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MANAGEMENT of Natura 2000 habitats
Depressions on peat substrates of the *Rynchosporion*
7150

Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora

EUROPEAN COMMISSION

environment

The European Commission (DG ENV B2) commissioned the Management of Natura 2000 habitats. 7150 Depressions on peat substrates of the *Rhynchosporion*

This document was completed in March 2008 by Mathilde Stallegger, Ecosphère

Comments, data or general information were generously provided by:

Francis Muller, Pôle Relais Tourbières, France
Geert Raeymaekers, expert, Belgium
Antonio Martínez Cortizas, Universidad de Santiago de Compostela, Spain
Viera Stanová, Daphne, Slovakia
Mats Erikson, MK Natur- Och Miljökonsult HB, Sweden
Gwyn Jones, European Forum on Nature Conservation and Pastoralism, UK
Guy Beaufoy, European Forum on Nature Conservation and Pastoralism, UK
Andrew Coupar, Scottish Natural Heritage, UK

Coordination: Concha Olmeda, ATECMA & Daniela Zaghi, Comunità Ambiente

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Rhynchosporion community, Moulinel wet heath, northern France. Photo : Sylvain Tourte

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EUNIS Classification:

D2.3H1 Nemoral bare peat communities

Summary

Depressions on peat substrates of the *Rhynchosporion* are pioneer communities of humid exposed peat or sometimes sand, with *Rhynchospora alba, R. fusca, Drosera intermedia, D. rotundifolia, Lycopodiella inundata,* forming on cutover CHECK areas of blanket or raised bogs, but also on naturally seep- or frost-eroded areas of wet heaths and bogs, in flushes and in the fluctuation zone of oligotrophic pools with sandy, slightly peaty substratum (European Commission 2007). These communities, which are rare at European scale, have a short-lived existence and occur in fragmentary stands.

This habitat type appears to be widely distributed in the EU, especially in the Atlantic and Continental biogeographical regions. Due to its existence as a microhabitat within larger habitats of Annex 1 of Habitat directive (7110, 7120, 4010, 4020, 3110, 3130, 3160), the area covered by *Rhynchosporion* communities as well as its geographical extent is often difficult to evaluate.

Stands of *Rhynchosporion* communities have experienced a severe regression and strong deterioration of habitat quality last decades, particularly linked to the abandonment of traditional exploitation creating artificial stripped areas favourable to *Rhynchosporion* pioneer species development and the maintenance of open spaces on the one hand, and more generally to wetlands destruction or abandonment on the other.

Rhynchosporion communities have strong requirements regarding water in terms of quality (oligotrophy, acidity) and quantity (constant humidity) and concerning the presence of open areas and bare peat areas occurring through natural or artificial disturbances. Consequently, to ensure its ecological existence conditions, *Rhynchosporion* management has to be considered at two different levels: the maintenance of a complex of peaty habitats (mires or wet heaths) and the maintenance of pioneer stands within these habitats. Indeed, the functioning integrity of mires and bogs in which the pioneer community occurs in mosaic as a sub-habitat should be preserved both with regard to the regulation of the water balance and the maintenance of open areas. These objectives can be achieved through restoring and stabilizing favourable hydrological conditions and introducing or maintaining extensive grazing and mowing activities.

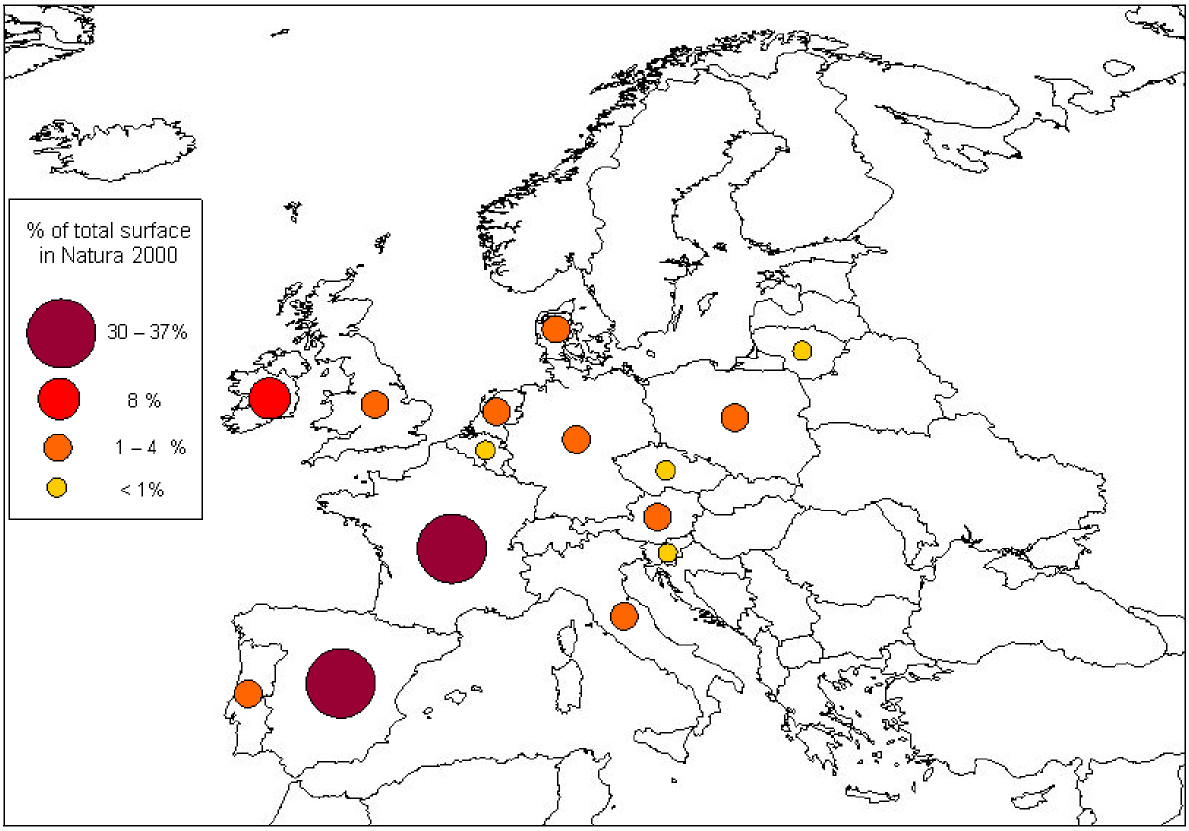
At the stand level, the improvement of *Rhynchosporion* conservation status can be ensured by creating disturbances, by locally removing vegetation, litter and part of the soil surface. Small-scale peat cutting proved to be a successful but expensive management way for plant species and invertebrate fauna typical for depressions on peat substrates of the *Rhynchosporion*.

1. Description of habitat and related species

Depressions on peat substrates of the *Rhynchosporion* are pioneer communities of humid exposed peat or sometimes sand, with *Rhynchospora alba, R. fusca, Drosera intermedia, D. rotundifolia, Lycopodiella inundata,* forming on stripped areas of blanket or raised bogs, but also on naturally seep- or frost-eroded areas of wet heaths and bogs, in flushes and in the fluctuation zone of oligotrophic pools with sandy, slightly peaty substratum (European Commission 2007). These communities, which are rare at European scale, have a short-lived existence and occur in fragmentary stands.

Distribution

This habitat type appears to be widely distributed in the EU, especially in the Atlantic and Continental biogeographical regions (JNCC 2007). It is mostly distributed in Western European regions which tend towards the Atlantic. It is also found in the Alpine domain, in European low mountain ranges (Ellmauer 2005) and in the Carpathians (Koczur 2004). *Rhynchosporion* communities are also represented in the Oro-Mediterranean region in Spain, Portugal and Italy (ICN 2006).



Percentage distribution of the total surface of Depressions on peat substrates of the Rhynchosporion in Natura 2000

Depressions on peat substrates of the *Rynchosporion* in Natura 2000 sites

The following data have been extracted from the Natura 2000 Network database, elaborated by the European Commission with data updated on December 2006. The surface was estimated on the basis of the habitat cover indicated for each protected site and should be considered only as indicative of the habitat surface included in Natura 2000.

Due to its existence in small fragmentary stands in mosaic vegetation, the area covered by *Rhynchosporion* communities is often difficult to evaluate. About 200 Natura 2000 sites are said arbitrarily to have 1% cover of this habitat, the idea clearly being to express a small area (France, Spain, Ireland, etc.). In reality, this often results in an overestimation of the area (MNHN 2007). On the other hand, Belgium, the UK and Germany seem to have a more precise estimation based on GIS cartography.

Biogeographical region	Nº of sites	Estimated surface in Natura 2000 (ha)	% of total surface in Natura 2000
Atlantic	299	19,687	55.45
Mediterranean	21	9,954	28.04
Continental	250	4,105	11.56
Alpine	299	1,692	4.77
Boreal	1	66	0.19
Countries	Nº of sites	Estimated surface in Natura 2000 (ha)	% of total surface in Natura 2000
France	101	13,059	36.78
Spain	28	10,552	29.72
Ireland	57	2,865	8.07
Denmark	22	1,494	4.21
United Kingdom	32	1,372	3.86
Netherlands	11	1,259	3.55
Austria	17	1,183	3.33
Poland	28	1,091	3.07
Italy	40	1,083	3.05
Portugal	1	888	2.50
Germany	273	405	1.14
Slovenia	3	153	0.43
Lithuania	1	66	0.19
Belgium	17	33	0.09
Czech Republic	1	1	0.00
TOTAL	**632**	**35,504**	**100**

Doniță *et al.* (2005) describes this habitat type from the Romanian Carpathians; however reference lists of Annex 1 habitats for Bulgaria and Romania are not yet published. In Slovakia, this habitat is very rare with proven occurrence on one site on the Borská lowlands (Stanová & Valachovič 2002) and in Hungary it is considered to be extinct in the Pannonian biogeographical region (ETCBD 2005). Probably due to the large extent of bogs and mires in the Boreal biogeographical zone, *Rhynchosporion* communities were not identified as a separate unit and are included in other raised bogs and mires habitats.

Main habitat features, ecology and variability

The *Rhynchosporion albae* W. Koch 1926 alliance is typical for pioneer and heliophilous vegetation developing on humid exposed peat or sometimes acid sand. The herbaceous layer, often sparse and discontinuous, provides a habitat for a limited number of species: *Rhynchospora alba, R. fusca, Drosera intermedia, D. rotundifolia, Lycopodiella inundata*. However these species are typical weak competitors and they are often exclusive to this habitat type (Bensettiti *et al.* 2002). Vascular vegetation is characterized by a low cover, frequently around 20% (Dierssen & Dierssen 2001 *in* Ellmauer 2005), and bare soil areas. The bryophyte layer is always thin. A few *Sphagnum* species can develop sparsely, but as concurrent plants with *Rhynchosporion* species, their development represents a more advanced stage of the pioneer community (Bardat pers. comm.).

Bare peat soils are frequently covered by a thin layer of a filamentous alga, *Zygogonium ericetorum* and less often by hepatics as *Fossombronia doumortieri* and *Gymnocolea inflata* (Wolejko *et al.* 2005). This hygrophilous circumboreal vegetation with a subatlantic trend is an initial stage for wet heath and acidophilous peat-forming communities (Bensettiti *et al.* 2002). The pioneer and colonizing communities of bare surfaces have a short-lived existence and often occur in small fragmentary stands covering often less than 10 m^2 (JNCC 2007). These communities are similar, and closely related, to those of shallow bog hollows (51.122) and of transition mires (54.57) (European Commission 2007).

Characteristic species: *Rhynchospora alba, R. fusca, Drosera intermedia, D. rotundifolia, Carex panicea, Pinguicula lusitanica, Anagallis tenella, Juncus bulbosus, Eleocharis multicaulis, Hammarbya paludosa, Lycopodiella inundata, Sphagnum pylaisii, S. fallax, S. cuspidatum, Zygogonium ericetorum* (Bensettiti *et al.* 2002, MLUV Brandenburg 2007)

Rhynchosporion communities have an Atlantic character and on the edges of its distribution some characteristic species are not present e.g. *Sphagnum pylaisii,* which has a very localized occurrence in the Atlantic area. Regionally-characteristic species, with broader ecological amplitude may also occur, such as *Hydrocotile vulgaris*, *Sphagnum subsecundum,* or other fenland species (Hájek & Háberová 2001).

This fragmentary dynamical alliance occurs on cutover areas in complex mosaics with other wetland vegetation, in transition mires, and on the margins of bog pools and hollows in both raised and blanket bogs, as well as in areas disturbed by footpaths, tracks and ditches (JNCC 2007). The New Forest, considered to hold the largest area in England of depressions on peat substrates of the *Rhynchosporion,* can be mentioned as an example of the diversity of occurrence of habitat 7150 (JNCC 2007).

Ecological requirements

Appearing in the Atlantic, Continental and Alpine biogeographic regions from the plains to the high mountains on depressions on peat substrates, the *Rhynchosporion* community has strong requirements in terms of both water quality and quantity and as regards the openness of the ecosystem (open areas and bare peat)(Bensettiti *et al.* 2002):

- Acidity and oligotrophy: habitat 7150 develops on acid (pH ranging 3.5 to 5.5), oligo-mesotrophic, holoorganic, humic and mineral substrates, in other words, on peat or gravelly humus-bearing sand (Bensettiti *et al.* 2002).
- Constant moisture. Water supply is ensured either by seepage or overland flow or through the occurrence of a shallow water table (Bensettiti *et al.* 2002).
- Disturbance. The *Rhynchosporion* alliance is typical for fluctuation zones, where the substrate repeatedly experiences a temporary phase of winter immersion followed by an emergent phase during summer. It forms on naturally seepage- or frost-eroded areas of wet heaths and bogs and in flushes (European Commission – EUR 27).

The habitat is also found on areas disturbed by human, game (e.g. deer, wild boar) or livestock action. Particularly linked to human disturbances, habitat 7150 occurs in Ireland as a sub-habitat in cutover bogs, representing situations where part of the original mass of peat has been removed through intensive cutting or other forms of peat extraction (The Heritage Council 2007). Likewise, the most important *Rhynchosporion* populations in Wallonia are in a military camp (Lagland), where military activities have disturbed the natural vegetation cover in areas of wet heath (Verté pers. comm.).

Dynamics

This habitat often has a human origin: peat extraction, carried out traditionally by manual cutting and continued with machinery in a few areas, produced and to some extent maintained bare surfaces. Nowadays in most countries it is vegetation damage by vehicles or by trampling which creates the limited bare surface areas.

Considered as "secondary healing communities" in the French habitat handbook (Bensettiti *et al.* 2002), the *Rhynchosporion* plants develop from viable seeds contained in the soil (peat has significant powers of preservation), from vegetative propagation or through seed dispersal.

The sporadic community is quickly replaced by more competitive species: vegetation evolves in mires (development of *Sphagnum* spp.) or heaths (development of *Erica tetralix, Molinia caerulea, Ulex* spp.). In most of the cases, *Rhynchosporion* communities do not persist for more than ten years in the face of succession processes (Bensettiti *et al.* 2002), i.e. if no continued disturbance.

The question of the habitat only being present as fragmentary stands even in optimal and natural conditions has been raised by Jiménez (2004). The most plausible explanation is that areas suitable for *Rhynchosporion* communities, though small in total surface area, are always being created and destroyed through the dynamics of the various disturbance process and hydrological variation found within natural peatland habitats.

Variability

Depressions on peat substrates of the *Rhynchosporion* present a remarkable constancy throughout their entire distribution area; the community's characteristic species composition shows an important homogeneity due to the extreme but narrow ecological conditions described above. However, altitudinal or latitudinal communities can be distinguished by the presence of *Scheuchzeria palustris*. Ecological variations in time and space can be differentiated, the vegetation composition depending on dynamic phases and on site conditions.

The phytosociological concept of the *Rhynchosporion* alliance is sometimes considered to be much wider than the one introduced in habitat 7150 of the Habitats Directive. According to Dierssen & Reichelt (1988), its distribution spans temperate and Boreal regions and the alliance includes three main associations: *Caricetum limosae, Sphagno-Rhynchosporetum* and *Caricetum rotundatae,* including numerous vascular plants and bryophyte species. This is because when consideration of phytosociological samples started, at the beginning of XXth century, the modern practice of separating vegetation units was not used. As the Polish handbook (Herbichowa 2004) admits, knowledge of this alliance from a classificatory perspective is still poor. The French Natura 2000 management handbook (Bensettiti *et al.* 2002) describes several associations:

Drosero intermediae-Rhynchosporetum albae (All. et Denis 1923) All. 1926
Lycopodiello inundatae-Rhynchosporetum fuscae All. et Gaume 1925
Sphagno pylaisii-Rhynchosporetum albae Clément et Touffet 1979

Association *Sphagno subsecundi-Rhynchosporetum albae* (Koch 1926) Rybníček 1984 is known from Western and Central Europe (Rybníček *et al.* 1984).

Species that depend on the habitat

In spite of its low species diversity, these high specialized communities shelter extremely demanding species. Many of them are often restricted to this habitat, for example, *Rhynchospora fusca, Drosera intermedia, Lycopodiella inundata* and *Hammarbya paludosa*. These are species of high interest, with high protection status at national or European scale; they often belong to national red lists. These species are weak competitors, demanding a space free of other plants for their proper development. Shrub encroachment, peat cutting and eutrophication all threaten their localities.

Depressions on peat substrates constitute a habitat for some moss species of Annex II or IV: *Bruchia vogesiaca* and *Sphagnum pylaisii* are particularly linked to open areas and bare peat in France, Portugal and Spain.

Invertebrate fauna is diverse on this habitat. Some examples are given below from three different groups:

- Invertebrate species of European interest listed in Annex II and IV and which are typical for bogs and heaths in general: *Leucorrhinia pectoralis* (large white-faced darter dragonfly) and *Coenonympha oedippus* (false ringlet).
- Typical species for *Rhynchosporion* communities in the vegetation stratum include: *Aeshna subarctica (*subarctic darner)*, Pachybrachius luridus, Pirata uliginosus* (LfU & LWF 2007).
- Invertebrate fauna of mud bottoms specialised in poor, wet peat soils, including some carabid beetles of genus *Elaphrus* (e.g. *E. uliginosus*), *Bembidion* (e.g. *B. humerale*, central European species, extending north to southern Scandinavia, classified as Endangered in the UK - UKBAP 2007). *Patrobus* (e.g. *P. assimilis*) and *Agonum* (e.g. *A. ericeti*) are typical species in *Rhynchosporion* communities (Ellmauer 2005). The uncommon dysticid beetle *Acilius canaliculatus* also appears to favour acid pools created as a result of previous domestic peat-cutting (Buglife 2007).

Related habitats

According to Evans (2006), habitat 7150 'Depressions on peat substrates of the *Rhynchosporion'* is usually found in a dynamic mosaic of other habitats, occupying small surfaces on disturbed and cutover areas. *Rhynchosporion* communities are included in bog, mires and wet heath ecosystems as components of this biotope complex.

- Bog habitats which can be associated with this rare community include: 7110* Active raised bogs; 7120 Degraded raised bogs still capable of natural regeneration; 7140 Transition mires and quaking bogs; 7130 Blanket bogs (* if active bog); 91D0 * Bog woodland.

- Depressions on peat substrates also appear in pockets in wet heaths: 4010 Northern Atlantic wet heaths with *Erica tetralix*; 4020 * Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix*.

- In other ecological conditions, they are found on humid organic sand in mosaics with standing freshwater habitats: 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*); 3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*; 3160 Natural dystrophic lakes and ponds. In these habitats, 7150 may also be found on exposed sandy or peaty shorelines, where moderate erosion by waves (sometimes in combination with ice) can help to maintain the right conditions for *Rhynchosporion* communities over time.

Its small size, fragmentary existence and close association with numerous Annex I habitats, as mentioned above, means that the *Rhynchosporion* vegetation is difficult to isolate *"when member states have to complete the standard data forms, as the area of each habitat type found on a given site will change frequently and there are also likely to be difficulties with monitoring and reporting"* (Evans 2006).

Some of EU member states therefore incorporate *Rhynchosporion* in habitat 7110, 7140 or 91D0, so that separate registration and differentiation of the stands is not necessary (Ellmauer 2005, Bensettiti *et al.* 2002, LfU & LWF 2007). For the Boreal biogeographic region, *Rhynchosporion* is consistently included as elements of these habitats, as well as in 3110 and 3130. However, its occurrence in other situations still requires to be registered separately.

Ecological services and benefits of the habitat

Placed in the general context of bog or wet heath, depressions on peat substrates of the *Rhynchosporion* provide the same ecological services as "peatlands" in general, which have and are being used as an energy resource, as humus and organic soil improver in agriculture and as a substrate in horticulture. Bogs and fens play an important role in the regulation of environment (Joosten & Clarke 2002). These ecological functions include carbon storage, water purification and flood prevention, which are particularly important in the context of current global climate changes. Of course, the efficiency of these functions depends on the condition of the habitat, on its area and on the thickness of peat layer. The thickness of the peat influences the carbon storage capacity, but it is the nature and condition of the vegetation and bog surface that influences its ability to purify water and prevent, or at least ameliorate, flooding (Coupar pers. comm.).

Mires have been identified as significant storehouses of carbon as well as sources of carbon dioxide. By sequestering and releasing significant amounts of carbon, bog ecosystems play two critical but contrasting roles in mitigating the effects of climate change: the regulation of greenhouse gases and the physical buffering of climate change impacts (MEA 2005). The issue of carbon release caused by drying out will be tackled below under "Climate change effects".

Wetlands are natural filters, helping to improve the quality of runoff water from urban and agricultural lands by the trapping of pollutants, denitrification and the trapping and storing of sediments (Wetlands International 2007, Pôle Relais Tourbières 2007). Mires release water of high quality and are natural sources of drinking water, assuming their survival is not endangered by pollution.

Furthermore, the role of peatlands in the water cycle is critical: since they have a huge water storage capacity, they permit the regulation of hydrological flows and flood prevention. This same water is then slowly released back to the adjacent hydrosystems (Pôle relais tourbières 2007). They are able to regulate regional and local climate (Joosten & Clarke 2002) and are a store of water for agriculture and industry.

Peatlands also have a cultural, recreational and educational dimension: under sustainable management regimes, they offer opportunities for hunting and fishing and tourism. This ecosystem is particularly well suited to being used to promote awareness of nature's complexity and the need for conservation (Manneville 2006).

Mires, due to the incomplete cycling of material which characterises them and the consequent continuous accumulation of organic material, record their own history and that of their wide surroundings in systematic layers, making them particularly suited to the reconstruction of long-term human and environmental history (Joosten & Clarke 2002).

Finally, bogs and particularly *Rhynchosporion* communities provide a source of medicinal plants. Known for their antibacterial, antibiotic, antispasmodic, antitussive, demulcent, expectorant and hypoglycaemic proprieties, European *Drosera* species (*D. rotundifolia, D. longifolia and D. intermedia*) were traditionally collected and used as medicine, and nowadays, about 230 medicinal preparations are produced world-wide from sundew species (Joosten & Clarke 2002) for both allopathic and homeopathic remedies.

Trends

Depressions on peat substrate of the *Rhynchosporion* habitat is closely linked to types of wetland (bogs, wet heaths and dystrophic lakes and ponds), that have experienced a strong regression since the beginning of the 20th century and that are by now extremely threatened.

On a global scale, Europe has suffered the greatest losses in mires. Peat formation has stopped in about 60% of the original mire area, and possibly 10-20% is not even peatland any more (Joosten 1997 *in* European Commission 2000).

Peatlands have been extensively extracted for domestic and industrial fuel, subject to reed exploitation and the harvesting medicinal plants. In the middle of 20th century, these traditional and extensive uses largely ceased. This severe reduction in the level of traditional exploitation, which had created artificial cutover areas favourable to *Rhynchosporion* pioneer species development and which maintained open spaces on peatlands, led to a strong deterioration of habitat quality: stands of *Rhynchosporion* communities declined in number in the last decades (Ellmauer 2005). Commercial extraction of peat for the horticulture industry still continutes in some countries and its relation with the extension/degradation of *Rhynchosporion* is not well documented. The difficulty with describing the ecological influence of peat extraction is that while locally it may favour *Rhynchosporion* in the short term, it leads to significant changes in the mire, and even its complete destruction where the extraction rate exceeds that of peat formation.

These practices were replaced either by the complete destruction of the habitat through drainage, farming intensification, afforestation and urban, industrial and infrastructure development (Manneville 2006) or by the complete abandonment human extractive activity, leading to scrub or tree encroachment. The combined effect has been a severe regression of *Rhynchosporion* communities (Bensettiti *et al.* 2002).

Working to a limited extent against these trends, the recognition by the Ramsar Convention that peatlands are a particularly threatened wetland type has led to an increased emphasis on sustainable practices in the form of improved planning, water regulation, and post-mining restoration (Joosten & Clarke 2002, Ramsar 2007).

Threats

Linked to bogs, wet heaths and oligotrophic ponds, *Rhynchosporion* communities suffer from direct destruction of these ecosystems by agriculture intensification, afforestation, peat exploitation, building development or abandonment (the latter leading to their disappearance through the process of succession) (Bensettiti *et al.* 2002, Buglife 2007). Occurring on fragmentary stands on small-scale surfaces, they are particularly threatened communities within the complex overall microtopography. As highly specialised plant communities, they demand extremely precise ecological conditions in terms of water quality (oligotrophy, acidity) and quantity and of the presence of open conditions (Jiménez 2004). Various kinds of activities (e.g. road construction, building, gravel extraction) taking place in the surroundings of a peatland area may thus have a detrimental external impact on the water-table and water quality, even if the peatland site is left intact. Consequently, *Rhynchosporion* communities are mainly exposed to following threats:

Human induced changes in water regime

Lowering of the water table, the main threat for the habitat is linked to different human induced factors:

- Drainage for conversion to intensive agriculture and forestry. Past drainage of peatland has lowered water tables and led to the drying of bog and wet heath habitats. Large-scale or local drainage schemes were very successful, especially in the lowlands, where the majority of peatland have been drained and converted to arable land which now has limited potential for restoration. The majority of drainage schemes are still functioning. Neighbouring agricultural areas require lowered water levels via marginal ring-ditches and other intrusive drainage measures.
- Water extraction for irrigation or drinking water. Within catchments, abstraction has had an adverse effect on peatland hydrology, affecting the natural balance between ground and surface waters, with their different, usually contrasting, water quality.
- Afforestation. Trees dry out neighbouring areas and act as an invasive seed source within the catchment

On the other hand, flooding e.g. during restoration activities may be also threatening for bog communities.

Nutrient enrichment and eutrophication

Run-off from agricultural land damages the ecology of bogs (Buglife 2007). The main source of pollution tends to be fertilisers, which lead to the eutrophication of bog waters: in those nutrient rich conditions, *Rhynchosporion* species cannot grow.

Abandonment of traditional peat extraction

Low-intensity peat extraction in past centuries created small-scale areas of bare peat, required by *Rhynchosporion* communities, until it largely died out at the end of the 19^{th} century. It continued at significant levels in the UK and Ireland until at least the late 20^{th} century. The extent of peat cutting was apparently on a quite phenomenal scale, some six million 0.3m x 0.3m peats being cut per annum in the New Forest, UK (Tubbs 1986 *in* Life project "New Forest" 1997-2001). The disappearance of this practice has been one of the greatest threats for habitat 7150.

Where an intensive peat industry replaced this traditional work, it led to extreme peatland destruction. In Ireland, the most serious impact of mechanised peat extraction has been on the Midland raised bogs, causing a loss of 22% of the resource in less than 50 years. Today 92% of the area of raised bog has been modified by man and lost to conservation (Ireland Peatland Conservation Council 2007).

Scrub and tree encroachment

The abandonment of traditional management practices such as mowing or grazing, especially on dried-out peatland, has led to invasion of both herbaceous and ligneous species, to the detriment of pioneer communities.

Excessive frequentation

Recreational and tourism pressure has had a pronounced impact on the habitat (Ellmauer 2005). Excessive trampling is damaging. The interest in carnivorous and medicinal plants like *Drosera* species is one of the reasons: habitat 7150 is particularly sought out by tourists because of the presence of plants like the sundews, *Drosera rotundifolia, D. longifolia, D. anglica*. According to WWF Germany (2001), *Drosera* species are potentially threatened by excessive plant gathering nowadays despite their protected status in most of European countries.

Fire is also mentioned as a threat for habitat 7150 (ICN 2006).

Climate change effects

Peatlands are among the most sensitive and threatened habitats in Europe in spite of protection efforts carried out last decades. Significant climate change consequences are expected on bogs, mires and wet heaths. According to the Swiss climate report (Niedermair 2007), higher temperatures and longer dry periods could endanger raised bogs and result in the invasion of non bog specific plants into the ecosystem, leading to strong habitat alteration. Increased evapotranspiration, altered precipitation and the increased frequency of extreme events (in this case, droughts) would result in a lowering of the water table during the growing season (Laine undated).

The reduced water supply would lead to a degradation of peat soils, while the frequency of associated species, many of European and national interest, will decrease due to their extreme specialisation of bog species. This is especially true of *Rhynchosporion* communities. The general value of the ecosystem is thus reduced. Experiments carried out in Scandinavia (Wiedermann *et al.* 2007 in Niedermair *et al.* 2007), underlined the fact that a combination of several threat factors like eutrophication and temperature rise could lead to a drastic bog habitat regression.

Peatlands are important carbon stores and contribute significantly to the global carbon cycle. Any major change to the hydrology and vegetative communities of a bog will have the potential to affect the carbon sink (MEA 2005). Vegetation changes associated with water drawdown result in better aeration of the peat and thus to increased microorganism activity and to accelerated peat decomposition and increased carbon release into the atmosphere (Manneville 2006, LfU 2007). Other aspects of climate change, such as longer and more frequent droughts, would have negative effects on the carbon balance in peatland (MEA 2005) in addition to those outlined above.

2. Conservation management

General recommendations

Considering the fragmentary stands colonized by the *Rhynchosporion* habitat, it is impossible to contemplate its conservation independently of the bog or wet heath where it occurs in pockets. The challenge is to balance the disturbance regime necessary for this habitat with the rather more conservative needs of other habitats which will be present.

Habitat 7150 is naturally transitory at any particular point in space and time. The maintenance of its presence at the habitat complex level therefore depends on there being optimal conditions for its establishment *at least somewhere* on the same mire at any particular time.

Rhynchosporion communities have strong requirements regarding water in terms of quality (oligotrophy, acidity) and quantity (constant humidity) and concerning the openness of the ecosystem (open and bare peat areas) (Bensettiti *et al.* 2002).

Management thus has to be considered at two different scales:

- At the mire or wet heath level: the functioning integrity of peatland in which the community occurs in mosaic as a sub-habitat should be preserved as regards the regulation of water balance, the maintenance of open areas and so on.
- At the stand level: if the overall ecological conditions for *Rhynchosporion* are present, its development can be promoted by creating specific favourable conditions, e.g. by removing vegetation, litter and part of the soil surface from limited areas.

Passive protection is recommended for occurrences in naturally formed depressions on mire surface (Wolejko *et al.* 2005) and in mires that are in natural stage. Well-protected habitats with their original hydrological regimes intact do not require any management. Referring to Gwyn Jones (pers. comm.), it is not unusual for peat bogs and their Rhynchosporion communities in the UK and Ireland to be in 'naturally' good condition, in the sense that human impacts are at a level which is not inconsistent with their maintenance.

Managers should aim to put this habitat back into its dynamic context and define their intervention choices in terms of spontaneous vegetation evolution, their wish to conserve rare species or to preserve habitat diversity and integrity. The possible conflicts between the needs of this community and others which are also Community priorities have to be discussed. For example, management through small-scale peat cutting could mean reducing the extent of e.g. 7110, 7130.

Active management

Stabilizing favourable water conditions

The basic protection measure is the provision of appropriately high soil moisture content, allowing a continuous accumulation of organic matter and thereby maintaining the peatland in its natural state (Brandyk 2007). At the *Rhynchosporion* stand scale, permanent wet conditions are required for installation and maintenance of pioneer communities as well as specialist mud-bottom invertebrates. In order to maintain this water layer on bare peat, the whole hydrological system of the bog must be considered. Changes in the water regime, for example, for agriculture intensification or tree plantation, have been identified as the most important threat in the last decades, leading to the drying out of bogs. Even where drainage was eventually unsuccessful in terms of the original purpose, the effect of the drainage operations was still severe on most European peatlands where they have taken place (Dupieux 1998).

Maintaining a stable high water table implies the ongoing management of hydrological control structures works such as sluice gates, and piezometric monitoring and surveillance.

Extensive grazing

Depending on the site, the management objectives, ecological conditions and the behaviour of the livestock, either continuous or intermittent grazing will be favoured. However in Ireland and the UK, where good conditions are more frequent, it is not an issue as a low grazing pressure is sufficient (e.g. wild deer grazing will cover the needs). Some areas are even overgrazed and need some control.

On the other hand, introducing extensive grazing on peatland has been largely recognised at European scale by managers as an important conservation management tool for non-productive areas, recreating the past conditions, when these ecosystems were managed by large wild herbivores (Bokdam *et al.* 2002). By browsing and trampling, complementary actions inducing the maintenance of open areas and aiming increasing biodiversity, livestock acts on the ecosystem by:

- *Controlling invasive species*: Invasive grasses like *Molinia caerula* are limited by consumption of herbaceous vegetation.
- *Preventing scrub encroachement* through the action of hoof on ligneous species.
- *Ensuring a diverse vegetation structure:* the microtopography[1] in bogs partly by trampling actions provides a range of conditions that support invertebrates. By feeding selectively in different areas and on different plants, free-roaming livestock help to maintain variation in the vegetation composition and structure (English Nature 2004).
- *Increasing superficial wetness and recycling organic matter*
- *Developing pioneer communities.* Cattle trampling creates open conditions and small patches of bare peat and sandy ground that are of benefit to a variety of specialised plants such as *Rhynchosporion* species and associated invertebrate fauna. Openness and low-productive early-successional stages are guaranteed by the effects of large herbivores through their interaction with abiotic disturbances (Olff *et al.* 1999 in Bokdam *et al.* 2002).

Nevertheless, the positive effects of grazing have their limits: excessive trampling can cause habitat destruction; dunging can induce nutrient enrichment. Optimal grazing conditions have to be developed to minimize the unwanted effects of foraging and trampling. Heavy grazing should be avoided on wet heath as it can lead to a decline in characteristic dwarf shrub cover in favour of grass and sedge species, as well as excessive poaching and erosion of the underlying peat (English Nature 2004).

The grazing intensity has to be determined carefully - a good balance has to be found between under- and overgrazing. Usually, an average pressure of between 0.2 and 0.8 Livestock Units/ha is recommended by managers for a range of mire habitats. According to Gwyn Jones (pers. comm.), 0.8 seems very high for blanket or raised bog sites in the UK and Ireland - a pressure of 0.1 LU/ha or lower seems enough to maintain good conditions. While higher levels might seem necessary in cases of rank vegetation, it should be remembered that peatland habitats are very sensitive to damage by trampling. It is in any case advisable to start with a low pressure that can be increased if it turns out to be too low (Dupieux 1998).

In the UK and Ireland, blanket and raised bogs are grazed by sheep breeds, considered as the most suitable animals, like the Shetland, the Scottish Blackface, or the North Country Cheviot. The conditions in peatland being sometimes quite difficult (cold, waterlogged soil, acidity, low nutritive value of vegetation, etc.), the animals used in other geographical areas often belong to traditional hardy breeds, with good adaptations to these conditions, for example, Scottish Highland cattle, the *Bretonne pie noire* - a small breed of cattle from Brittany, the Highland or Konik Polski ponies, the Mediterranean Camargue horses and the Solognot. The livestock can remain outside in winter or gathered in shelters and they will need in any case access to other habitats or food provided by farmers.

Introducing extensive grazing involves ensuring an adequate level of infrastructure - fences, shelters, feeding stances, watering points (if water is sometimes scarce), sheepfolds and cattle pens.

[1] Mainly resulting in natural conditions from the differential growth of the vegetation, particularly *Sphagnum* species

Mowing and clearing of brushwood

For natural habitats in good conditions mowing is normally not necessary. In other cases, grazing is generally preferred. However, it is not always possible as stockbreeders have vanished in several areas (especially for sheep in continental Europe away from Mediterranean or mountainous areas).

Furthermore the management proposed here is not specific to *Rhynchosporion* but more adapted to bog management. Depending on the conditions (more or less natural or linked to agro-pastoralist traditions), mowing and clearing could be considered as adapted or not.

Both tradition and ecological knowledge suggest that mowing is a suitable management tool for open and short peatland habitats (Bokdam *et al.* 2002), thereby stopping the spontaneous dynamics of closing vegetation cover and maintaining species richness. The effects and advantages of mowing are numerous:

- Prevention of scrub encroachment and invasive species extension: regular mowing and clearance is needed to maintain open conditions required by *Rhynchosporion* communities.
- Favouring soil oligotrophy by removing the litter layer from the site.
- Easier to control and supervise than grazing (date of mowing…).

Mowing and cutting may complement insufficient grazing pressure. This might involve hay making (or mowing with another form of biomass removal), grazing of the aftermath and (mechanical) shrub removal.

To preserve bog and wet heath biodiversity, some principles have to be respected as regards the date of mowing, the maintenance of refuge areas and the use of light machinery:

<u>Late and occasional mowing</u>

Mowing should be done in late summer (from end of July to September) to allow late plant species to complete their reproduction cycle. Many of the short areas might need only mowing once per 2-3 years. In restoration phase, mowing should be done every year to restore short vegetation (reed beds and other areas with advanced succession). When the colonising species has been reversed, mowing may become less frequent (Werpachowski 2002 *in* Bokdam *et al.* 2002). Mowing frequency should depend on management objectives, relevant species phenology and vegetation productivity. Mowing of the same parcel annually is not advisable because of the pluriannual development cycle of invertebrate species as butterflies of European interest *Coenonympha oedippus* and *Euphydryas aurinia*. In the case of wet heath where *Rhynchosporion* species occur in pockets, late mowing is advisable from August to March, with a frequency of five to eight years depending on vegetation dynamics. Mowing should be done by rotation to create vegetation heterogeneity: separate different units cut each year alternately (Bensettiti *et al.* 2002). As a non-selective management tool, mowing presents a threat for slow moving animals. Therefore, it is recommended to mow centrifugally or by bands so that fauna can evade.

<u>Maintain refuge areas</u>

It is recommended that areas linking similar ecosystems be preserved for use as ecological corridors by invertebrate species (Dupieux 1998).

<u>Use adapted equipment</u>

Heavy harvesters damage fragile vegetation and soil structure of peatlands and the use of new specially-designed harvesting equipment is now possible. This 'New Wetland Harvester' project (sponsored by European LIFE-programme) is the first stage of a project to develop an environmentally sustainable wetland management technology to restore the 'open' state of selected wetlands to what it was until the 1920s (Bokdam *et al.* 2002). Hand mowing using a scythe or edge trimmer or small mechanical equipment is used complementarily on small areas.

Recovery management

Restoring favourable hydrological conditions

Restoration of a high water table favourable to the ecosystem integrity and functioning is carried out by blocking sluices, building dams or infilling the draining ditches responsible for the drying of the site.

Sluice and dam building

Drainage ditches are first described (slope, width, depth) and mapped, and the ground water can also be studied (monitoring level and fluctuations of the water table). The method usually implemented is the insertion of a series of small dams (using turf or wood) at regular intervals in the ditches. These dams impound the water and slow its transit time, thereby accumulating sediment and other materials and causing the ditches to fill with vegetation. Over time the water table is raised. In a Polish Life Project for bog conservation, 15 sluices were built on drainage ditches, with promising results: water levels increased by ca. 0.5m (LIFE Nature project, Poland 2004-2007). These interventions are very often labour intensive, especially on sites with a dense ditch network. These dams are sometimes difficult to build and need a careful survey to ensure of their water tightness (Dupieux 1998).

Infilling draining ditches

Back-filling ditches with local material - peat or soil, as the case may be - creates hydrological conditions much closer, though far from identical, to those of the original bog (LIFE Nature project, Poland 2004-2007). This method is more expensive than building dams, because of the large volumes of material which have to be moved and the consequent contractor costs. As an example, the infilling of 100 m of ditches on the Rothenthurm bog in Switzerland required 75 man days of labour (Brooks & Stoneman 1997 *in* Dupieux 1998). Care is required to ensure that damage is not caused to other habitats in finding the back-fill material.

Small-scale peat cutting

The following text is largely inspired from the French guidelines for peatland management, produced within the framework of the LIFE-Nature programme “bogs in France” (Dupieux 1998), and which provide precise information on this original method.

Principles

In order to create areas with favourable conditions for *Rhynchosporion* development on cut areas, which in the past were a natural consequence of the hand cutting of peat, some small areas were deliberately cut for conservation purposes. Existing small-scale peat cuttings are very effective in providing and maintaining early succession stages, small pools, bare peat and low vegetation, and thereby diversifying vegetation composition and structure. The typical mosaic created by domestic hand-cutting of peat provides a range of small-scale structures across a site, favourable to *Rhynchosporion* communities (Buglife 2007).

Inspired by observations of disturbances creating bare peat areas (tractor, over trampling, peat digging), removal of the top layer of soil (down to the bottom of the turf) has emerged as an obvious management and diversification tool for pioneer communities like *Rhynchosporion*.

Small-scale peat cutting work remains experimental and should not be carried out on ‘natural’ sites. Mechanisms of plant and animal recolonization into cut areas and the factors involved are poorly understood and are the subject of monitoring. If water conditions are optimal, three spontaneous processes will permit recolonization: germination of the seed bank conserved in superficial layer of turf; vegetative growth from species on the borders of the cut areas, and diaspore scattering. Lots of bog plants are able to produce seeds or spores which are capable of surviving for a long period is conditions are unfavourable for germination; they are crypto-potentialities (Blanchard 1996 *in* Dupieux 1998). Stripping off the soil layer induces the germination of pioneer species seeds. In addition, turf-stripping removes the eutrophicated topsoil, in degraded peat bogs where recovery management is needed), and has the additional favourable effect that wetter conditions are created in the remaining topsoil by lowering of the surface level (Dick van der Hoek 2005).

Even small-scale peat cutting is a traumatic and damaging action, and demands thorough reflection on the part of managers, in the framework of a scientific rigorous analysis. The objectives, the adaptation of the proposed techniques to those objectives and to the ecosystem's characteristics, and the methods to be used for monitoring and scientific evaluation must all be defined. Specialised agencies, such as Pôle Relais Tourbières in France, can assist site managers.

Technical prescriptions

According to Dupieux (1998), turf-cutting operations are best carried out before spring in order not to disturb the plant phenological cycle and soil microfauna.

These operations should follow four successive steps: localization and delimitation of the areas to be cut; mowing; cutting, and finally, the gathering and removal of the cut peat

- *Localization and delimitation of stands to strip off.* The first step is to locate suitable areas which have no stumps or tree roots, are easy to access and far enough from undesirable plant species like *Molinia caerulea* for instance, which might colonize the eroded areas by seed dissemination or vegetative multiplication and consequently limit the development of expected pioneer plants. On the Cerisaie mire near Paris in France, reed propagated on a stripped area in disfavour to *Rhynchosporion* communities (the substrate characteristics may be part of the problem). The ideal area for peat cutting is estimated at between 10 to 100 m^2, large enough in order not to be overwhelmed by adjacent strongly competing plants and small enough in order to preserve the ecosystem from excessive disturbance.

- *Mowing of stands.* Stands and surrounding areas are mowed at level with the ground, so that the grass seed producers are cut away. The hay is exported, in order to limit risks of enrichment of the soil by decomposition of organic matter. Mowing can be lead by hand (scythe) or mechanically by means of an edge trimmer or a reaper.

- *Peat stripping*. Manual or mechanical techniques can be used depending on factors linked to the area to be cut (ecosystem sensitiveness, soil moisture, accessibility), to the work (the surface area to be cut) and the manager (labour, available time, budget). Hand-cutting using specialized and/or traditional peat extraction tools (e.g. peat iron) is adapted to small areas. Some managers used less conventional tools, like the chain saw. For larger areas, cutting could be done by means of a mechanical shovel. Using of heavy machines on peatland can be delicate, causing damage to soil and vegetation. However some mechanical shovels are adapted to wet soils. Using a mini shovel weighting hardly 300 kg can be a way to limit damage to vegetation and soil. As regards the depth of turf cutting, the water table position and fluctuations as well as the seed bank depth have to be taken into account. The best recolonization results are observed with prolonged or permanent wet conditions, conditioned by the proximity of the water table with the surface or by the alimentation by durable superficial flow. To be able to recover *Rhynchosporion*, nutrient poor water is mandatory. Cutting in a gently sloping area and monitoring with piezometers increase the chance of achieving the desired soil hydrology.

- *Gathering and exportation of stripped off material*. The cut has to be removed from the site so that it can't mineralize *in situ* and induce a nutrient enrichment on the stand. This can be done by tarpaulins, corrugated iron or sleigh, which could be drawn out by horse or quad bike. Extracted peat can be used for filling in irrigation ditches or to dam up the sluices. An interesting experiment carried out by Ecosphère (1994) highlighted the role of extracted peat in restoration process: laying down peat on a prepared area of mineral substrate permits the doubling of the cover of pioneer plants.

On the Cerisaie mire in the Rambouillet forest, France, several key species for *Rhynchosporion* like *Drosera intermedia, Drosera rotundifolia, Carex demissa* appeared during the second summer following peat extraction. During the third season, a final typical species appeared: *Rhynchospora alba*. Three years later, the average density of pioneer species was respectively 3.61 individuals/m^2 for *Drosera intermedia*, 5 individuals/m^2 for *D. rotundifolia* and 2.97 individuals/m^2 for *Eriophorum angustifolium* (Dupieux 1998). The speed of recolonisation of *Rhynchosporion* species of high interest is an interesting indicator.

Peat stripping also has positive effects as regards mud invertebrate fauna conservation. According to Buglife (2007), European organisation devoted to the conservation of invertebrates, the occurrence of species such as *Pterostichus aterrimus* and *Bembidion humerale* is favoured by small diggings, much shallower than traditional cuttings. The best form of cutting tends only to be deep enough to form a shallow pool, with turf replaced at the bottom of the cutting.

Finally, this practice is also recommended to preserve the two moss species listed in Annex II of the Habitats Directive, *Bruschia vogesiaca* and *Sphagnum pylaisii* (Bensettiti *et al.* 2002).

Other relevant measures

Prevent nutrient enrichment and pollution of the water table

Pollution incidents and nutrient enrichment lead to the loss of *Sphagnum* bog or wet heath vegetation, reducing its ability to support species such as *Rhynchosporion* communities, which require a high rate of oligotrophy. The use of organic and mineral fertilizer should be banned on the ecosystem, as should the use of pesticides.

Monitoring of abiotic conditions

Monitoring of water quality (physico-chemical conditions, nutrients) and water level (water table depth, hydrology) is recommended if the required ecological conditions of the *Rhynchosporion* are to be met (MLUV Brandenburg 2007). When *Rhynchosporion* communities occur in connection with oligo-mesotrophic lakes (habitats 3110, 3130), it is important to control not only water quality but also water level fluctuations and factors such as wave and ice exposure that support the long-term maintenance of the habitat.

Monitoring of plant recolonization

Monitoring of the cut areas is recommended. Providing knowledge about pioneer vegetation dynamics is important for the future optimisation of conservation management. Different kind of monitoring can be carried out to follow vegetation evolution: photographic monitoring, phytosociologic sampling, and permanent plots. Monitoring is part of the management action, integrated with it in both space and time, and should be set out before the practical work starts, in partnership with scientists (Dupieux 1998).

Seed gathering, ex situ conservation and Rhynchosporion communities' reinforcement

The conservation program for *Rhynchospora alba* carried out in the Cabañeros National Park, Castilla-La Mancha, Spain, by Jiménez (2004) recommends seed gathering in order to build up a reserve of genetic material from relevant plants especially *Rhynchospora alba* itself, as well as to secure the artificial conservation of the species. Furthermore, the propagation of *ex situ* plants will permit the reinforcement of population viability.

Regulation of tourism activities and education

A last way to protect bog or heath lands and particularly "Depressions on peat substrates of the *Rhynchosporion"* from destruction is the regulation of tourism and medicinal plants gathering activities. The creation of footpaths on bogs or wet heaths as well as the running of educational programs to improve conservation awareness are also sometime recommended but after an impact study (need to be careful with pathways).

Special requirements driven by relevant species

Drosera intermedia is a weak competitor, sensitive to succession and flooding. It may survive short-term, shallow flooding. If the flooding is long term and the water table is high, it may have a very negative impact on populations of the species. To block succession, it may be necessary to carry out the regular management of microsites, since, without disturbance the species may disappear. Very good results were achieved in the Czech Republic by the creation of shallow peat pools using explosives (there are other, more controlled ways of achieving the same objective) and the subsequent adjustment of their banks, combined with transplanting of individual plants. The population was increased by several hundred individuals (Albrecht & Čeřovský 1999).

Lycopodiella inundata is an acidophilous species and a weak competitor. It is one of the most threatened species on European scale, particularly affected by habitat destruction and vegetation succession. It is a fluctuating species (light spores may quickly create large populations on acidic and wet bare areas), which disappears after some time by the invasion of stands by stronger competitors. For protection of species populations, habitat management is needed. In Slovakia, extensive grazing and trampling by animals and also foraging by wild pigs were observed to be helpful for the maintenance of populations of the species (Čeřovský & Vágenknecht 1999).

Other special requirements driven by relevant species (rare pioneer plants, bog invertebrates and mud bottom invertebrates) were mentioned further in the "Active management" and "Recovery management" parts.

Cost estimates and potential sources of EU financing

Specific cost features for the habitat

Although ongoing management may survive in some circumstances (mostly marginal areas with traditional farming), farming on peatlands is no longer economically competitive, even if mires and bogs can represent additional forage during dry years. This means that the public or voluntary sector has to pay for the conservation of this ecosystem, whether on private and public land. In the case of ongoing agricultural management, this falls mainly to CAP measures, such as the Single Farm Payment, Disadvantaged Areas or Agri-Environment schemes. On other land, grazing and mowing is carried out by employees of conservation bodies, volunteers and/or contractors (Bokdam *et al.* 2002). However it has to be noticed that in UK and Ireland there is still much grazing of blanket bog and extensive farming on peatland seems still economically competitive.

To understand cost estimates for the management of habitat 7150, so that it is comparable from one member state to another, it is important to differentiate between:

- Conservation management stakeholders: farmers and other land managers; NGO owners or managers; service providers; public institutions, etc.
- Measure types, for which the source of payments differ: agri-environmental measures; other management measures; work of ecological interest and non productive investments; technical expertise. Also, whether the expenditure is one-off or occasional or is paid annually.

<u>Farmers and agri-environmental schemes</u>. Sites on a farm can possibly be managed by farmers through agri-environmental schemes. These are co-financed by the European Union as part of Rural Development Programmes. They are the main mechanism used to encourage farmers to adopt environmentally friendly practices. In return for voluntarily undertaking to respect the strict specifications of agri-environment schemes, farmers receive annual EARDF payments.

<u>Conservation bodies and non-productive recurring activities</u>. For non-productive recurring actions including mowing and peat cutting or maintaining the water regime in the framework of conservation management, management actions may be paid on the basis of:

- time unit: hand or mechanical mowing, comprising the writing off of the material cost, handling, surveillance, expert cost
- distance unit: transport of exported material, of harvester, moving costs

In the case of grazing activities, the costs cover

- one-off investments: the purchase of cattle, fences, shelter or housing, etc.
- time unit costs: herding, feeding in winter, maintaining equipment
- distance unit costs: transport including the fact that the managers may live at some distance from the site
- unit costs: supplementary feed, veterinary costs, insurance, etc.

Services providers and one-off work of ecological interest. Concerning ecological work and non-productive investments, such as small-scale peat cutting or the restoration of favourable hydrological conditions, the cost comprises:

- the time unit cost of the service provider, including a profit margin in appropriate circumstances,
- the moving of heavy machinery and the extraction of peat material.

In France, small-scale peat cutting costs were evaluated from 10 to 80 €/m² with an average of 50 €/m². For larger sites, the cost of a possible mechanised approach ranges from 0.16 to 3.9 €/m² (Thauront et al. 2006).

Considering the costs of the various management actions, and the limited budget allocated to conservation in most of the cases, intervention has to be prioritised: small-scale peat cutting may compete with other operations (scrub removal, mowing, grazing) or it may be impossible to manage the entire site in the way originally desired.

Relations with potential sources of EU funds

The cost issue has to be seen in the light of Article 17 of the Charter of Fundamental Rights of the European Union, which sets the principle of compensation for income foregone, and the rules concerning concurrency.

Management measures for Natura 2000 were defined in the annexes of Communication from the Commission on Financing Natura 2000 (COM 2004-0431 and its working documents). Four categories were defined with several types of activities for each of them. The two first ones concern the establishment of the Natura 2000 network and management planning, administration and maintenance of network related infrastructure. They are not considered in this document. The two last ones are more appropriate to this exercise which is focused on active management, in particular as regards conservation management measures, management schemes and agreements, provisions of services and infrastructure costs.

Concerning potential sources of EU financing, a Guidance Handbook presents the EU funding options for Natura 2000 sites in the period 2007-2013 that are, in principle, available at the national and regional level. Furthermore an IT-tool is available on the EC web site:
(http://ec.europa.eu/environment/nature/natura2000/financing/index_en.htm).

By development of an IT-tool the Commission wishes to provide easier access to the information of the Guidance Handbook and create the opportunity to use the information in the framework of management planning. This document will only summarise the main tools and how they may be used specifically for the focused habitat.

For the period 2007-2013, there are several EU funds (EARDF, EFF, ERDF, and the Cohesion Fund), each with a national/regional programme based on EU and national strategic guidelines. Furthermore several project funds such as Interreg, LIFE+, the 7th Research Framework Program (FP7) or Leader+ may be useful. However some actions are not allowed under certain programmes, e.g. under LIFE+, recurring management is not eligible. Each Member State has identified the issues that are of most concern locally, and has prioritized EU funds in order to address these issues. The integrated use of these resources will allow the financing of various management actions for areas with habitats listed in the Habitats directive and included in the Natura 2000 network.

Among the diversity of sources for EU funding, the following funds might primarily be of interest for the management of the habitat 7150:

- The European Fund for Rural Development (EARDF). As it was mentioned above, this program has a potential to cover several relevant management activities, although the need for the measures has to be set out in the National Strategy Plans and the measures themselves in the Rural Development Programmes (RDPs) in order to be eligible on a national basis.

- The European Regional Development Fund (ERDF), The Cohesion Fund and Interreg. These funds might be relevant in single cases although activities related to Natura 2000 sites mostly need to be integrated in a broader development context. However, the Interreg approach is more flexible but needs a cross-border, transregional or transnational objective and partnership. Different geographical levels have been defined and all of them have their specific rules, eligibility criteria and objectives.

- The Financial Instrument for the Environment (LIFE+). The 'Nature' component of LIFE+ supports best practice and demonstration projects contributing to the implementation of the Birds and Habitats Directives but only exceptionally outside Natura 2000 sites. The 'Biodiversity' component is for demonstration and innovation projects contributing to the objectives of the Commission Communication 'Halting the loss of biodiversity by 2010 – and beyond'. Both the 'Nature' and 'Biodiversity' components emphasise on concrete non-recurring management actions (at least 25 % of the budget). Recurring management is not eligible under LIFE+.

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