FV	FV	U2	U1	U1		FV	FV	U1	U1

The major threats to this habitat are changes in hydrologic conditions due to various human activities but also include natural processes (Summary sheet of the online report on Article 17 of the Habitats Directive).

In many bogs and mires Butterfly Conservation Europe observe an increased growth of trees producing unsuitable habitat conditions for characteristic butterflies, which might be stimulated by the accumulated nutrient input from the air over many years. Even bogs with largely undisturbed hydrology are affected. Changes in *Sphagnum* species composition (with different ecology: no peat production) might play an important role (ongoing research project of ANL). Classification to 91D0

[12] According to the current Art. 17 report assessment: FV (Rehklau)
[13] Only in the long-term (around 2100): too optimistic, climate warming must be expected to affect hydrology and peat mineralisation! (Ewald)

should be carefully checked; it might reflect recent growth of trees on formerly open bogs. For butterflies the amount of trees and their shading are an important negative influence.

During restoration of bogs and mires 2 main problems for biodiversity arise:

1. Still suitable habitats for typical and endangered species (e.g. butterfly *Colias palaeno*) may only be found in parts where peat was extracted, they are thus on a lower level and may get flooded during restoration so that important species may get lost. On a long term, new habitats may develop after restoration, but if species are already lost they cannot re-colonize the site.

2. More or less dry bogs mires and fens form secondary habitats of species of dry habitats. During restoration they are not considered adequately.

On mountain pastures susceptible wet areas (especially if small) are included in grazed areas and may suffer from too heavy grazing (higher grazing pressure, animals much heavier than formerly). Such habitats should be fenced off.

Colias palaeno lost in recent years about 50% of its localities in southern Bavaria (continental and alpine region) higher altitudes are less affected. It might be an early warning species for above described general changes. Similar declines in lower altitudes are described from other regions.

Further butterfly species that have to be considered include *Boloria aquilonaris, Plebejus optilete*. The latter may especially be associated with some light tree growth.

Reported pressures on habitat and their importance to associated species

Pressure description (2nd level)	Bog woodland
General Forestry management	x
Peat extraction	x
Drainage	x
Modification of hydrographic functioning	x

Reported threats to habitat and their importance to associated species

Threats description (2nd level)	Bog woodland
General Forestry management	x
Peat extraction	x
Pollution	x
Modification of hydrographic functioning	x
Biocenotic evolution[14]	x

Threats and Pressures Identified by Country Experts

		LIFE	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
1)	Groundwater abstractions for agriculture (J02.07.01)				1									
2)	Groundwater abstractions for public water supply (J02.07.02)				1									
3)	Decline or extinction of species (M02.03)				1									
4)	Human induced changes in hydraulic conditions (J02)	✓	1		3									
5)	Damage caused by game (excess population density) (F03.01.01)				2									
6)	Droughts and less precipitations (M01.02)		1		2									
7)	Peat extraction (C01.03)				1									

[14] The biocenotic evolution caused by climate change-> the bogs get dryer, bog woodlands profit. See Kaule, G. (2011) in the reference section for evidence.

8)	Nitrogen-input (H04.02)		2		2								
9)	Paths, tracks, cycling tracks (D01.01)	✓	1		2				1				
10)	Grazing in forests/ woodland (B06)				1								
11)	Thinning of tree layer (B02.06)				1								
12)	Surface water abstractions for agriculture (J02.06.01)								1				
13)	Forestry activities not referred to above (B07)	✓							1				
14)	Improved access to site (D05)								1				
15)	Water abstractions from groundwater (J02.07)								1				
16)	Canalisation (J03.03.02)								1				
17)	Intensive grazing (A04.01)		2		1								
18)	Large scale water deviation (J02.03.01)		1										
19)	Forest replanting (B02.01)		1										
20)	Agricultural intensification (A02.01)		1										
21)	Species composition change (succession) (K02.01)		1							1			
22)	Modification of hydrographic functioning, general (J02.05)									1			
23)	Modifying structures of inland water courses (J02.05.02)									1			

Habitat Impacts: In **Germany** groundwater abstraction and drainage leads to a less specific, dryer vegetation (e.g. with predomination of heather (*Calluna vulgaris*)). Moreover, the growth of scrubs and trees also increases. In recent years, there has been an extreme decline of the moorland clouded yellow (*Colias palaeno*), which is dependent on bog bilberry (*Vaccinium uliginosum*). It is remarkable, that only populations restricted to habitats in higher elevations (approximately higher than 700–800 m above sea level) have been stable till now. Bearing this in mind it is very likely, that this trend is caused by climate change (**Kraus**). The threats and pressures on forest habitats are estimated to be less sweeping than in the continental region, as indicated by the favourable conservation status of many forest habitats in the Bavarian Alps. Remoteness, inaccessibility, steepness, and harsh environmental conditions have led to a higher proportion of well-preserved woodland that has been spared from settlement, forest clearing and urban development. The ranking level "high" in the alpine region is therefore not comparable with "high" in the continental region. Drainage systems are partially active today. Species responses to drainage are indicated by a decrease in species number and the portion of bog-dwelling peat mosses (*Sphagnum div. spec.*). The threat from game comes from red deer, largely focussed on single bog woodlands, but when present the impact is very notable. Moreover, the grazing damage is concentrated on dwarf mountain pine (*Pinus mugo*) and peat-bog pine (*Pinus x rotundata*), both of which are characteristic woody species of bog woodland in the alpine region (Kaule 1974). Case studies and habitat modelling revealed that the majority of peat bogs in Austria and Bavaria are critically endangered due to a temperature increase of 2.3°C until the middle of the 21st century (Ewald 2009, Niedermair & Plattner 2010, Walentowski et al. 2008). This risk assessment is even applicable to intact peat bogs, but their vulnerability to the threat climate change is estimated to be lower than in drained bogs. Bogs in lower valleys of Alpine rivers are also threatened or affected by nitrogen-input, caused by intensive farming or intensive agriculture within bog watersheds (Kaule 1974) (**Kanold**). The threats and pressures in the alpine region are estimated to be generally in a lower level as in the continental region, based on the favourable conservation status in the Bavarian Alps. Drainage systems with channels were predominantly installed in former decades but parts of them are still active in draining important peat bogs and bog woodlands. In a few areas the construction of new forestry tracks fragments intact peat bogs and disrupts the hydrologic balance of these organic soils. Some peat bogs and bog woodlands are used as pasture for cattle or sheep – this could lead to trampling damage and increased surface runoff. Heavy browsing by red and roe deer was found in single, large bog woodlands. *Pinus mugo* is affected and cannot rejuvenate. The big populations of red deer in these bogs lead also to eutrophication and changes of the typical vegetation. Only time can tell if the climate change can reduce the surface of important bog woodlands. Some landscape preservation organisations think that a real peat bog has to be completely open and free of trees, including *Pinus mugo*. But as a result of their management species like *Betula pubescens* often regenerate at greater densities after tree clearance (**Mittermeier**). In **Italy** the extraction of water for irrigation or drinking are the main threats to this habitat (**Unterthiner**). In **Austria** the drawdown of water level affects the habitats in many ways. In the case of the active raised bogs mineralization occurs and colonization by trees, leading to a shift in the species composition of the moss layer. This is characterized by the increase of forest species, which have less capacity for peat accumulation. This trend is further reinforced by excess nitrogen-input. In the fens and transitional bogs there is also a strong mineralization process, which leads with the widespread eutrophication and a radical change in the structure and the species composition (through acidification). In bog woodlands the pressure from forestry is also very high (**Schröck**). In

Finland most mire habitats are in established wilderness or protected areas, where forestry (including drainage related to forestry measures) is not allowed and construction is restricted. Partly due to this, the conservation status of all these mire habitats is favourable and there are no significant threats and pressures threatening the viability of these habitat types in Alpine region of Finland. A marginal threat/pressure in some instances comes from intensive grazing by semi-domesticated reindeer. Fens are important summer rangelands for reindeer. Grazing can influence structure and species composition of understory vegetation in mire habitats and it can prevent the growth of birch seedlings in bog woodlands. However, the influence of grazing is not only negative. On the other hand, grazing prevents open mire habitats from overgrowing with shrubs and trees (**Pääkkö**). In **Poland** we largely observe the results of former drainage, carried out to enable the use of wetlands (e.g. peat exploitation, forest management, access to mountain meadows and fens). However, some drainage activities continue and still pose a threat. The invasion of alien species leads to changes in species composition. Moreover changes in water conditions cause less higrophile species to compete with and displace the typical flora (**Pieniny NP**). The **LIFE** Project identified the main threats associated with this habitat as follows: Use of ATVS and associated noise problems (SI); selective promotion of *Piecea* for small scale foresty disrupts habitat structure (SI & DE); and drainage (DE).

Management Requirements Identified by Country Experts

		LIFE	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
4.1)	**a)** Ditch damming to optimize habitat functions for targeted bog dwelling species and ecological functions (e.g. carbon sink, lowering of flood alleviation); and **b)** Tree and shrub management when necessary (e.g. to support the rewetting effect or to avoid dieback processes and bark beetle gradation after rewetting).				2					1				
4.2)	Rewetting through careful restoration that avoids impacts on butterfly populations that may be present. In difficult cases (where impacts are probable) a stepwise increase in water level is recommended.		1		1									
5)	Minimize damage caused by roe and red deer on habitat-typical trees and shrubs (esp. *Pinus mugo, P. x rotundata*).	✓			2									
6)	**Mitigation:** Intact moors are to be conserved to prevent or reduce the release of gases affecting climate change. **Adaptation:** Rewetting of drained bogs to minimize the adverse effects of climate change on bog woodland.				2									
8.1)	Establishing or widening of buffer zones.				1									
8.2)	Reduction of atmospheric nitrogen deposition.		1											
8.3)	Research to understand bog development, and if recent declines of *C. palaeno* are caused by nutrient deposition from the air proves to be true, develop and apply methods to decrease influence of nutrients and change *Sphagnum* composition.		1		1									
9)	Avoid the construction of new forestry tracks in areas with organic soils.				1									
10)	Installation of fences to avoid trespassing of cattle in bog woodlands.		2		2									
11)	Abandonment of active land use in bog woodlands, at least in stands with *Pinus mugo* (91D3).				1									
18)	Careful restoration of the water balance.		1											
19)	Promoting a locally appropriate tree species composition.	✓	1											
20)	Significant extensification of agricultural activities in the immediate vicinity.		1											

21)	Removal of invasive alien plant species								1					
	Do not use heavy machinery, incl. logging (SE & SI)	✓												

Additional Information: In **Germany** this habitat type is protected by the Federal Nature Conservation Act (Article 30, Legally Protected Biotopes). Measures that may lead to the destruction or any other significant or lasting adverse impact (e.g. by forest road construction or any other paths or tracks) are prohibited (**Kanold**). In **Italy** it's very important that experts decide which silvicultural measures need to be taken to maintain this habitat. A procedure of "tree marking" by forest experts (forest engineers, Forest Service) is very important. It is also very important to have well prepared documents (e.g. "le tipologie forestali") in order to do the "tree marking" in the best way (**Unterthiner**).

Current Management Practices Identified by Country Experts

		AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
4)	**a)** Measures are based on practice-oriented guidance on bog restoration, provided by the Bavarian Environment Agency; **b)** Bog restoration projects in the state forest are eligible as "particular welfare measures", Bavarian state forestry law, according to Article 22 (4)); and **c)** Further bog restoration projects are realized within the framework of BayernNetzNatur and the Allgäuer Moorallianz.			2									
5)	Regulation of game populations based on the vegetation-expertise from the Bavarian forestry administration.			2									
6)	Stabilization of the bog-system by the management detailed above (row 4) for adaptation to the adverse effects of climate change.			2									
8)	Usage of public funding for ecological management to prevent afforestation and avoid the use of chemicals and artificial fertilizers within the bog watersheds.			1									
10)	Occasional purchase of the bogs.	1											
11)	Awareness-raising and communication.			1									
18)	Scattered bog restoration programs.	1											
21)	Management (mowing and grazing) to protect against succession.	1											
22)	A pilot project was completed on a site (Torfowiska Orawsko-Nowotarskie) using the Financial Mechanism of the European Economic Area (removal of pine). Other activities are planned within the conservation plans of Natura 2000 sites, but their implementation is dependent on available financial and organizational resources.								1				

Additional Information: In **Germany** the Bavarian Forestry administration supported the transnational DBU-project DSS WAMOS and has initiated a "Pilot Project for Mapping and Analysis of Peatland forests"(duration from Jun2012 to April 2013; Project leader: Prof. Dr. Matthias Drösler at HSWT, University of Applied Sciences Weihenstephan). Main object: Development of a subject-specific foundation for setting of priorities in the field of bog restoration within in the Bavarian state forests. A follow-up project "Evaluating success of peat bog restoration in Bavarian state forests" is currently in the process of being planned. The aim of the "Allgäuer Moorallianz" project is to safeguard and develop the most important core zones of the Bavarian wetlands by means of an intact hydrological regime and appropriate use (Kanold). In **Italy** the Forest Service in the Autonomous Province of Bolzano is responsible for the "tree marking". We hope that this procedure will not change! (Unterthiner). With rare exceptions (that generally pertain to landscape protection areas), peatland habitats are situated inside of Natura 2000 sites or protected biotopes which both ensure protection. The management plans, especially in nature parks, promote the conservation management of resources (Lasen).

Barriers and Bottlenecks Identified by Country Experts

	LIF	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK

		E												
4.1)	Insufficient funds; not enough personnel with expert knowledge; and non-cooperating landowners.		1		3									
4.2)	Habitat rewetting does not take biodiversity into account at a detailed enough level.		1		1									
5)	Uncooperative hunters and lack of natural predators.				2									
6)	Vulnerability of drained bogs and unknown future.				2									
8)	Research to understand bog development, and if recent declines of *C. palaeno* are caused by nutrient deposition from the air proves to be true, develop and apply methods to decrease influence of nutrients and change *Sphagnum* composition.		1		1									
10.1)	Existing rights for pasturing in woodlands, agricultural funds to support alpine farming (INVEKOS).				1									
10.2)	Uncooperative farmers and a lack of subsidy to reduce grazing - insufficient funds leads to poor uptake.		1		1									
11)	Lack of knowledge.				1									
17)	The need for the conservation management of bogs is commonly not believed.		1		1									
21)	In places where water conditions are deeply decreased the succession may be advanced and any restoration activities may have very limited success.									1				
22)	The blocking of ditches in bog woods might lead to flooding of nearby agricultural ground (mainly meadows) and forests. This could be an important obstacle in their management, therefore such actions might be opposed by local ground owners. This activity is also directly dependent on available funds so implementation in most cases would be based on access to external resources. Finally there's still not enough research directly analyzing the effectiveness of such measures. There is a need to improve GIS and other tools that would help understand wetland hydroecology.									1				
	The obstacles that do not permit the necessary management measures of peatland habitats are: **a)** Limited financial resources compared with the requirements; **b)** Difficult relationships with other administrations dealing with land management; **c)** Insufficient human resources to carry out the necessary supervision of land management and of specific projects; **d)** Excessive bureaucracy: European and national standards are even more onerous than the obligations imposed on private citizens by the Autonomous Province itself. Consequently, a long time is needed for the approval of environmental plans; **e)** Difficult relationships with owners: it's always difficult to explain that to preserve naturalistic values (species and habitats) some restriction is necessary, unless you are able to be more convincing in terms of cost-effectiveness.								1					
	Climate change is a long-term threat to most of the Alpine habitat types. It may compromise the results of most measures taken to manage the habitat types						1							
	Lack of communication between government bodies, i.e. Forestry and Environment, to allow management through private cutting (SE)	✓												
Additional Information: In **Italy** in the silvicultural management of forest it's always necessary to find a compromise between the (economic) benefits to the owner and the benefits to the general public (**Unterthiner**). In **Austria** the landowners may still maintain existing drainage ditches and														

keep them clear. The transition from the mires to the adjacent agricultural land is often very abrupt which causes strong eutrophication from agricultural run-off. In addition, the data on the individual mire types is often poor because of a lack of standardised recording. Interpretation is difficult as a result. There is an urgent need to revise the Austrian data for individual habitat types and species. The structure and functionality of peatlands are strongly influenced by bryophytes. For this reason, further research and management programs must involve this group of organisms (**Schröck**).

Potential Solutions Identified by Country Experts

		LIFE	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
4)	Improving financial resources (e.g. Forest Climate Fund) and capacity building in bog restoration (experienced hydrologist as a central contact person working with local practitioners) and improving public awareness.				2									
5)	Awareness raising and strict implementation of existing rights.				2									
8)	Better communication, transparency, cooperation and more attractive funding.				1									
10.1)	Exchange or dissolution of pasturing rights and stop providing agricultural subsidies in forest habitats.				1									
10.2)	Show and discuss the problem with owners (farmers) and provide subsidy to reduce grazing pressure.		1											
11)	Awareness-raising.				1									
19)	Educate Forestry Service on reasons for restrictions (SE)	✓												
	Increase further education (owners) and further training (Forest Service).								1					
	The main solution for peatlands is to improve instruction through a constant ecological education starting from compulsory schooling. In order to obtain the same result for adults, it is necessary to engage with the different production sectors that includes: **a)** Better coordination between the different sectors of provincial administration dealing with land management; **b)** Enactment of legislation favouring a more naturalistic management by discouraging intensive agricultural practices (such as those related to manure and slurry disposal); **c)** Improve the state of knowledge in various sectors by identifying high nature value areas (HNV) which should be connected by an ecological network in order to avoid the fragmentation of habitats and to promote the restoration of areas where the ecological network has already been compromised; and **d)** Allocate more efforts in scientific and applied research in order to obtain appropriate and applicable management protocols.								1					
	a) Close dialogue with the landowners and intensive education of the general public; and **b)** Networking and lively exchange across national borders.		1											
	Better understanding of recent advances in bog ecology and new management techniques etc. and better funding.		1		1									
	Generally all of the described activities have no economic justification in the traditional sense. They									1				

	will not increase income from forestry. Therefore the only solution is effective fund-raising. The planned projects should provide support for both direct conservation measures, such as the improvement of water conditions, reforestation, removal of alien species and indirect conservation measures such as research (to optimize the effectiveness of different measures) and training and education. Nevertheless the development of long-term strategy/policy on how to maintain the results of such activities, supported with appropriate financial mechanisms, is indispensable. Otherwise such effort will have the character of haphazard intervention which in the longer term will have a negative influence on the perception of nature conservation by the local communities.													
	Grouse-friendly deer exclosures to manage regeneration and demonstrate deer management to landowners (DE & SI)	✓												
	Input into national forestry plan (SI)	✓												

Species Management Requirements Identified by Country Experts

	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
Indigenous peatland flora like highly specialized peat mosses (*Spahgnum div. Spec.*), dwarf shrubs (*Andromeda polifolia, Oxycoccus palustris*) and sedges (*Eriophorum vaginatum, Trichoporum cespitosum*) depend on intact bog ecology. Moreover, occurrences of some relicts of glacial tundra (arctic-alpine taxons) like *Betula nana* and have contracted to bog woodlands of the Alpine and pre-Alpine region of Bavaria. Spatial diversity of the meso- and microstructural patterns are similar to northern boreal/ sub-Arctic transition zones. Managing biodiversity of semi-wooded habitats with relict and endemic species is a huge challenge for nature conservation (Walentowski & Zehm 2010). Suitable concepts and measures have to be combined with purposeful aid programs and ongoing observation (e.g. *Betula nana* and *Carabarus menetresii pacholei*). The Alps are attractive for outdoor activity and tourism (Interreg III B Project AlpNaTour). Valuable habitats sensitive to trampling (e.g. bog vegetation) and rare species sensitive to disruption (e.g. grouse [Tetraoninae]) need sufficient undisturbed refugia. For that purpose, recreational use of the landscape may be restricted for which information and justified regulations are required (**Kanold**).			1										
In the long term measures for relict species like *Betula nana*. Typical species of bog woodlands like *Tetrao tetrix* or *Tetrao urogallus* urgently need undisturbed zones, which are vanishing because of increasing pressure from tourism, outdoor activities and forestry (**Mittermeier**).			1										
The current laws in force at a provincial level do not include specific measures to conserve individual species. There are habitat protection measures within the management plans of natural parks and protected biotopes, as well as provincial laws of general landscape protection, which avoid some of the negative effects. To reverse species population declines and provide measures suitable to promote the recovery of a single species (or rare habitat) it is necessary to first invest in better knowledge. It should also be considered that if there are rules that provide for effective protection of habitats, the benefits will extend to species as well (**Lasen**).							1						

Keep nutrients (dung) away from oligotrophic species and keep cattle away from headwaters (**Gepp**).	1											
Need to promote openings for berries without allowing conversion to grassland; avoid disruption of breeding cycles; and time work to avoid bird breeding seasons (e.g. nothing between March and July in SI to avoid impacts on grouse populations) (**LIFE**).												

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Case Studies Identified by Country Experts

	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
Transnational DBU-project DSS WAMOS			✓									
"Allgäuer Moorallianz" project			✓									
BayernNetzNatur project			✓									

Other Information

According to the ETC/BD calculations 0-50% of the area of this habitat type are within SCIs. This means that potentially important part of the management needs of this habitat types occurs outside Natura 2000 network.

Number of SCIs and habitat area (ha) within SCIs per Member State in the Alpine biogeographical region

	AT	BG	DE	ES	FI	FR	IT	PL	RO	SE	SI	SK
Number of sites	33	4	11	1	14	11	47	9	23	37	3	23
Habitat area (ha)	2457	45	226	22	44947	282	919	1081	2215	43397	548	1539

The figures include all SCIs where the habitat type is mentioned including sites coded as D. Data source ETC/BD.

Map of SCIs proposed for Bog woodland & Article 17 distribution